## 4 Rel-15 and previous release maintenance for LTE and NR

### 4.1 NR WIs (up to Rel-15)

#### 4.1.6 RRM core requirements (38.133/36.133)

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**Email discussion: [102-e][201] Maintenance\_R15\_NR\_RRM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][201] Maintenance\_R15\_NR\_RRM | R15 NR (NR\_newRAT-Core/Perf) | Rel-15 NR RRM Core/Perf maintenance | 4.1.6  4.1.7 | Li Zhang |

**R4-2206744 Email discussion summary: [102-e][201] Maintenance\_R15\_NR\_RRM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207042 (from R4-2206744).**

**R4-2207042 Email discussion summary: [102-e][201] Maintenance\_R15\_NR\_RRM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 28th)**

**[102-e][201] Maintenance\_R15\_NR\_RRM**

Issue 1-1-1: Applicable DRX cycle for measurement in NE-DC and NR-DC

* Proposals:
  + Option 1 (MTK, Apple, QC, HW, vivo)
    - For both NE-DC and NR-DC mode, the applicable DRX cycle for the inter-frequency measurement requirement follows the maximum of configured MCG DRX cycle and SCG DRX cycle
  + Option 2 (Nokia)
    - For both NE-DC and NR-DC mode, no clarification in 38.133 is needed.
      * For the case where the MCG and the SCG configure an inter-frequency or an inter-RAT measurement on a different *ssbFrequency*, follow DRX cycle of the CG that configures the measurement.
      * For the case where the MCG and the SCG configure an inter-frequency or an inter-RAT measurement on a same non-serving *ssbFrequency*, follow the shortest DRX cycle between MCG and SCG.
      * For the case where the MCG and the SCG configure an inter-frequency or an inter-RAT measurement on a same serving *ssbFrequency*, follow the shortest DRX cycle of the CG that is “in use”.
  + Option 3 (Ericsson)
    - DRX cycle for NR-DC inter-frequency case shall follow the principles agreed for intra-frequency measurements.
    - DRX cycle for NE-DC shall be follow the principles mentioned in below table.
      * For inter-frequency NR measurement configured by MCG, follow MCG DRX cycle
      * For inter-RAT NR LTE measurement configured by MCG, follow SCG DRX cycle
* Session chair: No consensus can be reached. Do not recommend to continue discussion.

Issue 1-2-1: FR2 cell reselection in Idle mode

* Proposals:
  + Option 1 (Ericsson, MTK, vivo)
    - Update 10s to 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
  + Option 2 (Apple, Intel, HW)
    - Keep 10s in Rel-15, and FFS for later release.
  + Option 3 (HW, Nokia)
    - Keep 10s.
* Discussion
  + TBA
* Agreements
  + Keep 10s in Rel-15 and Rel-16, and FFS for Rel-17

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206791 | WF on remaining issues in Rel-15 NR RRM | Huawei, HiSilicon |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2203593 | Maintenance for cell phase synchronization accuracy | ZTE Corporation | Endorsed |  |
| R4-2203799 | Draft CR on core part maintenance for TS36.133 R15 | Apple | Revised |  |
| R4-2203837 | draft Cat-F CR (R15) to SCell Activation Core | Qualcomm Incorporated | Revised |  |
| R4-2204179 | CR on TS38.133 for applicable DRX cycle in NR-DC and NE-DC inter-frequency measurement | MediaTek inc. | Revised |  |
| R4-2204308 | Draft CR to maintain inter-RAT measurements in TS 36.133 | OPPO | Revised |  |
| R4-2204802 | Draft CR on R15 inter-RAT LTE measurement | vivo | Revised |  |
| R4-2204838 | Correction to SCell Interruptions requirements\_EUTRA\_R15 | Huawei, Hisilicon | Revised |  |
| R4-2204841 | Correction to SCell Interruptions requirements\_NR\_R15 | Huawei, Hisilicon | Revised |  |
| R4-2205341 | CR on SCell activation delay requirements 38133 R15 | Huawei, HiSilicon, Apple | Revised |  |
| R4-2205342 | CR on SCell activation delay requirements 38133 R16 | Huawei, HiSilicon, Apple | Revised |  |
| R4-2205344 | CR on RSTD measurement requirements 36133 R15 | Huawei, HiSilicon | Revised |  |
| R4-2205406 | [draft CR] R15 Maintenance for 38133 | ZTE Corporation | Endorsed |  |
| R4-2205519 | draftCR on RRM remaining issues - r15 | Ericsson | Revised |  |
|  |  |  |  |  |
| R4-2203563 | Reduction of allocated RBs for CSI-RS based RLM TC in FR2 | Anritsu Corporation | Revised |  |
| R4-2203564 | Reduction of allocated RBs for CSI-RS based RLM TC in FR2 | Anritsu Corporation | Revised |  |
| R4-2203565 | Reduction of allocated RBs for CSI-RS based RLM TC in FR2 | Anritsu Corporation | Revised |  |
| R4-2203567 | Correction on the FR2 inter-frequency relative RSRP accuracy | Anritsu Corporation, MediaTek Inc. | Revised |  |
| R4-2203570 | Draft CR to maintain performance requirement | Anritsu Corporation | Revised |  |
| R4-2203596 | Draft CR to TS 38.133: Corrections to active TCI state switch test cases (Rel 15) | Rohde & Schwarz | Revised |  |
| R4-2203599 | Draft CR to TS 38.133: Corrections to inter-RAT measurement test cases (Rel 15) | Rohde & Schwarz | Endorsed |  |
| R4-2203602 | Draft CR to TS 38.133: Corrections to intra-frequency event triggered test cases (Rel 15) | Rohde & Schwarz | Revised |  |
| R4-2203802 | Draft CR on performance part maintenance for TS38.133 R15 | Apple | Revised |  |
| R4-2203831 | draft Cat-F CR (R15) to PDSCH RMC | Qualcomm Incorporated | Revised |  |
| R4-2203834 | draft Cat-F CR (R15) to E-UTRAN - NR FR2 interruptions at transitions between active and non-active during DRX in Xsynchronous EN-DC A.5.5.2.x | Qualcomm Incorporated | Revised |  |
| R4-2203840 | draft Cat-F CR (R15) to SCell Activation Test Cases | Qualcomm Incorporated | Revised |  |
| R4-2203892 | Draft CR on radio link monitoring test cases | CATT | Revised |  |
| R4-2204371 | CR for the RRC based BWP switch test case in EN-DC for R15 | MediaTek Inc. | Endorsed |  |
| R4-2204844 | Correction of R15 FR1 test cases and RMCs\_R15 | Huawei, Hisilicon | Return to |  |
| R4-2204847 | Correction of R15 FR2 test cases and RMCs\_R15 | Huawei, Hisilicon | Revised |  |
| R4-2205073 | draft CR: Correction of SA RRC re-establishment tests in FR2 Rel-15 | Ericsson | Endorsed |  |
| R4-2205074 | draft CR: Correction of SA RRC re-establishment tests in FR2 Rel-16 | Ericsson | Endorsed |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206791 WF on remaining issues in Rel-15 NR RRM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**R4-2203593 Maintenance for cell phase synchronization accuracy**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: ZTE Corporation*

**Abstract:**

To fix a statement in cell phase synchronization accuracy requirements.

**Decision: Endorsed.**

**R4-2203594 Maintenance for cell phase synchronization accuracy R16 Cat A**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: ZTE Corporation*

**Abstract:**

This is a Category A CR.

**Decision: Endorsed.**

**R4-2203595 Maintenance for cell phase synchronization accuracy R17 Cat A**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: ZTE Corporation*

**Abstract:**

This is a Category A CR.

**Decision: Endorsed.**

**R4-2203799 Draft CR on core part maintenance for TS36.133 R15**

*Type: draftCR For: Endorsement  
 36.133 v15.15.0 CR- rev Cat: F (Rel-15)  
  
 Source: Apple*

**Decision: Revised to R4-2206792 (from R4-2203799).**

**R4-2206792 Draft CR on core part maintenance for TS36.133 R15**

*Type: draftCR For: Endorsement  
 36.133 v15.15.0 CR- rev Cat: F (Rel-15)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2203800 Draft CR on core part maintenance for TS36.133 R16**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: A (Rel-16)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2203801 Draft CR on core part maintenance for TS36.133 R17**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2203837 draft Cat-F CR (R15) to SCell Activation Core**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Qualcomm Incorporated*

**Decision: Revised to R4-2206793 (from R4-2203837).**

**R4-2206793 draft Cat-F CR (R15) to SCell Activation Core**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2203838 draft Cat-A CR (R16) to SCell Activation Core**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2203839 draft Cat-A CR (R17) to SCell Activation Core**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2204178 Discussion on applicable DRX cycle in NE-DC and NR-DC mode inter-frequency measurement**

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

**Decision: Noted.**

**R4-2204179 CR on TS38.133 for applicable DRX cycle in NR-DC and NE-DC inter-frequency measurement**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: MediaTek inc.*

**Decision: Revised to R4-2206794 (from R4-2204179).**

**R4-2206794 CR on TS38.133 for applicable DRX cycle in NR-DC and NE-DC inter-frequency measurement**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: MediaTek inc.*

**Decision: Return to.**

**R4-2204180 CR on TS38.133 for applicable DRX cycle in NR-DC and NE-DC inter-frequency measurement**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: MediaTek inc.*

**Decision: Return to.**

**R4-2204181 CR on TS38.133 for applicable DRX cycle in NR-DC and NE-DC inter-frequency measurement**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Return to.**

**R4-2204308 Draft CR to maintain inter-RAT measurements in TS 36.133**

*Type: draftCR For: Endorsement  
 36.133 v15.15.0 CR- rev Cat: F (Rel-15)  
  
 Source: OPPO*

**Decision: Revised to R4-2206795 (from R4-2204308).**

**R4-2206795 Draft CR to maintain inter-RAT measurements in TS 36.133**

*Type: draftCR For: Endorsement  
 36.133 v15.15.0 CR- rev Cat: F (Rel-15)  
  
 Source: OPPO*

**Decision: Return to.**

**R4-2204309 Draft CR to maintain inter-RAT measurements in TS 36.133**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: A (Rel-16)  
  
 Source: OPPO*

**Decision: Return to.**

**R4-2204310 Draft CR to maintain inter-RAT measurements in TS 36.133**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: OPPO*

**Decision: Return to.**

**R4-2204544 On DRX configurations for NR-DC and NE-DC**

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

**Decision: Noted.**

**R4-2204802 Draft CR on R15 inter-RAT LTE measurement**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: vivo, Ericsson*

**Decision: Revised to R4-2206796 (from R4-2204802).**

**R4-2206796 Draft CR on R15 inter-RAT LTE measurement**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: vivo, Ericsson*

**Decision: Return to.**

**R4-2204803 Draft CR on R16 inter-RAT LTE measurement**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: vivo, Ericsson*

**Decision: Return to.**

**R4-2204804 Draft CR on R17 inter-RAT LTE measurement**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: vivo, Ericsson*

**Decision: Return to.**

**R4-2204838 Correction to SCell Interruptions requirements\_EUTRA\_R15**

*Type: draftCR For: Endorsement  
 36.133 v15.15.0 CR- rev Cat: F (Rel-15)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2206797 (from R4-2204838).**

**R4-2206797 Correction to SCell Interruptions requirements\_EUTRA\_R15**

*Type: draftCR For: Endorsement  
 36.133 v15.15.0 CR- rev Cat: F (Rel-15)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204839 Correction to SCell Interruptions requirements\_EUTRA\_R16**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: A (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204840 Correction to SCell Interruptions requirements\_EUTRA\_R17**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204841 Correction to SCell Interruptions requirements\_NR\_R15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2206798 (from R4-2204841).**

**R4-2206798 Correction to SCell Interruptions requirements\_NR\_R15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204842 Correction to SCell Interruptions requirements\_NR\_R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204843 Correction to SCell Interruptions requirements\_NR\_R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2205341 CR on SCell activation delay requirements 38133 R15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Huawei, HiSilicon, Apple*

**Decision: Revised to R4-2206799 (from R4-2205341).**

**R4-2206799 CR on SCell activation delay requirements 38133 R15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Huawei, HiSilicon, Apple*

**Decision: Return to.**

**R4-2205342 CR on SCell activation delay requirements 38133 R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon, Apple*

**Decision: Revised to R4-2206800 (from R4-2205342).**

**R4-2206800 CR on SCell activation delay requirements 38133 R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon, Apple*

**Decision: Return to.**

**R4-2205343 CR on SCell activation delay requirements 38133 R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon, Apple*

**Decision: Return to.**

**R4-2205344 CR on RSTD measurement requirements 36133 R15**

*Type: draftCR For: Endorsement  
 36.133 v15.15.0 CR- rev Cat: F (Rel-15)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206801 (from R4-2205344).**

**R4-2206801 CR on RSTD measurement requirements 36133 R15**

*Type: draftCR For: Endorsement  
 36.133 v15.15.0 CR- rev Cat: F (Rel-15)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205345 CR on RSTD measurement requirements 36133 R16**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: A (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205346 CR on RSTD measurement requirements 36133 R17**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205406 [draft CR] R15 Maintenance for 38133**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: ZTE Corporation*

**Abstract:**

To clarify the definitions of some symbols and abbreviations.

**Decision: Endorsed.**

**R4-2205407 [draft CR] R15 Maintenance for 38133 (R16 Cat A)**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: ZTE Corporation*

**Abstract:**

This is a Category A CR.

**Decision: Endorsed.**

**R4-2205408 [draft CR] R15 Maintenance for 38133 (R17 Cat A)**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: ZTE Corporation*

**Abstract:**

This is a Category A CR.

**Decision: Endorsed.**

**R4-2205518 Remaining issue for Idle mode**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the remaining issues for Idle mode in Rel-15

**Decision: Noted.**

**R4-2205519 draftCR on RRM remaining issues - r15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Ericsson*

**Abstract:**

This draft CR captures some remaining issues update in R15

**Decision: Revised to R4-2206802 (from R4-2205519).**

**R4-2206802 draftCR on RRM remaining issues - r15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Ericsson*

**Abstract:**

This draft CR captures some remaining issues update in R15

**Decision: Return to.**

**R4-2205520 draftCR on RRM remaining issues - r16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

This draft CR captures some remaining issues update in R15

**Decision: Return to.**

**R4-2205521 draftCR on RRM remaining issues - r17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR captures some remaining issues update in R15

**Decision: Return to.**

**R4-2206022 Correction to reference point defintion for UE timing in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Ericsson, Intel, Huawei, HiSilicon, Qualcomm*

**Abstract:**

Definition of reference point for UE timing error is clarified

**Decision: Revised to R4-2207023 (from R4-2206022).**

**R4-2207023 Correction to reference point defintion for UE timing in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Ericsson, Intel, Huawei, HiSilicon, Qualcomm*

**Abstract:**

Definition of reference point for UE timing error is clarified

**Decision: Return to.**

**R4-2206023 Correction to reference point defintion for UE timing in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Ericsson, Intel, Huawei, HiSilicon, Qualcomm*

**Abstract:**

Definition of reference point for UE timing error is clarified

**Decision: Return to.**

**R4-2206024 Correction to reference point defintion for UE timing in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Ericsson, Intel, Huawei, HiSilicon, Qualcomm*

**Abstract:**

Definition of reference point for UE timing error is clarified

**Decision: Return to.**

#### 4.1.7 RRM performance requirements (38.133/36.133)

**R4-2203563 Reduction of allocated RBs for CSI-RS based RLM TC in FR2**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Anritsu Corporation*

**Abstract:**

Associated discussion paper in #101-e: R4-2117786

**Decision: Revised to R4-2206803 (from R4-2203563).**

**R4-2206803 Reduction of allocated RBs for CSI-RS based RLM TC in FR2**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Anritsu Corporation*

**Abstract:**

Associated discussion paper in #101-e: R4-2117786

**Decision: Return to.**

**R4-2203564 Reduction of allocated RBs for CSI-RS based RLM TC in FR2**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Anritsu Corporation*

**Abstract:**

Associated discussion paper in #101-e: R4-2117786

**Decision: Revised to R4-2206804 (from R4-2203564).**

**R4-2206804 Reduction of allocated RBs for CSI-RS based RLM TC in FR2**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Anritsu Corporation*

**Abstract:**

Associated discussion paper in #101-e: R4-2117786

**Decision: Return to.**

**R4-2203565 Reduction of allocated RBs for CSI-RS based RLM TC in FR2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: F (Rel-17)  
  
 Source: Anritsu Corporation*

**Abstract:**

Associated discussion paper in #101-e: R4-2117786

**Decision: Revised to R4-2206805 (from R4-2203565).**

**R4-2206805 Reduction of allocated RBs for CSI-RS based RLM TC in FR2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: F (Rel-17)  
  
 Source: Anritsu Corporation*

**Abstract:**

Associated discussion paper in #101-e: R4-2117786

**Decision: Return to.**

**R4-2203566 FR2 Inter-frequency Relative SS-RSRP accuracy**

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

**Abstract:**

Discussion on the characteristics of the candidate relaxation factors for the FR2 Inter-frequency Relative SS-RSRP accuracy test case.

Associated draft CR: R4-2203567-3569

**Decision: Noted.**

**R4-2203567 Correction on the FR2 inter-frequency relative RSRP accuracy**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Anritsu Corporation, MediaTek Inc.*

**Abstract:**

Associated discussion paper : R4-2203566

**Decision: Revised to R4-2206806 (from R4-2203567).**

**R4-2206806 Correction on the FR2 inter-frequency relative RSRP accuracy**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Anritsu Corporation, MediaTek Inc.*

**Abstract:**

Associated discussion paper : R4-2203566

**Decision: Return to.**

**R4-2203568 Correction on the FR2 inter-frequency relative RSRP accuracy**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Anritsu Corporation, MediaTek Inc.*

**Abstract:**

Associated discussion paper : R4-2203566

**Decision: Return to.**

**R4-2203569 Correction on the FR2 inter-frequency relative RSRP accuracy**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Anritsu Corporation, MediaTek Inc.*

**Abstract:**

Associated discussion paper : R4-2203566

**Decision: Return to.**

**R4-2203570 Draft CR to maintain performance requirement**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Anritsu Corporation*

**Decision: Revised to R4-2206807 (from R4-2203570).**

**R4-2206807 Draft CR to maintain performance requirement**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Anritsu Corporation*

**Session chair: Does not follow tdoc cap**

**Decision: Return to.**

**R4-2203571 Draft CR to maintain performance requirement**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Anritsu Corporation*

**Decision: Return to.**

**R4-2203572 Draft CR to maintain performance requirement**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Anritsu Corporation*

**Decision: Return to.**

**R4-2203596 Draft CR to TS 38.133: Corrections to active TCI state switch test cases (Rel 15)**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Rohde & Schwarz*

**Decision: Revised to R4-2206808 (from R4-2203596).**

**R4-2206808 Draft CR to TS 38.133: Corrections to active TCI state switch test cases (Rel 15)**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Rohde & Schwarz*

**Decision: Return to.**

**R4-2203597 Draft CR to TS 38.133: Corrections to active TCI state switch test cases (Rel 16)**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Rohde & Schwarz*

**Decision: Return to.**

**R4-2203598 Draft CR to TS 38.133: Corrections to active TCI state switch test cases (Rel 17)**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Rohde & Schwarz*

**Decision: Return to.**

**R4-2203599 Draft CR to TS 38.133: Corrections to inter-RAT measurement test cases (Rel 15)**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Rohde & Schwarz*

**Decision: Endorsed.**

**R4-2203600 Draft CR to TS 38.133: Corrections to inter-RAT measurement test cases (Rel 16)**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Rohde & Schwarz*

**Decision: Endorsed.**

**R4-2203601 Draft CR to TS 38.133: Corrections to inter-RAT measurement test cases (Rel 17)**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Rohde & Schwarz*

**Decision: Endorsed.**

**R4-2203602 Draft CR to TS 38.133: Corrections to intra-frequency event triggered test cases (Rel 15)**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Rohde & Schwarz*

**Decision: Revised to R4-2206809 (from R4-2203802).**

**R4-2206809 Draft CR to TS 38.133: Corrections to intra-frequency event triggered test cases (Rel 15)**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Rohde & Schwarz*

**Session chair: Does not follow tdoc cap**

**Decision: Return to.**

**R4-2203603 Draft CR to TS 38.133: Corrections to intra-frequency event triggered test cases (Rel 16)**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Rohde & Schwarz*

**Decision: Return to.**

**R4-2203604 Draft CR to TS 38.133: Corrections to intra-frequency event triggered test cases (Rel 17)**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Rohde & Schwarz*

**Decision: Return to.**

**R4-2203802 Draft CR on performance part maintenance for TS38.133 R15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Apple*

**Decision: Revised to R4-2206810 (from R4-2203802).**

**R4-2206810 Draft CR on performance part maintenance for TS38.133 R15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2203803 Draft CR on performance part maintenance for TS38.133 R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2203804 Draft CR on performance part maintenance for TS38.133 R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2203831 draft Cat-F CR (R15) to PDSCH RMC**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Qualcomm Incorporated*

**Decision: Revised to R4-2206811 (from R4-2203831).**

**R4-2206811 draft Cat-F CR (R15) to PDSCH RMC**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2203832 draft Cat-A CR (R16) to PDSCH RMC**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2203833 draft Cat-A CR (R17) to PDSCH RMC**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2203834 draft Cat-F CR (R15) to E-UTRAN - NR FR2 interruptions at transitions between active and non-active during DRX in Xsynchronous EN-DC A.5.5.2.x**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Qualcomm Incorporated*

**Decision: Revised to R4-2206812 (from R4-2203834).**

**R4-2206812 draft Cat-F CR (R15) to E-UTRAN - NR FR2 interruptions at transitions between active and non-active during DRX in Xsynchronous EN-DC A.5.5.2.x**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2203835 draft Cat-A CR (R16) to E-UTRAN - NR FR2 interruptions at transitions between active and non-active during DRX in Xsynchronous EN-DC A.5.5.2.x**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2203836 draft Cat-A CR (R17) to E-UTRAN - NR FR2 interruptions at transitions between active and non-active during DRX in Xsynchronous EN-DC A.5.5.2.x**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2203840 draft Cat-F CR (R15) to SCell Activation Test Cases**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Qualcomm Incorporated*

**Decision: Revised to R4-2206813 (from R4-2203840).**

**R4-2206813 draft Cat-F CR (R15) to SCell Activation Test Cases**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Qualcomm Incorporated*

**Session chair: Does not follow tdoc cap**

**Decision: Return to.**

**R4-2203841 draft Cat-A CR (R16) to SCell Activation Test Cases**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2203842 draft Cat-A CR (R17) to SCell Activation Test Cases**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2203892 Draft CR on radio link monitoring test cases**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: CATT*

**Decision: Revised to R4-2206814 (from R4-2203892).**

**R4-2206814 Draft CR on radio link monitoring test cases**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2203893 Draft CR on radio link monitoring test cases**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2203894 Draft CR on radio link monitoring test cases**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2204371 CR for the RRC based BWP switch test case in EN-DC for R15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: MediaTek Inc.*

**Decision: Endorsed.**

**R4-2204372 CR for the RRC based BWP switch test case in EN-DC for R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: MediaTek Inc.*

**Decision: Endorsed.**

**R4-2204373 CR for the RRC based BWP switch test case in EN-DC for R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: MediaTek Inc.*

**Decision: Endorsed.**

**R4-2204374 Discussion on FR2 inter-frequency relative RSRP accuracy**

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

**Decision: Noted.**

**R4-2204844 Correction of R15 FR1 test cases and RMCs\_R15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204845 Correction of R15 FR1 test cases and RMCs\_R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204846 Correction of R15 FR1 test cases and RMCs\_R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204847 Correction of R15 FR2 test cases and RMCs\_R15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2206815 (from R4-2204847).**

**R4-2206815 Correction of R15 FR2 test cases and RMCs\_R15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204848 Correction of R15 FR2 test cases and RMCs\_R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: A (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204849 Correction of R15 FR2 test cases and RMCs\_R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204856 Discussion on test cases maintenance**

*Type: discussion For: Discussion  
 38.133 v15.16.0 CR- rev Cat: (Rel-15)  
  
 Source: Huawei, Hisilicon*

**Decision: Noted.**

**R4-2205073 draft CR: Correction of SA RRC re-establishment tests in FR2 Rel-15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: F (Rel-15)  
  
 Source: Ericsson*

**Abstract:**

This draft CR corrects the test parameters for SA RRC re-establishment tests in FR2.

**Decision: Endorsed.**

**R4-2205074 draft CR: Correction of SA RRC re-establishment tests in FR2 Rel-16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

This draft CR corrects the test parameters for SA RRC re-establishment tests in FR2

**Decision: Endorsed.**

**R4-2205075 draft CR: Correction of SA RRC re-establishment tests in FR2 Rel-16**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR corrects the test parameters for SA RRC re-establishment tests in FR2

**Decision: Endorsed.**

#### 4.1.9 Positioning specifications (36.171, 37.171 and 38.171)

### 4.2 LTE WIs (up to Rel-15)

#### 4.2.3 RRM requirements

**R4-2203725 CR: Correction on SyncRef UE Frequency Offset in Synchronization Reference Selection/Reselection Test**

*Type: draftCR For: Endorsement  
 36.133 v14.20.0 CR- rev Cat: F (Rel-14)  
  
 Source: Qualcomm, Inc.*

**Decision: Endorsed.**

**R4-2203726 (mirror R15)CR: Correction on SyncRef UE Frequency Offset in Synchronization Reference Selection/Reselection Test**

*Type: draftCR For: Endorsement  
 36.133 v15.15.0 CR- rev Cat: A (Rel-15)  
  
 Source: Qualcomm, Inc.*

**Decision: Endorsed.**

**R4-2203727 (mirror R16)CR: Correction on SyncRef UE Frequency Offset in Synchronization Reference Selection/Reselection Test**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: A (Rel-16)  
  
 Source: Qualcomm, Inc.*

**Decision: Endorsed.**

**R4-2203728 (mirror R17)CR: Correction on SyncRef UE Frequency Offset in Synchronization Reference Selection/Reselection Test**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Qualcomm, Inc.*

**Decision: Endorsed.**

**R4-2203731 CR: Correction on Synchronization Reference Selection/Reselection SyncRefUE Frequency Offset Side Condition for LTE-V2X**

*Type: draftCR For: Endorsement  
 36.133 v14.20.0 CR- rev Cat: F (Rel-14)  
  
 Source: Qualcomm, Inc.*

**Decision: Revised to R4-2206832 (from R4-2203731).**

**R4-2206832 CR: Correction on Synchronization Reference Selection/Reselection SyncRefUE Frequency Offset Side Condition for LTE-V2X**

*Type: draftCR For: Endorsement  
 36.133 v14.20.0 CR- rev Cat: F (Rel-14)  
  
 Source: Qualcomm, Inc.*

**Decision: Return to.**

**R4-2203732 (mirro R15)CR: Correction on Synchronization Reference Selection/Reselection SyncRefUE Frequency Offset Side Condition for LTE-V2X**

*Type: draftCR For: Endorsement  
 36.133 v15.15.0 CR- rev Cat: A (Rel-15)  
  
 Source: Qualcomm, Inc.*

**Decision: Return to.**

**R4-2203733 (mirro R16)CR: Correction on Synchronization Reference Selection/Reselection SyncRefUE Frequency Offset Side Condition for LTE-V2X**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: A (Rel-16)  
  
 Source: Qualcomm, Inc.*

**Decision: Return to.**

**R4-2203734 (mirro R17)CR: Correction on Synchronization Reference Selection/Reselection SyncRefUE Frequency Offset Side Condition for LTE-V2X**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Qualcomm, Inc.*

**Decision: Return to.**

**R4-2205347 CR to eMTC inter-frequency measurement requirements in Idle mode R14**

*Type: draftCR For: Endorsement  
 36.133 v14.20.0 CR- rev Cat: F (Rel-14)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206833 (from R4-2205347).**

**R4-2206833 CR to eMTC inter-frequency measurement requirements in Idle mode R14**

*Type: draftCR For: Endorsement  
 36.133 v14.20.0 CR- rev Cat: F (Rel-14)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205348 CR to eMTC inter-frequency measurement requirements in Idle mode R15**

*Type: draftCR For: Endorsement  
 36.133 v15.15.0 CR- rev Cat: A (Rel-15)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205349 CR to eMTC inter-frequency measurement requirements in Idle mode R16**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: A (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205350 CR to eMTC inter-frequency measurement requirements in Idle mode R17**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

## 5 Rel-16 maintenance for LTE and NR

### 5.1 NR WIs and TEI

#### 5.1.1 NR-based access to unlicensed spectrum

##### 5.1.1.3 RRM requirements

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**Email discussion: [102-e][203] Maintenance\_NR\_unlic\_NWM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][203] Maintenance\_NR\_unlic\_NWM | R16 NR-U (NR\_unlic) | RRM requirements maintenance | 5.1.1.3 | Rafael Paiva |

**R4-2206746 Email discussion summary: [102-e][203] Maintenance\_NR\_unlic\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207044 (from R4-2206746).**

**R4-2207044 Email discussion summary: [102-e][203] Maintenance\_NR\_unlic\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (TBA)**

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2207085 | WF on RRM requirements Rel 16 NR\_unlic maintenance | Nokia, Nokia Shanghai Bell |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2203522 | Correction of NR-U inter-frequency cell identification and measurements requirements | Nokia, Nokia Shanghai Bell | Endorsed |  |
| R4-2204857 | Draft CR on maintenance of measurement requirements for NR-U R16 | Huawei, Hisilicon | Endorsed |  |
| R4-2205076 | Draft CR: Clarification of availability of SSB monitoring occasions for RLM and BM | Ericsson | Endorsed |  |
| R4-2203524 | Correction of inter-frequency measurement procedures TCs under CCA | Nokia, Nokia Shanghai Bell | Endorsed |  |
| R4-2203526 | Removal of TCI state switching TC for unlicensed bands | Nokia, Nokia Shanghai Bell | Endorsed |  |
| R4-2204859 | Draft CR on TC of BFD and CBD for NR-U R16 | Huawei, Hisilicon | Endorsed |  |
| R4-2204861 | Draft CR on TC of inter-RAT measurement procedure for NR-U R16 | Huawei, Hisilicon | Endorsed |  |
| R4-2204863 | Draft CR on TC of inter-RAT SFTD measurement procedure for NR-U R16 | Huawei, Hisilicon | Endorsed |  |
| R4-2204865 | Draft CR on TC of intra-frequency measurement accuracy for NR-U R16 | Huawei, Hisilicon | Endorsed |  |
| R4-2204867 | Draft CR on TC of RLM for NR-U R16 | Huawei, Hisilicon | Endorsed |  |
| R4-2205078 | Draft CR: Addition of SS-SINR/SS-RSRQ measurement accuracy tests for NR-U | Ericsson | Endorsed |  |
| R4-2205523 | draftCR on cell selection in Idle mode for NR-U -r16 | Ericsson | Return to |  |
| R4-2203845 | draft Cat-F CR (R16) to SCell Activation Core NR-U | Qualcomm Incorporated | Return to |  |
| R4-2203849 | draft Cat-F CR (R16) to SCell Activation Test Cases NR-U | Qualcomm Incorporated | Return to |  |
| R4-2204552 | Draft CR to maintain inter-RAT measurements subject to CCA in TS 36.133 | OPPO | Return to |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2207085 WF on RRM requirements Rel 16 NR\_unlic maintenance**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**R4-2203522 Correction of NR-U inter-frequency cell identification and measurements requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Resubmission of R4-2115277, which was not implemented in BIG CR# R4-2115462/CR# R4-2115464

**Decision: Endorsed.**

**R4-2203523 Correction of NR-U inter-frequency cell identification and measurements requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Resubmission of R4-211326, which was not implemented in BIG CR# R4-2115463/CR# R4-2115465

**Decision: Endorsed.**

**R4-2203524 Correction of inter-frequency measurement procedures TCs under CCA**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Resubmission of R4-2115281, which was not implemented in Big CR#R4-2115462/CR# R4-2115464

**Decision: Endorsed.**

**R4-2203525 Correction of inter-frequency measurement procedures TCs under CCA**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Resubmission of R4-2115281, which was not implemented in Big CR# R4-2115463/CR# R4-2115465

**Decision: Endorsed.**

**R4-2203526 Removal of TCI state switching TC for unlicensed bands**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Resubmission of R4-2113248, which was not implemented in Big CR#R4-2115462/CR#R4-2115464

**Decision: Endorsed.**

**R4-2203527 Removal of TCI state switching TC for unlicensed bands**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Resubmission of R4-2113249, which was not implemented in Big CR# R4-2115463/CR# R4-2115465

**Decision: Endorsed.**

**R4-2204857 Draft CR on maintenance of measurement requirements for NR-U R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Endorsed.**

**R4-2204858 Draft CR on maintenance of measurement requirements for NR-U R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Endorsed.**

**R4-2204859 Draft CR on TC of BFD and CBD for NR-U R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Endorsed.**

**R4-2204860 Draft CR on TC of BFD and CBD for NR-U R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Endorsed.**

**R4-2204861 Draft CR on TC of inter-RAT measurement procedure for NR-U R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Endorsed.**

**R4-2204862 Draft CR on TC of inter-RAT measurement procedure for NR-U R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Endorsed.**

**R4-2204863 Draft CR on TC of inter-RAT SFTD measurement procedure for NR-U R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Endorsed.**

**R4-2204864 Draft CR on TC of inter-RAT SFTD measurement procedure for NR-U R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Endorsed.**

**R4-2204865 Draft CR on TC of intra-frequency measurement accuracy for NR-U R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Endorsed.**

**R4-2204866 Draft CR on TC of intra-frequency measurement accuracy for NR-U R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Endorsed.**

**R4-2204867 Draft CR on TC of RLM for NR-U R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Endorsed.**

**R4-2204868 Draft CR on TC of RLM for NR-U R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Endorsed.**

**R4-2205076 Draft CR: Clarification of availability of SSB monitoring occasions for RLM and BM**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

This draft CR is the resubmission of R4-2115285, agreed in RAN4#100-e, but not included in big CR.

**Decision: Endorsed.**

**R4-2205077 Draft CR: Clarification of availability of SSB monitoring occasions for RLM and BM**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR is the resubmission of R4-2115285, agreed in RAN4#100-e, but not included in big CR.

**Decision: Endorsed.**

**R4-2205078 Draft CR: Addition of SS-SINR/SS-RSRQ measurement accuracy tests for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

This draft CR is the re-submission of R4-2115284 agreed in RAN4#100-e, but not included in big CR.

**Decision: Endorsed.**

**R4-2205079 Draft CR: Addition of SS-SINR/SS-RSRQ measurement accuracy tests for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR is the re-submission of R4-2115284 agreed in RAN4#100-e, but not included in big CR.

**Decision: Endorsed.**

**R4-2205522 Remaining issues on cell selection in Idle mode for NR-U**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the cell selection timer issue for NR-U Idle mode in Rel-16

**Decision: Noted.**

**R4-2205523 draftCR on cell selection in Idle mode for NR-U -r16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

This draft CR updates the timer to initiate the cell selection in NR-U Idle mode

**Decision: Return to.**

**R4-2205524 draftCR on cell selection in Idle mode for NR-U -r17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR updates the timer to initiate the cell selection in NR-U Idle mode

**Decision: Return to.**

**R4-2203845 draft Cat-F CR (R16) to SCell Activation Core NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm Incorporated*

**Session chair: Move from AI 5.1.5.3.1 to AI 5.1.1.3**

**Decision: Return to.**

**R4-2203846 draft Cat-A CR (R17) to SCell Activation Core NR-U**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Session chair: Move from AI 5.1.5.3.1 to AI 5.1.1.3**

**Decision: Return to.**

**R4-2203849 draft Cat-F CR (R16) to SCell Activation Test Cases NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm Incorporated*

**Session chair: Move from AI 5.1.5.3.2 to AI 5.1.1.3**

**Decision: Return to.**

**R4-2203850 draft Cat-A CR (R17) to SCell Activation Test Cases NR-U**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Session chair: Move from AI 5.1.5.3.2 to AI 5.1.1.3**

**Decision: Return to.**

**R4-2204552 Draft CR to maintain inter-RAT measurements subject to CCA in TS 36.133**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: F (Rel-16)  
  
 Source: OPPO*

**Session chair: moved from AI 4.1.6 to 5.1.1.3**

**Decision: Return to.**

**R4-2204553 Draft CR to maintain inter-RAT measurements subject to CCA in TS 36.133**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: OPPO*

**Session chair: moved from AI 4.1.6 to 5.1.1.3**

**Decision: Return to.**

#### 5.1.2 Enhancements on MIMO for NR

##### 5.1.2.1 RRM requirements

================================================================================

**Email discussion: [102-e][204] Maintenance\_NR\_eMIMO\_NWM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][204] Maintenance\_NR\_eMIMO\_NWM | R16 NR eMIMO (NR\_eMIMO) | RRM requirements maintenance | 5.1.2.1 | Yiyan Zhang |

**R4-2206747 Email discussion summary: [102-e][204] Maintenance\_NR\_eMIMO\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207045 (from R4-2206747).**

**R4-2207045 Email discussion summary: [102-e][204] Maintenance\_NR\_eMIMO\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 28th)**

**[102-e][204] Maintenance\_NR\_eMIMO\_NWM**

Issue 2-1-1: Whether to define the test case for Pathloss RS switching

* Proposals:
  + Option 1: Support (ZTE, Anritsu, CMCC)
  + Option 2: Do not support (Apple, Huawei, Qualcomm)
* Discussion
  + Apple: from NWM – “Our main concern is on the lack of PHR accuracy requirement. Since we don’t have PHR accuracy, we have a large SNR change to ensure L1-RSRP change triggering a PHR. Do we verify any L1-RRP report based on SSB change? Also, based on the current SNR levels, the SNR of SSB1 after PL-RS switch is very low, we don't guarantee L1-RSRP measurement accuracy at such low SNR.”
  + ZTE: Can accommodate SNR levels proposal from Apple. For PHR accuracy – we can consider even larger margins.
* Session chair: recommend discuss the details of test case parameters. Check final status on Thursday.

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206820 | WF on eMIMO RRM Maintenance | Samsung |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204694 | Draft CR to TS38.133 Corrections on L1-SINR requirement (Rel-16) | Samsung | Endorsed |  |
| R4-2204695 | Draft CR toTS38.133 Corrections on L1-SINR requirement (Rel-17) | Samsung | Endorsed |  |
| R4-2205318 | DraftCR on maintaining PL-RS switching delay requirements R16 | Huawei | Return to |  |
| R4-2205412 | [dCR] Test cases for applicable timing for PL RS activated by MAC-CE | ZTE | Return to |  |
| R4-2205320 | DraftCR on correction to L1-SINR and SCell BFR tests R16 | Huawei | Endorsed |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206820 WF on eMIMO RRM Maintenance**

*Type: other For: Approval  
 Source: Samsung*

**Abstract:**

**Discussion:**

**Decision: Return to.**

================================================================================

**R4-2203573 Consideration on MAC-CE based PL-RS switching delay TCs**

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

**Abstract:**

Discussion on the necessary conditions of threshold level for PHR and the difference of Tx power level between SSB for MAC-CE based pathloss RS (PL-RS) switching delay measurement.

**Decision: Noted.**

**R4-2204694 Draft CR to TS38.133 Corrections on L1-SINR requirement (Rel-16)**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Samsung*

**Decision: Endorsed.**

**R4-2204695 Draft CR to TS38.133 Corrections on L1-SINR requirement (Rel-17)**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: F (Rel-17)  
  
 Source: Samsung*

**Decision: Endorsed.**

**R4-2205317 Discussion on maintaining PL-RS switching delay requirements in R16**

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

**Decision: Noted.**

**R4-2205318 DraftCR on maintaining PL-RS switching delay requirements R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2207089 (from R4-2205318).**

**R4-2207089 DraftCR on maintaining PL-RS switching delay requirements R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205319 DraftCR on maintaining PL-RS switching delay requirements R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205320 DraftCR on correction to L1-SINR and SCell BFR tests R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2205321 DraftCR on correction to L1-SINR and SCell BFR tests R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2205411 On defining test cases for PL RS activation delay**

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

**Decision: Noted.**

**R4-2205412 [dCR] Test cases for applicable timing for PL RS activated by MAC-CE**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: B (Rel-16)  
  
 Source: ZTE Corporation, Anritsu Corporation*

**Decision: Revised to R4-2207086 (from R4-2205412).**

**R4-2207086 [dCR] Test cases for applicable timing for PL RS activated by MAC-CE**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: B (Rel-16)  
  
 Source: ZTE Corporation, Anritsu Corporation*

**Decision: Return to.**

**R4-2205413 [dCR] Test cases for applicable timing for PL RS activated by MAC-CE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: ZTE Corporation, Anritsu Corporation*

**Abstract:**

This is a Category A CR.

**Decision: Return to.**

#### 5.1.3 NR Positioning Support

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**Email discussion: [102-e][205] Maintenance\_NR\_pos**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][205] Maintenance\_NR\_pos | R16 NR Positioning (NR\_pos) | RRM requirements maintenance | 5.1.3 | Meng Zhang |

**R4-2206748 Email discussion summary: [102-e][205] Maintenance\_NR\_pos**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207046 (from R4-2206748).**

**R4-2207046 Email discussion summary: [102-e][205] Maintenance\_NR\_pos**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (March 1st)**

**[102-e][205] Maintenance\_NR\_pos**

Issue 2-2-3: Applicability of Rx-Tx accuracy requirements with autonomous timing adjustment:

* Proposals:
  + Option 1 (QC, CATT, vivo): UE Rx-Tx measurement accuracy requirements shall apply if the uplink transmission timing changes during the UE Rx-Tx measurement period due to autonomous adjustment.
  + Option 3 (E///, Huawei, Intel, Nokia): Applicability of Rx-Tx accuracy requirements with autonomous timing adjustment is defined as:
    - UE Rx-Tx measurement accuracy requirements shall apply for a cell, which is also the downlink reference cell (defined in section 7.1.1) for SRS transmission even if the uplink transmission timing changes during the UE Rx-Tx measurement period due to autonomous adjustment.
    - UE Rx-Tx measurement accuracy requirements shall not apply for a cell, which is not the downlink reference cell (defined in section 7.1.1) for SRS transmission, if the uplink transmission timing changes during the UE Rx-Tx measurement period due to autonomous adjustment.
* Discussion
  + QC: for Option 3 – how is multi RTT is supported?
  + E///: we think that Option 3 does not limit or exclude multi-RTT. For Option 1 – we think there will be impact on accuracy.
  + CATT: For Option 3 – what is the reference cell? Also, how does LMF know which cell UE performs the measurements?
    - E///: LMF does not need to know and it is up to UE to report
  + Huawei: Reference cells is one the serving cells.
  + vivo: For Option 3 seems that UE needs to continue measurements but without accuracy requirements.
    - E///: in our understanding UE shall discard the measurement. Measurement period shall restart.
* Tentative agreements
  + Applicability of Rx-Tx accuracy requirements with autonomous timing adjustment is defined as:
    - If the uplink transmission timing changes during the UE Rx-Tx measurement period due to autonomous adjustment
      * Option 1:
        + If the autonomous timing adjustment is below threshold X

UE Rx-Tx measurement accuracy requirements shall apply

* + - * + Otherwise

UE Rx-Tx measurement accuracy requirements shall apply for a cell, which is also the downlink reference cell (defined in section 7.1.1)

UE Rx-Tx measurement accuracy requirements shall not apply for a cell, which is not the downlink reference cell (defined in section 7.1.1) for SRS transmission. UE shall restart the measurement period in such case

* + - * Option 2:
        + UE Rx-Tx measurement accuracy requirements shall apply for a cell, which is also the downlink reference cell (defined in section 7.1.1)
        + UE Rx-Tx measurement accuracy requirements shall not apply for a cell, which is not the downlink reference cell (defined in section 7.1.1) for SRS transmission. UE [may or shall] restart the measurement period in such case

Issue 2-3-1: PRS-RSRP accuracy under extreme condition:

* Proposals:
  + Option 1: The PRS RSRP accuracy requirements in extreme condition are X dB larger than that in normal condition, and X is one single value for each SNR side condition across different PRS configurations:
    - 3dB for absolute accuracy for FR1.
    - 3dB for absolute accuracy for FR2.
    - 1dB for relative accuracy for FR1.
    - 3dB for relative accuracy for FR2.
  + Option 2: The margin for PRS-RSRP accuracy requirements under extreme conditions are:
    - 3dB for absolute accuracy for FR1.
    - 3dB for absolute accuracy for FR2.
    - 1.5dB for relative accuracy for FR1.
    - 3dB for relative accuracy for FR2.
  + Option 3: No need to define PRS-RSRP accuracy requirements for extreme conditions in Rel-16.
* Agreements
  + Introduce PRS-RSRP accuracy requirements for extreme conditions in Rel-16
  + The margin for PRS-RSRP accuracy requirements under extreme conditions are:
    - [4.5] dB for absolute accuracy for FR1.
    - [3.0] dB for absolute accuracy for FR2.
    - [1.5] dB for relative accuracy for FR1.
    - [3.0] dB for relative accuracy for FR2.

Issue 2-1-3: Frequency drift margin for RSTD measurement accuracy requirements:

* Agreements
  + Specify a frequency drift margin of 32 Tc for RSTD that applies for a maximum time offset of 160 msec between the PRS resource instances used to calculate the RSTD measurement for the case of a single PFL in FR1 and FR2.
  + Specify a frequency drift margin of [256 Tc] for RSTD that applies for a maximum time offset of [1.28 second] between the PRS resource instances used to calculate the RSTD measurement for the case of multiple PFLs.

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206821 | WF on maintenance to R16 POS requirements | Intel Corporation |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2203870 | Draft CR on R16 NR positioning measurement requirements (R16) | CATT | Revised |  |
| R4-2204654 | Draft CR to 38.133 correction to NR positioning measurement requirements (R16) | vivo | Not pursued |  |
| R4-2205352 | CR on positioning measurement requirements R16 (R16) | Huawei, HiSilicon | Not pursued |  |
| R4-2206032 | Updates to measurement requirements for UE positioning measurements in TS 38.133 (R16) | Ericsson | Not pursued |  |
| R4-2203873 | Draft CR on R16 NR positioning accuracy requirements (R16) | CATT | Not pursued |  |
| R4-2203875 | Draft CR on SRS configuration for R16 positioning test case (R16) | CATT | Revised |  |
| R4-2204656 | Draft CR to 38.133 correction to NR positioning accuracy requirements | vivo | Revised |  |
| R4-2205355 | CR on accuracy requirements for positioning measurement R16 (R16) | Huawei, HiSilicon | Revised |  |
| R4-2205357 | CR to introduce posSRS RMC for positioning test cases R16 (R16) | Huawei, HiSilicon | Not pursued |  |
| R4-2206035 | Updates to accuracy requirements for UE positioning measurements in TS 38.133 (R16) | Ericsson | Revised |  |
| R4-2205442 | Draft CR to TS 38.133: Additions to RSTD test cases for UE-based DL-TDOA support (R16)  Submitted to AI 5.1.5.3 | Rohde & Schwarz | Return to |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206821 WF on maintenance to R16 POS requirements**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

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##### 5.1.3.1 RRM core requirement

**R4-2203869 Discussion on R16 NR positioning core requirement maintenance**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2203870 Draft CR on R16 NR positioning measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: CATT*

**Decision: Revised to R4-2206822 (from R4-2203870).**

**R4-2206822 Draft CR on R16 NR positioning measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2203871 Draft CR on R16 NR positioning measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2204461 Remaining issues in NR positioning core requirements**

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

**Decision: Noted.**

**R4-2204652 Remaining issues on measurement requirements for Rel-16 NR positioning**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204654 Draft CR to 38.133 correction to NR positioning measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Not pursued.**

**R4-2204655 Draft CR to 38.133 correction to NR positioning measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: vivo*

**Decision: Withdrawn.**

**R4-2205351 Discussion on remaining issues for positioning measurement requirements**

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

**Decision: Noted.**

**R4-2205352 CR on positioning measurement requirements R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Not pursued.**

**R4-2205353 CR on positioning measurement requirements R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Withdrawn.**

**R4-2206031 On UE positioning measurement requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

On open issues related to measurement requirements for UE positioning measurements (PRS-RSRP, RSTD and UE Rx-Tx time difference)

**Decision: Noted.**

**R4-2206032 Updates to measurement requirements for UE positioning measurements in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Correction to PRS-RSRP, RSTD and UE Rx-Tx time difference measurement requirements.

**Decision: Not pursued.**

**R4-2206033 Updates to measurement requirements for UE positioning measurements in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Correction and update to PRS-RSRP, RSTD and UE Rx-Tx time difference measurement requirements.

**Decision: Withdrawn.**

**R4-2205441 On UE-based DL-TDOA support**

*Type: discussion For: Agreement  
 38.133 v16.10.0 CR- rev Cat: (Rel-16)  
  
 Source: Rohde & Schwarz*

**Session chair: Move from AI 5.1.5.3.2 to AI 5.1.3.1**

**Decision: Noted.**

**R4-2205442 Draft CR to TS 38.133: Additions to RSTD test cases for UE-based DL-TDOA support (Rel 16)**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Rohde & Schwarz*

**Session chair: Move from AI 5.1.5.3.2 to AI 5.1.3.1**

**Decision: Return to.**

**R4-2205443 Draft CR to TS 38.133: Additions to RSTD test cases for UE-based DL-TDOA support (Rel 17)**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Rohde & Schwarz*

**Session chair: Move from AI 5.1.5.3.2 to AI 5.1.3.1**

**Decision: Return to.**

##### 5.1.3.2 RRM performance requirements

**R4-2203872 Discussion on R16 NR positioning performance maintenance**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2203873 Draft CR on R16 NR positioning accuracy requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: CATT*

**Decision: Not pursued.**

**R4-2203874 Draft CR on R16 NR positioning accuracy requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: CATT*

**Decision: Withdrawn.**

**R4-2203875 Draft CR on SRS configuration for R16 positioning test case**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: CATT*

**Decision: Revised to R4-2206823 (from R4-2203875).**

**R4-2206823 Draft CR on SRS configuration for R16 positioning test case**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2203876 Draft CR on SRS configuration for R16 positioning test case**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2204407 Discussion on Rel-16 NR positioning measurement accuracy requirements**

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

**Decision: Noted.**

**R4-2204462 On UE measurement accuracy requirements for NR positioning**

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

**Decision: Noted.**

**R4-2204653 Remaining issues on measurement accuracy requirements for Rel-16 NR positioning**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204656 Draft CR to 38.133 correction to NR positioning accuracy requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Revised to R4-2206824 (from R4-2204656).**

**R4-2206824 Draft CR to 38.133 correction to NR positioning accuracy requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Return to.**

**R4-2204657 Draft CR to 38.133 correction to NR positioning accuracy requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: vivo*

**Decision: Return to.**

**R4-2205354 Discussion on accuracy requirements for positioning measurement**

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

**Decision: Noted.**

**R4-2205355 CR on accuracy requirements for positioning measurement R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206825 (from R4-2205355).**

**R4-2206825 CR on accuracy requirements for positioning measurement R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205356 CR on accuracy requirements for positioning measurement R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205357 CR to introduce posSRS RMC for positioning test cases R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Not pursued.**

**R4-2205358 CR to introduce posSRS RMC for positioning test cases R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Withdrawn.**

**R4-2206034 On UE positioning accuracy measurements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

On open issues related to accuracy requirements for UE positioning measurements (PRS-RSRP, RSTD and UE Rx-Tx time difference)

**Decision: Noted.**

**R4-2206035 Updates to accuracy requirements for UE positioning measurements in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Correction and update to PRS-RSRP, RSTD and UE Rx-Tx time difference accuracy requirements.

**Decision: Revised to R4-2206826 (from R4-2206035).**

**R4-2206826 Updates to accuracy requirements for UE positioning measurements in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Correction and update to PRS-RSRP, RSTD and UE Rx-Tx time difference accuracy requirements.

**Decision: Return to.**

**R4-2206036 Updates to accuracy requirements for UE positioning measurements in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Correction and update to PRS-RSRP, RSTD and UE Rx-Tx time difference accuracy requirements.

**Decision: Return to.**

#### 5.1.4 NR RRM requirements for CSI-RS based L3 measurement

================================================================================

**Email discussion: [102-e][206] Maintenance\_NR\_CSIRS\_L3meas\_NWM (AI 5.1.4)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][206] Maintenance\_NR\_CSIRS\_L3meas\_NWM | R16 NR CSI-RS L3 Measurements (NR\_CSIRS\_L3meas) | RRM requirements maintenance | 5.1.4 | Qiuge Guo |

**R4-2206749 Email discussion summary: [102-e][206] Maintenance\_NR\_CSIRS\_L3meas\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207047 (from R4-2206749).**

**R4-2207047 Email discussion summary: [102-e][206] Maintenance\_NR\_CSIRS\_L3meas\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (TBA)**

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206827 | WF on CSI-RS based L3 measurement  requirements | CATT |  |
| R4-2206828 | LS on the applicability of mixed numerology on UE capability maxNumberCSI-RS-RRM-RS-SINR | Apple | To: RAN1, RAN2 |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204709 | 38.133 draftCR on CSI-RS based measurements reporting requirements | Nokia | Revised |  |
| R4-2205360 | CR on CSI-RS measurement requirements R16 | Huawei | Revised |  |
| R4-2205655 | Draft CR on CSI-RS L3 measurement capability for TS36.133 R16 | Apple | Endorsed |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206827 WF on CSI-RS based L3 measurement requirement**

*Type: other For: Approval  
 Source: CATT*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206828 LS on the applicability of mixed numerology on UE capability maxNumberCSI-RS-RRM-RS-SINR**

*Type: LS out For: Approval  
 to RAN1, RAN2  
 Source: Apple*

**Abstract:**

**Discussion:**

**Decision: Return to.**

================================================================================

**R4-2204708 Open issues on CSI-RS based measurement requirements**

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

**Decision: Noted.**

**R4-2204709 38.133 draftCR on CSI-RS based measurements reporting requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2206829 (from R4-2204709).**

**R4-2206829 38.133 draftCR on CSI-RS based measurements reporting requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Return to.**

**R4-2204710 38.133 draftCR on CSI-RS based measurements reporting requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Return to.**

**R4-2205359 Discussion on remaining issue in CSI-RS core requirements**

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

**Decision: Noted.**

**R4-2205360 CR on CSI-RS measurement requirements R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206830 (from R4-2205360).**

**R4-2206830 CR on CSI-RS measurement requirements R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205361 CR on CSI-RS measurement requirements R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205655 Draft CR on CSI-RS L3 measurement capability for TS36.133 R16**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Endorsed.**

**R4-2205656 Draft CR on CSI-RS L3 measurement capability for TS36.133 R17**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Apple*

**Decision: Endorsed.**

#### 5.1.5 Other NR WIs and Rel-16 NR TEI

##### 5.1.5.3 RRM requirements

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**Email discussion: [102-e][202] Maintenance\_NR\_RRM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][202] Maintenance\_NR\_RRM | Misc | Rel-16 NR RRM maintenance and TEI | 5.1.5.3 | Yang Tang |

**R4-2206745 Email discussion summary: [102-e][202] Maintenance\_NR\_RRM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207043 (from R4-2206745).**

**R4-2207043 Email discussion summary: [102-e][202] Maintenance\_NR\_RRM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (TBA)**

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2203528 | Correction of 2-step RACH RRM performance requirements | Nokia, Nokia Shanghai Bell | Endorsed |  |
| R4-2203574 | Draft CR to maintain HST performance requirement | Anritsu Corporation | Endorsed |  |
| R4-2203575 | Draft CR to maintain HST performance requirement | Anritsu Corporation | Endorsed |  |
| R4-2203723 | CR: Correction on SyncRef UE Frequency Offset in Synchronization Reference Selection/Reselection Test | Qualcomm, Inc. | Merged |  |
| R4-2203729 | CR: Correction on Synchronization Reference Selection/Reselection SyncRefUE Frequency Offset Side Condition for NR-V2X | Qualcomm, Inc. | Revised |  |
| R4-2203797 | Draft CR on core part maintenance for TS38.133 R16 | Apple | Endorsed |  |
| R4-2203843 | draft Cat-F CR (R16) to SCell Activation Core | Qualcomm Incorporated | Return to |  |
| ~~R4-2203845~~ | ~~draft Cat-F CR (R16) to SCell Activation Core NR-U~~ | ~~Qualcomm Incorporated~~ |  | Handled in [203] |
| R4-2203847 | draft Cat-F CR (R16) to SCell Activation Test Cases | Qualcomm Incorporated | Return to |  |
| ~~R4-2203849~~ | ~~draft Cat-F CR (R16) to SCell Activation Test Cases NR-U~~ | ~~Qualcomm Incorporated~~ |  | Handled in [203] |
| R4-2204158 | Draft CR on EUTRAN-NR cell re-selection in HST | CATT | Endorsed |  |
| R4-2204311 | Draft CR to maintain measurement gap sharing in TS 38.133 | OPPO | Endorsed |  |
| R4-2204349 | Draft CR on SRVCC maintenance for TS36.133 R16 | Apple | Revised |  |
| R4-2204369 | CR for the number of ACK and NACK in CGI reading test case in NR SA for R16 | MediaTek Inc. | Return to |  |
| R4-2204426 | Corrections to HST requirements in R16 | Intel Corporation | Endorsed |  |
| R4-2204850 | Correction of NR Sidelink reference configurations\_R16 | Huawei, Hisilicon | Revised |  |
| R4-2204852 | Correction of NR Sidelink test cases\_R16 | Huawei, Hisilicon | Return to |  |
| R4-2204854 | Correction of mobility enhancement test cases\_R16 | Huawei, Hisilicon | Return to |  |
| R4-2205322 | DraftCR on correction on interruption requirements for IBM R16 | Huawei, HiSilicon | Return to |  |
| R4-2205362 | CR on inter-frequency measurement without MG R16 | Huawei, HiSilicon | Return to |  |
| R4-2205364 | CR on CBW change requirements R16 | Huawei, HiSilicon | ~~Endorsed~~ Return to | Marked as return to since Rel-17 is not agreeable and should be decided jointly |
| R4-2205365 | CR on CBW change requirements R17 | Huawei, HiSilicon | Return to |  |
| R4-2205366 | CR to introduce EMR TC#5 R16 | Huawei, HiSilicon | Endorsed |  |
| R4-2205405 | draft CR to 38174 on antenna connectors and RIBs | ZTE Corporation | Revised |  |
| R4-2205644 | Editorial correction to EN-DC interruption requirements | Ericsson | Endorsed |  |
| R4-2204347 | Maintenance CR for RRM requirements on 38.133 R16 | MediaTek (Shenzhen) Inc. | Return to |  |
| R4-2206068 | Draft CR on number of serving carriers to be supported for FR2 in NR SA | Ericsson | Return to |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2207090 LS on UE capability for inter-frequency measurement without MG**

*Type: LS out For: Approval  
 to RAN2   
 Source: Huawei*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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###### 5.1.5.3.1 RRM core requirements

**R4-2203729 CR: Correction on Synchronization Reference Selection/Reselection SyncRefUE Frequency Offset Side Condition for NR-V2X**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm, Inc.*

**Decision: Revised to R4-2206816 (from R4-2203729).**

**R4-2206816 CR: Correction on Synchronization Reference Selection/Reselection SyncRefUE Frequency Offset Side Condition for NR-V2X**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm, Inc.*

**Decision: Return to.**

**R4-2203730 (mirror R17)CR: Correction on Synchronization Reference Selection/Reselection SyncRefUE Frequency Offset Side Condition for NR-V2X**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Qualcomm, Inc.*

**Decision: Return to.**

**R4-2203797 Draft CR on core part maintenance for TS38.133 R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Endorsed.**

**R4-2203798 Draft CR on core part maintenance for TS38.133 R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Apple*

**Decision: Endorsed.**

**R4-2203843 draft Cat-F CR (R16) to SCell Activation Core**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2203844 draft Cat-A CR (R17) to SCell Activation Core**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2204158 Draft CR on EUTRAN-NR cell re-selection in HST**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: F (Rel-16)  
  
 Source: CATT*

**Decision: Endorsed.**

**R4-2204159 Draft CR on EUTRAN-NR cell re-selection in HST**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: CATT*

**Decision: Endorsed.**

**R4-2204311 Draft CR to maintain measurement gap sharing in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: OPPO*

**Decision: Endorsed.**

**R4-2204312 Draft CR to maintain measurement gap sharing in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: OPPO*

**Decision: Endorsed.**

**R4-2204349 Draft CR on SRVCC maintenance for TS36.133 R16**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Revised to R4-2206817 (from R4-2204349).**

**R4-2206817 Draft CR on SRVCC maintenance for TS36.133 R16**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2204350 Draft CR on SRVCC maintenance for TS36.133 R17**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2204426 Corrections to HST requirements in R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: (Rel-16)  
  
 Source: Intel Corporation*

**Decision: Endorsed.**

**R4-2204427 Corrections to HST requirements in R16**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Endorsed.**

**R4-2205322 DraftCR on correction on interruption requirements for IBM R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205323 DraftCR on correction on interruption requirements for IBM R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205362 CR on inter-frequency measurement without MG R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205363 CR on inter-frequency measurement without MG R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205364 CR on CBW change requirements R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205365 CR on CBW change requirements R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: F (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205405 draft CR to 38174 on antenna connectors and RIBs**

*Type: draftCR For: Endorsement  
 38.174 v16.5.0 CR- rev Cat: F (Rel-16)  
  
 Source: ZTE Corporation*

**Decision: Revised to R4-2206819 (from R4-2205405).**

**R4-2206819 draft CR to 38174 on antenna connectors and RIBs**

*Type: draftCR For: Endorsement  
 38.174 v16.5.0 CR- rev Cat: F (Rel-16)  
  
 Source: ZTE Corporation*

**Decision: Return to.**

**R4-2207091 draft CR to 38174 on antenna connectors and RIBs**

*Type: draftCR For: Endorsement  
 38.174 v17.15.0 CR- rev Cat: A (Rel-17)  
  
 Source: ZTE Corporation*

**Decision: Return to.**

**R4-2205644 Editorial correction to EN-DC interruption requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Interruption requirements due to BWP timer expiry is dupliced while the interruption requirements due to DCI based BWP switch is missing.

**Decision: Endorsed.**

**R4-2205828 Discussion on number of DL CC to be supported for FR2**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this paper we discuss the necessity for increasing DL CC supported for FR2 inter-band CA

**Decision: Withdrawn.**

**R4-2205829 Draft CR on number of DL CC in FR2 for IBM UE**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

CR corrects the number of DL CC UE supports for NR-SA

**Decision: Withdrawn.**

**R4-2206067 Discussion on number of serving carriers to be supported for FR2**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this paper we discuss the number of serving carriers supported for FR2 in NR SA

**Decision: Noted.**

**R4-2206068 Draft CR on number of serving carriers to be supported for FR2 in NR SA**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

CR corrects the number of serving carriers to be supported for NR-SA in FR2

**Decision: Return to.**

**R4-2204347 Maintenance CR for RRM requirements on 38.133 R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: MediaTek (Shenzhen) Inc.*

**Session chair: moved from AI 5.2.3 to AI 5.1.5.3.1**

**Decision: Return to.**

**R4-2204348 Maintenance CR for RRM requirements on 38.133 R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: MediaTek (Shenzhen) Inc.*

**Session chair: moved from AI 5.2.3 to AI 5.1.5.3.1**

**Decision: Return to.**

###### 5.1.5.3.2 RRM performance requirements

**R4-2203528 Correction of 2-step RACH RRM performance requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Purpose of 2-step RACH should include verification of Msg PRACH and PUSCH not only PRACH

**Decision: Endorsed.**

**R4-2203529 Correction of 2-step RACH RRM performance requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Purpose of 2-step RACH should include verification of Msg PRACH and PUSCH not only PRACH

**Decision: Endorsed.**

**R4-2203574 Draft CR to maintain HST performance requirement**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Anritsu Corporation*

**Decision: Endorsed.**

**R4-2203575 Draft CR to maintain HST performance requirement**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: F (Rel-17)  
  
 Source: Anritsu Corporation*

**Decision: Endorsed.**

**R4-2203723 CR: Correction on SyncRef UE Frequency Offset in Synchronization Reference Selection/Reselection Test**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm, Inc.*

**Decision: Merged.**

**R4-2203724 (mirror R17)CR: Correction on SyncRef UE Frequency Offset in Synchronization Reference Selection/Reselection Test**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Qualcomm, Inc.*

**Decision: Withdrawn.**

**R4-2203847 draft Cat-F CR (R16) to SCell Activation Test Cases**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2203848 draft Cat-A CR (R17) to SCell Activation Test Cases**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2203895 Draft CR on TC for EUTRAN-NR cell re-selection in HST**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: CATT*

**Decision: Withdrawn.**

**R4-2203896 Draft CR on TC for EUTRAN-NR cell re-selection in HST**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: CATT*

**Decision: Withdrawn.**

**R4-2204369 CR for the number of ACK and NACK in CGI reading test case in NR SA for R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: MediaTek Inc.*

**Decision: Return to.**

**R4-2204370 CR for the number of ACK and NACK in CGI reading test case in NR SA for R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: MediaTek Inc.*

**Decision: Return to.**

**R4-2204850 Correction of NR Sidelink reference configurations\_R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2206818 (from R4-2204850).**

**R4-2206818 Correction of NR Sidelink reference configurations\_R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204851 Correction of NR Sidelink reference configurations\_R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204852 Correction of NR Sidelink test cases\_R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204853 Correction of NR Sidelink test cases\_R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204854 Correction of mobility enhancement test cases\_R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204855 Correction of mobility enhancement test cases\_R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2205366 CR to introduce EMR TC#5 R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2205367 CR to introduce EMR TC#5 R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

### 5.2 LTE WIs and TEI

#### 5.2.3 RRM requirements

================================================================================

**Email discussion: [102-e][207] Maintenance\_LTE\_RRM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][207] Maintenance\_LTE\_RRM | Misc | LTE RRM maintenance (up to Rel-15) Rel-16 LTE RRM maintenance | 4.2.3 5.2.3 | Santhan Thangarasa |

**R4-2206750 Email discussion summary: [102-e][207] Maintenance\_LTE\_RRM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207048 (from R4-2206750).**

**R4-2207048 Email discussion summary: [102-e][207] Maintenance\_LTE\_RRM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (TBA)**

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206831 | WF on LTE RRM Maintenance | Ericsson |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2203725 | CR: Correction on SyncRef UE Frequency Offset in Synchronization Reference Selection/Reselection Test | Qualcomm, Inc. | Endorsed |  |
| R4-2203731 | CR: Correction on Synchronization Reference Selection/Reselection SyncRefUE Frequency Offset Side Condition for LTE-V2X | Qualcomm, Inc. | Revised |  |
| R4-2205347 | CR to eMTC inter-frequency measurement requirements in Idle mode R14 | Huawei, HiSilicon | Revised |  |
| R4-2205205 | Clarification on asynchronous DAPS handover R16 | Huawei, Hisilicon | Return to |  |
| R4-2205324 | Correction to DAPS handover test cases in TS36.133 R16 | Huawei, Hisilicon | Revised |  |
| R4-2205415 | Correction on the synchronous condition for DAPS handover | Ericsson | Return to |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206831 WF on LTE RRM Maintenance**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Return to.**

================================================================================

**R4-2204885 Clarification on asynchronous DAPS handover R16**

*Type: CR For: Agreement  
 36.133 v16.12.0 CR-7138 rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Withdrawn.**

**R4-2204886 Clarification on asynchronous DAPS handover R17**

*Type: CR For: Agreement  
 36.133 v17.4.0 CR-7139 rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Withdrawn.**

**R4-2205205 Clarification on asynchronous DAPS handover R16**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2205206 Clarification on asynchronous DAPS handover R17**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2205324 Correction to DAPS handover test cases in TS36.133 R16**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206834 (from R4-2205324).**

**R4-2206834 Correction to DAPS handover test cases in TS36.133 R16**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205325 Correction to DAPS handover test cases in TS36.133 R17**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205414 TDD UL-DL and DL-UL switching in LTE DAPS handover**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

Further clarification on DL-to-UL and UL-to-DL switching time

**Decision: Noted.**

**R4-2205415 Correction on the synchronous condition for DAPS handover**

*Type: draftCR For: Endorsement  
 36.133 v16.12.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Add conditions for not expected to transmit / not expected to receive covering both source and target cell. Add autonomous interruption allowance if these conditions are unspecified.

**Decision: Return to.**

**R4-2205416 Correction on the synchronous condition for DAPS handover**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Add conditions for not expected to transmit / not expected to receive covering both source and target cell. Add autonomous interruption allowance if these conditions are unspecified.

**Decision: Return to.**

## 9 Rel-17 spectrum related WIs for NR

================================================================================

**Email discussion: [102-e][208] Spectrum\_RRM\_NWM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][208] Spectrum\_RRM\_NWM | Misc | RRM impacts for NR/LTE spectrum WIs | 9, 12 | Muhammad Kazmi |

Handled tdocs:

* R4-2205061 CR to TS 38.133 - introduction of band n104
* R4-2205993 CR to TS 36.133: implementation of LTE\_upper\_700MHz\_A band 103

**R4-2206751 Email discussion summary: [102-e][208] Spectrum\_RRM\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207049 (from R4-2206751).**

**R4-2207049 Email discussion summary: [102-e][208] Spectrum\_RRM\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (TBA)**

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2205061 | CR to TS 38.133 - introduction of band n104 | Ericsson | Return to |  |
| R4-2205993 | CR to TS 36.133: implementation of LTE\_upper\_700MHz\_A band 103 | Huawei, HiSilicon | Endorsed |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

================================================================================

### 9.3 Introduction of 6GHz NR licensed bands

#### 9.3.5 Others

**R4-2205061 CR to TS 38.133 - introduction of band n104**

*Type: CR For: Agreement  
 38.133 v17.4.0 CR-2256 rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This contribution is a CR to TS 38.133 introducing band n104

**Decision: Return to.**

## 10 Rel-17 non-spectrum related work items for NR

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

#### 10.3.3 RRM core requirements

================================================================================

**Email discussion: [102-e][209] NR\_RF\_FR1\_enh\_RRM\_NWM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][209] NR\_RF\_FR1\_enh\_RRM\_NWM | R17 NR FR1 RF (NR\_RF\_FR1\_enh) | RRM Core requirements RRM Perf requirements | 10.3.3 10.3.4 | Han Jing |

**R4-2206752 Email discussion summary: [102-e][209] NR\_RF\_FR1\_enh\_RRM\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207050 (from R4-2206752).**

**R4-2207050 Email discussion summary: [102-e][209] NR\_RF\_FR1\_enh\_RRM\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: For email approval.**

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206836 | WF on R17 NR FR1 RF enhancement RRM | Huawei, Hisilicon |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204887 | Big CR: RRM requirements for Rel-17 NR FR1 RF | Huawei, Hisilicon | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206836 WF on R17 NR FR1 RF enhancement RRM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

================================================================================

**R4-2204887 Big CR: RRM requirements for Rel-17 NR FR1 RF**

*Type: CR For: Agreement  
 38.133 v17.4.0 CR-2253 rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2206835 (from R4-2204887).**

**R4-2206835 Big CR: RRM requirements for Rel-17 NR FR1 RF**

*Type: CR For: Agreement  
 38.133 v17.4.0 CR-2253 rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

#### 10.3.4 RRM performance requirements

**R4-2204888 Test case for R17 Tx switching enhancement**

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

**Decision: Noted.**

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

#### 10.4.6 RRM core requirements

================================================================================

**Email discussion: [102-e][210] NR\_RF\_FR2\_req\_enh2\_RRM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][210] 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 | 10.4.6 10.4.6.1 10.4.6.2 | Lei Du |

**R4-2206753 Email discussion summary: [102-e][210] NR\_RF\_FR2\_req\_enh2\_RRM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207051 (from R4-2206753).**

**R4-2207051 Email discussion summary: [102-e][210] NR\_RF\_FR2\_req\_enh2\_RRM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 28th)**

Issue 1-1-1: performance degradation due to network driven Rx beam switch e.g. TCI state change (Case 1)

* Proposals:
  + Option 1: Adding a note “If the receive time difference exceeds [X] of that SCS, demodulation performance degradation is expected for **the first or the last symbol** of the slot in the SCells of the other band, where X is defined in Table 7.6.4”. (Qualcomm, LG, Mediatek, OPPO, Huawei, Nokia, ZTE)
  + Option 1a: Adding a note “If the receive time difference exceeds [X] of that SCS, and there are no gaps where data is not received, demodulation performance degradation is expected for the first or the last symbol of the slot in the SCells of the other band, where X is defined in Table 7.6.4.” (Ericsson)
  + Option 2: Scheduling restriction should be introduced to prevent the significant performance degradation due to Rx beam switching in CBM when MRTD is not small enough (Apple)
    - When FR2 PCell and PSCell slot boundary is always used as the reference for Rx beam switching, no performance degradation can be guaranteed for PCell and PCell.
    - On all SCell, symbols right before and after the PCell/PSCell slot boundary where Rx beam switching should be subjected to the scheduling restriction.
    - When there is no PCell and PSCell, the slot boundary of the FR2 SCell which arrives the earliest to the UE will be used as the reference for Rx beam switching. In this case, all impacted symbols from other CC should be the last symbol of the slot.
    - Since network has not info which SCell will arrive first, scheduling restriction applies on the last symbol of the slot right before Rx beam switch happens for all CC.
* Discussion
  + Ericsson: Option 1a to optimize performance
  + Apple: We are concerned that RAN4 does not want to quantify performance degradation. For this case we assume that there will be big performance loss and whole slot performance can be degraded.
  + QC: To E/// - not clear on additional benefits on 1a. To Apple – we do not support scheduling restriction.
* Agreements
  + Performance degradation due to network driven Rx beam switch (e.g. TCI state change) (Case 1)
    - Add a note “If the receive time difference exceeds [X] of that SCS, demodulation performance degradation is expected for the first or the last symbol of the slot in the SCells of the other band, where X is defined in Table 7.6.4. This may result in performance degradation for the slot, where impacted symbols belong to, if PDCCH/PDSCH is scheduled in these symbols.”

Issue 1-1-2: performance degradation due to UE autonomous Rx beam switch (Case 2)

* Proposals:
  + Option 1: Adding a note to the corresponding MRTD table, same as in Issue 1-1-1. (LG, Mediatek, Huawei, Ericsson, Nokia)
    - Option 1a: Additional clarification notes may be needed to consider some performance degradation with a maximum limit (Nokia)
  + Option 2: Do not define any explicit requirements on how often and how much performance degradation is expected unless it can be tested under specific conditions where the degradation can be accurately quantified. (Qualcomm, OPPO, MediateK, Apple, Huawei)
* Discussion
  + Apple: can compromise to Option 1
* Agreements
  + Performance degradation due to UE autonomous Rx beam switch (Case 2)
    - Do not define requirements (e.g., performance degradation) for Case 2 when receive time difference exceeds [X], where X is defined in Table 7.6.4

Issue 1-2-1: Scheduling restriction

* Proposals:
  + Option 1: The existing scheduling restriction for intra-band FR2 CA is extended to inter-band FR2 CA for CMB UEs, and do not differentiate between RTD < X and RTD > X. (Qualcomm, Mediatek, Huawei, Ericsson)
    - Option 1a: For a UE capable of common beam management on this FR2 band pair, when inter-band carrier aggregation in FR2 is performed, the scheduling restrictions due to a given serving cell should also apply to all other serving cells in the same band and other band on the symbols that fully or partially overlap with the aforementioned restricted symbols. The scheduling restriction is limited to the bands where single-receiver architecture based CBM DL CA is used, if defined by RF group. FFS on the details of the bands. (Qualcomm)
    - Option 1b: When inter-band carrier aggregation in FR2 with CBM is performed, the scheduling restrictions on FR2 serving PCell or PSCell apply to all serving cells in the same band or in the CBM cell group on the symbols that fully or partially overlap with restricted symbols (Mediatek, Huawei)
  + Option 2: The existing scheduling restriction for intra-band FR2 CA is extended to inter-band FR2 CA for CMB UEs for RTX < X (OPPO, Nokia, Apple)
    - Once X is known RAN4 need to define scheduling restrictions for when RTD exceeds X
* Discussion
  + TBA
* Agreements
  + TBA

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206837 | WF on RRM requirements for FR2 Inter-band DL CA and UL CA | Nokia |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2205869 | draftCR on CBM inter-band FR2 DL CA | Nokia, Nokia Shanghai Bell | Revised |  |
| R4-2205424 | Timing requirements for inter-band DL CA | Ericsson | Merged |  |
| R4-2205871 | draftCR on MRTD for CBM inter-band FR2 DL CA | Nokia, Nokia Shanghai Bell | Revised |  |
| R4-2204184 | Introduction of SCell activation delay requirement for FR2 inter-band CA with common beam management | Mediatek | Revised |  |
| R4-2205328 | DraftCR on applicability rules for FR2 inter-band CA with CBM | Huawei | Revised |  |
| R4-2205831 | Draft CR on scheduling restriction for FR2 inter-band DL CA for CBM UE | Ericsson | Revised |  |
| R4-2205873 | draftCR on measurement restriction for CBM inter-band FR2 DL CA | Nokia, Nokia Shanghai Bell | Revised |  |
| R4-2205833 | Draft CR on number of UL CC support for FR2 and interruption requirements for FR2 UL CA for IBM UE | Ericsson | Revised |  |
| R4-2205875 | draftCR on RRM requirements for IBM inter-band FR2 UL CA | Nokia, Nokia Shanghai Bell | Postponed |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206837 WF on RRM requirements for FR2 Inter-band DL CA and UL CA**

*Type: other For: Approval  
 Source: Nokia*

**Abstract:**

**Discussion:**

**Decision: Return to.**

================================================================================

**R4-2205868 Draft Big CR on RRM requirements for FR2 Inter-band CA**

*Type: CR For: Agreement  
 38.133 v17.4.0 CR-2257 rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Draft Big CR on RRM requirements for FR2 Inter-band CA to merge all approved draftCRs in this 102-e meeting and 101bis-e meetings.

**Decision: For email approval.**

##### 10.4.6.1 Inter-band DL CA requirements for CBM

**R4-2205869 draftCR on CBM inter-band FR2 DL CA**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

draftCR on abbreviation and BM-RS configuration assuption for inter-band FR2 DL CA for CBM

**Decision: Revised to R4-2206838 (from R4-2205869).**

**R4-2206838 draftCR on CBM inter-band FR2 DL CA**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

draftCR on abbreviation and BM-RS configuration assuption for inter-band FR2 DL CA for CBM

**Decision: Return to.**

###### 10.4.6.1.1 MRTD requirements

**R4-2203860 MRTD requirements for CBM based Inter-band DL CA**

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

**Decision: Noted.**

**R4-2204149 Discussion on MRTD for FR2 inter-band CA based on CBM**

*Type: discussion For: (not specified)  
 Source: LG Electronics*

**Abstract:**

It discusses MRTD requirements for CBM based FR2 inter-band CA.

**Decision: Noted.**

**R4-2204182 Discussion on CBM MRTD requirement for FR2 inter-band DL CA**

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

**Decision: Noted.**

**R4-2204271 MRTD requirements for FR2 inter-band DL CA enhancements**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2205326 Discussion on MRTD requirements for FR2 inter-band DL CA with CBM**

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

**Decision: Noted.**

**R4-2205423 Timing requirements for inter-band DL CA**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

Analysis of CBM requirements and remedies for MRTD=3 µs.

**Decision: Noted.**

**R4-2205424 Timing requirements for inter-band DL CA**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

CR for MRTD requirements for CBM UE.

**Decision: Merged.**

**R4-2205870 discussion on MRTD for CBM inter-band FR2 DL CA**

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

**Abstract:**

discussion on MRTD requirements for inter-band FR2 DL CA for CBM

**Decision: Noted.**

**R4-2205871 draftCR on MRTD for CBM inter-band FR2 DL CA**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

draftCR on MRTD requirements for inter-band FR2 DL CA for CBM

**Decision: Revised to R4-2206839 (from R4-2205871).**

**R4-2206839 draftCR on MRTD for CBM inter-band FR2 DL CA**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

draftCR on MRTD requirements for inter-band FR2 DL CA for CBM

**Decision: Return to.**

###### 10.4.6.1.2 Other RRM requirements

**R4-2203861 RRM requirements for CBM based Inter-band DL CA**

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

**Decision: Noted.**

**R4-2204183 Discussion on CBM RRM requirements for FR2 inter-band DL CA**

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

**Decision: Noted.**

**R4-2204184 Introduction of SCell activation delay requirement for FR2 inter-band CA with common beam management**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Revised to R4-2206840 (from R4-2204184).**

**R4-2206840 Introduction of SCell activation delay requirement for FR2 inter-band CA with common beam management**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Return to.**

**R4-2204272 Other RRM requirements for FR2 inter-band DL CA enhancements**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2205327 Discussion on other RRM requirements for FR2 inter-band DL CA with CBM**

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

**Decision: Noted.**

**R4-2205328 DraftCR on applicability rules for FR2 inter-band CA with CBM**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206841 (from R4-2205328).**

**R4-2206841 DraftCR on applicability rules for FR2 inter-band CA with CBM**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205657 On network driven Rx beam switch for CBM**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2205830 Discussion on RRM requirements of inter-band DL CA for CBM UE**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution, we provide our views on RRM requirements for FR2 inter-band DL CA UEs operating with CBM.

**Decision: Noted.**

**R4-2205831 Draft CR on scheduling restriction for FR2 inter-band DL CA for CBM UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

We provide draft CR to introduce Scheduling restriction requirements for CBM UE

**Decision: Revised to R4-2206842 (from R4-2205831).**

**R4-2206842 Draft CR on scheduling restriction for FR2 inter-band DL CA for CBM UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

We provide draft CR to introduce Scheduling restriction requirements for CBM UE

**Decision: Return to.**

**R4-2205872 discussion on other RRM requirements for CBM inter-band FR2 DL CA**

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

**Abstract:**

discussion on other RRM requirements for inter-band FR2 DL CA for CBM

**Decision: Noted.**

**R4-2205873 draftCR on measurement restriction for CBM inter-band FR2 DL CA**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

draftCR on measurement restriction for inter-band FR2 DL CA for CBM

**Decision: Revised to R4-2206843 (from R4-2205873).**

**R4-2206843 draftCR on measurement restriction for CBM inter-band FR2 DL CA**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

draftCR on measurement restriction for inter-band FR2 DL CA for CBM

**Decision: Return to.**

##### 10.4.6.2 Inter-band UL CA for IBM

**R4-2205832 Discussion on RRM requirements for inter-band UL CA for IBM UE**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution, we provide our views on number of UL carrier to be supported for FR2 inter-band UL CA for IBM UE.

**Decision: Withdrawn.**

**R4-2205833 Draft CR on number of UL CC support for FR2 and interruption requirements for FR2 UL CA for IBM UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

We introduce draft CR for FR2 inter-band UL CA

**Decision: Revised to R4-2206844 (from R4-2205833).**

**R4-2206844 Draft CR on number of UL CC support for FR2 and interruption requirements for FR2 UL CA for IBM UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

We introduce draft CR for FR2 inter-band UL CA

**Decision: Return to.**

**R4-2205874 Discussion on supportedserving carriers for IBM inter-band FR2 UL CA**

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

**Abstract:**

Discussion on supportedserving carriers for IBM inter-band FR2 UL CA

**Decision: Noted.**

**R4-2205875 draftCR on RRM requirements for IBM inter-band FR2 UL CA**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

draftCR on RRM requirements for IBM inter-band FR2 UL CA

**Decision: Postponed.**

**R4-2206069 Discussion on RRM requirements of FR2 inter-band DL and UL CA for IBM UE**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution, we provide our views on number of serving carrier to be supported for FR2 inter-band DL and UL CA for IBM UE.

**Decision: Noted.**

##### 10.4.6.3 UL gaps for self-calibration and monitoring

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

#### 10.8.2 RRM core requirements

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**Email discussion: [102-e][211] NR\_HST\_FR1\_enh\_RRM\_1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][211] NR\_HST\_FR1\_enh\_RRM\_1 | R17 NR FR1 HST enhancements (NR\_HST\_FR1\_enh) | RRM Core requirements | 10.8.1 10.8.2 | Jingjing Chen |

**R4-2206754 Email discussion summary: [102-e][211] NR\_HST\_FR1\_enh\_RRM\_1**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207052 (from R4-2206754).**

**R4-2207052 Email discussion summary: [102-e][211] NR\_HST\_FR1\_enh\_RRM\_1**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206845 | WF on RRM for FR1 HST | CMCC |  |
| R4-2206846 | LS on release independent for Rel-17 FR1 HST RRM enhancement | CMCC | To: RAN\_2 |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204269 | Draft CR on enhanced requirements for SCell measurement for Rel-17 FR1 HST requirements | CMCC | Endorsed |  |
| R4-2204889 | Correction on inter-frequency measurements for FR1 HST | Huawei, Hisilicon | Endorsed |  |
| R4-2203742 | CR on L1-SINR measurement in FR1 HST | Apple | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206845 WF on RRM for FR1 HST**

*Type: other For: Approval  
 Source: CMCC*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206846 LS on release independent for Rel-17 FR1 HST RRM enhancement**

*Type: LS out For: Approval  
 to RAN2  
 Source: CMCC*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**R4-2203710 On NR FR1 HST RRM Requirements**

*Type: discussion For: Discussion  
 Source: Qualcomm, Inc.*

**Decision: Noted.**

##### 10.8.2.1 Intra-frequency measurements

**R4-2204269 Draft CR on enhanced requirements for SCell measurement for Rel-17 FR1 HST requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CMCC*

**Decision: Endorsed.**

##### 10.8.2.2 Inter-frequency measurements

**R4-2204889 Correction on inter-frequency measurements for FR1 HST**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Endorsed.**

##### 10.8.2.3 L1-SINR measurements

**R4-2203741 On R17 FR1 HST L1-SINR**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2203742 CR on L1-SINR measurement in FR1 HST**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Revised to R4-2206847 (from R4-2203742).**

**R4-2206847 CR on L1-SINR measurement in FR1 HST**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2203897 Discussion on L1-SINR measurements for FR1 HST**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204204 Discussion on Rel-17 HST in FR1**

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

**Decision: Noted.**

**R4-2204273 Further discussion on remaining issues for Rel17 FR1 HST**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204334 Discussion on L1-SINR measurements in R17 FR1 HST**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204713 L1-SINR requirements for NR HST in FR1**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

L1-SINR requirements for NR HST in FR1

**Decision: Noted.**

**R4-2204890 Discussion on L1-SINR in FR1 HST**

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

**Decision: Noted.**

**R4-2205209 Further discussion on L1-SINR measurements for Rel-17 FR1 HST CA**

*Type: other For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

This document discusses L1-SINR requirement for FR1 HST CA.

**Decision: Noted.**

##### 10.8.2.4 Others

**R4-2203743 On remaining issues for R17 FR1 HST**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2204260 Discussion on general requirements for FR1 HST RRM**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2204714 Other RRM requirements for NR HST in FR1**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

Other RRM requirements for NR HST in FR1

**Decision: Noted.**

**R4-2204891 Discussion on remaining issues in FR1 HST**

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

**Decision: Noted.**

### 10.9 NR support for high speed train scenario in FR2

#### 10.9.3 RRM core requirements

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**Email discussion: [102-e][212] NR\_HST\_FR2\_RRM\_1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][212] NR\_HST\_FR2\_RRM\_1 | R17 NR FR2 HST (NR\_HST\_FR2) | RRM Core requirements:  - General - Mobility requirements - Signalling characteristics - Measurement procedure requirements | 10.9.3.1 10.9.3.2 10.9.3.4 10.9.3.5 | Dmitry Petrov |

**R4-2206755 Email discussion summary: [102-e][212] NR\_HST\_FR2\_RRM\_1**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207053 (from R4-2206755).**

**R4-2207053 Email discussion summary: [102-e][212] NR\_HST\_FR2\_RRM\_1**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 21, 2022)**

Key open issues

* Topic #1: General
  + Sub-topic 1-1: General
    - Issue 1-1-1: Lightweight network assistance signaling
    - Issue 1-1-2: LS on network signaling to RAN2
    - Issue 1-1-3: Applicability of enhanced Set-1 RRM requirements
    - Issue 1-1-4: Train travelling opposite to the serving beam
    - Issue 1-1-5: Link simulation assumptions for L1 and L3 measurement accuracy
  + Sub-topic 1-2: UE capabilities and features
    - Issue 1-2-1: Type definition for HST FR2 RRM features
    - Issue 1-2-2: Capability for one shot large UL timing adjustment
    - Issue 1-2-3: Indication of HST FR2 RRM feature support and Applicability of enhanced RRM requirements (PC 6)
* Topic #2: Mobility, Measurement procedure and Signaling characteristics
  + Sub-topic 2-1: RRC CONNECTED and IDLE state mobility requirements
    - Issue 2-1-1: Cell reselection in IDLE/INACTIVE mode
  + Sub-topic 2-2: Measurement procedure requirements
    - Issue 2-2-1: Time period for PSS/SSS detection and Measurement period for intra-frequency measurements
    - Issue 2-2-2: Lower bound for 80ms< DRX cycle≤ 320ms
  + Sub-topic 2-3: Signaling characteristics
    - Issue 2-3-1: TCI switching delay
    - Issue 2-3-2: Inter-symbol interference during TCI switching
    - Issue 2-3-3: CSI-RS based RLM and BFD requirements

Issue 2-2-1: Time period for PSS/SSS detection and Measurement period for intra-frequency measurements

* Proposals
  + Option 1 (Apple, CATT, CMCC, Ericsson, Nokia, Samsung, Intel): Scaling factors (Mpss/sss\_synch\_w/o\_gaps and Mmeas\_period\_w/o\_gaps) equal 6 for Set 1 and 18 for Set 2
  + Option 2 (Huawei, Qualcomm): Scaling factors (Mpss/sss\_synch\_w/o\_gaps and Mmeas\_period\_w/o\_gaps) equal 10 for Set 1 and 24 for Set 2
* Discussion
  + Samsung: Option 1. In our understanding we have agreed to define requirements for 80ms DRX and not requirements for DRX > 80ms shall be defined
  + QC: Suggest compromise 8 for Set 1 and 21 for Set 2.
  + Huawei: 3 samples are needed for PC3. We consider to extend number of samples for two-side deployments. We can compromise to 6 for Set 1 and 21 for Set 2.
    - Intel: 6 beams analysis did not assume any coverage loss
  + Intel: We need to reduce the delays as much is possible. 3 samples assumption shall be the baseline.
  + E///: we do not see any reason to extend beyond 3 samples
* Agreements
  + Scaling factors (Mpss/sss\_synch\_w/o\_gaps and Mmeas\_period\_w/o\_gaps) equal to 6 for Set 1 and [18] for Set 2

**Sub-topic 1-2: UE capabilities and features**

Proposal #1 (Samsung)

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Capability interpretation for mixture of FDD/TDD and/or FR1/FR2 | Note | Mandatory/Optional |
| x-1 | Support of FR2 HST operation | 1) Support of FR2 UE PC6  2) Support of enhanced RRM requirements for FR2 HST (except the requirement for one shot large UL timing adjustment)  3) Support of demodulation processing for FR2 HST | R15 RAN4 feature group:  Support of FR2 UE power class 6 | Yes | No | UE does not meet FR2 high speed train scenario | Per Band | No | Applicable to FR2 only | N/A | FR2 UE power class PC6 signalling is used to indicate support of feature group | Optional with capability signaling |
| x-2 | Support of one shot large UL timing adjustment | 1) Support of one shot large UL timing adjustment |  | Yes | No | UE does not support one shot large UL timing adjustment | Per Band | No | Applicable to FR2 only | N/A |  | Mandatory with capability signaling |

* Agreement:
  + The following UE feature list description for feature “x-1 Support of FR2 HST operation” is endorsed in the RRM session. Further confirmation in the RAN4 Main and Demod session is required.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Capability interpretation for mixture of FDD/TDD and/or FR1/FR2 | Note | Mandatory/Optional |
| x-1 | Support of FR2 HST operation | 1) Support of FR2 UE PC6  2) Support of enhanced RRM requirements for FR2 HST (except the requirement for one shot large UL timing adjustment)  3) Support of demodulation processing for FR2 HST | [R15 RAN4 feature group:  Support of FR2 UE power class 6] | Yes | No | UE does not meet FR2 high speed train scenario | Per Band | No | Applicable to FR2 only | N/A | FR2 UE power class PC6 signalling is used to indicate support of feature group | Optional with capability signaling |

Issue 1-2-2: Capability for one shot large UL timing adjustment (not discussed)

* Proposals
  + Option 1: Introduce a new feature group and capability for one shot large UL timing adjustment) as mandatory with capability signaling.
  + Option 2: Introduce a new feature group and capability for one shot large UL timing adjustment) as optional with capability signaling
* Discussion
  + TBA
* Agreements
  + TBA

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206848 | WF on FR2 HST RRM (part 1) | Nokia, Nokia Shanghai Bell |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2203714 | TP to TR 38.854 on the Number of Rx beams | Qualcomm | Revised |  |
| R4-2204721 | draft CR On RRC\_CONNECTED state mobility for HST FR2 RRM | Ericsson | Revised |  |
| R4-2205896 | TP to TR 38.854 – beam coverage for FR2 HST | Nokia, Nokia Shanghai Bell | Endorsed |  |
| R4-2204489 | Draft CR for Cell re-selection for HST FR2 | ZTE Corporation | Revised |  |
| R4-2204490 | Draft CR for L1-RSRP measurements for Reporting for HST FR2 | ZTE Corporation | Revised |  |
| R4-2204629 | CR to TS 38.133: intra-frequency measurements without gaps for for FR2 NR HST | Nokia, Nokia Shanghai Bell | Revised |  |
| R4-2204895 | Scheduling restriction for L1-SINR for FR2 HST | Huawei, Hisilicon | Revised |  |
| R4-2205960 | TP to TR 38.854 on Legacy RRM Requirement Mobility Performance in HST FR2 Deployment Scenarios | Nokia, Nokia Shanghai Bell | Endorsed |  |
| R4-2205961 | TP to TR 38.854 on Analysis of Mobility Performance in HST FR2 Deployment Scenarios | Nokia, Nokia Shanghai Bell | Endorsed |  |
| R4-2203901 | Draft CR on RLM/BFD requirement for FR2 HST | CATT | Revised |  |
| R4-2205894 | Draft CR to introduce active TCI state switching delay requirement for FR2 HST UE | Samsung | Revised |  |

**2nd round email discussion conclusions**

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| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206848 WF on FR2 HST RRM (part 1)**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**Email discussion: [102-e][213] NR\_HST\_FR2\_RRM\_2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][213] NR\_HST\_FR2\_RRM\_2 | R17 NR FR2 HST (NR\_HST\_FR2) | RRM Core requirements:  - Timing | 10.9.3.3 | Xutao Zhou |

**R4-2206756 Email discussion summary: [102-e][213] NR\_HST\_FR2\_RRM\_2**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207054 (from R4-2206756).**

**R4-2207054 Email discussion summary: [102-e][213] NR\_HST\_FR2\_RRM\_2**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 21, 2022)**

Key open issues

* Topic #1: Timing requirements
  + Sub-topic 1-1: Inter-RRH indication
  + Sub-topic 1-2: Detailed procedure with inter-RRH indication
  + Sub-topic 1-3: Detailed procedure without inter-RRH indication
  + Sub-topic 1-4: Comments on the CR 4631 assuming RAN4 will introduce inter-RRH indication
  + Sub-topic 1-5: Comments on the CR 5892 and 3713 assuming RAN4 will NOT introduce inter-RRH indication

Sub-topic 1-1: Inter-RRH indication

* Issue: Whether to introduce inter-RRH indication?
  + Option 1: Yes (Apple, Qualcomm, Nokia, Ericsson, ZTE)
  + Option 2: No (CATT, Samsung)
* Discussion
  + Nokia: Inter-RRH indication has benefits for all timing adjustment mechanisms. Propose very simple MAC CE indication.
  + Samsung: We suggest to merge the discussion in two email threads on inter-RHR indication and lightweight assistance.
    - Nokia: same understanding
  + Samsung: Details of MAC CE indication are not clear. Benefits of signalling are questionable. For RRC signalling again we may need to have a clear description. We suggest to address this in the next release.
  + QC: Need to address this in this release due to possible impacts on UE performance. Do not see problems with MAC CE indication.
  + Intel: Inter-RRH signalling resolves problems of false alarm, but it does not resolve performance issues mentioned by Nokia and QC.
  + Apple: Inter-RRH signalling can be also helpful for L1 RSRP measurments. We prefer RRC signalling.
  + Samsung: We admit possible benefits of signalling. However, based on prior analysis the number of beams used for FR2 HST is limited and it gives UE more flexibility for tracking timing for other SSBs.
  + QC: if signalling is not introduced, then the network needs to request aperiodic L1-RSRP to give an implicit indication of RRH switch
  + Nokia: signalling is required to avoid performance issues. For QC proposal – we think it requires extra studies
  + Samsung: For QC proposal – we are not sure if re-writing the purpose of signalling is a valid approach and need further discussion on this.
  + Intel: QC proposal requires more analysis. Performance degradation can be resolved via scheduling restrictions.
  + QC: Network knows when to make TCI state switch. We also do not intend to change the meaning of aperiodic L1-RSRP request
* Agreements
  + Inter-RRH indication
    - Do not introduce explicit inter-RRH indication signalling for NR FR2 HST in Rel-17
    - FR2 HST Inter-RRH indication signalling enancements can be considered in Rel-18 subject to RAN plenary decision
  + FFS whether additional assumptions for the definition one shot UL timing adjustment requirements shall be introduced (e.g. UE is configured with aperiodic L1-RSRP reporting before the TCI state switch, or UE performed fine time tracking within X ms before/after TCI state switching)

**GTW session (March 01, 2022)**

Additional assumptions for applying one shot UL timing adjustment

* Proposal
  + Option 1: Implicit inter-RRH indication based approach
    - Option 1a: Aperiodic L1-RSRP based approach
    - Option 1b: Active TCI list based approach
  + Option 2: UE detection based approach without any implicit inter-RRH indication
* Moderator WF
  + RAN4 will further decide the following options for UE to perform downlink timing tracking
    - Option 1: Implicit inter-RRH indication by configuring aperiodic L1-RSRP measurement
    - Option 2: Introducing additional TCI switching delay for UE to perform fine downlink timing tracking (Samsung, Nokia, Intel, Ericsson)
  + RAN4 will further decide to introduce scheduling restriction based on decision of above options of downlink timing tracking
  + FR2 HST UE is allowed to perform one shot large UL timing adjustment only if UE identified the DL timing is changed with the magnitude larger than one fourth of OFDM symbol CP length, i.e., 4.5\*64\*Tc.
  + The accuracy of one-shot timing adjustment is 4 times of DL timing estimation error.
* Discussion
  + QC: Option 1.
  + Samsung: We originally proposed advanced UE with detection of switching. Can accept Option 2.
  + Nokia: Option 2
  + Intel: Similar to QC we consider that HST UEs have advanced capabilities. We can accept Option 2 as a compromise. Option 1 is a not straightforward network behavior
  + Apple: Ask some clarification on Option 2 implementation details
    - Samsung: the idea is to introduce a new factor similar TOk
* Agreement
  + Introduce additional TCI switching delay for UE to perform fine downlink timing tracking

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| [R4-2203713](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203713.zip) | Draft CR to introduce one shot large UL timing adjustment for FR2 HST UE | [Qualcomm](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203713.zip) | Revised |  |
| [R4-2204631](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204631.zip) | CR to TS 38.133: Tq timing adjustment requirements for FR2 NR HST | Nokia | Revised |  |
| [R4-2205892](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205892.zip) | Draft CR to introduce one shot large UL timing adjustment for FR2 HST UE | Samsung | Revised |  |
| [R4-2205891](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205891.zip) | TP to TR 38.854 on RA-based UL Timing Adjustment for FR2 HST | Samsung | Revised |  |

**2nd round email discussion conclusions**

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| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
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**WF/LS for approval**

================================================================================

**R4-2206016 Big CR to TS 38.133 on HST FR2 RRM Core Requirements**

*Type: CR For: Agreement  
 38.133 v17.4.0 CR-2258 rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: For email approval.**

**R4-2203711 On NR FR2 HST RRM Requirements**

*Type: discussion For: Discussion  
 Source: Qualcomm, Inc.*

**Decision: Noted.**

##### 10.9.3.1 General

**R4-2203714 TP to TR 38.854 on the Number of Rx beams**

*Type: discussion For: Endorsement  
 Source: Qualcomm, Inc.*

**Decision: Revised to R4-2206849 (from R4-2203714).**

**R4-2206849 TP to TR 38.854 on the Number of Rx beams**

*Type: discussion For: Endorsement  
 Source: Qualcomm, Inc.*

**Decision: Return to.**

**R4-2203898 Discussion on general issues for FR2 HST**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204715 General requirements for HST FR2**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

General requirements for HST FR2

**Decision: Noted.**

**R4-2204720 LS on network signalling for Rel-17 NR HST RRM**

*Type: LS out For: Approval  
 to RAN2  
 Source: Ericsson*

**Abstract:**

LS on network signalling for Rel-17 NR HST RRM

**Decision: Noted.**

**R4-2204721 draft CR On RRC\_CONNECTED state mobility for HST FR2 RRM**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

RRC\_CONNECTED state mobility for HST FR2 RRM

**Decision: Revised to R4-2206850 (from R4-2204721).**

**R4-2206850 draft CR On RRC\_CONNECTED state mobility for HST FR2 RRM**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

RRC\_CONNECTED state mobility for HST FR2 RRM

**Decision: Return to.**

**R4-2205008 General RRM requirements for HST FR2**

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

**Decision: Noted.**

**R4-2205895 Discussion on capability and feature list for FR2 HST UE**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2205896 TP to TR 38.854 – beam coverage for FR2 HST**

*Type: pCR For: Approval  
 38.854 v0.3.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Endorsed.**

**R4-2205900 Link simulation assumptions for L1 and L3 measurement accuracy for FR2 HST scenarios**

*Type: other For: Approval  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Initial link simulation assumptions for L1 and L3 measurement accuracy for FR2 HST unidirectional and bidirectional scenarios A and B

**Decision: Noted.**

**R4-2206008 Discussion on applicability of enhanced requirements for HST in FR2**

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

**Decision: Noted.**

##### 10.9.3.2 RRC Idle/Inactive and connected state mobility requirements

**R4-2204254 Discussion on mobility requirements for FR2 HST**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2204489 Draft CR for Cell re-selection for HST FR2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: ZTE Corporation*

**Decision: Revised to R4-2206851 (from R4-2204489).**

**R4-2206851 Draft CR for Cell re-selection for HST FR2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: ZTE Corporation*

**Decision: Return to.**

**R4-2204629 CR to TS 38.133: intra-frequency measurements without gaps for for FR2 NR HST**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

The following requirements for FR2 NR HST are defined: Intra-frequency measurements without gaps in connected mode including PSS/SSS detection, and measurement period.

**Decision: Revised to R4-2206853 (from R4-2204629).**

**R4-2206853 CR to TS 38.133: intra-frequency measurements without gaps for for FR2 NR HST**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

The following requirements for FR2 NR HST are defined: Intra-frequency measurements without gaps in connected mode including PSS/SSS detection, and measurement period.

**Decision: Return to.**

**R4-2204716 RRC Idle/Inactive and connected state mobility requirements**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

Mobility requirements for HST FR2

**Decision: Noted.**

**R4-2204892 Discussion on RRC Idle/Inactive and connected state mobility requirements for HST in FR2**

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

**Decision: Noted.**

**R4-2205898 On remaining RRM measurement open issues for FR2 HST**

*Type: other For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Discussing remaining issues on FR2 HST RRM measurements in connected and idle modes.

**Decision: Noted.**

**R4-2205960 TP to TR 38.854 on Legacy RRM Requirement Mobility Performance in HST FR2 Deployment Scenarios**

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

**Decision: Endorsed.**

##### 10.9.3.3 Timing requirements

**R4-2203713 Draft CR to introduce one shot large UL timing adjustment for FR2 HST UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Qualcomm, Inc.*

**Decision: Revised to R4-2206857 (from R4-2203713).**

**R4-2206857 Draft CR to introduce one shot large UL timing adjustment for FR2 HST UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Qualcomm, Inc.*

**Decision: Return to.**

**R4-2203754 Discussion on timing requirement for FR2 HST**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2203899 Discussion on timing requirement for FR2 HST**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204631 CR to TS 38.133: Tq timing adjustment requirements for FR2 NR HST**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Specify enhancements for autonomous time adjustment and one shot large UL timing adjustment

**Decision: Revised to R4-2206858 (from R4-2204631).**

**R4-2206858 CR to TS 38.133: Tq timing adjustment requirements for FR2 NR HST**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Specify enhancements for autonomous time adjustment and one shot large UL timing adjustment

**Decision: Return to.**

**R4-2204719 On Timing requirements for HST FR2**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

On Timing requirements for HST FR2

**Decision: Noted.**

**R4-2205890 Remaining Issues on Timing Requirements for FR2 HST**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2205891 TP to TR 38.854 on RA-based UL Timing Adjustment for FR2 HST**

*Type: pCR For: Approval  
 38.854 v0.3.0 CR- rev Cat: (Rel-17)  
  
 Source: Samsung*

**Decision: Revised to R4-2206860 (from R4-2205891).**

**R4-2206860 TP to TR 38.854 on RA-based UL Timing Adjustment for FR2 HST**

*Type: pCR For: Approval  
 38.854 v0.3.0 CR- rev Cat: (Rel-17)  
  
 Source: Samsung*

**Decision: Return to.**

**R4-2205892 Draft CR to introduce one shot large UL timing adjustment for FR2 HST UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Samsung*

**Decision: Revised to R4-2206859 (from R4-2205892).**

**R4-2206859 Draft CR to introduce one shot large UL timing adjustment for FR2 HST UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Samsung*

**Decision: Return to.**

**R4-2205959 On HST FR2 UL Timing Adjustment**

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

**Decision: Noted.**

##### 10.9.3.4 Signalling characteristics requirements

**R4-2203755 Discussion on signalling characteristics requirements**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2203900 Discussion on TCI switching delay for FR2 HST**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2203901 Draft CR on RLM/BFD requirement for FR2 HST**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Revised to R4-2206855 (from R4-2203901).**

**R4-2206855 Draft CR on RLM/BFD requirement for FR2 HST**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2204718 Signalling characteristics requirements for HST FR2**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

Signalling characteristics requirements for HST FR2

**Decision: Noted.**

**R4-2204893 Discussion on signaling characteristics requirements for high speed train scenario in FR2**

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

**Decision: Noted.**

**R4-2205009 Discussion on Signaling characteristics for HST FR2**

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

**Decision: Noted.**

**R4-2205893 Remaining Issues on signaling characteristics requirements for FR2 HST**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2205894 Draft CR to introduce active TCI state switching delay requirement for FR2 HST UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Samsung*

**Decision: Revised to R4-2206856 (from R4-2205894).**

**R4-2206856 Draft CR to introduce active TCI state switching delay requirement for FR2 HST UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Samsung*

**Decision: Return to.**

##### 10.9.3.5 Measurement procedure requirements

**R4-2203756 Discussion on measurement procedure requirement for FR2 HST**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2203902 Discussion on measurement procedure requirements for FR2 HST**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204490 Draft CR for L1-RSRP measurements for Reporting for HST FR2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: ZTE Corporation*

**Decision: Revised to R4-2206852 (from R4-2204490).**

**R4-2206852 Draft CR for L1-RSRP measurements for Reporting for HST FR2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: ZTE Corporation*

**Decision: Return to.**

**R4-2204717 Measurement procedure requirements for HST FR2**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

Measurement procedure requirements for HST FR2

**Decision: Noted.**

**R4-2204894 Discussion on RRM requirements for high speed train scenario in FR2**

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

**Decision: Noted.**

**R4-2204895 Scheduling restriction for L1-SINR for FR2 HST**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2206854 (from R4-2204895).**

**R4-2206854 Scheduling restriction for L1-SINR for FR2 HST**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2205961 TP to TR 38.854 on Analysis of Mobility Performance in HST FR2 Deployment Scenarios**

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

**Decision: Endorsed.**

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

#### 10.10.1 General

#### 10.10.2 RRM core requirements

##### 10.10.2.1 SRS antenna port switching

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**Email discussion: [102-e][214] NR\_RRM\_enh2\_1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][214] NR\_RRM\_enh2\_1 | R17 NR RRM further enhancements (NR\_RRM\_enh2) | RRM Core requirements:  - General - SRS antenna port switching | 10.10.1 10.10.2.1 | Jerry Cui |

**R4-2206757 Email discussion summary: [102-e][214] NR\_RRM\_enh2\_1**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207055 (from R4-2206757).**

**R4-2207055 Email discussion summary: [102-e][214] NR\_RRM\_enh2\_1**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 23, 2022)**

Key open issues

* Topic #1: SRS antenna port switching (10.10.2.1)
  + Sub-topic 1: Impact of SRS antenna port switching to other requirements
  + Sub-topic 2: Interruption requirement design
  + Sub-topic 3: Miscellaneous issues

Issue 2-3: Interruption requirement (symbol-level) proposals for scenario 1 sync case

* Summary of the interruption requirement proposals for scenario 1 sync case

|  |  |  |  |
| --- | --- | --- | --- |
| Victim CC SCS(kHz) | Aggressor CC SCS (kHz) | | |
| 15 | 30 | 60 |
| 15 (NR or LTE) | 2 (vivo, Xiaomi, Nokia)  3 (Apple, QC, CMCC, MTK, HW, Ericsson)  4 (OPPO, Intel) | 1 (Xiaomi)  2 (Apple, QC, vivo, MTK, Nokia, HW)  3 (CMCC, OPPO, Ericsson)  4 (Intel) | 1 (Xiaomi)  2 (Apple, QC, vivo, MTK, HW)  3 (CMCC, OPPO, Ericsson)  N/A (Nokia) |
| 30 | 3 (Xiaomi)  4 (Apple, vivo, MTK, Nokia, HW)  5 (QC, CMCC)  6 (OPPO, Intel, Ericsson) | 2 (Xiaomi)  3 (Apple, QC, vivo, MTK, Nokia, HW)  4 (CMCC, OPPO, Intel)  5 (Ericsson) | 2 (Xiaomi)  3 (Apple, QC, vivo, MTK, HW, Ericsson)  4 (CMCC, OPPO, Intel)  N/A (Nokia) |
| 60 | 6 (Xiaomi)  7 (Apple, vivo, MTK, HW)  8 (QC, Nokia)  9 (CMCC, OPPO)  10 (Ericsson)  11 (Intel) | 4 (Xiaomi)  5 (Apple, QC, vivo, MTK, HW)  6 (OPPO, Nokia)  7 (CMCC, Intel)  8 (Ericsson) | 3 (Xiaomi)  4 (Apple, QC, vivo, MTK, Intel, HW)  5 (OPPO)  6 (CMCC)  7 (Ericsson)  N/A (Nokia) |
| 120 | 12 (Xiaomi)  13 (Apple, vivo, HW)  14 (QC, OPPO, MTK)  17 (CMCC)  20 (Ericsson)  N/A (Nokia) | 8 (Xiaomi)  9(Apple, QC, vivo, HW)  10 (OPPO, MTK)  13 (CMCC)  14 (Ericsson)  N/A (Nokia) | 4 (Intel)  6 (Xiaomi)  7 (Apple, QC, vivo, HW)  8 (OPPO, MTK)  11 (CMCC)  14 (Ericsson)  N/A (Nokia) |

* Recommended WF

|  |  |  |  |
| --- | --- | --- | --- |
| Victim CC SCS (kHz) | Aggressor CC SCS (kHz) | | |
| 15 | 30 | 60 |
| 15 (NR or LTE) | [3] | [2] | [2] |
| 30 | [4] | [3] | [3] |
| 60 | [8] | [6] | [5] |
| 120 | [14] | [10] | [8] |

* Discussion
  + Nokia: Originally we had concerns on 60kHz but we are ok to keep it. However, carrier-based switching does not support it. So, we may need to consider to change it.
    - Session chair: we can discuss in TEI/Maintenance framework
* Agreements
  + Interruption requirement (symbol-level) for scenario 1 sync case
    - Note: Unit of interruption requirement is symbol of victim CC

|  |  |  |  |
| --- | --- | --- | --- |
| Victim CC SCS (kHz) | Aggressor CC SCS (kHz) | | |
| 15 | 30 | 60 |
| 15 (NR or LTE) | [3] | [2] | [2] |
| 30 | [4] | [3] | [3] |
| 60 | [8] | [6] | [5] |
| 120 | [14] | [10] | [8] |

Issue 2-4: Interruption requirement (slot-level) proposals for scenario 1 async case

* Recommended WF (Option 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Victim CC SCS(kHz) | Aggressor CC SCS (kHz) | | |
| 15 | 30 | 60 |
| 15 (NR or LTE) | 2 | 2 | 2 |
| 30 | 2 | 2 | 2 |
| 60 | 2 | 2 | 2 |
| 120 | 2 | 2 | 2 |

* Discussion
  + TBA
* Agreements
  + Interruption requirement (slot-level) for scenario 1 async case
    - Note: Unit of interruption requirement is slot for NR and subframe for LTE of victim CC

|  |  |  |  |
| --- | --- | --- | --- |
| Victim CC SCS (kHz) | Aggressor CC SCS (kHz) | | |
| 15 | 30 | 60 |
| 15 (NR or LTE) | 2 | 2 | 2 |
| 30 | 2 | 2 | 2 |
| 60 | 2 | 2 | 2 |
| 120 | 2 | 2 | 2 |

Issue 2-5: Interruption requirement (slot-level) proposals for scenario 2

* Recommended WF (Option 1)

|  |  |  |  |
| --- | --- | --- | --- |
| Victim CC SCS(kHz) | Aggressor CC SCS (kHz) | | |
| 15 | 30 | 60 |
| 15 (NR or LTE) | 2 | 2 | 2 |
| 30 | 2 | 2 | 2 |
| 60 | 3 | 2 | 2 |
| 120 | 5 | 3 | 3 |

* Discussion
  + TBA
* Agreements
  + Interruption requirement (slot-level) for scenario 2
    - Note: Unit of interruption requirement is slot for NR and subframe for LTE of victim CC

|  |  |  |  |
| --- | --- | --- | --- |
| Victim CC SCS (kHz) | Aggressor CC SCS (kHz) | | |
| 15 | 30 | 60 |
| 15 (NR or LTE) | 2 | 2 | 2 |
| 30 | 2 | 2 | 2 |
| 60 | 3 | 2 | 2 |
| 120 | 5 | 3 | 3 |

* + - FFS how to handle UEs supporting *simultaneousRxTxInterBandENDC* or *simultaneousRxTxInterBandCA*
    - FFS whether to exclude downlink symbols from interruption requirements for intra-band TDD synchronous case.

Issue 1-1: Impact of SRS antenna port switching to RRM requirements in NR-SA

* Proposals
  + Option 1 (Apple, Intel, HW, Ericsson): NR measurements are always prioritized including L3 measurement, RLM/BFD/CBD and L1-RSRP/L1-SINR measurement
  + Option 2: NR measurements are always prioritized including L3 measurement, RLM/BFD/CBD and L1-RSRP/L1-SINR measurement, and,
    - Option 2a (QC, CATT): No requirement applies for AP/P/SP L1-RSRP/L1-SINR measurement colliding with AP SRS.
    - Option 2b (OPPO, MTK): No requirement applies for aperiodic L1-RSRP/L1-SINR measurement collides with AP SRS in the same OFDM symbol.
    - Option 2c (Nokia): Do not define the requirements when AP NR SRS resource and the P/SP CSI-RS for NR L1-RSRP/L1-SINR measurement are scheduled in the same OFDM symbol, or the prioritization needs to be clarified for this particular case.
    - Option 2d (vivo): Add clarifications that longer delay for L1-RSRP/L1-SINR measurements will be expected if the interrupted DL symbols due to SRS antenna switching colliding with the DL symbol for AP L1-RSRP or L1-SINR measurements, and no requirement is specified.
* Agreements
  + NR measurements are always prioritized including L3 measurement, RLM/BFD/CBD and L1-RSRP/L1-SINR measurement
    - FFS whether to define requirement for L1-RSRP/L1-SINR measurements colliding with AP SRS

Session chair: come back in the 2nd round

**GTW session (March 01, 2022)**

Issue 1-1: Impact of SRS antenna port switching to RRM requirements in NR-SA

* 1st round agreements
  + NR measurements are always prioritized including L3 measurement, RLM/BFD/CBD and L1-RSRP/L1-SINR measurement
    - FFS whether to define requirement for L1-RSRP/L1-SINR measurements colliding with AP SRS

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206861 | WF on further RRM enhancement for NR and MR-DC - SRS antenna port switching | Apple |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2203922 | Interruption requirement to LTE serving cell, and impacts to other LTE RRM | CATT | Revised |  |
| R4-2205837 | Draft CR on Interruption requirement to NR serving cell, and impacts to other NR RRM requirement (if applicable) | Ericsson | Revised |  |
| R4-2204705 | draftCR on introduction of SRS antenna port switching | Nokia | Endorsed |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206861 WF on further RRM enhancement for NR and MR-DC - SRS antenna port switching**

*Type: other For: Approval  
 Source: Apple*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**R4-2203717 On SRS antenna switching**

*Type: discussion For: Discussion  
 Source: Qualcomm, Inc.*

**Decision: Noted.**

**R4-2203783 Discussion on SRS antenna port switching**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2203921 Further discussion on SRS antenna port switching**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2203922 Interruption requirement to LTE serving cell, and impacts to other LTE RRM requirement**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Revised to R4-2206862 (from R4-2203922).**

**R4-2206862 Interruption requirement to LTE serving cell, and impacts to other LTE RRM requirement**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2204242 Further discussion on RRM requirements for SRS antenna switching**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204265 Discussion on SRS antenna port switching**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2204274 RRM requirements for SRS ant port switch**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204314 Discussion on interruption due to SRS antenna port switching**

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

**Decision: Noted.**

**R4-2204335 Discussion on RRM requirements for SRS antenna port switching**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204362 Discussion on SRS antenna port switching**

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

**Decision: Noted.**

**R4-2204399 Discussion on SRS antenna port switching**

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

**Decision: Noted.**

**R4-2204704 Interruption requirements at SRS antenna port switching**

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

**Decision: Noted.**

**R4-2204705 38.133 draftCR on introduction of SRS antenna switching**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Endorsed.**

**R4-2204869 Discussion on requirements for SRS antenna switching**

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

**Decision: Noted.**

**R4-2205 836 RRM requirements for SRS antenna port switching**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution we provide our views on the open issues of SRS antenna port switching

**Decision: Noted.**

**R4-2205837 Draft CR on Interruption requirement to NR serving cell, and impacts to other NR RRM requirement (if applicable)**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

We provide draft CR to introduce interruption requirements to NR serving cell

**Decision: Revised to R4-2206863 (from R4-2205837).**

**R4-2206863 Draft CR on Interruption requirement to NR serving cell, and impacts to other NR RRM requirement (if applicable)**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

We provide draft CR to introduce interruption requirements to NR serving cell

**Decision: Return to.**

##### 10.10.2.2 HO with PSCell

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**Email discussion: [102-e][215] NR\_RRM\_enh2\_2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][215] NR\_RRM\_enh2\_2 | R17 NR RRM further enhancements (NR\_RRM\_enh2) | RRM Core requirements:  - HO with PSCell | 10.10.2.2 | Qian Yang |

**R4-2206758 Email discussion summary: [102-e][215] NR\_RRM\_enh2\_2**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207056 (from R4-2206758).**

**R4-2207056 Email discussion summary: [102-e][215] NR\_RRM\_enh2\_2**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 23, 2022)**

Key open issues

* Topic #1: HO with PSCell
  + Sub-topic 2-2 Delay requirement design of HO with PSCell
  + Sub-topic 2-5 Requirements for NR-U

Issue 2-2-3b: If UE SW processing and RF warm-up for PCell HO and PSCell addition/change are performed in parallel

* In the previous two meetings, following common understanding is reached regarding processing timing for legacy PCell handover and PSCell addition/change.
  + Tprocessing for PCell HO
    - Reuse the Tprocessing defined for legacy PCell HO
      * 20ms, when source and target cells are in the same FR
      * 40ms, when source and target cells are in different FRs
  + Tprocessing for PSCell change for NR-DC and EN-DC
    - 20ms, when source and target cells are in the same FR
    - 40ms, when source and target cells are in different FRs
  + Tprocessing for PSCell addition for NR-DC and EN-DC
    - 20ms, when NR PSCell is in the same FR as PCell
    - 40ms, when NR PSCell is in the different FR from PCell
* Proposals
  + Option 1: (Apple, ZTE, Huawei)
    - Tprocessing for HO with PSCell = max(Tprocessing for PCell HO, Tprocessing for PSCell addition/change)
  + Option 1a: (Qualcomm, vivo, Xiaomi, MTK, Apple, OPPO)
    - Tprocessing for HO with PSCell = max(Tprocessing for PCell HO, Tprocessing for PSCell addition/change) + [X] ms.
    - X=5 (Qualcomm, Xiaomi, OPPO, Apple)
    - X=10 (MTK, Apple, Qualcomm, OPPO)
    - X= can be different for different HO with PSCell scenarios (vivo)
    - Tprocessing 30ms for NR-SA to ENDC exceptional. (Qualcomm)
  + Option 2: (CATT, Ericsson, Nokia)
    - Tprocessing applies independently for PCell and PSCell.
    - No margin is needed. (CATT)
    - 20ms or 40ms depending on whether target is same or different FR (CMCC)
  + Option 3: (Intel)
    - For the parallel processing case of HO with PSCell, PSCell addition delay requirements and HO delay requirements are defined separately:
    - HO delay = TRRC\_delay +Tsearch + TIU + (Tprocessing\_PCell +X) + T∆ + Tmargin ms
    - PSCell addition delay= TRRC\_delay + (Tprocessing\_PSCell +X) + Tsearch + T∆ + TPSCell\_ DU + 2 ms
    - Where Tprocessing\_PCell and Tprocessing\_PSCell are UE processing time for PCell HO and PSCell addition respectively, and X is margin with FFS value.
* Discussion
  + TBA
* Agreements
  + Option 1a: (Qualcomm, vivo, Xiaomi, MTK, Apple, OPPO, Intel, Huawei)
    - Tprocessing for HO with PSCell = max(Tprocessing for PCell HO, Tprocessing for PSCell addition/change) + [5] ms.
  + Option 2: (CATT, Ericsson, Nokia)
    - Tprocessing applies independently for PCell and PSCell
    - X = [10] ms additional margin is applied for PSCell addition/change

Session chair: come back in the 2nd round

Issue 2-2-3c-1: Applicability and value of extra margin Y ms for sequential processing

* Previous agreement
  + Introduce extra margin Y ms for sequential processing case comparing to parallel processing case for UE SW processing and RF warm-up for [PCell handover] and PSCell addition/change
    - Y = [10] ms
    - Note: no extra interruption is required
* Proposals
  + Option 1: (Apple, Qualcomm, OPPO, Huawei, Xiaomi, MTK, Intel)
    - Introduce extra margin Y ms for sequential processing case comparing to parallel processing case for UE SW processing and RF warm-up for PCell handover and PSCell addition/change
      * Y = 10 ms
      * Note: no extra interruption is required
  + Option 2: (Ericsson)
    - Introduce extra margin Y ms for sequential processing case comparing to parallel processing case for UE SW processing and RF warm-up for [PCell handover] and PSCell addition/change
      * Y = 5 ms
      * Note: no extra interruption is required
  + Option 3: (Nokia)
    - Extra margin Y ms for UE RF adjustment in sequential processing compared to parallel processing is only applied for PSCell addition/change in HO with PSCell requirements.
* Discussion
  + TBA
* Agreements
  + Introduce extra margin Y ms for sequential processing case comparing to parallel processing case for UE SW processing and RF warm-up for [PCell handover] and PSCell addition/change
    - Y = 10 ms
    - Note: no extra interruption is required

Issue 2-2-3d: Processing timeline for NR SA to EN-DC

* Proposals
  + Option 1a (Apple)
    - if explicit SMTC configuration of target unknown PSCellis present in*RRCConnectionReconfiguration*, sequential processing is used.
    - Otherwise, if explicit SMTC configuration of target unknown PSCellis absent in*RRCConnectionReconfiguration*, parallel processing is used.
    - If source PCell has configured the UE with an MO which have the same SSB frequency and SCS as target PSCell, UE uses the SMTC in the configured MO, or
    - If source PCell doesn’t configure the UE with MO which have the same SSB frequency and SCS as target PSCell, UE assumes 5ms as SSB periodicity for target PSCell.
  + Option 1b (MTK)
    - Sequential processing, if the SMTC of the target PSCell is configured in HO command:
    - UE follows the timing reference of target E-UTRA PCell, where sequential processing should be performed to obtain the target PCell timing first.
    - Parallel processing, if the SMTC of the target PSCell is not configured in HO command:
    - If UE is configured with source PCell MO, UE follows the SMTC in this MO.
    - If UE is not configured with source PCell MO, UE assumes SSB has 5ms periodicity.
  + Option 1c (Qualcomm, OPPO)
    - Sequential processing is applied when SMTC of target unknown PScell is provided by to UE in the container obtained from target E-UTRAN PCell. Otherwise, parallel processing can be applied.
  + Option 1d (CATT)
    - Sequential processing will be applied for HO with PSCell if explicit SMTC configuration is present in *RRCConnectionReconfiguration*, and UE applies PSCell SMTC configuration based on the timing reference of target EUTRA PCell. Otherwise, parallel processing case of HO with PSCell will be applied.
  + Option 1e (Ericsson)
    - If explicit SMTC for PSCell is configured in *RRCConnectionReconfiguration,* HO with PSCell requirements are to be defined assuming sequential operation for cell search and timing acquisition. In other cases, requirements can be defined assuming parallel processing.
  + Option 1f (Xiaomi)
    - Sequential processing will be applied for HO with PSCell if explicit SMTC configuration is present in *RRCConnectionReconfiguration*, and UE applies PSCell SMTC configuration based on the timing reference of target EUTRA PCell. Otherwise, parallel processing case of HO with PSCell will be applied.
    - If the SMTC of the target PSCell is configured in *RRCConnectionReconfiguration*, UE applies the PSCell SMTC configuration based on the timing reference of target EUTRA PCell and sequential processing is assumed.
    - If the SMTC of the target PSCell is not configured in *RRCConnectionReconfiguration*,
    - If either source PCell or source PSCell has configured the UE with an MO which have the same SSB frequency and SCS as target PSCell,
      * UE uses the SMTC in the configured MO and parallel processing is assumed.
    - If both source PCell and source PSCell have configured the UE with MOs which have the same SSB frequency and SCS as target PSCell,
      * it is up to UE implementation which SMTC in the MOs are used and parallel processing is assumed.
    - If neither source PCell nor source PSCell has configured the UE with MO which have the same SSB frequency and SCS as target PSCell,
      * UE assumes 5ms as SSB periodicity for target PSCell and parallel processing is assumed.
  + Option 1g (vivo)
    - sequential processing for the case when SMTC of target unknown PSCell is provided to UE in the container obtained from target E-UTRAN PCell, and
    - parallel processing for the case when target PSCell is known, and
    - parallel processing for the case when SMTC of target unknown PSCell is obtained by UE from the MOs of source PCell
    - If UE assumes 5ms SSB periodicity for the target PSCell by default, parallel processing is assumed.
    - RAN4 may further discuss whether to allow larger X in Tprocessing if the SSB periodicity for either PCell HO or PSCell change is not more than 5ms.
  + Option 2 (Nokia)
    - In HO with PSCell for NR-SA to EN-DC, parallel processing delay requirements which will reuse legacy HO and PSCell addition will fulfill the delay in this specific case when SMTC of target unknown PSCell is configured by source NR PCell in *RRCConnectionReconfiguration* of *targetRAT-MessageContainer*.
* Recommended WF
  + If explicit SMTC of target unknown PSCell is configured by source NR PCell in *RRCConnectionReconfiguration* of *targetRAT-MessageContainer*,
    - UE follows the timing reference of target E-UTRA PCell and sequential processing is assumed.
  + Otherwise
    - UE follows the timing reference of source NR PCell and parallel processing is assumed.
      * If source NR PCell has configured the UE with an MO which have the same SSB frequency and SCS as target NR PSCell, UE uses the SMTC in the configured MO, or
      * If source NR PCell doesn’t configure the UE with MO which have the same SSB frequency and SCS as target NR PSCell, UE assumes 5ms as SSB periodicity for target NR PSCell.
* Discussion
  + Session chair: come back in the 2nd round

**GTW session (March 01, 2022)**

Issue 2-2-3b: If UE SW processing and RF warm-up for PCell HO and PSCell addition/change are performed in parallel

* 1st round agreements
  + Option 1a: (Qualcomm, vivo, Xiaomi, MTK, Apple, OPPO, Intel, Huawei, CMCC)
    - Tprocessing for HO with PSCell = max(Tprocessing for PCell HO, Tprocessing for PSCell addition/change) + [5] ms.
  + Option 2: (CATT, Ericsson, Nokia)
    - Tprocessing applies independently for PCell and PSCell
    - X = [10] ms additional margin is applied for PSCell addition/change
* Discussion
  + E///: can’t UE time the interruption so that it will not overlap with DL RS for synchronization?
  + Nokia: The main concern in this issue is about the RF warm up processing of PSCell may interrupt PCell DL synchronization, would it be more clarified how the interrupt will impact the time for Tprocessing?
  + Apple: original Option 1 is to make parallel processing for SW processing and RF warm-up. Then we tried to address Option 2 and handle PCell and PSCell separately.
  + Nokia: can compromise to Option 1a but prefer to remove 5 ms margin
* Agreements
  + Tprocessing for HO with PSCell = max(Tprocessing for PCell HO, Tprocessing for PSCell addition/change) + 5 ms.

Issue 2-2-3c-1: Applicability and value of extra margin Y ms for sequential processing

* Agreement (update to previous agreement)
  + Introduce extra margin Y ms for sequential processing case comparing to parallel processing case for UE SW processing and RF warm-up for [PCell handover] and PSCell addition/change
    - Y = ~~10~~ 5 ms
    - Note: no extra interruption is required

Issue 2-5-1: Requirements for HO with PSCell for NR-U

* Proposal
  + Option 1
    - Postpone the requirement design of NR-U HO with PSCell until RAN4 completes the baseline requirement for HO with PSCell on licensed band.
  + Option 1a
    - Specify the requirements for NR-U HO with PSCell in the Rel-17 maintenance phase.
* Session chair: continue discussion till Thursday. So far, no consensus to make the requirements in the WI scope.

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206864 | WF on further RRM enhancement for NR and MR-DC – HO with PSCell | vivo |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| [R4-2203785](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203785.zip) | Draft CR on HO with PSCell for NR SA to EN-DC\_R17 | Apple | Revised |  |
| [R4-2204871](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204871.zip) | Draft CR on requirements for HO with PSCell from EN-DC to EN-DC | Huawei, Hisilicon | Revised |  |
| [R4-2205839](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205839.zip) | Drfat CR on HO with PSCell requirements for NE DC to NE-DC | Ericsson | Revised |  |
| [R4-2205877](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205877.zip) | dratCR on HO with PSCell for NR-DC to NR-DC | Nokia, Nokia Shanghai Bell | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206864 WF on further RRM enhancement for NR and MR-DC – HO with PSCell**

*Type: other For: Approval  
 Source: vivo*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**R4-2203784 Discussion on RRM requirement for handover with PSCell**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2203785 Draft CR on HO with PSCell for NR SA to EN-DC\_R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Apple*

**Decision: Revised to R4-2206865 (from R4-2203785).**

**R4-2206865 Draft CR on HO with PSCell for NR SA to EN-DC\_R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2203866 RRM requirements for HO with PSCell**

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

**Decision: Noted.**

**R4-2203923 Further discussion on HO with PSCell**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204162 Discussion on RRM requirements for HO with PSCell**

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

**Decision: Noted.**

**R4-2204231 Further discussion on RRM requirements for handover with PSCell**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204256 Discussion on HO with PSCell**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2204275 RRM requirements for HO with PSCell**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204336 Discussion on RRM requirements for HO with PSCell**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204400 Discussion on HO with PSCell**

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

**Decision: Noted.**

**R4-2204870 Discussion on requirements for HO with PSCell**

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

**Decision: Noted.**

**R4-2204871 Draft CR on requirements for HO with PSCell from EN-DC to EN-DC**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2206866 (from R4-2204871).**

**R4-2206866 Draft CR on requirements for HO with PSCell from EN-DC to EN-DC**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2205838 RRM requirements for handover with PSCell**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution we provide our views on the open issues for HO with PSCell

**Decision: Noted.**

**R4-2205839 Drfat CR on HO with PSCell requirements for NE DC to NE-DC**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

We provide draft CR to introduce PSCell requirements for NE DC to NE-DC

**Decision: Revised to R4-2206867 (from R4-2205839).**

**R4-2206867 Drfat CR on HO with PSCell requirements for NE DC to NE-DC**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

We provide draft CR to introduce PSCell requirements for NE DC to NE-DC

**Decision: Return to.**

**R4-2205863 Discussion on HO with PSCell**

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

**Decision: Noted.**

**R4-2205876 discussion on HO with PSCell**

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

**Abstract:**

discussion on HO with PSCell

**Decision: Noted.**

**R4-2205877 dratCR on HO with PSCell for NR-DC to NR-DC**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

DraftCR for HO with PSCell for NR-DC to NR-DC

**Decision: Revised to R4-2206868 (from R4-2205877).**

**R4-2206868 dratCR on HO with PSCell for NR-DC to NR-DC**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

DraftCR for HO with PSCell for NR-DC to NR-DC

**Decision: Return to.**

##### 10.10.2.3 PUCCH SCell activation/deactivation

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**Email discussion: [102-e][216] NR\_RRM\_enh2\_3**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][216] NR\_RRM\_enh2\_3 | R17 NR RRM further enhancements (NR\_RRM\_enh2) | RRM Core requirements:  - PUCCH SCell activation/deactivation | 10.10.2.3 | Qiuge Guo |

**R4-2206759 Email discussion summary: [102-e][216] NR\_RRM\_enh2\_3**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207057 (from R4-2206759).**

**R4-2207057 Email discussion summary: [102-e][216] NR\_RRM\_enh2\_3**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 23, 2022)**

Key open issues

* Topic #1: PUCCH SCell activation/deactivation requirements
  + Sub-topic 1-1 PUCCH SCell activation requirements for unknown cell
  + Sub-topic 1-2 Components of Tactivation\_time
  + Sub-topic 1-3 PUCCH Scell activation delay requirement for invalid TA case
  + Sub-topic 1-4 PUCCH SCell activation delay requirements with multiple DL Scells
  + Sub-topic 1-5 Applicability of PUCCH SCell activation requirements

Issue 1-3-2: How to capture the delay uncertainty of PDCCH order receiving in PUCCH Scell activation delay requirements for invalid TA case.

* Agreement in RAN4#99e meeting:
  + T1 is up to the summation of SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213
* Proposals
  + Option 1: (Apple, CATT, Xiaomi, MTK, Ericsson)
    - Introduce a new uncertainty parameter TPDCCH in PUCCH Scell activation delay requirements with no certain value defined.
  + Option 2a: (Apple, QC, OPPO, DOCOMO, Nokia, Intel, vivo, ZTE, Ericsson)
    - The uncertainty for PDCCH order receiving is included in the definition of T1. T1 is the delay uncertainty in acquiring the first available PDCCH triggered PRACH occasion in the PUCCH SCell after Tactivation\_time.
  + Option 2b: (MTK)
    - revised the definition of T1, e.g., T1 is up to the summation of a delay uncertainty for reception of PDCCH order, SSB to PRACH occasion association period and 10 ms. SSB to PRACH occasion associated period is defined in the table 8.1-1 of TS 38.213. The delay uncertainty for reception of PDCCH order starts from end of n + THARQ+ Tactivation\_time until reception of PDCCH order.
* Tentative agreements
  + The uncertainty for PDCCH order receiving is included in the definition of T1. T1 is the delay uncertainty in acquiring the first available PDCCH triggered PRACH occasion in the PUCCH SCell after Tactivation\_time.

Session chair: come back in the 2nd round

Issue 1-3-3: Whether to include [X] in the PUCCH Scell activation delay requirements for invalid TA case?

* Proposals
  + Option 1: (QC, CATT, Xiaomi, OPPO, MTK, DOCOMO)
    - No
  + Option 2: (Nokia)
    - The relaxation margin [X] is not needed for the case of unknown FR1 PUCCH SCell activation with a valid TA.
    - TL1-RSRP, report is re-defined as “the delay of acquiring CSI reporting resources in a cell on which the L1-RSRP report is sent” to capture the relaxation margin [X] in FR2.
  + Option 3: (Ericsson)
    - Based on RAN1/2 progress.
* Discussion
  + TBA
* Agreements
  + Do not include [X] in the PUCCH Scell activation delay requirements for invalid TA case
    - Note: the decision can be revisited in case any issues are identified based on further RAN1/2 decisions

Issue 1-2-4: Whether the PL-RS will introduce extra delay time when the known condition is met?

* Proposals
  + Option 1: (QC)
    - RAN4 does not define PUCCH SCell activation requirements that require an assumption of UE being able to maintain a measurement of PL-RS configured in a different serving cell in the same band as the PUCCH Scell.
  + Option 2: (Apple, Huawei, QC, Intel, vivo)
    - when PL-RS of target PUCCH Scell is known, the 5 sample measurement time is always considered and no need to consider condition of ‘maintain’ or ‘not maintain’.
  + Option 3: (CATT, CMCC, MTK, Intel, DOCOMO, Ericsson, Apple)
    - 5 samples time is considered when PL-RS is not maintained before Scell is activated. And no additional delay is needed when PL-RS is maintained before Scell is activated.
  + Option 3a: (Intel)
    - If the Scell being activated belongs to FR2 and if there is at least one active serving cell on that FR2 band, and PL-RS is maintained on the active serving cell, UE don’t need extra 5 samples to calculate pathloss.
  + Option 4: (Nokia)
    - No additional delay will be introduced due to PL-RS measurement.
* Discussion
  + TBA
* Tentative agreements
  + When PL-RS of target PUCCH Scell is known
    - When PL-RS is not maintained before Scell is activated, 5 samples delay is introduced
    - When PL-RS is maintained before Scell is activated
      * Option 2: 5 samples delay is introduced
      * Option 3: No additional delay is introduced

Session chair: come back in the 2nd round

**GTW session (March 01, 2022)**

1-2-3: The known condition of PL-RS

* Tentative agreements
  + the known condition of PL-RS for known PUCCH SCell could be defined as (based on the known condition in legacy PL-RS switching delay, and the different part form legacy definition is highlighted in *yellow*):
    - The pathloss reference signal is known *for known PUCCH Scell during activation* if the following conditions are met during the period between the last transmission of the RS resource used for *L3 RSRP measurement reporting* and *the completion of PUCCH Scell activation*, where the RS resource is the target pathloss reference signal or QCLed (with Type D) to the target pathloss reference signal.
      * *Pathloss reference signal activation command* is received within 1280 ms upon the last transmission of the RS resource for *L3 measurement*
      * The UE has sent at least one *L3 RSRP report* for the target pathloss reference signal before *the pathloss reference signal activation command*
      * The target pathloss reference signal remains detectable during *the PUCCH Scell activation period*
        + SNR of the target pathloss reference signal≥-3dB
      * The associated SSBs with the target pathloss reference signal remain detectable during *the PUCCH Scell activation period*
        + SNR of the associated SSB ≥-3dB
      * Otherwise, the pathloss reference signal is unknown.
    - The pathloss reference signal is known for *unknown PUCCH Scell during activation* if the following conditions are met during the period between the last transmission of the RS resource used for L1-RSRP measurement reporting and *the completion of PUCCH Scell activation*, where the RS resource is the target pathloss reference signal or QCLed (with Type D) to the target pathloss reference signal.
      * *Pathloss reference signal activation command* is received within 1280 ms upon the last transmission of the RS resource for beam reporting or measurement
      * The UE has sent at least one L1-RSRP report for the target pathloss reference signal before *the pathloss reference signal activation command*
      * The target pathloss reference signal remains detectable during *the PUCCH SCell activation period*
        + SNR of the target pathloss reference signal≥-3dB
      * The associated SSBs with the target pathloss reference signal remain detectable during *the PUCCH SCell activation period*
        + SNR of the associated SSB ≥-3dB
      * Otherwise, the pathloss reference signal is unknown.
* Discussion
  + Nokia: have a number of comments (details provided in the 2nd round comments)
  + Apple: See our replies to Nokia in the 2nd round document. We propose the following to address Nokia comments
    - Replace “Activation command for uplink spatial relation associated with the pathloss reference signal” with “Activation command for uplink spatial relation associated with the pathloss reference signal”
  + Session chair: Come back on Thu

**Sub-topic 1-4 PUCCH SCell activation delay requirements with multiple DL Scells**

Issue 1-4-2: The delay requirements for PUCCH SCell activation with multiple DL Scells?

* Proposals
  + Option 1: Define the requirements based on the following scenarios (different processing assumption for PUCCH Scell and other DL Scells)
    - **Scenario 1: The procedure of PUCCH Scell activation and other DL Scells activation can be performed in parallel.** 
      * FFS on the requirements:
        + the single PUCCH SCell activation delay requirements still apply for the PUCCH Scell, and
        + the normal SCell activation delay requirement for deactivated SCell with multiple Downlink SCells defined in clause 8.3.7 of current specification 38.133 apply for other downlink Scells.
    - **Scenario 2: The procedure of PUCCH Scell activation and other Scells activation cannot be performed in parallel.** 
      * FFS on the requirements:
        + PUCCH SCell activation shall be prioritised w.r.t other SCells.
        + the single PUCCH SCell activation delay requirements still apply for the PUCCH Scell.
  + Option 2: Define the requirements taking normal Scell activation with multiple DL Scell as baseline (i.e. take PUCCH Scell as one of normal Scell in R16 requirement)
    - ~~FFS on the requirements:~~ 
      * ~~the normal SCell activation delay requirement for deactivated SCell with multiple Downlink SCells defined in clause 8.3.7 of current specification 38.133 apply for other downlink Scells.~~
      * ~~PUCCH Scell activation delay requirements can be derived from single PUCCH SCell activation delay by replacing with~~
* Agreement
  + Define delay requirements for PUCCH SCell activation with multiple DL Scells taking normal Scell activation with multiple DL Scell as baseline

1-2-4: Whether the PL-RS will introduce extra delay time when the known condition is met?

* Tentative agreements
  + When PL-RS of target PUCCH Scell is known
    - When PL-RS is not maintained before Scell is activated, 5 samples delay is introduced
    - When PL-RS is maintained before Scell is activated
      * Option 2: 5 samples delay is introduced
      * Option 3: No additional delay is introduced

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206869 | WF on further RRM enhancement for NR and MR-DC – PUCCH SCell activation/deactivation requirements | CATT |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2203925 | PUCCH Scell activation delay requirements with multiple Scell | CATT | Revised |  |
| R4-2204703 | 38.133 draft CR on PUCCH SCell activation delay requirements | Nokia | Revised |  |
| R4-2204873 | Draft CR on requirements for interruption requirements to NR serving Cell for PUCCH SCell activation | Huawei | Revised |  |
| R4-2205841 | Draft CR on Interruption requirements to LTE serving cell | Ericsson | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206869 WF on further RRM enhancement for NR and MR-DC – PUCCH SCell activation/deactivation requirements**

*Type: other For: Approval  
 Source: CATT*

**Abstract:**

**Discussion:**

**Decision: Return to.**

================================================================================

**R4-2203786 Discussion on PUCCH SCell activation and deactivation**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2203852 PUCCH SCell activation and deactivation**

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

**Decision: Noted.**

**R4-2203924 Further discussion on PUCCH SCell activation\_deactivation**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2203925 PUCCH Scell activation delay requirements with multiple Scell**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Revised to R4-2206870 (from R4-2203925).**

**R4-2206870 PUCCH Scell activation delay requirements with multiple Scell**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2204232 Further discussion on SCell activation and deactication requirements for PUCCH SCell**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204264 Discussion on PUCCH SCell activation/deactivation**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2204276 RRM requirements for PUCCH SCell Activation/Deactivation**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204363 Discussion on PUCCH SCell activation and deactivation**

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

**Decision: Noted.**

**R4-2204364 Draft CR for PUCCH SCell deactivation delay requirements in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek Inc.*

**Decision: Postponed.**

**R4-2204401 Discussion on PUCCH SCell activation**

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

**Decision: Noted.**

**R4-2204688 Discussions on PUCCH SCell Activation/Deactivation delay requirements**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: NTT DOCOMO, INC.*

**Decision: Noted.**

**R4-2204702 Discussion on the activation delay for deactivated PUCCH SCell**

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

**Decision: Noted.**

**R4-2204703 38.133 draft CR on PUCCH SCell activation delay requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2206871 (from R4-2204703).**

**R4-2206871 38.133 draft CR on PUCCH SCell activation delay requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Return to.**

**R4-2204872 Discussion on requirements for PUCCH SCell activation**

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

**Decision: Noted.**

**R4-2204873 Draft CR on requirements for interruption requirements to NR serving Cell for PUCCH SCell activation**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2206872 (from R4-2204873).**

**R4-2206872 Draft CR on requirements for interruption requirements to NR serving Cell for PUCCH SCell activation**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2205840 RRM requirements for SCell activation/deactivation with PUCCH**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution we provide our views on the RRM requirements for SCell (de)activation with PUCCH

**Decision: Noted.**

**R4-2205841 Draft CR on Interruption requirements to LTE serving cell**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

We provide draft CR to introduce Interruption requirements to LTE serving cell

**Decision: Revised to R4-2206873 (from R4-2205841).**

**R4-2206873 Draft CR on Interruption requirements to LTE serving cell**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

We provide draft CR to introduce Interruption requirements to LTE serving cell

**Decision: Return to.**

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

#### 10.11.1 General

#### 10.11.2 RRM core requirements

##### 10.11.2.1 Pre-configured MG pattern(s)

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**Email discussion: [102-e][218] NR\_MG\_enh\_2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][218] NR\_MG\_enh\_2 | R17 NR measurement gap enhancements (NR\_MG\_enh) | RRM Core requirements:  - Pre-configured MG pattern(s) | 10.11.2.1 | Rui Huang |

**R4-2206761 Email discussion summary: [102-e][218] NR\_MG\_enh\_2**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207059 (from R4-2206761).**

**R4-2207059 Email discussion summary: [102-e][218] NR\_MG\_enh\_2**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 22, 2022)**

Key open issues

* Topic #1: Pre-configured MG pattern(s)
  + Sub-topic 1 Pre-MG configuration
  + Sub-topic 2 Pre-MG activation/deactivation
  + Sub-topic 3 Pre-MG activation/deactivation under CA

Issue 2-1 Additional trigger events for pre-MG activation/deactivation

* Agreements from RAN4 #101bis-e
  + For UE to autonomous pre-MG activation/deactivation the following trigger events may change the pre-MG activation status
    - BWP switching by DCI/Timer based
    - activation/de-activation of SCell(s)
  + FFS how to handle other cases in terms of UE and NW behavior
    - addition/removal of any measurement object(s)
    - addition/release/change of a SCell under CA
    - BWP switching by RRC
    - LPP positioning request
* Proposals
  + Option 1 (Apple, MTK, xiaomi, CMCC, Nokia, Ericsson): pre-configured MG activation/deactivation can be triggered by:
    - addition/removal of any measurement object(s)
    - addition/release/change of a SCell under CA
    - BWP switching by RRC
    - LPP positioning request
  + Option 1a (ZTE, Qualcomm): pre-configured MG activation/deactivation can be triggered by :
    - addition/removal of any measurement object(s)
    - addition/release/change of a SCell under CA
    - BWP switching by RRC
  + Option 2 (CATT, OPPO, Intel, Huawei): No additional trigger events in Rel17 WI
  + Option 3 (Nokia): For signalling-based Pre-MG activation/deactivation, RRC based BWP switching command and Pre-MG activation/deactivation status indication are combined in the same RRC message
* Discussion
  + Moderator: compromise proposal is to go with Option 2 and add clarifications on pre-MG requirements applicability in the spec
  + QC: We have already agreed a generic autonomous activation rule. The compromise proposal may override the rule.
    - Intel: We also need to consider signalling-based solution. Network will need to update the signalling. For autonomous rule – we see limited impacts from Option 1.
  + Apple: We share different view on RAN2 workload. RAN2 doesn’t need to define the rules.
  + QC: Same view as Apple on RAN2 workload. Option 1 events are critical for autonomous rules. For signalling-based approach the network controls the procedure.
  + Nokia: There shall be distinction between autonomous and signalling based solutions.
  + ZTE: for UE autonomous mechanism we need a clear rule. Support 1a. LPP request is transparent to the network.
  + CATT: these issues are for UE autonomous events. Option 1 will add workload for network.
  + E///: all these events are for autonomous mechanism. On LPP request we share view with ZTE and we may need to consider signalling. Our understanding is that LPP requestion is already supported. Can compromise to Option 2.
  + vivo: Need to ensure same behavior for UE and NW.
* Agreements
  + For UE autonomous pre-MG activation/deactivation the following trigger events may change the pre-MG activation status
    - BWP switching by DCI/Timer based
    - Activation/de-activation of SCell(s)
    - Addition/removal of any measurement object(s)
    - Addition/release/change of a SCell under CA
    - BWP switching by RRC

Issue 3-1 Criteria for the signaling-based Pre-MG (de)activation under CA (not discussed)

* Proposals
  + Option 1a (CATT,OPPO, vivo, ZTE, Ericsson)
    - When configured with per-UE gap,
      * assume the per-UE gap is ON as long as the pre-MG status of active DL BWP in one of the CCs is ON,
      * and assume the per-UE gap is OFF only if the pre-MG status of active DL BWP in all CCs are OFF.
    - When configured with per-FR gap,
      * assume the gap is ON as long as the pre-MG status of active DL BWP in one of the CCs in the same FR is ON,
      * and assume the gap is OFF only if the pre-MG status of active DL active DL BWP in all CCs in the same FR are OFF
  + Option 1b (Apple, xiaomi, Intel, Qualcomm, MTK, Huawei, Nokia).
    - For per-UE pre-MG,
      * UE assumes the pre-MG is ON as long as the pre-MG status for active DL BWP in one of the activated CCs or for one of the deactivated SCCs is ON,
      * and assume the pre-MG is OFF only if the pre-MG status for active DL BWP in all activated CCs and for all deactivated SCCs are OFF.
    - For per-FR pre-MG,
      * UE assumes the pre-MG is ON as long as the pre-MG status for active DL BWP in one of the activated CCs or for one of the deactivated SCCs in the same FR is ON,
      * and assume the pre-MG is OFF only if the pre-MG status for active DL BWP in all activated CCs and for all deactivated SCCs in the same FR are OFF
  + Option 2 (MTK).
    - If Option 1b is agreed, RAN4 needs to inform RAN2 to add an additional ON/OFF indication for de-activated SCell.
* Discussion
  + TBA
* Agreements
  + TBA

Issue 4-2-2 General principle to define the requirements of measurement period with pre-MG measurements (not discussed)

* Proposals
  + Option 1 (CATT, CMCC, Intel): The measurement requirements for the case that pre-MG status changed during the measurement period are based on the number of resources within gap and without gap respectively i.e. Tmeasure, total = M\*Tmeasurement with gap + N\*Tmeasurement without gap + (M+N)\* (Tactivation/deactivation delay). Where M is the number of samples measured with gap and N is the number of samples measured without gap.
  + Option 1b (vivo, Ericsson, Nokia, ZTE) : Total measurement period (Tmeasure, total) can be expressed in terms of basic measurement period (Tmeasure, basic) and aggregated time consumed due to total number of Pre-MG status changes (K\*Tstatus\_change) during the ongoing measurement:
    - Tmeasure, total = Tmeasure, basic+ N\* Tstatus\_change
    - Where
    - K=total number of Pre-MG status changes during the measurement period.
    - Tmeasure, basic = MAX(Tmeasure,BWP, Tmeasure,MG); where:
      * Tmeasure,BWP=It is measurement period when the measurement is fully performed without measurement gap
      * Tmeasure,MG =It is measurement period when the measurement is fully performed with measurement gap.
  + Option 3(MTK, Huawei, Qualcomm, Intel, xiaomi): RAN4 does not specify measurement period requirements for scenarios in which there are changes in the activation/deactivation status of the pre-configured MG during the measurement period.
* Discussion
  + TBA
* Agreements
  + TBA

**GTW session (March 01, 2022)**

Issue 2-1 Additional trigger events for pre-MG activation/deactivation

* Proposals
  + For UE autonomous pre-MG activation/deactivation the following trigger events may change the pre-MG activation status
    - Option 1: LPP positioning request
      * Option 1a: Initiation of LocationMeasurementIndication procedure
    - Option 2: “LPP positioning request” event is NOT supported
* Agreement
  + For UE autonomous pre-MG activation/deactivation the following trigger event may change the pre-MG activation status
    - Initiation of LocationMeasurementIndication procedure

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206883 | WF on R17 NR MG enhancements – Pre-configured MG | Intel Corporation |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2203736 | CR on Pre-MG activation/deactivation delay | Apple | Revised |  |
| R4-2203878 | Draft CR on measurement delay requirements with Pre-MG | CATT | Revised |  |
| R4-2204056 | Draft CR on 38.133 for L1 measurement impact of preconfigured gap | MTK | Revised |  |
| R4-2205369 | CR on pre-MG applicability | Huawei | Revised |  |
| R4-2206018 | Draft CR for Measurement requirements for Pre-MG in TS 38.133 | Ericsson | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206786 LS on R17 NR MG enhancements – Pre-configured MG**

*Type: LS out For: Approval  
 to RAN2   
 Source: Huawei, Intel*

**Decision: Revised to R4-2206789 (from R4-2206786).**

**R4-2206789 LS on R17 NR MG enhancements – Pre-configured MG**

*Type: LS out For: Approval  
 to RAN2   
 Source: Huawei, Intel*

**Decision: Approved.**

**R4-2206883 WF on R17 NR MG enhancements – Pre-configured MG**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**R4-2203735 On Pre-MG pattern**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2203736 CR on Pre-MG activation/deactivation delay**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Revised to R4-2206884 (from R4-2203736).**

**R4-2206884 CR on Pre-MG activation/deactivation delay**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2203877 Further discussion on pre-configured MG pattern**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2203878 Draft CR on measurement delay requirements with Pre-MG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Revised to R4-2206885 (from R4-2203878).**

**R4-2206885 Draft CR on measurement delay requirements with Pre-MG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2204055 Discussion on pre-configured gap**

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

**Decision: Noted.**

**R4-2204056 Draft CR on 38.133 for L1 measurement impact of preconfigured gap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Revised to R4-2206886 (from R4-2204056).**

**R4-2206886 Draft CR on 38.133 for L1 measurement impact of preconfigured gap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Return to.**

**R4-2204233 Further discussion on pre-configured MG pattern for NR**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204263 Discussion on pre-configured MG pattern(s)**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2204277 On pre-configured MG pattern(s) for NR\_MG\_enh**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204319 Further consideration on remaining issues on pre-configured MG patterns**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204404 Discussion on pre-configured measurement gap**

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

**Decision: Noted.**

**R4-2204467 On pre-configured measurement gaps**

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

**Decision: Noted.**

**R4-2205010 Views on pre-configured MG patterns**

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

**Decision: Noted.**

**R4-2205368 Discussion on pre-configured MG**

*Type: LS out For: Approval  
 to RAN2  
 Source: Huawei, HiSilicon*

**Decision: Noted.**

**R4-2205369 CR on pre-MG applicability**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206887 (from R4-2205369).**

**R4-2206887 CR on pre-MG applicability**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205936 Discussion on Pre-configured MG patterns**

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

**Abstract:**

Discussion on remaining issues for pre-configured NR MG patterns

**Decision: Noted.**

**R4-2206017 Further analysis of pre-configured measurement gap pattern**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

This document further analyzes RRM requirements for pre-configured MG in NR and MR-DC

**Decision: Noted.**

**R4-2206018 Updates to rules for pre-MG status change in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

The CR updates rules for changing the status of pre-configured measurement gaps. The CR is based on the endorsed Draft Big CR in R4-2202753.

**Decision: Revised to R4-2206888 (from R4-2206018).**

**R4-2206888 Updates to rules for pre-MG status change in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

The CR updates rules for changing the status of pre-configured measurement gaps. The CR is based on the endorsed Draft Big CR in R4-2202753.

**Decision: Return to.**

##### 10.11.2.2 Multiple concurrent and independent MG patterns

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**Email discussion: [102-e][217] NR\_MG\_enh\_1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][217] NR\_MG\_enh\_1 | R17 NR measurement gap enhancements (NR\_MG\_enh) | RRM Core requirements:  - General - Multiple concurrent and independent MG patterns | 10.11.1 10.11.2.2 | Ato Yu |

**R4-2206760 Email discussion summary: [102-e][217] NR\_MG\_enh\_1**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207058 (from R4-2206760).**

**R4-2207058 Email discussion summary: [102-e][217] NR\_MG\_enh\_1**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 22, 2022)**

Key open issues

* Topic #2: Multiple concurrent and independent MG patterns (AI 6.11.2.2)
  + Sub-topic 2-1 Applicability and configurations
  + Sub-topic 2-2: UE capability related issues
  + Sub-topic 2-3: Overlapping
  + Sub-topic 2-4: Overhead
  + Sub-topic 2-5: Measurement requirements
  + Sub-topic 2-6: Impact to other L1 measurements

Issue 2-3-3: UE behavior during colliding gap occasion

* Background: Status after last meeting
  + Option 1: Priority rule
    - UE will only do the measurement w.r.t. the gap with higher priority on all colliding occasions
    - The priority can be configurable or fixed
    - FFS whether to resume data scheduling during dropped gap occasions
  + Option 5: Compromised proposal from moderator
    - Introduce gap sharing rule.
      * Request RAN2 to reserve some RRC signaling for different sharing factors.
        + The signalling design may consider the possibility of resuming data scheduling on dropped gaps
      * Rel-17 requirements will only consider sharing ratios 0% and 100%.
      * The requirements for other sharing factors are FFS in later releases.
      * FFS whether the resume scheduling on those dropped gaps as well as the impact to other intra-frequency measurements
* Moderator:
  + As RAN4 already spent a great effort to converge to the 2 options above, I suggest not to go back to re-open other options.
  + Whether to resume data scheduling will be discussed in a separate issue.
* Proposals
  + Option 1: Apple, CATT, Xiaomi, OPPO, QC, Huawei, Ericsson, Nokia, LGE
    - Option 1 in last meeting. Each concurrent MG should be configured with a unique priority
  + Option 5: CMCC, OPPO, [vivo], Intel, ZTE, Nokia, Apple
    - Option 5 in last meeting.
* Discussion
  + Moderator: as a compromise suggest to go with both Option 1 and Option 5.
  + Qualcomm: Signalling for Option 1 is more clear. We are not opposed to include both options.
  + E///: Sharing rule may require more design efforts and can be considered in future. Priority rule can be extended to support sharing in future.
  + Nokia: Option 1 is ok for us.
  + vivo: Ok to have Option 1. Prefer to have Option 5.
  + CATT: Option 1 is simpler. Support of both options may not resolve NTN issues.
  + Huawei: Suggest downselecting a single solution due to impact on RAN2 and RAN4 workload.
  + Xiaomi: Ok with both Option 1 and 5. For Option 5 – need some clarifications.
  + LGE: Option 1. For NTN we can configure same priority.
  + Huawei: agree with Huawei that need to downselect. Can compromise to Option 1.
  + ZTE: Originally, we prefer Option 5. We can compromise to Option 1.
  + MTK: ok with Option 1.
* Agreements
  + Introduce a priority rule for UE behavior during colliding MG occasions
    - UE will only do the measurement for the MG with a higher priority on all colliding occasions
    - The priority of the MG can be RRC configurable and details are FFS
    - For Rel-17 define requirements for the case when different MGs are configured with different priorities (i.e., do not consider equal priorities case)
  + Session chair: aim to send LS to RAN2 on signalling by the end of the first week. MediaTek will prepare a draft

Issue 2-3-3: UE behavior during colliding gap occasion Issue 2-1-1: Whether concurrent gaps are allowed in the case when only E-UTRAN measurement objectives are configured (not discussed)

* Proposals
  + Option 1: CATT, MTK, Xiaomi, Intel, ZTE, Ericsson, Nokia, CMCC
    - Yes
  + Option 1a: LGE, vivo
    - Yes, provided that UE supports LTE measurement with concurrent MGs, which is up to UE capability
  + Option 1b: OPPO
    - Yes, under the condition that only one per-UE MG is configured for UE
  + Option 2: Apple, Huawei
    - No
* Discussion
  + TBA
* Agreements
  + TBA

Issue 2-4-1: Whether to define the overhead cap (not discussed)

* Proposals
  + Option 1: Apple, MTK, LGE, Xiaomi, vivo, Huawei
    - Yes
  + Option 2: CATT, CMCC, Intel, QC, Ericsson, Nokia
    - No
  + Option 3: Apple, MTK
    - Up to UE capability
* Discussion
  + TBA
* Agreements
  + TBA

Issue 2-3-4: Number of configurable priority levels, if Option 1 in Issue 2-3-3 is agreed (not discussed)

* Proposals
  + Option 1: 5
* Discussion
  + TBA
* Agreements
  + TBA

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206874 | WF on R17 NR MG enhancements – multiple concurrent MGs | MediaTek inc. |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2203738 | CR on CSSF for concurrent gaps | Apple | Return to |  |
| R4-2203880 | Draft CR on measurement delay requirements for concurrent MG patterns | CATT | Revised |  |
| R4-2204058 | Draft CR on 38.133 for L1 measurement impact of concurrent gaps | MediaTek inc. | Revised |  |
| R4-2204235 | DraftCR on inter-frequency measurement delay requirements with concurrent gaps | Xiaomi | Revised |  |
| R4-2204279 | Draft CR to 38133 on CSI-RS based L3 measurement requirements with concurrent gap | OPPO | Revised |  |
| R4-2204411 | DraftCR to TS 38.133: Positioning measurement requirements due to concurrent gap in NR | Intel Corporation | Revised |  |
| R4-2205371 | CR on collision handling for concurrent MGs | Huawei, HiSilicon | Revised |  |
| R4-2205517 | draftCR on concurrent gaps(9.1.2B) | Ericsson | Revised |  |
| R4-2205652 | Draft CR: Corrections to RRM requirements Rel-17 NR MG enhancements | Nokia, Nokia Shanghai Bell | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206785 LS on collision handling of concurrent MGs**

*Type: LS out For: Approval  
 to RAN2 cc RAN1  
 Source: MediaTek inc.*

Feb 25 / The following text is agreeable

|  |
| --- |
| RAN4 has discussed the handling of collisions between concurrent measurement gaps and reached the following agreements   * Introduce a priority rule to resolve collisions between measurement gap occasions   + - In each collision, the UE will perform only measurements associated with the measurement gap ~~occasion~~ with the highest priority     - The priority of the measurement gap ~~pattern~~ can be RRC configurable     - In Rel-17, define requirements for the case when different measurement gaps ~~patterns~~ are configured with different priorities (i.e., do not consider equal priorities case)   + Regarding the number of priority levels, only two levels are needed in the NR\_MG\_enh WI. However, considering ~~some~~ forward compatibility on inter-working with other features (e.g., MUSIM, NTN, Positioning), RAN4 recommends 5 levels. RAN4 kindly requests that at least two priority levels are supported in Rel-17 and leaves the decision to support a higher number of priority levels to RAN2. |

**Decision: Revised to R4-2206788 (from R4-2206785).**

**R4-2206788 LS on collision handling of concurrent MGs**

*Type: LS out For: Approval  
 to RAN2 cc RAN1  
 Source: MediaTek inc.*

**Decision: Approved.**

**R4-2206874 WF on R17 NR MG enhancements – multiple concurrent MGs**

*Type: other For: Approval  
 Source: MediaTek inc.*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**R4-2203737 On multiple concurrent and independent MG patterns**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2203738 CR on CSSF for concurrent gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Revised to R4-2207084 (from R4-2203738).**

**R4-2207084 CR on CSSF for concurrent gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2203879 Further discussion on multiple concurrent and independent MG patterns**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2203880 Draft CR on measurement delay requirements for concurrent MG patterns**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Revised to R4-2206875 (from R4-2203880).**

**R4-2206875 Draft CR on measurement delay requirements for concurrent MG patterns**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2204057 Discussion on concurrent gaps**

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

**Decision: Noted.**

**R4-2204058 Draft CR on 38.133 for L1 measurement impact of concurrent gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Revised to R4-2206876 (from R4-2204058).**

**R4-2206876 Draft CR on 38.133 for L1 measurement impact of concurrent gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Return to.**

**R4-2204150 Discussion on multiple concurrent and independent MG patterns**

*Type: discussion For: (not specified)  
 Source: LG Electronics*

**Abstract:**

It discusses multiple concurrent and independent MG patterns.

**Decision: Noted.**

**R4-2204234 Further discussion on multiple concurrent and independent MG patterns for NR**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204235 DraftCR on inter-frequency measurement delay requirements with concurrent gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Xiaomi*

**Decision: Revised to R4-2206877 (from R4-2204235).**

**R4-2206877 DraftCR on inter-frequency measurement delay requirements with concurrent gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Xiaomi*

**Decision: Return to.**

**R4-2204257 Discussion on multiple concurrent and independent MG patterns**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2204278 On multiple concurrent and independent MG patterns for NR\_MG\_enh**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204279 Draft CR to 38133 on CSI-RS based L3 measurement requirements with concurrent gap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Revised to R4-2206878 (from R4-2204279).**

**R4-2206878 Draft CR to 38133 on CSI-RS based L3 measurement requirements with concurrent gap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Return to.**

**R4-2204320 Further consideration on remaining issues on multiple concurrent and independent MG patterns**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204405 Discussion on multiple and independent concurrent measurement gaps in NR**

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

**Decision: Noted.**

**R4-2204411 DraftCR to TS 38.133: Positioning measurement requirements due to concurrent gap in NR**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Revised to R4-2206879 (from R4-2204411).**

**R4-2206879 DraftCR to TS 38.133: Positioning measurement requirements due to concurrent gap in NR**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Return to.**

**R4-2204468 On multiple concurrent measurement gaps**

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

**Decision: Noted.**

**R4-2205011 Views on multiple concurrent and independent MGs**

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

**Decision: Noted.**

**R4-2205370 Discussion on multiple concurrent MGs**

*Type: LS out For: Approval  
 to RAN2  
 Source: Huawei, HiSilicon*

**Decision: Noted.**

**R4-2205371 CR on collision handling for concurrent MGs**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206880 (from R4-2205371).**

**R4-2206880 CR on collision handling for concurrent MGs**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205516 Discussion on Multiple concurrent MG patterns**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses concurrent gaps

**Decision: Noted.**

**R4-2205517 draftCR on concurrent gaps(9.1.2B)**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR introduces the measurement requirement skeleton for concurrent gaps

**Decision: Revised to R4-2206881 (from R4-2205517).**

**R4-2206881 draftCR on concurrent gaps(9.1.2B)**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR introduces the measurement requirement skeleton for concurrent gaps

**Decision: Return to.**

**R4-2205651 Concurrent measurement gap enhancements**

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

**Decision: Noted.**

**R4-2205652 Draft CR: Corrections to RRM requirements Rel-17 NR MG enhancements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2206882 (from R4-2205652).**

**R4-2206882 Draft CR: Corrections to RRM requirements Rel-17 NR MG enhancements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Return to.**

##### 10.11.2.3 Network Controlled Small Gap

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**Email discussion: [102-e][219] NR\_MG\_enh\_3**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][219] NR\_MG\_enh\_3 | R17 NR measurement gap enhancements (NR\_MG\_enh) | RRM Core requirements:  - Network Controlled Small Gap | 10.11.2.3 | Qiming Li |

**R4-2206762 Email discussion summary: [102-e][219] NR\_MG\_enh\_3**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207060 (from R4-2206762).**

**R4-2207060 Email discussion summary: [102-e][219] NR\_MG\_enh\_3**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 22, 2022)**

Key open issues

* Topic #1: NCSG design
  + Sub-topic 1: Scenarios and use cases
  + Sub-topic 2: NCSG patterns
  + Sub-topic 3: UE capability and NW configuration
  + Sub-topic 4: measurement related requirements
  + Sub-topic 5: others

Issue 2-3: time offset for NCSG:

* Proposals
  + Option 1: The offset of NCSG refers to the starting point of VIL1. (QC, Apple, MTK, Intel, Nokia, vivo)
  + Option 2: The offset of NCSG refers to the starting point of ML – RRT. Allow 2 slots interruption for 15kHz, sync, mgta=0. (OPPO, ZTE, HW, E///)
  + Option 3: The offset of NCSG refers to the starting point of ML. (CATT)



* Agreements
  + The offset of NCSG refers to the starting point of VIL1

Issue 5-1: Whether to introduce a mapping table between legacy measurement gap patterns and corresponding NCSG patterns

* Proposals
  + Option 1: No (Apple, CATT, Intel, Nokia, MTK, QC)
  + Option 2: Yes (ZTE, HW, E///)
* Discussion
  + QC: what are the implications on spec drafting for Option 1 and 2?
    - Apple: We have agreed on NCSG pattern table. In addition we also need to define applicability rules similar to legacy. Since we already have table for NCSG, then we can add another table for applicability for Option 1. For Option 2 – we likely need to update existing legacy MG applicability table.
  + E///: There is 1:1 correspondence between NCSG and legacy MG patterns. We don’t need a new table, but we would like to see the linkage.
  + Nokia: Mapping table to legacy patterns is not needed. Some patterns do not have applicability and some NCSG patterns are independent.
  + Intel: To E/// - we are not clear about linkage between NCSG and legacy MG. From configuration perspective they are independent.
  + MTK: We already have a mapping, but it is implicit.
  + E///: We are ok now to have a new signalling, but would like to see explicit mapping in the specification.
  + Apple: We agree NCSG pattern was derived based on legacy pattern, but it does not mean we need to have explicit spec. For instance, in LTE we did not have such mapping.
  + QC: we prefer Option 1.
  + E///: For the new NCSG patterns in the future – are we going to follow the same principles (i.e. reuse legacy MG duration)? We think that we should not change the principles.
    - Apple: It is difficult to predict and depends on the purpose of pattern.
* Agreements
  + Do not introduce a mapping table between legacy measurement gap patterns and corresponding NCSG patterns in the specifications

Issue 1-1: NCSG for CSI-RS based inter-frequency measurement with gap

* Proposals
  + Option 1: NCSG for CSI-RS based inter-frequency measurement with gap is supported in R17. (CATT, CMCC)
  + Option 1a: NCSG can be used for CSI-RS inter-frequency measurement. UE reports supported CSI-RS BW for each band. (HW)
  + Option 2: NCSG for CSI-RS based inter-frequency measurement with gap is NOT supported in R17. (QC, Apple, MTK, OPPO, [Intel?], ZTE, E///, Nokia)
  + Option 2a: RAN4 to work on CSI-RS based inter-frequency measurement requirement via NCSG after stabilizing the SSB-based requirements. (OPPO, [Intel?], ZTE)
  + Option 2b: RAN4 to consider application of NCSG for measuring CSI-RS L3 based inter-frequency measurement with gap for Rel-18 as a residual of Rel-17 NR measurement gap enhancements (Nokia)
  + Option 3: NCSG for CSI-RS based inter-frequency measurement with gap is supported in R17. However, corresponding requirements will not be defined in R17. (Apple)
* Moderator proposal
  + NCSG for CSI-RS based inter-frequency measurement with gap is NOT supported in R17
* Discussion
  + CATT: disagree to preclude CSI-RS based measurements. Can go with Option 1a
  + CMCC: Can accept Option 1a.
  + Huawei: Same view as CATT and CMCC. For the workload – we need to introduce a section for measurement period. Besides that we do not see additional work.
  + Nokia: Option 2. We do not think that it can be concluded in one meeting. Additional signalling needs to be designed for Option 1. It can be left up to Rel-18.
  + Apple: Supported BW is a dynamic capability and design need to be discussed in more details.
  + E///: Option 2. Agree with Apple and Nokia. It will require WI extension. Details need discussion
  + Intel: Option 2. Expect impact on RAN2/RAN4 for Option 1.
  + CATT: Suggest to consider this in Rel-18
  + Session chair: interested companies can bring proposals for Rel-18 and this is subject to RAN plenary discussion and decision
* Agreements
  + NCSG for CSI-RS based inter-frequency measurement with gap is NOT supported in R17

Issue 2-1: On top of agreed pattern #0, #1, #13 and #14, whether additional NCSG gap patterns shall be mandatorily supported if UE supports NCSG. (not discussed)

* Proposals
  + Option 1: For NR-only measurement, NCSG GP#2, #3, #11, #17, #18, #19 are mandatory. (CATT, MTK, CMCC, OPPO, ZTE, HW, E///)
  + Option 2: no additional mandatory NCSG patterns (QC, Apple, Intel, Nokia)
* Moderator proposal
  + For NR-only measurement, NCSG GP#2, #3, #11, #17, #18, #19 are mandatory.

**GTW session (March 01, 2022)**

4-1: Tolerance requirement

* Proposal
  + Define tolerance requirement for deriveSSB-IndexFromCell-inter (△t):
    - When deriveSSB-IndexFromCell-inter is enabled, the UE assumes frame boundary alignment (including half frame, subframe and slot boundary alignment) across cells on the target carrier and reference carrier is within a tolerance not worse than △t and the SFNs of all cells on the target carrier and reference carrier are the same.
    - Option 1: △t = 2 SSB symbols of target carrier
    - **Option 2: △t = min(2 SSB symbols of target carrier, 1 PDSCH symbol of reference cell)**
    - Option 3: △t = min(2 SSB symbols of target carrier, 1 PDSCH symbol of victim cell)
* Agreement
  + Define tolerance requirement for deriveSSB-IndexFromCell-inter (△t):
    - When deriveSSB-IndexFromCell-inter is enabled, the UE assumes frame boundary alignment (including half frame, subframe and slot boundary alignment) across cells on the target carrier and reference carrier is within a tolerance not worse than △t and the SFNs of all cells on the target carrier and reference carrier are the same.
    - △t = min(2 SSB symbols of target carrier, 1 PDSCH symbol of reference cell)
  + Session chair: further clarification on the reference cell term shall be provided in the CR stage

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206889 | WF on NCSG | Apple |  |
| R4-2206890 | LS on R17 MG enhancement - NCSG | Apple |  |
| R4-2206891 | Draft CR on mgta for NCSG | Intel Corporation |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| [R4-2203716](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203716.zip) | CR: NCSG scheduling restriction | Qualcomm, Inc. | Revised |  |
| [R4-2203740](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203740.zip) | CR on NCSG | Apple | Revised |  |
| [R4-2203882](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203882.zip) | Draft CR on measurement delay requirements with NCSG | CATT | Revised |  |
| [R4-2204060](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204060.zip) | Draft CR on 38.133 for L1 measurement impact of NCSG | MediaTek inc. | Revised |  |
| [R4-2204294](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204294.zip) | Draft CR to UE behaviour to group the frequency layers with NCSG | OPPO | Revised |  |
| [R4-2205373](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205373.zip) | CR on use cases and CSSF for NCSG | Huawei | Revised |  |
| [R4-2206020](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2206020.zip) | Updates to NCSG patterns in TS 38.133 | Ericsson | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206889 WF on NCSG**

*Type: other For: Approval  
 Source: Apple*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206890 LS on R17 MG enhancement - NCSG**

*Type: LS out For: Approval  
 to RAN2, cc RAN1  
 Source: Apple*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**R4-2206891 Draft CR on mgta for NCSG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Intel Corportation*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2203715 On Network Controlled Small Gap RRM Requirement**

*Type: discussion For: Discussion  
 Source: Qualcomm, Inc.*

**Decision: Noted.**

**R4-2203716 CR: NCSG scheduling restriction**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Qualcomm, Inc.*

**Decision: Revised to R4-2206892 (from R4-2203716).**

**R4-2206892 CR: NCSG scheduling restriction**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Qualcomm, Inc.*

**Decision: Return to.**

**R4-2203739 On network controlled small gap**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2203740 CR on NCSG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Revised to R4-2206893 (from R4-2203740).**

**R4-2206893 CR on NCSG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2203881 Further discussion on Network Controlled Small Gap (NCSG)**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2203882 Draft CR on measurement delay requirements with NCSG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Revised to R4-2206894 (from R4-2203882).**

**R4-2206894 Draft CR on measurement delay requirements with NCSG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2204059 Discussion on NCSG**

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

**Decision: Noted.**

**R4-2204060 Draft CR on 38.133 for L1 measurement impact of NCSG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Revised to R4-2206895 (from R4-2204060).**

**R4-2206895 Draft CR on 38.133 for L1 measurement impact of NCSG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Return to.**

**R4-2204258 Further discussion on Network Controlled Small Gap**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2204293 Discussion on NCSG for NR\_MG\_enh**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204294 Draft CR to UE behaviour to group the frequency layers with NCSG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Revised to R4-2206896 (from R4-2204294).**

**R4-2206896 Draft CR to UE behaviour to group the frequency layers with NCSG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Return to.**

**R4-2204406 Discussion on NCSG in NR**

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

**Decision: Noted.**

**R4-2205012 Views on NCSG**

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

**Decision: Noted.**

**R4-2205372 Discussion on NCSG**

*Type: LS out For: Approval  
 to RAN2  
 Source: Huawei, HiSilicon*

**Decision: Noted.**

**R4-2205373 CR on use cases and CSSF for NCSG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206897 (from R4-2205373).**

**R4-2206897 CR on use cases and CSSF for NCSG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205937 Discussion on Network Controlled Small Gaps for NR**

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

**Abstract:**

Discussion on remaining issues for NR NCSG

**Decision: Noted.**

**R4-2206019 Further analysis of network controlled small gap**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

This document further analyzes RRM requirements for NCSG in NR and MR-DC

**Decision: Noted.**

**R4-2206020 Updates to NCSG patterns in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

The CR updates NCSG patterns to include the mapping to legacy gap patterns. The CR is based on the endorsed Draft Big CR in R4-2202753.

**Decision: Revised to R4-2206898 (from R4-2206020).**

**R4-2206898 Updates to NCSG patterns in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

The CR updates NCSG patterns to include the mapping to legacy gap patterns. The CR is based on the endorsed Draft Big CR in R4-2202753.

**Decision: Return to.**

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

#### 10.13.5 RRM core requirements

================================================================================

**Email discussion: [102-e][220] NR\_NTN\_solutions\_RRM\_1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][220] NR\_NTN\_solutions\_RRM\_1 | R17 NR NTN  (NR\_NTN\_solutions) | RRM requirements: - General requirements - Mobility requirements  - Measurement procedure requirements | 10.13.5.1 10.13.5.3 10.13.5.5 | CH Park |

**R4-2206763 Email discussion summary: [102-e][220] NR\_NTN\_solutions\_RRM\_1**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207061 (from R4-2206763).**

**R4-2207061 Email discussion summary: [102-e][220] NR\_NTN\_solutions\_RRM\_1**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 21, 2022)**

Key open issues

* + Topic #1: General
    - Issue 1-4: DRX Cycle => resolved
    - Issue 1-5: Cell Service Time
    - Issue 1-6: Neighbour/Target Cell/Satellite Information Acquisition
    - Issue 1-7: RRM Spec Documentation
    - Issue 1-8: Signalling characteristics
  + Topic #2: Mobility requirements
    - Issue 2-1: Cell selection and reselection
    - Issue 2-2 HO and CHO
  + Topic #3: Measurement procedure requirements
    - Issue 3-1: Multiple SMTCs and Measurement Gap
    - Issue 3-2: Measurement relaxation
    - Issue 3-3: Other aspects for Measurement procedure requirement
  + Topic #4: UE Capability
  + Topic #5: draft CRs

Issue 3-1-4A: Measurement with multiple SMTCs (Item-1: Scheduling restriction)

* Agreements from RAN4#101-b
  + Option 1: Scheduling restriction is always allowed for measurement of cells belonging to a different satellite than the serving cell if not fully confined within MG. No scheduling restriction for measurement of cells belonging to serving cell.
  + Option 2: Same as Option 1, but only for the case where either serving or target measurement cells is LEO. Otherwise, no scheduling restriction is defined.
  + Option 3: For both intra- and inter- frequency measurements, the UE uses measurement gaps; the UE is not required to measure the SSB-s unless the SSB-s are completely contained in the measurement gaps.
* Proposals
  + For measurements of SMTC associated with serving cell:
    - No scheduling restriction is defined
  + For measurements of SMTC not associated with serving cell (if not fully confined within MG):
    - Option 1: Qualcomm, CATT
      * No scheduling restriction is defined
    - Option 2-A: Apple
      * Scheduling restriction is needed
    - Option 2-B: LGE
      * Scheduling restriction is needed for all symbols within SMTC windows
    - Option 2-C: Ericsson
      * Scheduling restriction shall occupy full SMTC if at least one of LEO in the SMTC. For GEO, Scheduling restriction may be limited to [m] symbols before and after SSB symbols
      * Total scheduling restriction shall be limited, e.g. restricting number SMTC containing LEO. The detailed solution can be continued after issues on measurements on SMTC are clearer.
    - Option 3-A: MediaTek
      * SMTC shall be within MG
    - Option 3-B: Huawei
      * Re-use same principle in NT to determine whether a measurement is performed with MG or without MG.
      * For LEO, scheduling restriction is allowed for intra-frequency measurement outside MG. FFS whether to define UE capability for supporting intra-frequency measurement without scheduling restriction.
    - Option 4-A: Nokia
      * Whether a UE can perform measurements on cells from other NGSO satellites in parallel with normal operation (no scheduling restriction) should be a UE capability
      * For UEs not being able to perform measurements in parallel with normal operation scheduling restrictions shall apply.
      * For UEs not able to perform measurements in parallel with normal operation it is not required to measure SSB’s outside the measurement gaps and SMTCs.
    - Option 4-B: Intel
      * Introduce UE capabilities to indicate to the network whether the UE is able to receive/transmit in the serving cell while measure on the target cell which is an intra- frequency or inter-frequency neighbour cell.
* Tentative agreements
  + For measurements of SMTC associated with serving cell:
    - No scheduling restrictions are defined
  + For measurements of SMTC not associated with serving cell:
    - If SMTC is not fully confined within MG
      * Option 1: No scheduling restrictions are defined (QC, CATT)
      * Option 2: Scheduling restrictions are defined, and details are FFS (Apple, LGE, E///)
      * Option 3: Do not define requirements for this case
      * Option 4: It is up to UE capability whether it can perform measurements (Nokia, Intel, [HW])
    - If SMTC is fully confined within MG
      * No scheduling restrictions are defined
* Discussion
  + Intel: shall we replace serving cell with satellite?
    - QC: satellite is a better term. RAN2 is still discussing.
* Agreements
  + For measurements of cells belonging to the same satellite as the serving cell:
    - No additional scheduling restrictions will be defined
    - Note: existing scheduling restrictions requirements may apply
  + For measurements of cells belonging to different satellite as the serving cell and performed outside the MG:
    - Whether a UE can perform measurements on cells belonging to different satellite as the serving cell in parallel with normal operation (i.e. data/control transmission and/or reception, [and L1 measurements]) of serving cell without scheduling restrictions is up to UE capability.
    - FFS whether the capability applies for intra-frequency and/or inter-frequency measurements
    - For UEs not able to perform measurements in parallel with normal operation of serving cell scheduling restrictions shall apply.

Issue 3-1-4B: Measurement with multiple SMTCs (Item-2: Scaling factor) (not discussed)

* Agreements from RAN4#101-b
  + Option 1: When a measurement frequency is configured with multiple SMTCs with different offset values, the measurement frequency is treated as multiple independent measurement frequencies in terms of measurement period/interval and CSSF (Carrier Specific Scaling Factor) which represents the number of measurement carriers that share one cell search/measurement engine.
  + Option 2: Different solutions in terms of whether and exact number of scaling factor for the following cases:
    - Whether UE can measure multiple SMTCs within one periodicity, and how many SMTCs can be measured in parallel.
    - If not all of them can be used by UE in parallel, whether or not UE and NW are in-sync in terms of which SMTCs will be in use at a given time
  + Option 3: When a measurement frequency is configured with multiple LEO satellites to measure, the number of LEO satellites is accounted in CSSF for connected mode and Kcarrier for idle/inactive mode.
  + For all options, there can be more aspects to be taken into account, e.g. fully vs. partially overlapping SMTCs
* Proposals
  + Proposal 1: Qualcomm
    - For the measurement of multiple SMTCs configured on the same frequency, the measurement period is scaled up proportionally to the number of SMTCs.
  + Proposal 2: CATT
    - Scaling factor can be number of inter frequency layer for inter frequency measurement. If a measurement frequency is configured with multiple SMTCs with different offset values of MG, the measurement frequency is treated as multiple independent measurement frequencies in terms of measurement period/interval and CSSF.
  + Proposal 3: Huawei
    - Define requirements assuming UE can support parallel measurement of 2 SMTCs outside MG, i.e. measurement period is not scaled if two SMTCs do not overlap. FFS on scaling in case of 4 SMTCs per carrier for capable UE.
    - For LEO, define requirements assuming UE can measure 1 satellite in each SMTC, i.e. measurement period is scaled if UE is required to measure more than one satellites per SMTC. FFS whether to define UE capability for supporting parallel measurement of more than 1 satellites in an SMTC.
  + Proposal 4: Apple
    - Based on network configuration on one MO, UE uses multiple SMTCs simultaneously within SMTC periodicity and the delay scaling factor of this MO could be determined by
    - For intra-frequency MO without MG and inter-frequency MO without MG,
    - The maximum number of SMTCs simultaneously used by UE within SMTC periodicity per measurement object for the same ssbFrequency shall meet both of following conditions,
      * smaller than or equal to the SMTC number indicated in UE capability, and
      * guarantee the total scheduling restriction length less than or equal to [25%] of the SMTC periodicity length.
    - When the UE supported SMTC number in real specific scenario is smaller than in the UE capability report, FFS if network could indicate a SMTC pattern to UE or let UE reports such SMTC usage pattern to network.
  + Proposal 5: Ericsson
    - In connected mode.
      * Scaling factor is maximal number of LEO in each overlapped SMTCs or one SMTC, if LEO satellites cannot be handled by UE simultaneously.
      * Otherwise, e.g. one LEO in one SMTC and total 4 SMTCs, scaling factor is 1.
      * The criteria to handle Doppler shift simultaneously can be determined by UE’s capability, assuming that ephemeris data is known by UE and situation of Doppler shift also is known.
    - In idle mode, scaling factor can be 1+ [0.5]\* (number of SMTCs-1) for simplification purpose.
  + Proposal 6: MediaTek
    - For LEO, support Option 1 if SSBs are from only one LEO satellite in one SMTC. For the SMTC containing SSBs from multiple LEO satellites, the CSSF should be further extended by the number of LEO satellite within this SMTC
* Tentative agreement
  + When UE is configured with multiple SMTCs on the same measurement carrier (not more than UE capability)
    - If SMTCs do not overlap with each other, a scaling factor of measurement period is
      * Option 1A: not needed
      * Option 1B: proportional to the number of SMTCs
    - If SMTCs partially overlap with each other, a scaling factor of measurement period is
      * Option 2A: not needed
      * Option 2B: proportional to the number of SMTCs

Session chair: come back in the 2nd round

Issue 3-1-6: Measurement Gap

* Agreements from RAN4#101-b
  + RAN4 to discuss Gap-based measurement including the following aspects in detail based on further progress made by RAN2 NTN and RAN4 Concurrent MG WI before RAN4#102 e-meeting starts:
    - Maximal number of MG
    - Matching between SMTC and MG if applicable
    - Proximity condition for overlapping
    - UE behavior during colliding gap occasion
  + RAN4 to discuss how MG deals with unalignment, e.g. edge of SMTC window may cross MGL, due to propagation delay offset/timing error between serving cell and neighbor cell.
* Proposals
  + Proposal 1: Apple
    - In R17 RRM, maximal number of concurrent MG in NTN is 2 for per-UE MGs or for per-FR1 MGs.
    - For intra-frequency MO with MG and inter-frequency MO with MG, the maximum number of SMTCs simultaneously used by UE within SMTC periodicity per measurement object for the same ssbFrequency shall meet both of following conditions:
      * smaller than or equal to the SMTC number indicated in UE capability, and
      * guarantee these SMTCs can be contained in active measurement gaps.
  + Proposal 2: Qualcomm
    - For NTN measurement gap, RAN4 adopts a subset of outcome of Concurrent MG feature with the following conditions:
      * Enhancement related to positioning application is excluded
      * Enhancement related to FR2 is excluded
      * If needed, legacy measurement gap patterns #24 and 25 are allowed for a single measurement gap based NTN UE measurement.
  + Proposal 3: CMCC
    - RAN4 should discuss measurement requirements based on SMTC window is alignment with MG, and UE only using one MG to measure at one time if multiple MGs are overlapped.
  + Proposal 4: Xiaomi
    - For gap-based measurement, UE is expected to be configured with 2 independent gap patterns for the measurements on 2 SMTCs in parallel.
    - Two gap occasions are defined as colliding (overlapping) if the two gap occasions are partially overlapping in time domain or the minimum distance is less than 5ms.
    - For gap-based measurement, if gap occasions are colliding (overlapping), the delay requirement for measurement with gap should be extended by a scaling factor of 2.
  + Proposal 5: LGE
    - For the requirements with measurement gap,
      * Option 1: RAN4 should wait clear conclusion of RAN2 NTN measurement gap issues.
      * Option 2: RAN4 only defines intra-frequency measurement without measurement gap in Rel-17.
  + Proposal 6: Ericsson
    - In Rel-17, proper SMTC and MG configuration can deal with the offset between SMTC and MG. Enhancement can be further studied.
    - Proximity condition for overlapping For FR1 is 4ms, which refers to concurrent MG WI.
  + Proposal 7: Huawei
    - UE is only required to measure in SMTC windows that fall in MGs for measurement with MG.
    - Maximal number of MGs is 2 (same as concurrent MGs).
    - FFS on the proximity condition and collision handling between MGs.
* Tentative agreements
  + UE capability
    - Option 1A: NTN UE can support either one MG or two MG subject to UE capability (Apple, Xiaomi, QC)
    - Option 1B: NTN UE ~~can~~ shall support two MGs (Intel, E///, LGE)
  + For UE supporting one MG
    - Option 2A: legacy MG will be used without any change
    - Option 2B: there can be changes, e.g. legacy measurement gap patterns #24 and 25 are allowed for a single measurement gap based NTN UE measurement.
  + For UE supporting two MGs
    - Behavior is FFS
      * Option 1: Except the following aspects, outcome of on R17 concurrent MG item will be directly adopted
        + Modification of MG Colliding/Proximity condition
        + Exclusion of enhancement related to positioning application
        + Exclusion of enhancement related to FR2
* Agreements
  + UE capability for the maximum number of supported MGs
    - NTN UE can support either one MG or two MGs subject to UE capability
    - Note: the decision can be revisited in case it is identified that the agreement contradicts to RAN2 design

Session chair: come back in the 2nd round

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206899 | WF on NR NTN RRM requirements | Qualcomm |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2203854 | draft Cat-B CR (R17) MDT in NTN | Qualcomm Incorporated | Endorsed |  |
| R4-2203929 | Requirements for RRC connected state mobility for NTN | CATT | Endorsed |  |
| R4-2204725 | draft CR on signaling characteristics for NTN | Ericsson | Revised |  |
| R4-2204237 | DraftCR on maximum interruption in paging reception for NR NTN | Xiaomi | Endorsed |  |
| R4-2204421 | DraftCR for serving cell evaluation and intra-frequency measurements of NTN UE cell reselections | Intel Corporation | Revised |  |
| R4-2204474 | Draft CR for idle mode UE meausrement capability in NTN. | LG Electronics UK | Endorsed |  |
| R4-2205376 | CR on IDLE mode mobility requirements for NTN | Huawei, HiSilicon | Revised |  |
| R4-2204241 | DraftCR on inter-frequency measurement requirements for NR NTN | Xiaomi | Endorsed |  |
| R4-2204297 | Draft CR to general measurement requirement for NTN | OPPO | Endorsed |  |
| R4-2205378 | CR on intra-frequency measurement requirements for NTN | Huawei, HiSilicon | Endorsed |  |
| R4-2205958 | Draft CR on L1-RSRP measurements for Reporting in NTN | Apple | Endorsed |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206899 WF on NR NTN RRM requirements**

*Type: other For: Approval  
 Source: Qualcomm*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**Email discussion: [102-e][221] NR\_NTN\_solutions\_RRM\_2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][221] NR\_NTN\_solutions\_RRM\_2 | R17 NR NTN  (NR\_NTN\_solutions) | RRM requirements: - GNSS-related requirements - Timing requirments | 10.13.5.2 10.13.5.4 | Xuhua Tao |

**R4-2206764 Email discussion summary: [102-e][221] NR\_NTN\_solutions\_RRM\_2**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207062 (from R4-2206764).**

**R4-2207062 Email discussion summary: [102-e][221] NR\_NTN\_solutions\_RRM\_2**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 21, 2022)**

Key open issues

* Topic #2: UE timing requirements
  + Issue 1: UE transmit timing requirements
    - Issue 1-1: Requirement of initial transmit timing error (Te\_NTN).
    - Issue 1-2: The clarification on NTA,UE-specific and NTA,common.
    - Issue 1-3: The clarification on downlink timing of the reference cell.
    - Issue 1-4: The clarification on propagator model used to define the reference timing in UE UL timing requirements.
    - Issue 1-5: The clarification on reference timing adjustment for UE transmit timing.
    - Issue 1-6: Double correction issue related to combination of open and closed loop TA control.
    - Issue 1-7: Gradual timing adjustment requirement
    - Issue 1-8: UE behaviour for gradual timing adjustment for NTN UE.
    - Issue 1-9: Whether the maximum delay variation for the round trip delay should be considered in the gradual timing adjustment requirement in NTN?
    - Issue 1-10: Whether the feeder link time drift should be considered in the gradual timing adjustment requirement in NTN?
  + Issue 2: TA adjustment accuracy requirements
    - Issue 2-1: The additional conditions for NTN TA adjustment accuracy requirement.
    - Issue 2-2: The margin to accommodate UE autonomous open loop TA pre-compensation.

Issue 1-6: Double correction issue related to combination of open and closed loop TA control.

* Proposals
  + Option 1: (CATT, MTK)
    - Double correction issue can be addressed by defining NTN UE initial timing accuracy requirement for all UL transmissions.
  + Option 2: (Apple, Qualcomm, ZTE, Xiaomi, LGE, Intel, CMCC, Huawei)
    - Double correction issue can be addressed under the framework of gradual timing adjustment accuracy requirement.
* Discussion
  + MTK: we can accept Option 2
  + CATT: Option 2 is more complicated, but we can compromise
  + E///: ok with Option 1 and 2
* Agreements
  + Double correction issue shall be taken into account in the gradual timing adjustment accuracy requirement.

Issue 1-7: Gradual timing adjustment requirement

* Proposals
* Option1: (Apple)
  + The Tp\_NTN/Tq\_NTN of gradual timing adjustment accuracy requirement for NTN UE is same as legacy TN requirement:
  + When the transmission timing error between the UE and the reference timing exceeds ±Te\_NTN then the UE is required to adjust its timing to within ±Te\_NTN. The reference timing shall be (NTA+NTA,UE-specific+NTA,common+NTA,offset) ×Tc before the downlink timing of the reference cell. All adjustments made to the UE uplink timing shall follow these rules:
    - 1) The maximum amount of the magnitude of the timing change in one adjustment shall be Tq\_NTN.
    - 2) The minimum aggregate adjustment rate shall be Tp\_NTN per second.
    - 3) The maximum aggregate adjustment rate shall be Tq\_NTN per 200 ms.

Where the maximum autonomous time adjustment step Tq\_NTN and the aggregate adjustment rate Tp\_NTN are specified in following table.

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | SCS of uplink signals (kHz) | Tq\_NTN | Tp\_NTN |
| 1 | 15 | 5.5\*64\*Tc | 5.5\*64\*Tc |
|  | 30 | 5.5\*64\*Tc | 5.5\*64\*Tc |
|  | 60 | NA | NA |
| NOTE: Tc is the basic timing unit defined in TS 38.211 | | | |

* Option 2: (Qualcomm)
  + To address Gradual Timing Adjustment and Double Correction issue, the current gradual timing adjustment requirement is updated as below:
    - When a transmission timing interval from the previous transmission to the current transmission differs from absolute value of “slot\_length\*(number of slots between the two transmissions) – 0.5\*TA\_c + 0.5\*TA\_p” by more than 2\*Te\_NTN, all adjustments made to the current transmission timing apart from “slot\_length\*(number of slots between the two transmissions) – 0.5\*TA\_c + 0.5\*TA\_ p” shall follow these rules:
      * The maximum amount of the magnitude of the timing change in one adjustment shall be Tq.
      * The minimum aggregate adjustment rate shall be Tp per second.
      * The maximum aggregate adjustment rate shall be Tq per 200 ms.
      * Where the maximum autonomous time adjustment step Tq and the aggregate adjustment rate Tp are specified in Table 7.1.2.1-1.
      * TA\_p is the amount of timing advance applied in the previous uplink transmission, which is derived based on the previous UE position, satellite position, and N\_TA,common.
      * TA\_c is the amount of timing advance derived based on the current UE position, satellite position, and N\_TA,common before applying it to the current uplink transmission.
* Option 3: (Xiaomi)
  + The amount of gradual timing adjustment accuracy requirement applies to the following timing inaccuracy:
    - The unexpected DL reception timing jump
    - Timing inaccuracy when UE does not update its position at a reasonable rate
  + The gradual timing adjustment requirements for NR NTN UE are specified as follows:
    - 1) The maximum amount of the magnitude of the timing change in one adjustment shall be Tq\_NTN = 13.5Ts.
    - 2) The minimum aggregate adjustment rate shall be Tp\_NTN = 13.5Ts per second.
    - 3) The maximum aggregate adjustment rate shall be Tq\_NTN = 13.5Ts per 200 ms.
  + Where the maximum autonomous time adjustment step Tq\_NTN and the aggregate adjustment rate Tp\_NTN are specified in Table 1

Table 1: Tq Maximum Autonomous Time Adjustment Step and Tp Minimum Aggregate Adjustment rate

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | SCS of uplink signals (kHz) | Tq\_NTN | Tp\_NTN |
| 1 | 15 | 13.5\*64\*Tc | 13.5\*64\*Tc |
|  | 30 | 13.5\*64\*Tc | 13.5\*64\*Tc |
|  | 60 | N.A | N.A |
| NOTE: Tc is the basic timing unit defined in TS 38.211 | | | |

* Option 4: (ZTE)
  + Relax the gradual timing adjustment requirement accordingly to accommodate the timing change/drift, i.e. updating Tq, Tp, and/or the rate.
* Option 5: (LGE)
  + Reuse existing gradual timing adjustment requirements.
  + The UE specific TA update could be UE implementation as long as the timing requirements are met. However, at least the UE specific TA should be updated before uplink transmission as UE behavior.
* Option 6: (CMCC)
  + Further relax the gradual timing adjustment requirements based on the baseline method

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | SCS of uplink signals (kHz) | Tq\_NTN | Tp\_NTN |
| 1 | 15 | 9\*64\*Tc | 5.5\*64\*Tc |
|  | 30 | 9\*64\*Tc | 5.5\*64\*Tc |
|  | 60 | N/A | N/A |
| NOTE: Tc is the basic timing unit defined in TS 38.211 | | | |

* Option 7: (Huawei)
  + - For NTN UE, we suggest to define the gradual timing adjustment requirements according to the timing drift due to UE movements.
    - It is suggested to consider the values of Tq in Table 1 when defining the gradual timing adjustment requirements for NTN UE.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameters | | Values | | |
| Frequency range | | FR1 | | |
| UL SCS | | 15kHz | 15kHz | 15kHz |
| BWmin | | 5MHz | 5MHz | 10MHz |
| Sampling interval | | 4Ts | 4Ts | 2Ts |
| Timing drift due to 0.1ppm frequency error (per 200ms) | | 20ns | 20ns | 20ns |
| Max UE speed | | 1200 km/h | 1200 km/h | 1200 km/h |
| Max delay variation due to UE movement (per 200ms) | | 222.22 ns | 222.22 ns | 222.22 ns |
| Max downlink timing drift due to UE movement and frequency error (per 200ms) | | 242.22 ns | 242.22 ns | 242.2 ns |
| Max TA variation due to UE movement per 200ms | | 444.44 ns | 444.44 ns | 444.44 ns |
| Tq for combining downlink timing drift and TA variation | w/o DigRF error | 242.22 ns  (8Ts) | 242.22 ns  (8Ts) | 242.2 ns  (8Ts) |
| w/ DigRF error | 9.5Ts | 9.5Ts | 9.5Ts |
| Note 1: The time length of Ts equals to 1/30720000 second (≈ 32.55 ns)  Note 2: DigRF error is assumed as 1.5Ts. | | | | |

* Option 8: (Ericsson)
  + - Keep existing gradual timing adjustment requirements for the closed loop terms N\_TA+N\_(TA,offset).
* Option 9: (CATT, MTK)
  + - Not define gradual timing adjustment requirements for NTN UE.
* Way forward (based on proposal in RAN4 #101bis-e)
  + When the transmission timing error between the UE and the reference timing exceeds ±Te\_NTN then the UE is required to adjust its timing to within ±Te\_NTN. The reference timing shall be (NTA+NTA,UE-specific+NTA,common+NTA,offset)×Tc before the [downlink timing] of the reference cell. All adjustments made to the UE uplink timing shall follow these rules:

1) The maximum amount of the magnitude of the timing change in one adjustment shall be Tq.

2) The minimum aggregate adjustment rate shall be Tp per second.

3) The maximum aggregate adjustment rate shall be Tq per 200 ms.

      where the maximum autonomous time adjustment step Tq and the aggregate adjustment rate Tp are specified in Table below.

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | SCS of uplink signals (kHz) | Tq\_NTN | Tp\_NTN |
| 1 | 15 | [5.5, 9.5, 13.5]\*64\*Tc | [5.5, 13.5]\*64\*Tc |
|  | 30 | [5.5, 9.5, 13.5]\*64\*Tc | [5.5, 13.5]\*64\*Tc |
|  | 60 | NA | NA |
| NOTE: Tc is the basic timing unit defined in TS 38.211 | | | |

* Discussion
  + Intel: For reference timing - NTA,UE-specific is included and it means that gradual timing adjustment does not control open-loop adjustment. Suggest to remove and keep legacy reference timing
  + QC: we provided updated proposals
  + E///: in our proposal we keep closed loop. UE-specific adjustments – we assume UE positioning accuracy is always within 50m
  + Huawei: we suggest Tq = 9.5 x 64Tc
  + Xiaomi: for reference timing we follow RAN1 agreement
  + Apple: for accuracy we can compromise to Huawei proposal of 9.5
* Agreements
  + When the transmission timing error between the UE and the reference timing exceeds ±Te\_NTN then the UE is required to adjust its timing to within ±Te\_NTN.
  + The reference timing shall be (NTA+NTA,UE-specific+NTA,common+NTA,offset)×Tc before the downlink timing of the reference cell.
  + All adjustments made to the UE uplink timing shall follow these rules:
    - Option 1:
      * The maximum amount of the magnitude of the timing change in one adjustment shall be Tq.
      * The minimum aggregate adjustment rate shall be Tp per second.
      * The maximum aggregate adjustment rate shall be Tq per 200 ms.
    - Option 2:
      * The maximum amount of the magnitude of the timing change, apart from a change of (NTA,UE-specific+NTA,common) between the previous transmission and the current transmission, in one adjustment shall be Tq.
      * The minimum aggregate adjustment rate, apart from a change of (NTA,UE-specific+NTA,common) during the last one second, shall be Tp per second.
      * The maximum aggregate adjustment rate, apart from a change of (NTA,UE-specific+NTA,common) during the last 200ms, shall be Tq per 200 ms.
      * where the maximum autonomous time adjustment step Tq and the aggregate adjustment rate Tp are specified in Table 7.1.2.1-1.
  + The maximum autonomous time adjustment step Tq and the aggregate adjustment rate Tp are specified in Table below.

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | SCS of uplink signals (kHz) | Tq\_NTN | Tp\_NTN |
| 1 | 15 | [5.5 to 9.5]\*64\*Tc | [5.5 to 13.5]\*64\*Tc |
|  | 30 | [5.5 to 9.5]\*64\*Tc | [5.5 to 13.5]\*64\*Tc |
|  | 60 | NA | NA |
| NOTE: Tc is the basic timing unit defined in TS 38.211 | | | |

Issue 1-2: The clarification on NTA,UE-specific and NTA,common. (not discussed)

* Proposals
  + Option 1: (Apple)
    - Use the definition agreed in RAN1 for NTA,UE-specific and NTA,common, and no need to have additional clarification on NTA,UE-specific and NTA,common.
  + Option 1a: (ZTE)
    - Reuse RAN1 definition of NTA,common for RRM requirements.
  + Option 2: (Qualcomm)
    - Reference timing of N\_{TA,UE-specific} is S3 + S4, where
      * for S3, the slot when the UL transmission is supposed to arrive at the target satellite based on provided valid ephemeris information (no error in the provided ephemeris information will account for UE error) and Eckstein Hechler based propagator model
      * for S4, the slot when the DL transmission corresponding to the reference timing of downlink is supposed to arrive at the target satellite based on actual received time of the slot and provided valid ephemeris information (no error in the provided ephemeris information will account for UE error) and Eckstein Hechler based propagator model
    - Reference timing for N\_{TA,common}, F3+F4, is derived according to N\_{TA, common} related parameters broadcasted within a validity duration.
  + Option 3: (CATT)
    - The NTA,common is signal to UE by network, and additional clarification is not needed.
    - The NTA,UE-specific can be further clarified as it contains two times of propagate delay of from UE transmit signal to satellite received it and UE’s prediction.
  + Option 4: (CMCC, Xiaomi)
    - The NTA,UE-specific and NTA,common should be ideal value, no estimation or calculation error will be included.
    - Reference timing for NTA,UE-specific and NTA,common is the slot when UL transmission is supposed to arrive at the target satellite based on true satellite position.
  + Option 5: (Huawei)
    - NTA,UE-specific is defined as the TA value used to pre-compensate the two-way propagation delay between the serving satellite and the UE. The one-way propagation delay between the serving satellite and the UE is calculated by using the UE location and the serving satellite location. The serving satellite location is expected to be derived from the serving satellite ephemeris indicated by network.
    - NTA,common is defined as the TA value used to pre-compensate the two-way transmission delay between the uplink time reference point and the serving satellite. The one-way transmission delay between the uplink time reference point and the serving satellite () is calculated as follows:
    - Where:
      * TACommon, TACommonDrift and TACommonDriftVariation, are common TA parameters indicated in SIB of the reference cell.
      * When a SFN and a sub-frame number are provided through the SIB or dedicated signaling, tepoch is the starting time of the corresponding DL sub-frame. Otherwise, tepoch is the end of the SI window during which the SI message is transmitted.
      * t is the starting time of the DL slot on which NTA,common is applied.
    - It is assumed that UE is able to update the value of NTA,common for each subframe.
    - It is assumed that UE is able to calculate the serving satellite location for each subframe.
    - It is assumed that UE is able to update the value of NTA,UE-specific for each subframe, which is calculated based on the serving satellite location for this subframe and the latest estimated UE location, which leads that the estimation error of NTA,UE-specific will not exceed the UE moving distance during one update periodicity divided by the speed of light.
  + Option 6: (Ericsson)
    - All adjustments made to the UE uplink timing, for N\_(TA,UE-specific) shall follow this rule:
      * The UE GNSS position accuracy is 50 meters from true position.
* Open issues
  + NTA,UE-specific
    - Definition
      * Option 1A: Reuse RAN1 definition
      * Option 1B: NTA,UE-specific is defined as the TA value used to pre-compensate the two-way propagation delay between the serving satellite and the UE. The one-way propagation delay between the serving satellite and the UE is calculated by using the UE location and the serving satellite location. The serving satellite location is expected to be derived from the serving satellite ephemeris indicated by network.
    - Reference timing
      * Option 2A: Reference timing of N\_{TA,UE-specific} is S3 + S4
  + NTA,common
    - Definition
      * Option 3A: Reuse RAN1 definition
      * Option 3B: NTA,common is defined as the TA value used to pre-compensate the two-way transmission delay between the uplink time reference point and the serving satellite.
    - Reference timing
      * Option 4A: Reference timing for N\_{TA,common}, F3+F4, is derived according to N\_{TA, common} related parameters broadcasted within a validity duration.

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206903 | WF on GNSS-related and timing requirements for NR NTN | Xiaomi |  |
| R4-2206904 | Reply LS on NTN UL time and frequency synchronization requirements | Xiaomi | To: RAN1 |
| R4-2206905 | Reply LS on combination of open and closed loop TA control in NTN | Qualcomm | To: RAN1 |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204187 | Introduction of Timing advance requirement for NTN | MediaTek | Revised |  |
| R4-2204239 | DraftCR on UE timer accuracy for NR NTN | Xiaomi | Revised |  |
| R4-2205330 | DraftCR on UE transmit timing requirements for NTN | Huawei | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206903 WF on GNSS-related and timing requirements for NR NTN**

*Type: other For: Approval  
 Source: Xiaomi*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206904 Reply LS on NTN UL time and frequency synchronization requirements**

*Type: LS out For: Approval  
 to RAN1  
 Source: Xiaomi*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206905 Reply LS on combination of open and closed loop TA control in NTN**

*Type: LS out For: Approval  
 to RAN1  
 Source: Qualcomm*

**Abstract:**

**Discussion:**

**Decision: Return to.**

================================================================================

##### 10.13.5.1 General

**R4-2203853 General and RRM requirements impacts**

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

**Decision: Noted.**

**R4-2203854 draft Cat-B CR (R17) MDT in NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision: Endorsed.**

**R4-2203928 Further discussion on general RRM requirements for NTN**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2203929 Requirements for RRC connected state mobility for NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Endorsed.**

**R4-2204185 Discussion on general RRM requirements in NTN**

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

**Decision: Noted.**

**R4-2204295 Discussion on general RRM requirements for NTN**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204520 Discussion on NTN general requirements**

*Type: discussion For: Discussion  
 Source: LG Electronics UK*

**Decision: Noted.**

**R4-2204722 General requirements for NTN**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

General requirements for NTN

**Decision: Noted.**

**R4-2204725 draft CR on signaling characteristics for NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

draft CR on signaling characteristics for NTN

**Decision: Revised to R4-2206900 (from R4-2204725).**

**R4-2206900 draft CR on signaling characteristics for NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

draft CR on signaling characteristics for NTN

**Decision: Return to.**

**R4-2205374 Discussion on general issues for NTN RRM**

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

**Decision: Noted.**

**R4-2205422 Reply LS to RAN1: LS on open loop closed loop dual correction of timing**

*Type: LS out For: Approval  
 to RAN1  
 Source: Ericsson*

**Abstract:**

Draft Reply LS to RAN1 regarding open loop closed loop dual correction of timing.

**Decision: Noted.**

##### 10.13.5.2 GNSS-related requirements

##### 10.13.5.3 Mobility requirements

**R4-2203793 Discussion on CHO for NR NTN**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2203855 Mobility requirements**

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

**Decision: Noted.**

**R4-2203930 Further discussion on mobility requirements for NTN**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204236 Further discussion on mobility requirements for NR NTN**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204237 DraftCR on maximum interruption in paging reception for NR NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Xiaomi*

**Decision: Endorsed.**

**R4-2204296 Discussion on mobility requirements for NTN**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204418 Discussion on CHO delay requirements for NTN UE**

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

**Decision: Noted.**

**R4-2204421 DraftCR for serving cell evaluation and intra-frequency measurements of NTN UE cell reselections**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Revised to R4-2206901 (from R4-2204421).**

**R4-2206901 DraftCR for serving cell evaluation and intra-frequency measurements of NTN UE cell reselections**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Return to.**

**R4-2204474 Draft CR for idle mode UE meausrement capability in NTN.**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: LG Electronics UK*

**Decision: Endorsed.**

**R4-2204522 Discussion on NTN Mobility requirements**

*Type: discussion For: Discussion  
 Source: LG Electronics UK*

**Decision: Noted.**

**R4-2204724 Mobility requirements for NTN**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

Measurement requirements for NTN

**Decision: Noted.**

**R4-2205228 NTN CHO timeline considerations**

*Type: other For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

we discuss the preferred option for the definition of the NTN CHO timeline (DCHO) and the corresponding delay uncertainties involved

**Decision: Noted.**

**R4-2205375 Discussion on mobility requirements for NTN RRM**

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

**Decision: Noted.**

**R4-2205376 CR on IDLE mode mobility requirements for NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206902 (from R4-2205376).**

**R4-2206902 CR on IDLE mode mobility requirements for NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

##### 10.13.5.4 Timing requirements

**R4-2203794 Discussion on timing requirements for NR NTN**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2203856 Timing requirements**

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

**Decision: Noted.**

**R4-2203931 Further discussion on timing requirements for NTN**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204160 Discussion on timing requirements for NTN UE**

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

**Decision: Noted.**

**R4-2204186 Discussion on timing requirements in NTN**

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

**Decision: Noted.**

**R4-2204187 Introduction of Timing advance requirement for NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Revised to R4-2206906 (from R4-2204187).**

**R4-2206906 Introduction of Timing advance requirement for NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Return to.**

**R4-2204238 Further discussion on timing requirements for NR NTN**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204239 DraftCR on UE timer accuracy for NR NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Xiaomi*

**Decision: Revised to R4-2206907 (from R4-2204239).**

**R4-2206907 DraftCR on UE timer accuracy for NR NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Xiaomi*

**Decision: Return to.**

**R4-2204316 Discussion on NTN timing requirements**

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

**Decision: Noted.**

**R4-2204419 Discussion on the remaining issues for NTN timing requirements**

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

**Decision: Noted.**

**R4-2204530 Discussion on NTN timing requirements**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2205329 Discussion on NTN UE timing related requirements**

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

**Decision: Noted.**

**R4-2205330 DraftCR on UE transmit timing requirements for NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206908 (from R4-2205330).**

**R4-2206908 DraftCR on UE transmit timing requirements for NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205420 UE Timing requirements**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

Analysis of remaining NTN timing requirements.

**Decision: Noted.**

**R4-2205421 Reply LS to RAN1: LS on NTN UL time and frequency synchronization requirements (Timing)**

*Type: LS out For: Approval  
 to RAN1  
 Source: Ericsson*

**Abstract:**

Draft Reply LS to RAN1 regarding UE timing requirements.

**Decision: Noted.**

##### 10.13.5.5 Measurement procedure requirements

**R4-2203795 Discussion on measurement procedure requirements for NTN**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2203857 Measurement procedure requirements**

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

**Decision: Noted.**

**R4-2203932 Further discussion on measurement procedure requirements for NTN**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204240 Further discussion on measurement requirements for NR NTN**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204241 DraftCR on inter-frequency measurement requirements for NR NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Xiaomi*

**Decision: Endorsed.**

**R4-2204297 Draft CR to general measurement requirement for NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Endorsed.**

**R4-2204420 Discussion on multiple SMTC and measurement gaps for NTN UE**

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

**Decision: Noted.**

**R4-2204545 Discussion on NTN measurement requirements**

*Type: discussion For: Discussion  
 Source: LG Electronics UK*

**Decision: Noted.**

**R4-2204723 Measurement requirements for NTN**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

Measurement requirements for NTN

**Decision: Noted.**

**R4-2205230 Discussions on SMTC and measurement gaps**

*Type: other For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

This contribution addresses measurements with SMTC.

**Decision: Noted.**

**R4-2205377 Discussion on measurement requirements for NTN**

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

**Decision: Noted.**

**R4-2205378 CR on intra-frequency measurement requirements for NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2205958 Draft CR on L1-RSRP measurements for Reporting in NTN**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Apple*

**Decision: Endorsed.**

### 10.14 UE Power Saving Enhancements for NR

================================================================================

**Email discussion: [102-e][222] NR\_UE\_pow\_sav\_enh**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][222] NR\_UE\_pow\_sav\_enh | R17 NR Power Saving enhancements (NR\_UE\_pow\_sav\_enh) | RRM Core requirements RRM Perf requirements | 10.14.1 10.14.2 10.14.3 | Hsuanli Lin |

**R4-2206765 Email discussion summary: [102-e][222] NR\_UE\_pow\_sav\_enh**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207063 (from R4-2206765).**

**R4-2207063 Email discussion summary: [102-e][222] NR\_UE\_pow\_sav\_enh**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 25, 2022)**

Key open issues

* Topic #1: General and work plan (AI 10.14.1)
* Topic #2: UE measurements relaxation for RLM and/or BFD (AI 10.14.2)
  + Sub-topic 1 Relaxation applicability and criterion
  + Sub-topic 2 Low motility criteria
  + Sub-topic 3 Good serving cell quality criteria
  + Sub-topic 4 Exiting Relaxation criteria
  + Sub-topic 5 During Relaxation mode
  + Sub-topic 6 Other Aspects
* Topic #3: RRM performance requirements (AI 10.14.3)

Issue 2-3-5: Configuration type of offset for the cell quality criteria

* Proposals
  + Q1: Signalling method
    - Option 1: Offset for RLM/BFD relaxation is configured either per serving cell or per-CG. (Intel, MTK, vivo)
    - Option 1a: (Intel, MTK, [vivo])
      * Offset for RLM relaxation is configured per serving cell and offset for BFD is configured per-CG.
    - Option 1b: (vivo)
      * If the offset X is shared for both RLM and BFD, the offset configuration is on a per-serving cell basis, because BFD is configured on a per-serving cell basis.
      * Cell quality criterion is evaluated on a per-CC basis. UE can make RLM/BFD relaxation decisions separately for each configured CC/band according to the configured cell quality thresholds.
    - Option 2: per-UE basis. (Qualcomm, Apple, CMCC, Ericsson, Xiaomi, Oppo, Nokia)
      * Option 2a: per-UE basis, and the offset is shared for both RLM and BFD. (Qualcomm)
    - Option 3: The offset X for the cell quality criteria is per UE with FR differentiation (Moderator, Intel, vivo)
  + Q2: whether the offset is configured separately for RLM and BFD or not?
    - Option 1: the offset are configured separately for RLM and BFD. (Huawei, MTK, Nokia, Ericsson, vivo)
    - Option 2: the offset X is shared for both RLM and BFD (Qualcomm, Intel, vivo)
* Moderator WF
  + The offset X dB can be configured separately for RLM and BFD, if different configurable offset for RLM/BFD are agreed.
  + The offset X dB for the cell quality criteria is per UE with FR differentiation.
* Agreements
  + The offset X dB for the cell quality criteria is configured per UE. Separate values can be configured per FR.
  + The offset X dB can be configured separately for RLM and BFD

Issue 2-2-4: Clarifications for Low mobility criteria evaluation

* Proposals
  + Proposal 1: the low mobility criteria is evaluated on the NR PCell for the case of NR single carrier, NR CA, NE-DC, and evaluated on the NR PSCell for the case of EN-DC. (Vivo, MTK, Apple, CMCC, Xiaomi)
    - Proposal 1a: (Vivo, MTK, Apple, CMCC, Xiaomi)
      * the low mobility criteria is evaluated on Pcell in NR-DC.
    - Proposal 1b: (Qualcomm)
      * the low mobility criteria is evaluated separately on Pcell and PSCell in NR-DC.
  + Proposal 2: the low mobility criteria is evaluated on the cells where RLM-RS/BFD-RS is present. (Ericsson, Nokia)
* Agreements
  + The low mobility criteria is evaluated on the
    - NR PCell for the case of NR single carrier, NR CA, NE-DC
    - NR PSCell for the case of EN-DC
    - NR PCell for the case of NR-DC
    - FFS how to handle scenarios when BFD is configured in SCell

Issue 2-3-2: For RLM, other configurable values of offset X dB

* Proposals
  + Option 1: [2, 4, 6, 8] dB (Qualcomm, Apple, Ericsson, MTK, CMCC, CATT, Huawei, Intel, Oppo, Nokia)
  + Option 2: [-3, 3, 6, 9] dB. (vivo)
  + Not support the negative value: CATT
  + Option 3: [2, 4, 8, 12] dB. (MTK, CMCC, CATT, Huawei)
* Moderator WF
  + For RLM, the offset X dB can be configured from a set of [2, 4, 6, 8] dB.
* Discussion
  + TBA
* Agreements
  + TBA

**GTW session (March 01, 2022)**

Issue 2-3-3: For BFD, the reference threshold Qx and the predefined offset X

* Tentative agreement
  + For BFD, confirm Qx = Qin and the predefined offset value X is 0 dB*.*
* Discussion
  + TBA
* Agreements
  + TBA

Issue 2-3-4: For BFD, other configurable values of offset X dB

* Proposals
  + Option 1: [2, 4, 6, 8] dB (Qualcomm, Apple, MTK, Huawei, CMCC)
  + Option 2: [-3, 3, 6, 9] dB. (vivo)
  + Option 3: [2, 4, 8, 12] dB. (MTK, CMCC)
  + Option 4: [7,9,11,12] dB for BFD (Ericsson)
  + Option 4a: [3,6,9,12] dB for BFD (Ericsson, Nokia)
* Moderator WF
  + [3, 6, 9, 12] dB.
* Discussion
  + TBA
* Agreements
  + TBA

2-3-2: Configurable values of offset X dB for RLM

* Proposals
  + Option 1: [2, 4, 6, 8] dB (Qualcomm, Apple, Ericsson, MTK, CMCC, CATT, Huawei, Intel, Oppo, Nokia)
  + Option 2: [-3, 3, 6, 9] dB. (vivo)
    - Not support the negative value: CATT
  + Option 3: [2, 4, 8, 12] dB. (MTK, CMCC, CATT, Huawei)
* Tentative agreement
  + [2, 4, 6, 8] dB.

2-1-1: The cases that UE is allowed to apply the relaxed RLM/BFD requirement

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206787 | LS on RLM and BFD relaxation in R17 UE power saving | MediaTek Inc | To: RAN\_2 |
| R4-2206909 | WF on RLM/BFD relaxation for UE Power Saving enhancements | MediaTek Inc |  |
| R4-2206910 | Draft CR Minimum requirement for CSI-RS based beam failure detection for UE configured with relaxed measurement criterion | Xiaomi |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| [R4-2205661](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205661.zip) | CR on TS38.133 for applicability of RLM measurement relaxation | MediaTek inc, Ericsson | Revised |  |
| [R4-2205332](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205332.zip) | DraftCR on SSB based relaxed RLM requirements | Huawei, HiSilicon | Revised |  |
| [R4-2204338](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204338.zip) | draft CR on CSI-RS RLM requirements relaxation for R17 UE power saving | vivo | Revised |  |
| [R4-2204707](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204707.zip) | 38.133 draft CR on RLM relaxation criteria | Nokia, Nokia Shanghai Bell | Postponed |  |
| [R4-2205636](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205636.zip) | Draft CR to TS 38.133: Applicability of relaxed BFD requirements | Ericsson, MediaTek Inc. | Revised |  |
| [R4-2204533](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204533.zip) | Draft CR for TS 38.133 Minimum requirement for SSB based BFD for UE configured with relaxed measurement criterion | CMCC | Revised |  |
| [R4-2203904](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2203904.zip) | Draft CR on relaxed measurement criteria for BFD | CATT | Postponed |  |
| [R4-2205850](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205850.zip) | Clause title change on big CR | Qualcomm communications-France | Return to |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206787 LS on RLM/BFD relaxation for NR UE power saving enhancements**

*Type: LS out For: Approval  
 to RAN2   
 Source: MediaTek*

**Decision: Revised to R4-2206790 (from R4-2206787).**

**R4-2206790 LS on RLM/BFD relaxation for NR UE power saving enhancements**

*Type: LS out For: Approval  
 to RAN2   
 Source: MediaTek*

**Decision: Approved.**

**R4-2206909 WF on RLM/BFD relaxation for UE Power Saving enhancements**

*Type: other For: Approval  
 Source: MediaTek Inc*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206910 Draft CR Minimum requirement for CSI-RS based beam failure detection for UE configured with relaxed measurement criterion**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Xiaomi*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2207087 Reply LS to RAN2 on RLM/BFD relaxation for Enhanced Power Saving**

*Type: LS out For: Approval  
 to RAN2   
 Source: vivo*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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#### 10.14.1 General

**R4-2204531 Discussion on the UE feature for R17 RLM/BFD relaxation**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2205636 Draft CR to TS 38.133: Applicability of relaxed BFD requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson, MediaTek Inc.*

**Abstract:**

Applicability rule for relaxed BFD.

**Decision: Revised to R4-2206914 (from R4-2205636).**

**R4-2206914 Draft CR to TS 38.133: Applicability of relaxed BFD requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson, MediaTek Inc.*

**Abstract:**

Applicability rule for relaxed BFD.

**Decision: Return to.**

#### 10.14.2 RRM core requirements

**R4-2203721 On Power Saving RRM Requirement**

*Type: discussion For: Discussion  
 Source: Qualcomm, Inc.*

**Decision: Noted.**

**R4-2203757 UE measurements relaxation for RLM and/or BFD**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2203903 Further discussion on RLM/BFD relaxation for UE power saving enhancement**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2203904 Draft CR on relaxed measurement criteria for BFD**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Postponed.**

**R4-2204243 Further discussion on UE measurements relaxation for RLM and/or BFD**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204280 Discussion on RRM requirements for R17 RLM/BFD relaxation**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204337 Discussion on remaining issues on RLM and BFD relaxation for NR UE power saving**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204338 draft CR on CSI-RS RLM requirements relaxation for R17 UE power saving**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Revised to R4-2206913 (from R4-2204338).**

**R4-2206913 draft CR on CSI-RS RLM requirements relaxation for R17 UE power saving**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Return to.**

**R4-2204398 Discussion on UE power saving for RLM and BM**

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

**Decision: Noted.**

**R4-2204532 Discussion on RLM/BFD relaxation for NR power saving enhancement**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2204533 Draft CR for TS 38.133 Minimum requirement for SSB based BFD for UE configured with relaxed measurement criterion**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: CMCC*

**Decision: Revised to R4-2206915 (from R4-2204533).**

**R4-2206915 Draft CR for TS 38.133 Minimum requirement for SSB based BFD for UE configured with relaxed measurement criterion**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: CMCC*

**Decision: Return to.**

**R4-2204706 Discussion about RLM/BFD measurement relaxation**

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

**Decision: Noted.**

**R4-2204707 38.133 draft CR on RLM relaxation criteria**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Postponed.**

**R4-2205331 Further discussion on RLM/BFD measurement relaxation**

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

**Decision: Noted.**

**R4-2205332 DraftCR on SSB based relaxed RLM requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206912 (from R4-2205332).**

**R4-2206912 DraftCR on SSB based relaxed RLM requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205402 RLM and RLF relaxation for UE power saving**

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

**Decision: Noted.**

**R4-2205637 Discussions on UE power saving for RLM and BFD**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution we discuss the remaining issues of Rel-17 UE power saving.

**Decision: Noted.**

**R4-2205660 Discussion on Rel-17 RLM/BFD measurement relaxation**

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

**Decision: Noted.**

**R4-2205661 CR on TS38.133 for applicability of RLM measurement relaxation**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Revised to R4-2206911 (from R4-2205661).**

**R4-2206911 CR on TS38.133 for applicability of RLM measurement relaxation**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Return to.**

**R4-2205850 Clause title change on big CR**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Qualcomm communications-France*

**Decision: Return to.**

#### 10.14.3 RRM performance requirements

**R4-2203722 On Power Saving RRM Performance Requirement Scope**

*Type: discussion For: Discussion  
 Source: Qualcomm, Inc.*

**Decision: Noted.**

**R4-2203758 UE power saving enhancement: RRM performance requirements**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2203905 Discussion on RRM test cases for UE power saving enhancement**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204534 Discussion on test cases for RLM/BFD measurement relaxation**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

### 10.15 NR Sidelink enhancement

#### 10.15.5 RRM core requirements

================================================================================

**Email discussion: [102-e][223] NR\_SL\_enh\_RRM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][223] NR\_SL\_enh\_RRM | R17 NR SL enhancements (NR\_SL\_enh) | RRM Core requirements RRM Perf requirements | 10.15.5 10.15.6 | Yoonoh Yang |

**R4-2206766 Email discussion summary: [102-e][223] NR\_SL\_enh\_RRM**

*Type: other For: Information  
 Source: Moderator (LG Electronics)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207064 (from R4-2206766).**

**R4-2207064 Email discussion summary: [102-e][223] NR\_SL\_enh\_RRM**

*Type: other For: Information  
 Source: Moderator (LG Electronics)*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 24, 2022)**

Key open issues (Core part)

* Topic #1: RRM related to intra-band con-current V2X operation
  + Sub-topic 1-1 : Scheduling availability requirements
* Topic #2: RRM related to SL-DRX
  + Sub-topic 2-1: Selection/reselection of V2X Synchronization Reference Source
  + Sub-topic 2-2: Interruption due to SL-DRX

2-2-1: Avoidance of interruptions to WAN due to SL DRX transition between active and non-active

* Proposals
  + Option 1: (Ericsson, ZTE)
    - Interruptions due to SL DRX transition between active and non-active shall be avoided on WAN during:
      * reception of paging,
      * reception of system information,
      * while *onDurationTimer* is running
    - Interruptions on WAN due to SL DRX transition shall be avoided when UE is experiencing radio link problems on WAN:
      * T310 timer is running for RLF on PCell,
      * Performing candidate beam detection on PCell/serving cell as specified in section 8.5.5 and 8.5.6
  + Option 2: (LGE)
    - Interruptions to WAN are not applicable for the following WAN conditions when SL is mode1.
      * reception of paging
      * reception of system information
      * while onDurationTimer is running
  + Option 3: (Qualcomm)
    - The interruptions due to DRX transition agreed in RAN4#101bis is applicable:
      * to SL UE active to inactive transition
      * while onDurationTimer is running
      * while link recovery procedure is running
      * while SL is in resource allocation mode 1
  + Option 4: (Huawei, Oppo, vivo)
    - Not define any exception conditions for the interruption requirements on WAN due to SL-DRX
* Candidate scenarios

|  |  |  |
| --- | --- | --- |
| WAN operation | Applicability of WAN interruptions due to SL DRX transition between active/non-active states | |
| SL resource  allocation mode 1 | SL resource  allocation mode 2 |
| Reception of paging | Yes: QC, HW, OPPO, vivo  No: E///, ZTE, LGE | Yes: HW, vivo  No: E///, ZTE, LGE |
| Reception of system information | Yes: QC, HW, OPPO, vivo  No: E///, ZTE, LGE | Yes HW, vivo  No: E///, ZTE, LGE |
| ~~While onDurationTimer is running~~ | ~~Yes: QC, HW, OPPO, vivo~~  ~~No: E///, ZTE, LGE~~ | ~~Yes: QC, HW, OPPO, vivo~~  ~~No: E///, ZTE, LGE~~ |
| While RLF timer is running | Yes: QC, HW, OPPO, vivo  No: E///, ZTE | Yes: QC, HW, OPPO, vivo  No: E///, ZTE |
| While UE is performing CBD | Yes: QC, HW, OPPO, vivo  No: E///, ZTE | Yes: QC, HW, OPPO, vivo  No: E///, ZTE |

* Discussion
  + QC: for “onDurationTimer” – does it apply to UE in non-DRX?
    - LGE: This is relevant to Uu non-DRX
    - E///: agree with QC
  + E///: Ok to split SL resource allocation mode 2 and define exception for Mode 2 only
* Agreements
  + Define the following applicability rules for interruptions to WAN due to SL DRX

|  |  |  |
| --- | --- | --- |
| WAN operation | Applicability of WAN interruptions due to SL DRX transition between active/non-active states | |
| SL resource  allocation mode 1 | SL resource  allocation mode 2 |
| Reception of paging | Applicable | Not applicable |
| Reception of system information | Applicable | Not applicable |
| While RLF timer is running | Applicable | Not applicable for DRX cycle length < X ms  Applicable for other cases |
| While UE is performing CBD | Applicable |

* + - FFS on UE behavior for the case when WAN interruption shall be avoided (e.g., postpone SL-DRX transition)

Issue 2-2-1-1: Avoidance of interruptions to WAN due to SL DRX transition between active and non-active

* Proposals: Avoidance rules in 2-2-1 are applicable to
  + Option 1: UE active to inactive transition only
  + Option 2: All transitions
* Discussion
  + QC: We should not preclude UE to switch from inactive to active.
  + E///: it is not possible to differentiate between PS and non-PS in L1. Option 2.
  + vivo: agree with QC.
  + ZTE: Option 2.
  + Huawei: Option 2.

2-2-2: Interruption to WAN due to SL-DRX when NR is in DRX and SL is in SL-DRX

* Proposals
  + Option 1: Not allow interruption (CATT, ~~LGE~~, Oppo)
  + Option 2: Not specify interruption (vivo)
  + Option 3: Define interruption (Qualcomm)
  + Option 4: Interruptions shall be avoided on WAN while *onDurationTimer* is running (Ericsson, ZTE)
* Discussion
  + E///: Ok with Option 4 for mode 2
  + QC: Option 3
  + LGE: ok with Option 3 while onDurationTimer is running
* Tentative agreements
  + Define interruptions to WAN due to SL-DRX when NR is in DRX ~~and SL is in SL-DRX~~
    - Interruptions on WAN are not applicable while *onDurationTimer* is running for the SL resource allocation mode 2

2-1-2-1: Whether to skip asynchronized SLSS measurement & search or relax its requirement certain conditions are met

* Proposals
  + Option 1: Relax asynchronized SyncRef UE search requirement for R17 UE supporting DRX when the conditions are satisfied for an evaluation period, e.g. Tevaluate,SLSS  in initial/cease of SLSS Tx (Qualcomm, LGE?):
    - UE can extend the detection time to max(x\*50 DRx cycle length, 8s), DRx cycle length is the [longest] DRx cycle and 1<=x<=∞, when a set of conditions are satisfied over an evaluation period. x can be discussed after this option is agreed.
  + Option 2: R17 UE supporting DRX can skip asynchronized SyncRef UE search when the conditions are satisfied (Vivo, CATT, Qualcomm, LGE)
  + Option 3: Do not consider skip or relaxation in R17 (Xiaomi, Huawei, [LGE], OPPO)
* Discussion
  + QC: suggest to agree Option 1.
  + Vivo: Option 2 depends on conditions discussed in the other issue and we are ok with Option 1.
  + Huawei: We can compromise to Option 1
  + OPPO: Option 3 and need to prioritize performance. Can accept Option 1.
* Agreements
  + Relax asynchronized SyncRef UE search requirement for R17 UE supporting DRX when the conditions are satisfied for an evaluation period, e.g. Tevaluate,SLSS  in initial/cease of SLSS Tx:
    - UE can extend the detection time to max(X\*50 DRX cycle length, 8s) when a set of conditions are satisfied over an evaluation period
      * DRX cycle length is the [longest] DRX cycle
      * X is FFS: 1 ≤ X < ∞
      * Set of conditions is FFS

**GTW session (March 01, 2022)**

2.1.2 Conditional SyncRef UE detection

2.2.1.1 Avoidance of Interruption

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206916 | WF on NR SL enhancements RRM requirements | LG Electronics |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204146 | draft CR on interruption requirement for SL | LG Electronics | Revised |  |
| R4-2204646 | Draft CR on Selection Reselction of V2X Synchronization Reference Source for sidelink enhancement | vivo | Revised |  |
| R4-2205641 | Draft CR on WAN interruptions due to SL DRX for Rel-17 SL enhancement in TS 38.133 | Ericsson | Merged |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206916 WF on NR SL enhancements RRM requirements**

*Type: other For: Approval  
 Source: LG Electronics*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**R4-2203718 On NR SL RRM Core Requirement**

*Type: discussion For: Discussion  
 Source: Qualcomm, Inc.*

**Decision: Noted.**

**R4-2204147 Big CRs: RRM requirements for Rel-17 NR SL enhancement**

*Type: CR For: Agreement  
 38.133 v17.4.0 CR-2251 rev Cat: B (Rel-17)  
  
 Source: LG Electronics*

**Abstract:**

It is Big CR to introduce RRM core requirements for NR SL enhancement.

**Decision: For email approval.**

##### 10.15.5.1 Intra-band con-current V2X operation

**R4-2203906 Discussion on remaining issues for intra-band con-current SL operation**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204244 Further discussion on RRM requirements for intra-band con-current V2X operation**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204298 Discussion on RRM impact of intra-band concurrent V2X operation**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204644 Remaining issues on Intra-band con-current V2X operation RRM requirements**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2205640 Discussions on interruptions due to SL DRX for Rel-17 SL operation**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Sidelink DRX was discussed at previous meeting and a number of open issues were identified in [1]. In this contribution, we discuss and provide our view on those.

**Decision: Noted.**

##### 10.15.5.2 SL-DRX

**R4-2203907 Discussion on remaining issues for RRM requirements related to SL-DRX**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204145 RRM requirements for SL-DRX**

*Type: discussion For: (not specified)  
 Source: LG Electronics*

**Abstract:**

It discusses the remained RRM core requirements for NR SL enhancements.

**Decision: Noted.**

**R4-2204245 Further discussion on RRM requirements related to SL-DRX**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204299 Discussion on SL-DRX**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204645 Remaining issues on SL-DRX RRM requirements**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2205333 Discussion on RRM remaining issues related to SL-DRX**

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

**Decision: Noted.**

**R4-2205401 Discussions on DRX in NR SL enhancement**

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

**Abstract:**

This paper discusses one remaining issue related to SL DRX.

**Decision: Noted.**

**R4-2205641 Draft CR on WAN interruptions due to SL DRX for Rel-17 SL enhancement in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Draft CR to capture the interruption requirements on WAN due to SL DRX.

**Decision: Merged.**

##### 10.15.5.3 Others

**R4-2204146 draft CR on interruption requirement for SL**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: LG Electronics*

**Abstract:**

It is a draftCR to introduce the interrutption requirement for SL enh on top of the endorsed draftCR R4-2202652.

**Decision: Revised to R4-2206917 (from R4-2204146).**

**R4-2206917 draft CR on interruption requirement for SL**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: LG Electronics*

**Abstract:**

**Decision: Return to.**

**R4-2204646 Draft CR on Selection Reselction of V2X Synchronization Reference Source for sidelink enhancement**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: F (Rel-17)  
  
 Source: vivo*

**Decision: Revised to R4-2206918 (from R4-2204646).**

**R4-2206918 Draft CR on Selection Reselction of V2X Synchronization Reference Source for sidelink enhancement**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: F (Rel-17)  
  
 Source: vivo*

**Decision: Return to.**

#### 10.15.6 RRM performance requirements

**R4-2203719 On NR SL RRM Performance Requirement Scope**

*Type: discussion For: Discussion  
 Source: Qualcomm, Inc.*

**Decision: Noted.**

**R4-2203908 Discussion on RRM test cases for sidelink operation**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204148 Work Plan and Test Case List for NR SL enh RRM performance**

*Type: Work Plan For: Approval  
 Source: LG Electronics*

**Abstract:**

It is a work plan and list of test cases for NR SL enhancement performance.

**Decision: Noted.**

### 10.16 Extending current NR operation to 71GHz

#### 10.16.8 RRM core requirements

================================================================================

**Email discussion: [102-e][224] NR\_ext\_to\_71GHz\_RRM\_1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][224] NR\_ext\_to\_71GHz\_RRM\_1 | R17 NR 52.6 - 71GHz (NR\_ext\_to\_71GHz) | RRM Core requirements - General and RRM requirements impacts - Timing requirements | 10.16.8.1 10.16.8.2 | Prashant Sharma |

**R4-2206767 Email discussion summary: [102-e][224] NR\_ext\_to\_71GHz\_RRM\_1**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207065 (from R4-2206767).**

**R4-2207065 Email discussion summary: [102-e][224] NR\_ext\_to\_71GHz\_RRM\_1**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 23, 2022)**

Key open issues

* Topic #1: General
  + Sub-topic 1-1: Rx beam sweeping scaling factor
  + Sub-topic 1-2: deriveSSB-IndexFromCell
  + Sub-topic 1-3: Scheduling restrictions
  + Sub-topic 1-4: SSB index identification time
  + Sub-topic 1-5: Psharing\_factor
* Topic #2: Timing requirements
  + Sub-topic 2-1: UE transmit timing error
  + Sub-topic 2-2: Gradual timing adjustment
  + Sub-topic 2-3: Timing advance
  + Sub-topic 2-4: MRTD
  + Sub-topic 2-5: MTTD

Issue 1-1-1: Rx beam sweeping scaling factor

* Proposals
  + Proposal 1 (Vivo, Huawei, CATT, Apple, QC): The Rx beam sweeping scaling factor may need to be increased for FR2-2 compared with FR2-1.
  + Proposal 2a (LGE, Nokia, Intel, E///): Reuse the existing scaling factor for Rx beam sweeping for FR2-2 in CONNECTED mode.
  + Proposal 2b (LGE): Introduce a larger scaling factor for Rx beam sweeping ([8 x N])for FR2-2 in IDLE/INACTIVE mode.
* Discussion
  + E///: RF session agreed to use 8 antenna elements, but we do not see strong correlation between number of elements and number of beams. Prefer 2a.
  + Huawei: Increased number of antenna elements will require more beams. Do not support differentiation of IDLE/CONNECTED modes
  + LGE: Originally we prefer to extend, but considering timelines we suggest to split the discussion for IDLE/CONNECTED. We can compromise to reuse current scaling factor for all scenarios.
  + Apple: We need to reconsider beam sweeping factor.
  + QC: Need to increase.
  + vivo: The agreement in the RF session was made in the last meeting.
  + Intel: we typically operate with rough beams, while number of elements will mostly affect fine beams
  + Nokia: Not sufficient details for Proposal 1.
* Agreements
  + Rx beam sweeping scaling factor is FFS
    - Option 1: The Rx beam sweeping scaling factor is increased for FR2-2 compared with FR2-1
    - Option 2: Reuse the existing FR2-1 scaling factor for Rx beam sweeping for FR2-2.

Session chair: Continue discussion in the 2nd round to identify candidate values for Option 1. For the next meeting companies are encouraged to bring analysis for all identified options.

Issue 1-2-1: Frame boundary tolerance when deriveSSB-IndexFromCell is disabled

* Proposals
  + Option 1 (Qualcomm, Intel, Vivo, Apple): Specify the frame boundary alignment tolerance for the case when deriveSSB-IndexFromCell is disabled for 960kHz SCS.
  + Option 2 (CATT, Nokia, LGE, Ericsson, Huawei): Do not specify frame boundary alignment tolerance for the case when deriveSSB-IndexFromCell is disabled.
  + Option 3 (compromise): Specify the frame boundary alignment tolerance for the case when deriveSSB-IndexFromCell is disabled for 960kHz SCS. UE requirements are defined under assumption that UE can read PBCH payload.
* Discussion
  + Vivo: Option 1 is beneficial for both UE and NW.
  + Apple: Option 1. Agree with vivo
  + Huawei: Option 1 implies specific UE implementation. Need to define requirements based on the worst case. Compromise to define frame boundary alignment and allow UE to make decoding.
  + Nokia: Need further clarification on UE RX assumptions for Option 1.
  + Intel: Our understanding is that Option 1 and Option 3 are identical. If UE can detect PBCH DMRS then it will have improved performance.
  + QC: Our proposal was to enable DMRS-based detection (for Option 1). We are ok with Option 3. To E/// - we need to provide some assumption for UE. For the tolerance – we can reuse requirements for 480kHz.
* Agreements
  + Specify the frame boundary alignment tolerance for the case when deriveSSB-IndexFromCell is disabled for 960kHz SCS.
    - The tolerance is [6] SSB symbols
    - Requirements are defined under assumption that UE may read PBCH payload.

Issue 1-4-1: Intra-frequency SSB index identification time when deriveSSB-IndexFromCell is not enabled (not discussed)

* Proposals
  + Proposal 1 (Nokia, Intel): When deriveSSB-IndexFromCell is not enabled, use the following definition of TSSB\_time\_index\_intra for FR2-2:

|  |  |  |
| --- | --- | --- |
| DRX cycle | Without measurement gaps | With measurement gaps |
| No DRX | Max(200ms, ceil(MSSB\_index\_intra × Kp) × SMTC period) × CSSFintra | Max(200ms, ceil(MSSB\_index\_intra × Kp) × Max(MGRP, SMTC period)) × CSSFintra |
| DRX cycle≤ 320ms | Max(200ms, ceil(1.5 × MSSB\_index\_intra s × Kp) × Max(SMTC period, DRX cycle)) × CSSFintra | Max(200ms, ceil(1.5 × MSSB\_index\_intra × Kp) × Max(MGRP, SMTC period, DRX cycle)) × CSSFintra |
| DRX cycle>320ms | ceil(MSSB\_index\_intra × Kp) × DRX cycle × CSSFintra | ceil(MSSB\_index\_intra × Kp) × DRX cycle × CSSFintra |
| MSSB\_index\_intra will depend on the outcome of the PBCH index detection discussion and RF decision on supported power classes for FR2-2. | | |

* + Proposal 2a (CATT): If deriveSSB-IndexFromCell is not enabled, a UE could determine the LSBs of the SSB index using PBCH DMRS, which can only resolve up to 8 SSB indexes.
  + Proposal 2b (Mediatek, LGE): If deriveSSB-IndexFromCell is not enabled, additional time for PBCH detection for SSB index acquisition is allowed.
  + Proposal 2c (Qualcomm): If deriveSSB-IndexFromCell is not enabled, define the neighbour cell SSB index identification requirements for intra-frequency measurements based on the PBCH-DMRS detection delay corresponding to the frame boundary alignment tolerance.
  + Proposal 2d (Intel, vivo): The MSSB\_index\_intra can be calculated as 3 x N, where N is the Rx beam sweeping scaling factor, which can be different depending on the UE type
* Discussion
  + TBA
* Agreements
  + TBA

Issue 2-1-4: One/Two set of requirements (not discussed)

* Proposals
  + Proposal 1 (CATT, Vivo, Intel, Nokia, Qualcomm, Apple, Ericsson): One set of requirements.
  + Proposal 2 (Huawei, ZTE, Mediatek): Define two set of UL timing accuracy requirements
    - Option 2a (Huawei): One for SSB periodicity of 20ms, other for 80ms
    - Option 2b (ZTE): One for SSB periodicity of 40ms, other for 80ms
      * Define test cases for both sets of requirements under different SSB periodicities
    - Option 2c (Mediatek): One set correspond to Te/CP occupancy of 50%
  + Proposal 2a (Mediatek): Introduce a new UE capability to indicate which set of UE transmit timing error requirements can be applied
  + Proposal 3 (Nokia): If two set of requirements are defined, Te requirements with multiple SSB availability periods are applicable to all the UEs.

Issue 2-1-3: SSB periodicity

* Proposals
  + Proposal 1: For UL SCS of 480/960 kHz, a UE is required to meet the UL timing accuracy requirements if an SSB is available in the last X ms.
    - Option 1 (Qualcomm, Intel, Huawei, vivo): X=80/40ms for UL SCS of 480/960 kHz respectively
    - Option 2 (Apple, Huawei): X=20ms
    - Option 3 (CATT, Vivo, Qualcomm, Intel, Apple): X=40ms
    - Option 4 (CATT, Huawei, ZTE, Nokia): Two set of requirements, X=40ms and X = 80ms
    - Option 5 (CATT, Ericsson, Nokia, ZTE): one set X = 80 ms.
* Discussion
  + Intel: We support Option 1 as well
  + Nokia: We should cover 80ms
  + QC: Option 1 offers a good compromise between 40/80ms
  + Huawei: Option 1 or 3 are acceptable for us.
  + CATT: Options 3/4/5 are ok for us.
  + Apple: Prefer one set of requirements. Open to Option 3.
  + E///: Prefer 80ms
  + vivo: Prefer Option 3. Option 1 can be considered as a compromise
  + ZTE/Nokia: If 80ms is not included does it mean the NW cannot use it?
  + QC: We are referring to the availability of SSB rather than SSB periodicity.
* Agreements
  + For UL SCS of 480/960 kHz, a UE is required to meet the UL timing accuracy requirements if an SSB is available in the last X ms
    - X=80 ms for UL SCS of 480 kHz
    - X=40 ms for UL SCS of 960 kHz
    - Note: test cases will be defined for both cases
    - Note: the agreement can be revisited in case no feasible Te requirements values are identified.

Issue 2-1-8: Percentage of UL CP length Te can occupy for UL SCS of 480/960

* Tentative agreement
* Note: Set of supported SSB SCS and UL SCS combinations will be decided separately
* For X = 80ms

|  |  |  |
| --- | --- | --- |
| SSB SCS | UL SCS | Proposal 1 |
| 120 | 480 | [0.35] |
| 480 | 480 | [0.30] |
| 960 | 480 | [0.25] |

Support: Huawei, Intel, QC

Object: Nokia

* For X = 40ms

|  |  |  |  |
| --- | --- | --- | --- |
| SSB SCS | UL SCS | Proposal 1 | Proposal 2 |
| 480 | 960 | [0.40] | [0.43] |
| 960 | 960 | [0.40] | [0.38] |

Session chair: continue discussion in the 2nd round.

Issue 2-4-1: MRTD definition (not discussed)

* Proposals
  + Proposal 1a (Intel): RAN4 to change the definition of receive timing difference between carriers in case of NR CA to address the case when TAE + ΔT is larger than one slot. For instance, RTD can be considered between the sub-frame boundaries:
  + Proposal 1b (Intel): In case of NR DC RAN4 to consider the receive timing difference between carriers as the timing difference between the closest slot boundaries
  + Proposal 2 (CATT): Change the definition of MRTD for NR DC in legacy spec as below, so that it could be larger than 0.5 slot
    - A UE shall be capable of handling a relative receive timing difference between slot timing boundary of a cell belonging to MCG and slot timing boundary from the same slot index of a cell belonging to the SCG to be aggregated for NR DC operation. A UE shall be capable of handling a relative receive timing difference among the closest slot timing boundaries of different carriers to be aggregated in NR carrier aggregation

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206919 | WF on NR extension to 71 GHz RRM requirements (Part 1) | Qualcomm |  |
| R4-2206920 | Draft CR on deriveSSB-IndexFromCell tolerance | Qualcomm |  |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204189 | Scheduling restriction due to L3 measurements for FR2-2 | Mediatek | Revised |  |
| R4-2204190 | Scheduling restriction due to L1 measurements for FR2-2 | Mediatek | Revised |  |
| R4-2203533 | Draft CR adding timing requirements for FR2-2 | Nokia | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206919 WF on NR extension to 71 GHz RRM requirements (Part 1)**

*Type: other For: Approval  
 Source:* Qualcomm

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206920 Draft CR on deriveSSB-IndexFromCell tolerance**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Qualcomm*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**Email discussion: [102-e][225] NR\_ext\_to\_71GHz\_RRM\_2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][225] NR\_ext\_to\_71GHz\_RRM\_2 | R17 NR 52.6 - 71GHz (NR\_ext\_to\_71GHz) | RRM Core requirements - Interruption requirements - Active BWP switching delay requirements - MG interruption requirements - LBT requirements | 10.16.8.3 10.16.8.4 10.16.8.5 10.16.8.6 | Ilya Bolotin |

**R4-2206768 Email discussion summary: [102-e][225] NR\_ext\_to\_71GHz\_RRM\_2**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207066 (from R4-2206768).**

**R4-2207066 Email discussion summary: [102-e][225] NR\_ext\_to\_71GHz\_RRM\_2**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 28th)**

Key open issues

* Topic #1: Interruption and active BWP switching requirements
  + Sub-topic 1-1. Interruption requirements
* Topic #2: LBT impacts on RRM requirements
  + Sub-topic 2-1. Scope of the RRM requirements to be defined
  + Sub-topic 2-2. General aspects on the RRM requirements
  + Sub-topic 2-3. RRC\_IDLE and RRC\_CONNECTED state mobility requirements
  + Sub-topic 2-4. Measurement procedure

Issue 2-2-2: How to take into account the LBT failures on the RRM requirements

* Proposals
  + Option 1 (Nokia, Qualcomm, Huawei, Intel, vivo, Apple, CATT, MTK, E///) The time is extended by the number of SSB/SMTC occasions groups not available at UE. An SSB/SMTC group consists of N SSB/SMTC occasions, and it is not available when at least one SSB/SMTC occasions is not available in the group.
    - Option 1a: The time is extended by the number of SSB/SMTC occasions groups not available at UE. An SSB/SMTC group consists of N SSB/SMTC occasions, and it is not available when **~~at least one~~ none of the** SSB/SMTC occasions is ~~not~~ available in the group.
    - Option 1b: The time is extended by the number of SSB/SMTC occasions groups not available at UE. An SSB/SMTC group consists of N SSB/SMTC occasions, and it is not available when at least one SSB/SMTC occasion **~~is not available~~ in the group is not transmitted by the gNb.**
  + Option 2 (Nokia, Intel, vivo, ~~CATT~~): Number of additional Rx beam sweeping rounds is equal to the number of SMTC/SSB occasions not available at the UE and consecutively spaced by N SMTC/SSB occasions during the measurement period. If there are no SMTC/SSB occasions not available at the UE and consecutively spaced by N SMTC/SSB occasions during the measurement period, then only one additional Rx beam sweeping round is needed for measurement.
  + Option 3 (CATT): Number of additional Rx beam sweeping rounds is equal to the number of SMTC/SSB occasions not available at the UE and based on the measurement of the same beam during the measurement period. If there are no SMTC/SSB occasions not available at the UE and based on the measurement of the same beam during the measurement period, then only one additional Rx beam sweeping round is needed for measurement.
* Discussion
  + QC: High chance that UE will be looking in a wrong direction. Suggest 1a or 1b
  + Nokia: Prefer 1a. We discussed same issue in NR-U and for 1b UE may not know if gNB made a transmission.
  + Apple: Option 1b is implementable in the test case.
  + vivo: Option 1a is too strong. Prefer to soften the wording, e.g. “some of the SSB occasions”
  + MTK: Concern on 1a
  + Huawei: For 1b – UE cannot tell if gNB made a transmission. Suggest to take 1b as baseline and further discuss how to define test cases and possible Core part requirements.
  + QC: 1b is more suitable and can be taken as baseline
  + E///: Option 1b is an enhancement. We are ok to study 1b but want to leave door open for 1a.
  + Intel: 1a can lead to non-optimal beam selection. 1b – it is not clear how to differentiate from UE point of view
* Agreements
  + The time is extended by the number of SSB/SMTC occasions groups not available at UE. An SSB/SMTC occasions group consists of N consecutive SSB/SMTC occasions. An SSB/SMTC occasions group is not available, when at least one SSB/SMTC occasion in the group is not transmitted by the gNb.
  + The definition of SSB/SMTC occasion follows Rel-16 NR-U definition
  + FFS how to introduce the test case
  + FFS if agreement applies to RLM OOS and BFD

Issue 2-2-3: Maximum number of SMTC occasions not available at the UE

* Proposals
  + Option 1: RAN4 will reuse the FR1 value of maximum number of SMTC occasions not available at the UE considering that for FR2-2 it is the **maximum number of SMTC/SSB groups** with at least one SMTC/SSB occasion not available at the UE.
  + Option 2: RAN4 will reuse the FR1 value of maximum number of SMTC occasions not available at the UE considering that for FR2-2 it is the total **maximum number of SMTC/SSB occasion** not available at the UE.
* Discussion
  + TBA
* Agreements
  + TBA

Session chair: check status in Thu GTW

Issue 2-2-4: Time gap between two successful measurement samples

* Proposals
  + Option 1: Within the set of measurements any two measurements shall not be separated in time by more than X ms.
  + Option 2: No need to set the limit on the time gap between two successful measurement samples since it is already implicitly set by defining maximum numbers of SMTC occasions not available at the UE
* Discussion
  + TBA
* Agreements
  + TBA

Session chair: check status in Thu GTW

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206924 | WF on NR extension to 71 GHz RRM requirements (Part 2) | Intel |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204877 | Draft CR on interruption requirements for FR2-2 | Huawei, HiSilicon | Endorsed |  |
| R4-2204541 | Draft CR - Correction on BWP switch delay for dormant BWP in FR2-2 | Nokia, Nokia Shanghai Bell | Endorsed |  |
| R4-2204193 | Introduction of SCell activation with CCA for FR2-2 | MediaTek Inc. | Revised |  |
| R4-2204194 | Introduction of TCI state switch with CCA for FR2-2 | MediaTek Inc. | Revised |  |
| R4-2204542 | DraftCR for FR2-2 LBT support in Intra-Frequency measurements | Nokia, Nokia Shanghai Bell | Revised |  |
| R4-2204634 | Draft CR for FR2-2 LBT support in requirements for PSCell addition and release delay, PSCell change and Conditional PSCell change | vivo | Revised |  |
| R4-2204728 | DraftCR on cell reselection in Idle mode for NR\_ext\_to\_71GHz-Core | Ericsson | Revised |  |
| R4-2204879 | Draft CR on RLM and link recovery requirements for FR2-2 unlicensed operation | Huawei, HiSilicon | Revised |  |
| R4-2206007 | DraftCR for FR2-2 LBT support in RRC\_IDLE and RRC\_CONNECTED state mobility requirements | Intel | Revised |  |
|  |  |  |  |  |
|  |  |  |  |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206924 WF on NR extension to 71 GHz RRM requirements (Part 2)**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

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##### 10.16.8.1 General

**R4-2203531 Discussion on general RRM requirements for extension to 71 GHz**

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

**Decision: Noted.**

**R4-2203889 Further discussion on general RRM requirements for extension to 71GHz**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204188 Discussion on RRM requirements in FR2-2**

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

**Decision: Noted.**

**R4-2204189 Scheduling restriction due to L3 measurements for FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Revised to R4-2206921 (from R4-2204189).**

**R4-2206921 Scheduling restriction due to L3 measurements for FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Return to.**

**R4-2204190 Scheduling restriction due to L1 measurements for FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Revised to R4-2206922 (from R4-2204190).**

**R4-2206922 Scheduling restriction due to L1 measurements for FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Return to.**

**R4-2204315 Discussion on general RRM measurement requirements for extension to 71GHz**

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

**Decision: Noted.**

**R4-2204636 Further discussion on RRM impacts for extending NR operation to 71GHz**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204726 General RRM requirements for extending NR operation to 71GHz**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

General RRM requirements for extending NR operation to 71GHz

**Decision: Noted.**

**R4-2204728 draftCR on cell reselection in Idle mode for FR2-2 CCA**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

draftCR on cell reselection in Idle mode for FR2-2 CCA

**Decision: Revised to R4-2206929 (from R4-2204728).**

**R4-2206929 draftCR on cell reselection in Idle mode for FR2-2 CCA**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

draftCR on cell reselection in Idle mode for FR2-2 CCA

**Decision: Return to.**

**R4-2204874 Discussion on general RRM impacts for extending NR operation to 71GHz**

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

**Decision: Noted.**

##### 10.16.8.2 Timing requirements

**R4-2203532 Discussion on RRM timing requirements for extension to 71 GHz**

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

**Decision: Noted.**

**R4-2203533 Draft CR adding timing requirements for FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2206923 (from R4-2203533).**

**R4-2206923 Draft CR adding timing requirements for FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Return to.**

**R4-2203806 UE transmit timing for NR operation in 52.6GHz - 71GHz**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2203890 Further discussion on RRM timing requirements for higher SCS**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204191 Discussion on timing requirements in FR2-2**

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

**Decision: Noted.**

**R4-2204635 Further discussion on timing for 52.6-71GHz**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204875 Discussion on timing requirements for extending NR operation to 71GHz**

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

**Decision: Noted.**

**R4-2205403 On Te requirements for NR systems extended to 71 GHz**

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

**Decision: Noted.**

**R4-2205417 UE Timing requirements**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

Analysis of timing requirements.

**Decision: Noted.**

**R4-2206005 Discussion on timing requirements for NR 52.6 – 71 GHz**

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

**Decision: Noted.**

**R4-2206115 Timing requirements in FR2-2**

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

**Decision: Noted.**

##### 10.16.8.3 Interruption requirements

**R4-2204876 Discussion on interruption requirements for extending NR operation to 71GHz**

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

**Decision: Noted.**

**R4-2204877 Draft CR on interruption requirements for FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Endorsed.**

##### 10.16.8.4 Active BWP switching delay requirements

**R4-2204541 Draft CR - Correction on BWP switch delay for dormant BWP in FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Endorsed.**

##### 10.16.8.5 Measurement gap interruption requirements

##### 10.16.8.6 LBT impacts on RRM requirements

**R4-2203808 LBT impacts on RRM requirements for NR operation in 52.6GHz - 71GHz**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2204192 Discussion on LBT impacts on RRM requirements in FR2-2**

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

**Decision: Noted.**

**R4-2204193 Introduction of SCell activation with CCA for FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Revised to R4-2206925 (from R4-2204193).**

**R4-2206925 Introduction of SCell activation with CCA for FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Return to.**

**R4-2204194 Introduction of TCI state switch with CCA for FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Revised to R4-2206926 (from R4-2204194).**

**R4-2206926 Introduction of TCI state switch with CCA for FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek inc.*

**Decision: Return to.**

**R4-2204542 DraftCR: FR2-2 LBT support in Intra-Frequency measurements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2206927 (from R4-2204542).**

**R4-2206927 DraftCR: FR2-2 LBT support in Intra-Frequency measurements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Return to.**

**R4-2204543 LBT impact on NR RRM requirements in FR2-2**

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

**Decision: Noted.**

**R4-2204634 Draft CR for FR2-2 LBT support in requirements for PSCell addition and release delay, PSCell change and Conditional PSCell change**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Revised to R4-2206928 (from R4-2204634).**

**R4-2206928 Draft CR for FR2-2 LBT support in requirements for PSCell addition and release delay, PSCell change and Conditional PSCell change**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Return to.**

**R4-2204650 Further discussion on LBT requirements for FR2-2**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204727 LBT requirements for 71GHz**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

LBT requirements for 71GHz

**Decision: Noted.**

**R4-2204878 Discussion on LBT impacts for extending NR operation to 71GHz**

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

**Decision: Noted.**

**R4-2204879 Draft CR on RLM and Link recovery procedures for unlicensed operation in FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2206930 (from R4-2204879).**

**R4-2206930 Draft CR on RLM and Link recovery procedures for unlicensed operation in FR2-2**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2205404 On LBT impacts on RRM for NR systems extended to 71 GHz**

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

**Decision: Noted.**

**R4-2206006 Discussion on LBT impacts on RRM requirements for NR 52.6 – 71 GHz**

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

**Decision: Noted.**

**R4-2206007 DraftCR for FR2-2 LBT support in RRC\_IDLE and RRC\_CONNECTED state mobility requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Revised to R4-2206931 (from R4-2206007).**

**R4-2206931 DraftCR for FR2-2 LBT support in RRC\_IDLE and RRC\_CONNECTED state mobility requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Return to.**

### 10.17 Enhancements to Integrated Access and Backhaul (IAB) for NR

#### 10.17.4 RRM core requirements

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**Email discussion: [102-e][226] NR\_IAB\_enh\_RRM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][226] NR\_IAB\_enh\_RRM | R17 NR IAB enhancements (NR\_IAB\_enh) | RRM Core requirements | 10.17.4 | Richie Leo |

**R4-2206769 Email discussion summary: [102-e][226] NR\_IAB\_enh\_RRM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207067 (from R4-2206769).**

**R4-2207067 Email discussion summary: [102-e][226] NR\_IAB\_enh\_RRM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206932 | WF on IAB enhancement RRM | ZTE Corporation |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204881 | CR on timing requirements for Rel-17 IAB | Huawei, HiSilicon, Nokia, Nokia Shanghai Bell | Endorsed | Changed from Agreed to Endorsed and we’ll focus on Big CR |
| R4-2206030 | Case 6 timing requirement for IAB in TS 38.174 | Ericsson | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206932 WF on IAB enhancement RRM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**R4-2203592 On RRM for eIAB**

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

**Session chair: moved to AI 10.17.4**

**Decision: Withdrawn.**

**R4-2204880 Discussion on RRM requirements for eIAB**

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

**Session chair: moved to AI 10.17.4**

**Decision: Noted.**

**R4-2204881 CR on timing requirements for Rel-17 IAB**

*Type: CR For: Agreement  
 38.174 v16.5.0 CR-0025 rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Session chair: moved to AI 10.17.4**

**Decision: Endorsed.**

**R4-2205410 On RRM for eIAB**

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

**Session chair: moved to AI 10.17.4**

**Decision: Noted.**

**R4-2205962 On IAB Enhanced RRM Requirements**

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

**Session chair: moved to AI 10.17.4**

**Decision: Noted.**

**R4-2206029 Further analysis of RRM requirements for enhanced IAB**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

The paper further analyzes the impact of RRM on IAB enhancement

**Session chair: moved to AI 10.17.4**

**Decision: Noted.**

**R4-2206030 Case 6 timing requirement for IAB in TS 38.174**

*Type: draftCR For: Endorsement  
 38.174 v16.5.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

The CR defines timing for IAB-MT

**Session chair: moved to AI 10.17.4**

**Decision: Revised to R4-2206933 (from R4-2206030).**

**R4-2206933 Case 6 timing requirement for IAB in TS 38.174**

*Type: draftCR For: Endorsement  
 38.174 v16.5.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

The CR defines timing for IAB-MT

**Session chair: moved to AI 10.17.4**

**Decision: Return to.**

**R4-2203642 CLI measurement requirement for R17 NR eIAB RRM**

*Type: discussion For: Discussion  
 Source: Qualcomm CDMA Technologies*

**Abstract:**

CLI measurement requirement for IAB-MT

**Decision: Noted.**

### 10.19 Further enhancements on MIMO for NR

#### 10.19.3 RRM core requirements

================================================================================

**Email discussion: [102-e][227] NR\_feMIMO\_RRM\_1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][227] NR\_feMIMO\_RRM\_1 | R17 NR feMIMO (NR\_feMIMO) | RRM Core requirements - Inter-cell beam management - Others | 10.19.3 10.19.3.2 10.19.3.3 | Yiyan Zhang |

**R4-2206770 Email discussion summary: [102-e][227] NR\_feMIMO\_RRM\_1**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207068 (from R4-2206770).**

**R4-2207068 Email discussion summary: [102-e][227] NR\_feMIMO\_RRM\_1**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 25, 2022)**

Key open issues

* Topic #1: Inter-Cell Beam Management
  + Sub-topic 1-1: UE L1-RSRP measurement on NSC
  + Sub-topic 1-2: Behaviours for L1-RSRP measurement on NSC
  + Sub-topic 1-3: Delay requirement for L1-RSRP measurement on NSC
  + Sub-topic 1-4: Reply RAN1 LS on multi SSBs overlapped
* Topic #2: Other RRM requirements
  + Sub-topic 2-1: TRP specific BFR
  + Sub-topic 2-2: QCL definition
  + Sub-topic 2-3: Text proposal for BFD and RLM requirements in HST-SFN

Issue 1-1-4-1 Assumptions for defining the requirement: Measurement on NSC inside SMTC for FR2, whether the same Rx beam for L1 and L3 can be assumed

* Proposals
  + Option 1: Yes, and SNR side condition of L1-RSRP measurement on SC should be meet (vivo, Intel, Nokia, Ericsson)
  + Option 2: No. The same assumption as outside SMTC and introduce sharing factor for L1 and L3 measurement (Huawei, MTK, QC, ZTE, Apple)
  + Option 3: Do not define requirements for measurement on NSC inside SMTC for FR2
* Discussion
  + Huawei/Apple: Option 2
  + MTK: Different types of beams are used for L1/L3. Simulation results should justify use of Option 1.
  + Intel: Sharing factor will extra delay
  + E///: We should use same framework as L3
  + QC: Option 2 provides consistency across all measurements. Option 1 will require UE to use different types of beams inside/outside SMTC
  + Nokia: We have agreement that there will be no impact on L3, but both options will have impact (accuracy for Option 1 and delay for Option 2)
  + Samsung: Tradeoff between accuracy and delay. We prefer to prioritize delay and slightly prefer Option 1 and further discuss accuracy.
  + QC: for Option 1 are we going to change how we measure L1-RSRP? Does it mean we measure SC and NSC using different beams?
    - Samsung: we do not need to change – both L3/L1 are configured for the NSC. Rough beam is used for L3. No impact on current measurement results for SC L1-RSRP. We’ll use different types of beams.
    - QC: The network will not be able to compare SC and NSC L1-RSRP. Antenna gains are different.
  + Nokia: can compromise to Option 2.
* Tentative agreements
  + Measurement on NSC inside SMTC for FR2
    - Option 1: Same Rx beam for L1 and L3 can be assumed for requirements definition. SNR side condition of L1-RSRP measurement on SC should be meet.
    - Option 2: Same Rx beam for L1 and L3 can not be assumed for requirements definition. Introduce sharing factor for L1 and L3 measurement.
    - Option 3: Do not define requirements for measurement on NSC inside SMTC for FR2

Session chair: Come back in the 2nd round. Consider Option 3 in case no consensus is reached.

Issue 1-1-4-2 Assumptions for defining the requirement: Measurement on NSC inside SMTC, whether timing offset within CP is needed.

* Proposals
  + Option 1: Yes (Apple, Huawei, QC, MTK) and no requirement as long as timing offset beyond CP.
  + Option 2: No. (vivo, CMCC, Nokia, Ericsson) No timing assumption inside SMTC.
  + Option 3: No if SSB for NSC L1-RSRP and SMTC fully overlapped, otherwise Yes. (Intel, E///, CMCC)
* Discussion
  + MTK: Option 1. Option 2 will require 2 timings / 2 FFT windows, which will have impact on UE complexity
  + QC: Agree with MTK. Another reason is that in case we use fine beams, then measurements may take smaller time.
  + Nokia: Option 1. If we introduce sharing factor, then SC and NSC will be measured separately.
  + E///: For the sake of progress we can go with Option 3.
  + Intel: This issue is relevant to the previous one.
  + Apple: For outside SMTC we have an agreement that timing is within CP. For Option 3 we do not understand how the full framework works. Need to align the assumptions for all cases.
  + Huawei: Same view as Apple
  + CMCC: Can compromise to Option 3.
  + vivo: limiting NSC L1-RSRP to within CP is very challenging for network.
  + MTK: For Option 3 – we’ll need extra FFT for data reception.
    - vivo: for measurements within SMTC UE will not be required to make measurements and data reception simultaneously. Scheduling restriction will apply
    - MTK: UE will still need to maintain two timings
  + Samsung: Suggest tentative agreement – Existing L3 measurement requirements will not change
  + Tentative agreement
    - Existing L3 measurement requirements will not change due to measurement on NSC inside SMTC
  + Session chair: continue discussion in the 2nd round

Issue 1-1-5 Introduce sharing factor for inter-cell L1-RSRP measurement requirement

* Proposal: Introduce sharing factor for SC and NSC in FR2 when Nmax =1 as following table and do not consider RAN1 defined UE capability for simultaneous reception of full-overlapped SSB.

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Scenario** | **PSC** | **PNSC** |
| 1 | TSSB,SC = TSSB,NSC ≤ TSMTC | 2 | 2 |
| 2 | TSSB,SC < TSSB,NSC = TSMTC, or  TSSB,NSC < TSSB,SC = TSMTC | 1 | 1 |
| 3 | TSSB,SC < TSSB,NSC < TSMTC |  | 1 |
| 4 | TSSB,NSC < TSSB,SC < TSMTC | 1 |  |

* + Option 1: Support.
  + Option 2: Other solutions.
* Discussion
  + TBA
* Agreements
  + TBA

Issue 1-1-6 Applicability of RRM requirements for UE L1-RSRP measurements on NSC

* Proposals
  + Option 1: (vivo, QC, Apple, Nokia)
    - known NSC (known condition is up to Issue 1-1-2 based on the last meeting WF); and
    - unknown NSC in some certain cases (e.g. when SSBs from NSC for L1-RSRP measurements are measured within SMTC and within CP).
  + Option 1a: If option 1, introduce L1-RSRP measurement period requirement for known NSC and extra NSC identification time for unknown NSC
  + Option 2: Known NSC only (Huawei, ZTE)
  + Option 2a: If option 2, only Introduce the L1-RSRP measurement period requirement for known NSC
  + Option 3: Prioritize the requirement for the scenario that SSB configuration are fully overlapped for serving cell and cell with different PCI. (MTK, QC, ZTE)
* Discussion
  + TBA
* Agreements
  + TBA

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206934 | WF on FeMIMO RRM requirements for inter-cell beam management | Samsung | Capture agreements and WF for Topic#1 |
| R4-2206935 | WF on other RRM requirements for FeMIMO | Huawei | Capture agreements and WF for Topic#2 |
| R4-2206936 | Reply LS on L1-RSRP measurement behaviour when SSBs associated with different PCIs overlap | vivo | To: RAN1; CC: RAN2 |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204696 | DraftCR on Introduction of L1-RSRP measurements on NSC for Rel-17 FeMIMO | Samsung | Revised |  |
| R4-2203775 | Draft CR on Inter-cell L1-RSRP measurements | Apple | Revised |  |
| R4-2204342 | draft CR on L1-RSRP measurement requirements for inter-cell BM in R17 | vivo | Revised |  |
| R4-2204368 | CR for measurement restriction and scheduling availability for inter cell L1-RSRP measurement in R17 | MediaTek | Revised |  |
| R4-2205338 | DraftCR on QCL definition for R17 unified TCI | Huawei | Revised |  |
| R4-2205846 | Draft CR on TRP specific BFR and BFR with two CORESET | Ericsson | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206934 WF on FeMIMO RRM requirements for inter-cell beam management**

*Type: other For: Approval  
 Source: Samsung*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206935 WF on other RRM requirements for FeMIMO**

*Type: other For: Approval  
 Source: Huawei*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206936 Reply LS on L1-RSRP measurement behaviour when SSBs associated with different PCIs overlap**

*Type: LS out For: Approval  
 to RAN1, cc RAN2  
 Source: vivo*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**Email discussion: [102-e][240] NR\_feMIMO\_RRM\_2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][240] NR\_feMIMO\_RRM\_2 | R17 NR feMIMO (NR\_feMIMO) | Unified TCI for DL and UL | 10.19.3.1 | Hua Li |

**R4-2206783 Email discussion summary: [102-e][240] NR\_feMIMO\_RRM\_2**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207081 (from R4-2206783).**

**R4-2207081 Email discussion summary: [102-e][240] NR\_feMIMO\_RRM\_2**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 25, 2022)**

Key open issues

* Topic #1: Unified TCI (10.19.3.1)
  + Sub-topic 1-1: Definition of beam alignment
  + Sub-topic 1-2 Switching delay requirements for serving cell
  + Sub-topic 1-3 Switching delay requirements when SSB is associated with cell with different PCI
  + Sub-topic 1-4 Delay requirements for common TCI state switching in CA case
  + Sub-topic 1-5 Requirements for PL-RS switching delay indicated by unified TCI
  + Sub-topic 1-6 TCI state list update delay

**Sub-topic 1-3 Switching delay requirements when SSB is associated with cell with different PCI**

Issue 1-3-1 Known cell condition for TCI state switch associated with different PCI

* Proposals
  + Option 1(Samsung, ZTE):
    - Active BWP of cell with different PCI shall be within active BWP of serving cell
    - SCS between cell with different PCI and serving cell shall the same
    - Timing offset between SC and NSC are within CP
  + Option 1a (Nokia):
    - Active BWP of cell with different PCI shall be within active BWP of serving cell
    - SCS between cell with different PCI and serving cell shall the same
    - Timing offset between SC and NSC are within CP
    - If UE transmits any L1-RSRP measurement report for the non-serving cell within [X] ms before the TCI state is switched.
  + Option 2(vivo, ZTE):
    - If the cell with PCI different from a serving cell meets the known condition specified for inter-cell beam measurements (Apple, Intel)
    - UE need to check whether the ‘cell with different PCI’ is known before checking whether the TCI state is known.
    - update bullet 2 of known condition for inter-cell beam measurement as
      * after the corresponding cells configured for L1 measurements meet the detectable condition in 9.2.2 for [X=5] seconds, and exact value of X can be further discussed.
  + Option 3(MTK, Huawei):
    - The BWPs of serving cell and non-serving cell are the same
    - If UE transmits any L1-RSRP measurement report for the non-serving cell within [X] ms before the TCI state is switched. FFS: [X] for the valid L1-RSRP report and the value can follow the conclusion in inter-cell beam management.
  + Option 4(Ericsson):
    - TCI state is known if UE transmits valid L1-RSRP measurement report for the non-serving cell within [X] ms before the TCI state is switched. X is FFS.
* Moderator WF
  + Option 1 (MTK, Samsung):
    - Active BWP of cell with different PCI shall be equal to BWP of serving cell, SCS between cell with different PCI and serving cell shall the same
    - Timing offset between SC and NSC are within CP
    - UE transmits L1-RSRP measurement report for the non-serving cell within [X] ms before the TCI state is switched. FFS: [X]
  + Option 2 (Apple, Huawei, vivo):
    - Re-use known condition specified for inter-cell beam measurements
  + Option 3 (Nokia, E///):
    - UE transmits L1-RSRP measurement report for the non-serving cell within [X] ms before the TCI state is switched. FFS: [X]
* Discussion
  + Moderator: *In TCI state switch, the known TCI condition already be defined based on L1-RSRP report. From my understanding, here we are discussing the extra known cell condition.*
  + Nokia: we think these should be separate conditions from TCI state switch. Ok with Option 3.
  + Apple: We are fine with Option 2.
  + MTK: need separate conditions
  + Huawei: Option 2
  + Samsung: Option 1 can be acceptable.
  + Vivo: There is different between TCI known and Cell known conditions. Option 2.
  + Nokia: Ok with Option 2 + Option 3
* Agreements
  + Define separate known cell condition for TCI state switch associated with different PCI and known TCI state condition
  + Known cell condition for TCI state switch associated with different PCI
    - Re-use known condition specified for inter-cell beam measurements
  + Known TCI state condition
    - Re-use legacy known TCI state condition and add extra condition
      * UE transmits L1-RSRP measurement report for the non-serving cell within [X] ms before the TCI state is switched. FFS: [X]
  + FFS whether to consider additional delay for BWP switching for TCI state switch

Issue 1-3-3 Whether to define TCI state switch delay requirement for unknown cell case

* Proposals
  + Option 1(Samsung, vivo, MTK, Huawei, Intel, Ericsson, Qualcomm): No
    - RAN4 will NOT specify the requirements for unknown cell case for TCI swtiching dealy for a cell with different PCI from serving cell in Rel-17 (Samsung, Nokia).
    - For MAC-CE based TCI state activation, no RRM requirements is specified for TCI associated to the unknown cells (vivo).
  + Option 2(Apple): Yes
    - Extend TCI state switching requirements for cell with different PCI to the case when active BWP is not within serving cell active BWP or when SCS are different.
    - Extend the TCI state switching delay by active BWP switch delay for the case when active BWP is not within serving cell active BWP or when SCS are different.
  + Option 3 (MTK, Apple): depends on condition
    - No UE requirement applies for the case when the non-serving cell is unknown and the target TCI state is known.
    - For the case when the non-serving cell is unknown (the timing offset between serving cell and non-serving cell is less than one CP) and the target TCI state is unknown, two options are suggested:
    - Option 1: To extend the TCI state switch delay requirement, i.e., add TPSS/SSS\_sync\_intra (at least 600 ms) and TSSB\_time\_index\_intra (at least 120 ms).
    - Option 2: No UE requirement applies.
  + Option 4 (Nokia):
    - RAN4 studies further how to handle TCI switching delay on NSC out of the conditions for same TCI switching delay assumption between SC and NSC
* Moderator WF
  + Option 1(Samsung, vivo, MTK, Huawei, Intel, Ericsson, Qualcomm, Nokia):
    - RAN4 will NOT specify the requirements for unknown cell case for TCI switching delay for a cell with different PCI from serving cell in Rel-17
  + Option 2(Apple):
    - Extend the TCI state switching delay by active BWP switch delay for the case when active BWP is not within serving cell active BWP or when SCS are different.
    - If cell is not detected, extend the time by intra-freq cell identification/measurement time (same as inter-cell L1-RSRP measurement if cell is unknown)
* Discussion
  + Apple: We are ok not to define requirements for the case of BWP change, not detectable cell. What about unknown TCI condition?
  + E///: we can use legacy requirements for know cell and unknown TCI
  + vivo: we can have situations with known cell and unknown TCI
* Agreements
  + RAN4 will NOT specify the requirements for unknown cell case for TCI switching delay for a cell with different PCI from serving cell in Rel-17

**Sub-topic 1-4 Delay requirements for common TCI state switching in CA case**

Issue 1-4-2 Whether common TCI state switching delay requirement is defined for all CC or per CC

* Proposals
  + Option 1: Defined per CC.
    - Option 1a (Apple): The beam switching time for all CCs with common TCI switch associated with different TCI state/RS should be considered separately.
    - Option 1b (vivo): If TCI states involve QCL-A or QCL-C, TCI state switch is still determined by the RS in each CC.
    - Option 1c (Intel): If the RS in the TCI state provides QCL-TypeA or QCL-TypeB, the slot where new TCI state applies is determined based on the SCS of CC where TCI state switching is configured.
  + Option 2: Defined for all CC
    - Option 2a (Apple): For common TCI switch with shared RS, the existing requirements apply to all CCs with same TCI state/RS. For common TCI switch with shared RS the switching delay will be based on the smallest SCS.
    - Option 2b (MTK, ZTE): Reuse the delay requirement as the TCI state switching for single CC, with the clarification that the first slot to apply the new TCI state is determined on the CC with the smallest SCS among the CCs which applying the beam indication.
    - Option 2c (Nokia):No need to define additional requirement on TCI switching delay requirement in CA case. RAN4 may take a note in the spec for TCI switching delay requirement in CA case:
    - The requirements of Rel-17 unified TCI switching delay are applicable to CA cases based on the rule of reference BWP/CC selection in TS38.214.
    - Option 2d (Ericsson):
    - Single TCI state switching requirements shall be reused for common TCI state switching requirements.
    - DCI based common TCI switch delay shall follow the RAN1 agreement. That means, when a UE receive DCI based TCI state switch command at slot n, and sends ACK at slot n+TACK, UE should be able to receive on the new beam at n+TACK+ TBAT.
    - Option 2e(Samsung):
    - No additional TCI switching delay requirements for CA case if common TCI is configured.
    - RAN4 can specify the DCI based TCI switching delay requirements by referring to RAN1 agreed delay, i.e., and leave the detailed determination of beam application time for CA case to RAN1 and/or RAN2 specifications.
    - Option 2f (vivo):
    - Specify requirements for common TCI state switching delay in CA scenario, i.e. the switching delay between the TCI states whose QCL-D or UL TX filter is determined by a source RS in one of the CCs.
    - If common TCI is known, UE checks TOk for DL on a per-CC basis, and the requirements for DL TCI switching delay follows TOk=1 if at least in one CC, the corresponding source RS is not tracked according to the active TCI state list.
    - If common TCI is known, UE checks NM for UL on a per-CC basis, and the requirements for UL TCI switching delay follows NM=1 if at least in one CC, the corresponding PL-RS is not maintained according to the active TCI state list.
    - Option 2g(Intel):
    - For intra-band CA, if the RS in the TCI state provides QCL-TypeD, re-use MAC-CE based TCI switching delay defined for single CC. The slot where new TCI state applies is determined based on the carrier with the smallest SCS in the CC set.
* Moderator WF
  + Option 1: Defined for all CC
    - Option 1a (Apple):  For common TCI switch with shared RS, the existing requirements apply to all CCs with same TCI state/RS. For common TCI switch with shared RS the switching delay will be based on the smallest SCS.
    - Option 1b:
* Not need any additional requirement, re-using the requirement for single-CC case;
* The SCS should be the smallest SCS within all CCs;
* take a note in the spec for TCI switching delay requirement in CA case:
  + - The requirements of Rel-17 unified TCI switching delay are applicable to CA cases based on the rule of reference BWP/CC selection in TS38.214.
* FFS: if the RS in the TCI state provides QCL-TypeD
  + Option 2: Defined per CC.
    - Option 2a (Apple): The beam switching time for all CCs with common TCI switch associated with different TCI state/RS should be considered separately.
    - Option 2b (vivo, Intel): If TCI states involve QCL-A or QCL-C/QCL-TypeB, TCI state switch is still determined by the RS in each CC.
* Discussion
  + TBA
* Agreements
  + TBA

**Sub-topic 1-6 TCI state list update delay**

Issue 1-6-1 MAC CE based TCI state list update delay for serving cell

* Proposals
  + Option 1(vivo):
    - For MAC CE based TCI state list update, specify requirements for the case when not all TCI states are known.(Ericsson)
    - For MAC-CE based joint UL and DL TCI switching delay, introduce reference point in time domain for OTA testing purpose, while the reference point is the later one between endpoints for DL TCI switching delay and UL TCI switching delay, respectively.
    - If there is at least one unknown DL or UL TCI in the TCI list being activated, the requirement for TCI state list update delay follow the respective unknown case, i.e. extra delay for the respective L1-RSRP measurement is considered.(Ericsson)
  + Option 2(Apple, Intel, MTK, Samsung):
    - Define MAC CE based TCI state list update requirement for known TCI state case
* Discussion
  + TBA
* Agreements
  + TBA

**Sub-topic 1-2 Switching delay requirements for serving cell**

Issue 1-2-5 MAC-CE based UL TCI state switching delay when SSB is indicated as PL-RS in UL TCI state for FR2

* Proposals
  + Option 1 (Huawei):
    - When a SSB is indicated as PL-RS in a UL TCI state, the scaling factor for beam sweeping needs to be introduced for PL-RS measurement time in FR2.
    - In FR2, the MAC-CE based UL TCI state switching delay need to be separately defined for SSB based PL-RS.
    - In FR2, when a SSB is indicated as PL-RS in a UL TCI state, the MAC-CE based UL TCI state switching delay for both known case and unknown case can be defined as:
      * THARQ + 3ms + NM\*(5\*TL1-RSRP\_SSB + 2ms) with the assumption of M=1.
      * Where NM = 1, if the target PL-RS is not maintained by the UE, 0 otherwise.
  + Option 1a (Apple): The delay is
    - * 5\* TFirstSSB + 39\*TSSB
  + Option 2(Nokia, Samsung): Define generic requirement
  + Option 3: Further clarification is needed
* Discussion
  + TBA
* Agreements
  + TBA

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206943 | WF on FeMIMO RRM impact for unified TCI state | Intel |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204340 | draft CR on active DL and UL TCI state list update delay requirements in R17 | vivo | Revised |  |
| [R4-2204403](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204403.zip) | DraftCR to TS 38.133: MAC-CE based downlink/uplink TCI state switch delay for unified TCI state | Intel | Revised |  |
| [R4-2204491](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204491.zip) | Draft CR for Introduction of DL TCI state switching delay for unified TCI | ZTE | Revised |  |
| [R4-2204492](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2204491.zip) | Draft CR for Introduction of DL TCI state switching delay for unified TCI | ZTE | Revised |  |
| [R4-2205042](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205042.zip) | DraftCR on DCI based DL and UL TCI switching delay requirements | Nokia | Revised |  |
| [R4-2205335](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_102-e/Docs/R4-2205335.zip) | DraftCR on known condition requirements for R17 unified TCI | Huawei | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206943 WF on FeMIMO RRM impact for unified TCI state**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

================================================================================

##### 10.19.3.1 Unified TCI for DL and UL

**R4-2203773 Discussion on RRM requirements for Unified TCI**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2204266 Discussion on unified TCI**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2204270 Unified TCI in FeMIMO**

*Type: other For: Approval  
 Source: BEIJING SAMSUNG TELECOM R&D*

**Decision: Noted.**

**R4-2204339 Discussion on RRM requirements for unified TCI in R17 feMIMO**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204340 draft CR on active DL and UL TCI state list update delay in R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Revised to R4-2206944 (from R4-2204340).**

**R4-2206944 draft CR on active DL and UL TCI state list update delay in R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Return to.**

**R4-2204365 Discussion on unified TCI for DL and UL in R17 feMIMO**

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

**Decision: Noted.**

**R4-2204396 Discussion on Unified TCI state in FeMIMO**

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

**Decision: Noted.**

**R4-2204403 DraftCR to TS 38.133: MAC-CE based downlink/uplink TCI state switch delay for unified TCI state**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Revised to R4-2206945 (from R4-2204403).**

**R4-2206945 DraftCR to TS 38.133: MAC-CE based downlink/uplink TCI state switch delay for unified TCI state**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Return to.**

**R4-2204491 Draft CR for Introduction of DL TCI state swithcing delay for unified TCI**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: ZTE Corporation*

**Decision: Revised to R4-2206946 (from R4-2204491).**

**R4-2206946 Draft CR for Introduction of DL TCI state swithcing delay for unified TCI**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: ZTE Corporation*

**Decision: Return to.**

**R4-2204492 Draft CR for Introduction of UL TCI state swithcing delay for unified TCI**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: ZTE Corporation*

**Decision: Revised to R4-2206947 (from R4-2204492).**

**R4-2206947 Draft CR for Introduction of UL TCI state swithcing delay for unified TCI**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: ZTE Corporation*

**Decision: Return to.**

**R4-2205016 Discussion on Unified TCI for DL and UL**

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

**Decision: Noted.**

**R4-2205039 Discussion on requirements of unified TCI for DL and UL**

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

**Decision: Noted.**

**R4-2205042 DraftCR on DCI based DL and UL TCI switching delay requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2206948 (from R4-2205042).**

**R4-2206948 DraftCR on DCI based DL and UL TCI switching delay requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Return to.**

**R4-2205334 Discussion on TCI state switching delay requirements for R17 unified TCI**

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

**Decision: Noted.**

**R4-2205335 DraftCR on known condition requirements for R17 unified TCI**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206949 (from R4-2205335).**

**R4-2206949 DraftCR on known condition requirements for R17 unified TCI**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205843 RRM requirements of unified TCI state for FeMIMO**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution, we discuss RRM requirements for unified TCI state design requirements.

**Decision: Noted.**

##### 10.19.3.2 Inter-cell beam management

**R4-2203774 Discussion on RRM requirements for inter-cell beam management**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2203775 Draft CR on Inter-cell L1-RSRP measurements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Apple*

**Decision: Revised to R4-2206938 (from R4-2203775).**

**R4-2206938 Draft CR on Inter-cell L1-RSRP measurements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2204267 Discussion on inter-cell beam management**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2204341 Discussion on RRM requirements for inter-cell L1 beam measurements in R17 feMIMO**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204342 draft CR on L1-RSRP measurement requirements for inter-cell BM in R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Revised to R4-2206939 (from R4-2204342).**

**R4-2206939 draft CR on L1-RSRP measurement requirements for inter-cell BM in R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Return to.**

**R4-2204366 Discussion on inter cell beam management in R17 feMIMO**

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

**Decision: Noted.**

**R4-2204368 CR for measurement restriction and scheduling availability for inter cell L1-RSRP measurement in R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek Inc.*

**Decision: Revised to R4-2206940 (from R4-2204368).**

**R4-2206940 CR for measurement restriction and scheduling availability for inter cell L1-RSRP measurement in R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: MediaTek Inc.*

**Decision: Return to.**

**R4-2204397 Discussion on inter-cell beam management in FeMIMO**

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

**Decision: Noted.**

**R4-2204517 Requirements for Inter-Cell Beam Management**

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

**Decision: Noted.**

**R4-2204696 DraftCR on Introduction of L1-RSRP measurements on NSC for Rel-17 FeMIMO**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Samsung*

**Decision: Revised to R4-2206937 (from R4-2204696).**

**R4-2206937 DraftCR on Introduction of L1-RSRP measurements on NSC for Rel-17 FeMIMO**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Samsung*

**Decision: Return to.**

**R4-2204697 Discussion on UE behaviour for SSB-based L1 measurement on NSC**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2204698 RRM requirement for inter-cell beam management in FeMIMO**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2205017 Discussion on RRM requirements for inter-cell beam management**

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

**Decision: Noted.**

**R4-2205040 Discussion on requirements of inter-cell beam management**

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

**Decision: Noted.**

**R4-2205336 Discussion on inter-cell L1-RSRP measurement requirements for R17 NR FeMIMO**

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

**Decision: Noted.**

**R4-2205844 RRM requirements of inter-cell BM in FeMIMO**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution, we discuss RRM requirements of inter-cell BM in FeMIMO

**Decision: Noted.**

##### 10.19.3.3 Others

**R4-2203776 Discussion on other RRM requirements for FeMIMO**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2204343 Discussion on other RRM impacts in R17 feMIMO**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204367 Discussion on general and RRM requirements impacts in R17 feMIMO**

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

**Decision: Noted.**

**R4-2205041 Discussion on other items of Rel-17 feMIMO RRM**

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

**Decision: Noted.**

**R4-2205337 Discussion on other RRM requirements for R17 NR FeMIMO**

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

**Decision: Noted.**

**R4-2205338 DraftCR on QCL definition for R17 unified TCI**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206941 (from R4-2205338).**

**R4-2206941 DraftCR on QCL definition for R17 unified TCI**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205845 Discussion on FeMIMO other open issues**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribtuion, we discuss QCL definition update, and link recovery procedures for inter-cell beam management operation

**Decision: Noted.**

**R4-2205846 Drfat CR on TRP specific Beam Failure Recovery**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Draft CR on TRP specific beam failure recovery and BFR for CORESET with two activated TCI states

**Decision: Revised to R4-2206942 (from R4-2205846).**

**R4-2206942 Drfat CR on TRP specific Beam Failure Recovery**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

**Decision: Return to.**

### 10.20 Support of reduced capability NR devices

#### 10.20.3 RRM core requirements

================================================================================

**Email discussion: [102-e][228] NR\_redcap\_RRM\_1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][228] NR\_redcap\_RRM\_1 | R17 NR RedCap (NR\_redcap) | RRM Core requirements - UE complexity reduction  - NCD-SSB related requirements | 10.20.3  10.20.3.1  10.20.3.4 | Santhan Thangarasa |

**R4-2206771 Email discussion summary: [102-e][228] NR\_redcap\_RRM\_1**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207069 (from R4-2206771).**

**R4-2207069 Email discussion summary: [102-e][228] NR\_redcap\_RRM\_1**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 24, 2022)**

Key open issues

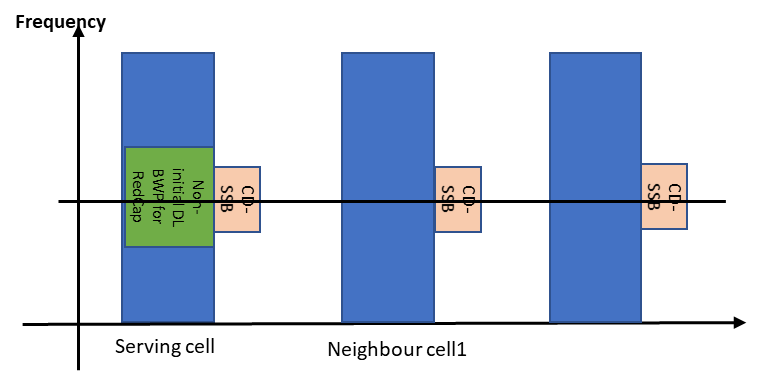
* Topic #1: General
  + Sub-topic 1-1: Measurement capability
  + Sub-topic 1-2: SSB type for IDLE/INACTIVE mode mobility
  + Sub-topic 1-3: Impact on paging reception requirements
  + Sub-topic 1-4: HD-FDD operation
  + Sub-topic 1-5: RedCap bandgroups
  + Sub-topic 1-6: Small data transmission for RedCap
* Topic #2: Mobility requirements
  + Sub-topic 2-1 Handover
  + Sub-topic 2-2 RRC re-establishment
  + Sub-topic 2-3 RRC Connection release with redirection
  + Sub-topic 2-4 Random access
* Topic #3: Timing requirements
  + Sub-topic 3-1 Timing
* Topic #4: Signalling characteristics
  + Sub-topic 4-1 RLM
  + Sub-topic 4-2 BFD
  + Sub-topic 4-3 CBD including L1-RSRP measurements
  + Sub-topic 4-4 BWP switching
  + Sub-topic 4-5 Active TCI state switching and UL spatial relation switch delay
* Topic #5: Measurement procedure
  + Sub-topic 5-1 Use of NCD-SSB for CONNECTED mode measurements
  + Sub-topic 5-2 CSSF, gap related issues
  + Sub-topic 5-3 PSS/SSS detection with 1 Rx
  + Sub-topic 5-4 time index detection with 1 Rx
  + Sub-topic 5-5 SSB based L3 measurement with 1 Rx
  + Sub-topic 5-6 Measurement conditions for HD-FDD UE
  + Sub-topic 5-7 CGI reading
* Topic #6: Work split
* Topic #7: Feature lists for RedCap

**Sub-topic 5-1 Use of NCD-SSB for CONNECTED mode measurements**

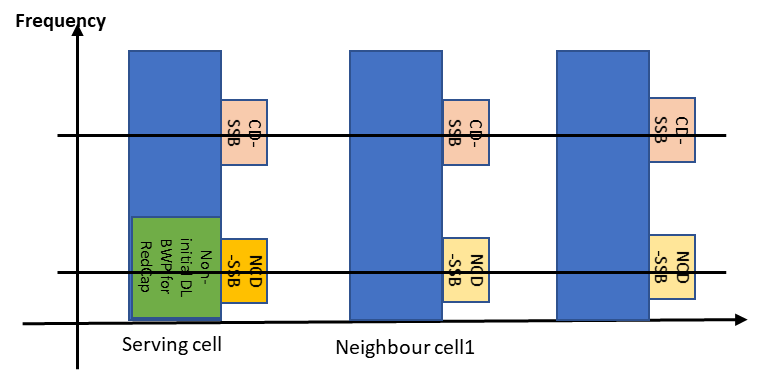
Issue 5-1-1: The measurement scenarios for NCD-SSB and CD-SSB

* Proposals
  + Option 1 (Ericsson): RAN4 to discuss RedCap UE’s measurement based on the following scenarios:
    - Case A: Serving cell active BWP includes CD-SSB
    - Case B: Serving cell active BWP includes NCD-SSB
      * Case B-1: All neighbour cells include NCD-SSB
      * Case B-2: Some neighbour cells include NCD-SSB, and some neighbour cells without NCD-SSB
    - Case C: Serving cell active BWP without SSB
    - Case D: Serving cell active BWP includes both CD-SSB and NCD-SSB
* Moderator inputs

**Case A: Serving cell active BWP includes CD-SSB**

****

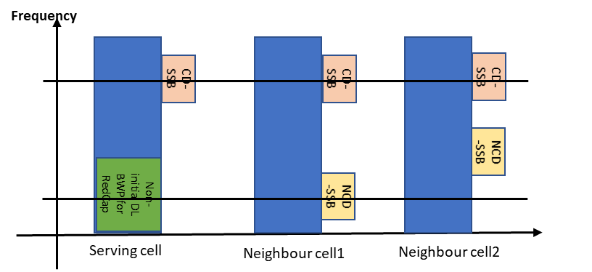
**Case B-1: Serving cell active BWP includes NCD-SSB and all neighbour cells have NCD-SSB**

****

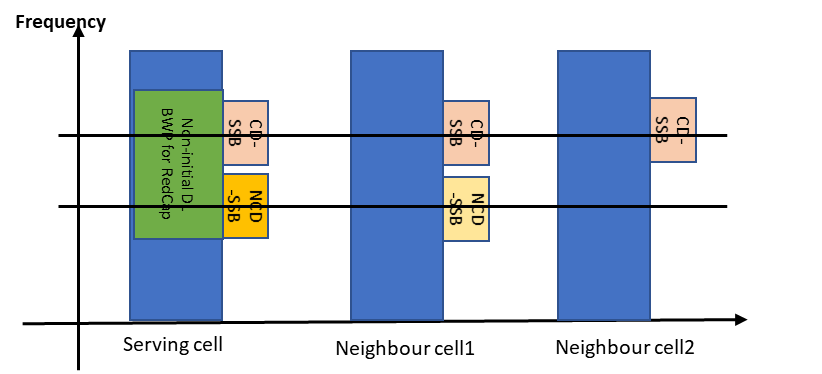
**Case B-2: Serving cell active BWP includes NCD-SSB but some neighbour cells have NCD-SSB and some neighbour cells don’t have NCD-SSB**

****

**Case C: Serving cell active BWP without SSB**

****

**Case D: Serving cell active BWP includes both CD-SSB and NCD-SSB**

****

* Discussion
  + E///: Case A, B1. Deprioritize B2, C, D.
  + CMCC: Support A, B, C. Include B2. Deprioritize D
  + QC: Support A, B. Deprioritize C.
  + Vivo: Support A, B1. Deprioritize C, D, B2.
  + Huawei: Support A, B. Deprioritize C, D
  + Nokia: Support A, B1. Deprioritize D
  + Apple: Support A, B1. Deprioritize C, D
  + MTK: Support A, B1. Deprioritize B2, C, D.
  + ZTE: Support A, B, C. Deprioritize D
* Agreements
  + Define RedCap UE’s measurement requirements based on the following scenarios:
    - Case A: Serving cell active BWP includes CD-SSB
    - Case B: Serving cell active BWP includes NCD-SSB
      * Case B-1: All neighbour cells include NCD-SSB on the same frequency location as serving cell NCD-SSB/[CD-SSB]
  + FFS whether to support Case B-2
    - Case B-2: Some neighbour cells include NCD-SSB, and some neighbour cells without NCD-SSB on the same frequency location as serving cell NCD-SSB/CD-SSB
    - Note: if the scenario is supported then no new requirements or minimum changes shall be introduced comparing to Case A and B-1 requirements

Issue 5-1-3: Reference SSB to decide measurement type (intra- or inter-frequency)

* Proposals
  + Option 1 (E///, QC, ZTE): NW indicates the reference SSB (CD-SSB or NCD-SSB)
  + Option 2 (Apple, Nokia, CMCC): The SSB ~~type~~ indicated in serving cell MO is used as reference SSB (CD-SSB or NCD-SSB)
  + Option 2a (Xiaomi, MTK, Nokia, QC, vivo): SSB in the active BWP is used (CD-SSB or NCD-SSB)
  + Option 3 (HW, CMCC): CD-SSB of the serving cell
* Discussion
  + E///: For Option 2 RAN2 is still discussing MO configuration and it may include multiple SSBs.
  + CMCC: Legacy definition can be reused.
  + QC: Option 2a. For Option 2 there may be multiple MOs.
  + vivo: Option 2a. We should consider both CD-SSB and NCD-SSB
  + Apple: Option 2 is the closest definition to the legacy definition.
  + Huawei: For Option 2 – does it mean there is a single SSB included? Need to avoid cases when one MO type can dynamically change from intra- to inter-frequency
  + Nokia: For Option 2 – “type” is not needed. May need for RAN2 decision.
  + MTK: the discussion is related to RAN2 design. Need to wait for RAN2 design.
  + ZTE: support Option 1.
* Agreements
  + FFS: Reference SSB to decide measurement type (intra- or inter-frequency)
    - Option 1 (E///, QC, ZTE): NW indicates the reference SSB (CD-SSB or NCD-SSB)
    - Option ~~2~~1a (Apple, Nokia, CMCC): The SSB ~~type~~ indicated in serving cell MO is used as reference SSB (CD-SSB or NCD-SSB)
    - Option 2~~a~~ (Xiaomi, MTK, Nokia, QC, vivo): SSB in the active BWP is used (CD-SSB or NCD-SSB)
    - Option 3 (HW, CMCC): CD-SSB of the serving cell

Issue 5-1-2: Whether to define neighbour cell measurement requirements for NCD-SSB

* Proposals
  + Option 1 (E///, Apple, CATT, vivo, CMCC, QC, Xiaomi): RRM measurement on neighbour cell can be based on CD-SSB or NCD-SSB.
  + Option 2 (HW): RRM measurement on neighbour cell is supposed to be performed on CD-SSB in connected mode.
* Discussion
  + TBA
* Agreements
  + TBA

Issue 5-1-5: When both CD-SSB and NCD-SSB are configured for serving cell measurements

* Proposals
  + Option 1 (E///): UE can perform serving cell measurements based on NCD-SSB within active BWP provided that
    - the difference of center frequency between NCD-SSB and CD-SSB is no larger than 20MHz in FR1 and 100MHz in FR2
    - the difference of reception power between NCD-SSB and CD-SSB is less than 3dB
    - the periodicity of NCD-SSB and CD-SSB is the same.

Otherwise, UE should perform serving cell measurements based on both NCD-SSB and CD-SSB.

* + Option 2 (vivo, CMCC, QC): UE should perform serving cell measurements based on SSB with active BWP.
* Discussion
  + TBA
* Agreements
  + TBA

**Sub-topic 3-1 Timing**

Issue 3-1-1: Whether SSB has to be in UE active BWP for meeting the UE transmit timing requirments

* Proposals
  + Option 1 (MTK): SSB has to be in active BWP.
  + Option 2 (ZTE, HW, CMCC, Apple): Redcap UE should meet the existing Te and Tq requirements provided that the SSB is available at the UE at least once every 160 ms regardless whether SSB is in active BWP.
  + Option 3 (E///): Te requirements are met under any of the following scenarios:
    - SSB is in the UE’s active BWP, or
    - SSB is not in the UE’s active BWP (RedCap BWP) but the following condition is met:
      * UE’s active BWP(RedCap BWP) and initial BWP are within 20 MHz for FR1, or within 100 MHz for FR2.

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206950 | WF on RedCap RRM requirements | Ericsson | To capture the agreements from thread [102-e][228] NR\_redcap\_RRM\_1 |
| R4-2206951 | LS on configuring margin for 1 Rx RedCap UEs | Ericsson | To: RAN\_2,  //Depends on outcome in 2nd round |
| R4-2206952 | LS on handover using NCD-SSB | Ericsson | To: RAN\_2  //Depends on outcome in 2nd round |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204282 | draft CR on measurements requirements for inactivate state Redcap UE | OPPO | Revised |  |
| R4-2205622 | Draft CR on RRC\_IDLE mode requirements for RedCap for TS 36.133 | Ericsson | Revised |  |
| R4-2205625 | Draft CR on RRC\_IDLE mode requirements for RedCap for TS 38.133 | Ericsson | Revised |  |
| R4-2205626 | Draft CR on RRC\_INACTIVE mode requirements for RedCap for TS 38.133 | Ericsson | Revised |  |
| R4-2205623 | Draft CR on RRC\_INACTIVE mode requirements for RedCap for TS 36.133 | Ericsson | Revised |  |
| R4-2204798 | Draft CR for maximum interruption in paging reception for Redcap | Vivo | Revised |  |
| R4-2204800 | Draft CR for Definitions, symbols and abbreviations for Redcap | vivo | Revised |  |
| R4-2204248 | Draft CR on timing requirements for RedCap UE | Xiaomi | Revised |  |
| R4-2204913 | Clarification on transmit timing before Msg1 or MsgA retransmission | Huawei, Hisilicon | Revised |  |
| R4-2204996 | Draft CR to 38.133 for introducing RedCap requirements on active BWP switch delay, active TCI state switching delay and UE specific CBW change | CMCC | Revised |  |
| R4-2206085 | DraftCR on reduced capability Ues for RLM for RedCap | MediaTek Inc. | Revised |  |
| R4-2204799 | Draft CR for Link Recovery Procedures for Redcap | vivo | Revised |  |
| R4-2204904 | Draft CR on mobility requirements for Redcap UE | Huawei, Hisilicon | Revised |  |
| R4-2204905 | Draft CR on E-UTRAN – NR Handover for Redcap UE | Huawei, Hisilicon | Revised |  |
| R4-2206038 | RRC connection release with redireciton for redcap in TS 36.133 | Ericsson | Revised |  |
| R4-2206087 | DraftCR on reduced capability Ues for general measurements and intra-frequency | MediaTek Inc. | Revised |  |
| R4-2206088 | DraftCR on reduced capability Ues for inter-frequency and inter-RAT measurements | MediaTek Inc. | Revised |  |
| R4-2204537 | Draft CR – Introducing L1-RSRP requirements for RedCap UEs | Nokia, Nokia Shanghai Bell | Revised |  |
| R4-2205511 | draftCR on inter-RAT NR measurement for RedCap | Ericsson | Revised |  |
| R4-2205938 | Introduction of RedCap UE in clause 9.11A | Nokia, Nokia Shanghai Bell | Revised |  |
| R4-2205627 | Updated worksplit for RedCap for RRM | Ericsson | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206950 WF on RedCap RRM requirements**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206951 LS on configuring margin for 1 Rx RedCap UEs**

*Type: LS out For: Approval  
 to RAN2  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206952 LS on NCD-SSB issues for RedCap UE**

*Type: LS out For: Approval  
 to RAN2  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2205624 Big CR for RedCap for TS 38.133**

*Type: other For: Approval  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Big CR to capture changes from all endorsed CRs for TS 38.133.

**Decision: For email approval.**

**R4-2205512 Big CR for RedCap for TS 36.133**

*Type: CR For: Agreement  
 36.133 v17.4.0 CR-7140 rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Big CR to capture changes from all endorsed CRs for TS 36.133.

**Decision: For email approval.**

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**Email discussion: [102-e][229] NR\_redcap\_RRM\_2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][229] NR\_redcap\_RRM\_2 | R17 NR RedCap (NR\_redcap) | RRM Core requirements - Extended DRX enhancements - RRM measurement relaxations - Others | 10.20.3.2 10.20.3.3 10.20.3.4 | Xusheng Wei |

**R4-2206772 Email discussion summary: [102-e][229] NR\_redcap\_RRM\_2**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207070 (from R4-2206772).**

**R4-2207070 Email discussion summary: [102-e][229] NR\_redcap\_RRM\_2**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 24, 2022)**

Key open issues

* Topic #1: Extended DRX enhancements
  + Sub-topic 1-1 General aspects on eDRX enhancements
  + Sub-topic 1-2 Idle state serving cell eDRX requirements
  + Sub-topic 1-3 Idle state cell reselection eDRX requirements
  + Sub-topic 1-4 eDRX requirements for inactive state
* Topic #2: RRM measurement relaxations
  + Sub-topic 2-1 General aspects for RRM measurement relaxation for Redcap
  + Sub-topic 2-2 RRM measurement relaxation for Redcap at Idle/Inactive state
  + Sub-topic 2-3 RRM measurement relaxation for Redcap at CONNECTED state
  + Sub-topic 2-4 Rel-17 Redcap RRM relaxation requirements
* Topic #3: Others
  + Sub-topic 3-1 On Redcap UE capabilities
  + Sub-topic 3-2 Reply LS for R2- 2201760

**Sub-topic 3-1 On Redcap UE capabilities**

Issue 3-1-2: UE capabilities in Reply LS

* Proposals
  + Option 1: RAN4 to respond to RAN2 LS on UE capability as follows (Ericsson)

|  |  |
| --- | --- |
| **Rel-15/Rel-16 features in TS 38.133** | **RedCap RRM requirements applicability in R17** |
| Dual connectivity and carrier aggregation | Not applicable |
| 2-step RA | Applicable |
| NR measurements with autonomous gaps | Applicable |
| **Rel-17 features in TS 38.133** |  |
| SDT | Applicable |
| *Note: RAN4 will not define any RRM requirements for RedCap UE for other release 16 features which are not listed above in release 17.* | |

* + Option 2: Reply to the RAN2 LS [1] using our previous conclusions captured in the WF [R4-2115358 2] and WF [R4-2120410 3] (ZTE)
  + Option 3: Support that RAN4 to capture the high speed measurements requirements in the RedCap rel-17 specification (MTK)
* Tentative agreements
  + RAN4 to respond to RAN2 LS on UE capability as follows

|  |  |
| --- | --- |
| **Rel-15/Rel-16 features in TS 38.133** | **RedCap RRM requirements applicability in R17** |
| Dual connectivity and carrier aggregation | Not applicable |
| 2-step RA | Applicable |
| NR measurements with autonomous gaps | Applicable |
| **Rel-17 features in TS 38.133** |  |
| SDT | Applicable |
| *Note 1: RAN4 will not define any RRM requirements for RedCap UE for other ~~Release 16~~ features which are not listed above in Release 17.*  *Note 2: Other ~~Release 16~~ features which are not listed above are considered not supported in release 17.* | |

* Discussion
  + CMCC: RAN2 asked which features are not applicable. Option 1 does not include all features.
  + Huawei: Concern on the 2nd note
  + QC: not comfortable with the second note
  + Nokia: 2nd note is not needed. Focus on what is not applicable.
  + MTK: suggest to include what is ~~not~~ supported
  + Session chair: E/// will provide updated LS. 1) include separate tables/paragraphs for features not supported ~~and RRM requirements not defined~~ for RedCap from RAN4 perspective; 2) include informative table/paragraph for RRM requirements for Rel-16/17 features which are planned to be defined for RedCap.

**Topic #1: Extended DRX enhancements**

Issue 1-2-2-1: FR1 PTW length (N1=1), whether M1 should be considered for FR1/FR2 Nserv  when DRX = 0.32 and 0.64s

* Proposals
  + Option 1: Keep M1 (M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle≤ 0.64s) (Apple MTK vivo oppo)
  + Option 2: Do not use M1(CMCC Nokia Ericsson ZTE)
  + Option 3: Keep M1 for FR1 and do not use M1 for FR2 (Huawei Apple xiaomi vivo)
* Agreements
  + Keep M1 for FR1 and do not use M1 for FR2

Issue 1-3-3-1 Whether to consider M2 when DRX = 0.32s

* Proposals
  + Option 1 included   (M2 = 1.5 if SMTC periodicity of measured intra-frequency cell > 20 ms, otherwise M2=1.(Apple Huawei MTK vivo)
  + Option 2: Do not include M2 (CMCC Nokia Ericsson ZTE)
* Agreements
  + Keep M2 for FR1 and do not use M2 for FR2

**Topic #2: RRM measurement relaxations**

Issue 2-1-2: Relaxation when multiple criteria of Rel-16 and Rel-17 are satisfied

* Proposals
  + Option 1: UE is allowed to meet the requirements that are the most relaxed out of Rel-16 and Rel-17 requirements. (ZTE Apple CMCC Ericsson Nokia vivo Huawei QC)
  + Option 2: Up to UE implementation (ZTE xiaomi oppo Huawei)
  + Option 3: The UE shall perform Rel-17 RRM relaxation method (MTK )
    - Option 3a: A note shall be added to the rel-17 RRM relaxation to mention that when rel-17 RRM relaxation criterion is fulfilled then the rel-16 RRM relaxation shall be disabled (MTK)
* Agreements
  + UE is allowed to meet the requirements that are the most relaxed out of Rel-16 and Rel-17 requirements

Issue 2-1-1: Scenarios for Rel-17 RedCap RRM relaxation

* Proposals

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | **Rel-16 relaxation criterion** | **Rel-17 relaxation criterion** | **Applicability** |
| 7 | Rel-16 low mobility | Rel-17 stationary | Allowed |
| 8 | Rel-16 not-at-cell-edge | Rel-17 stationary | NO |
| 9 | Rel-16 low mobility & Rel-16 not-at-cell-edge | Rel-17 stationary | * Option 1: Not allowed(Apple Nokia vivo) * Option 2: Allowed (xiaomi Huawei) |
| 10 | Rel-16 low-mobility | Rel-17 stationary & Rel-17 not-at-cell-edge | Allowed |
| 11 | Rel-16 not-at-cell-edge | Rel-17 stationary & Rel-17 not-at-cell-edge | * Option 1: Allowed (Apple xiaomi Huawei Nokia vivo) |
| 12 | Rel-16 low mobility & Rel-16 not-at-cell-edge | Rel-17 stationary & Rel-17 not-at-cell-edge | * Option 1: Allowed (Apple xiaomi Huawei Nokia vivo) |

* Discussion
  + TBA
* Agreements
  + TBA

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206974 | WF on eDRX and RRM measurement relaxations requirements for Redcap UE | vivo |  |
| R4-2206975 | Reply LS on RSRP measurement before Msg1 or MsgA retransmission | vivo | To: RAN2  Cc: RAN1 |
| R4-2206976 | LS on RRM relaxation for Redcap | vivo | To: RAN2 |
| R4-2206977 | Reply LS on UE capabilities for RedCap from RRM perspective | Ericsson | To: RAN2  CC: RAN1 |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204910 | Draft CR on measurement requirements for Redcap UE in inactive mode | Huawei, Hisilicon | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206974 WF on eDRX and RRM measurement relaxations requirements for Redcap UE**

*Type: other For: Approval  
 Source: vivo*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206975 Reply LS on RSRP measurement before Msg1 or MsgA retransmission**

*Type: LS out For: Approval  
 to RAN2, cc RAN1  
 Source: vivo*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206976 LS on RRM relaxation for Redcap**

*Type: LS out For: Approval  
 to RAN2  
 Source: vivo*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206977 Reply LS on UE capabilities for RedCap from RRM perspective**

*Type: LS out For: Approval  
 to RAN2, cc RAN1  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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##### 10.20.3.1 Impacts from UE complexity reduction

**R4-2204798 Draft CR for maximum interruption in paging reception for Redcap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Revised to R4-2206958 (from R4-2204798).**

**R4-2206958 Draft CR for maximum interruption in paging reception for Redcap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Return to.**

**R4-2204799 Draft CR for Link Recovery Procedures for Redcap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Revised to R4-2206964 (from R4-2204799).**

**R4-2206964 Draft CR for Link Recovery Procedures for Redcap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Return to.**

**R4-2204800 Draft CR for Definitions, symbols and abbreviations for Redcap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Revised to R4-2206959 (from R4-2204800).**

**R4-2206959 Draft CR for Definitions, symbols and abbreviations for Redcap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Return to.**

###### 10.20.3.1.1 General

**R4-2203590 reply LS on capability related assumptions for RedCap**

*Type: LS out For: Approval  
 to RAN2, cc RAN1  
 Source: ZTE Corporation*

**Abstract:**

We provide a draft LS reply to RAN2 LS R2-2109218 on UE capability assumptions.

**Decision: Noted.**

**R4-2203591 Discussions on general RRM aspects for RedCap UEs**

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

**Decision: Noted.**

**R4-2204249 Further discussion on general requirements for Redcap UE**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204281 Discussion on general requirements on Redcap UE**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204282 draft CR on measurements requirements for inactivate state Redcap UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Revised to R4-2206953 (from R4-2204282).**

**R4-2206953 draft CR on measurements requirements for inactivate state Redcap UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Return to.**

**R4-2204321 On remaining issues for general aspects on complexity reduction of Redcap**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204902 Discussion on general RRM requirements impacts for RedCap UE**

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

**Decision: Noted.**

**R4-2204992 On general requirements for RedCap UE**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision: Noted.**

**R4-2205622 Draft CR on RRC\_IDLE mode requirements for RedCap for TS 36.133**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

To introduce the RRC\_IDLE mode requirements for RedCap, including RRM relaxation and eDRX requirements.

**Decision: Revised to R4-2206954 (from R4-2205622).**

**R4-2206954 Draft CR on RRC\_IDLE mode requirements for RedCap for TS 36.133**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

To introduce the RRC\_IDLE mode requirements for RedCap, including RRM relaxation and eDRX requirements.

**Decision: Return to.**

**R4-2205625 Draft CR on RRC\_IDLE mode requirements for RedCap for TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

To introduce the RRC\_IDLE mode requirements for RedCap, including RRM relaxation and eDRX requirements.

**Decision: Revised to R4-2206955 (from R4-2205625).**

**R4-2206955 Draft CR on RRC\_IDLE mode requirements for RedCap for TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

To introduce the RRC\_IDLE mode requirements for RedCap, including RRM relaxation and eDRX requirements.

**Decision: Return to.**

**R4-2205627 Updated worksplit for RedCap for RRM**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

Updated work split.

**Decision: Revised to R4-2206973 (from R4-2205627).**

**R4-2206973 Updated worksplit for RedCap for RRM**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

Updated work split.

**Decision: Return to.**

**R4-2205628 Discussions on general requirements for RedCap**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution we discuss general requirements that apply in all RRC states for RedCap.

**Decision: Noted.**

**R4-2206078 Discussion on UE capability, scheduling availability and SDT**

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

**Decision: Noted.**

###### 10.20.3.1.2 Mobility requirements

**R4-2203584 Requirements under RRC Connected mode for RedCap UEs**

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

**Decision: Withdrawn.**

**R4-2203787 Discussion on mobility requirement for RedCap**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2204322 On remaining issues for mobility requirements for Redcap**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204539 Discussion on mobiliy requiremetns for RedCap UEs**

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

**Decision: Noted.**

**R4-2204903 Discussion on UE mobility requirements due to UE complexity reduction**

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

**Decision: Noted.**

**R4-2204904 Draft CR on mobility requirements for Redcap UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2206965 (from R4-2204904).**

**R4-2206965 Draft CR on mobility requirements for Redcap UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204905 Draft CR on E-UTRAN - NR Handover for Redcap UE**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2206966 (from R4-2204905).**

**R4-2206966 Draft CR on E-UTRAN - NR Handover for Redcap UE**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204993 On mobility requirements for RedCap UE**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision: Noted.**

**R4-2205409 Requirements under RRC Connected mode for RedCap UEs**

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

**Decision: Noted.**

**R4-2205626 Draft CR on RRC\_INACTIVE mode requirements for RedCap for TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

To introduce parts of RRC\_INACTIVE mode requirements.

**Decision: Revised to R4-2206956 (from R4-2205626).**

**R4-2206956 Draft CR on RRC\_INACTIVE mode requirements for RedCap for TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

To introduce parts of RRC\_INACTIVE mode requirements.

**Decision: Return to.**

**R4-2205629 Discussions on RedCap mobility requirements**

*Type: LS out For: Approval  
 to RAN2  
 Source: Ericsson*

**Abstract:**

In this contribution we discuss the mobility requirements for RedCap, HO, RRC re-establishment, RA and RRC connection release with redirection.

**Decision: Noted.**

**R4-2206038 RRC connection release with redireciton for redcap in TS 36.133**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

RRC connection release with redirection to redcap UE in 36.133. It is based on the work split in R4-2202718 and endosed Big CR in R4-2202763.

**Decision: Revised to R4-2206967 (from R4-2206038).**

**R4-2206967 RRC connection release with redireciton for redcap in TS 36.133**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

RRC connection release with redirection to redcap UE in 36.133. It is based on the work split in R4-2202718 and endosed Big CR in R4-2202763.

**Decision: Return to.**

**R4-2206079 Discussion on mobility requirements**

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

**Decision: Noted.**

**R4-2206111 Mobility requirements for RedCap UEs**

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

**Decision: Noted.**

###### 10.20.3.1.3 Timing requirements

**R4-2203585 Timing requirements for RedCap UEs**

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

**Decision: Noted.**

**R4-2204250 Further discussion on timing requirements for Redcap UE**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204906 Discussion on UE timing requirements due to UE complexity reduction**

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

**Decision: Noted.**

**R4-2204994 On timings requirements for RedCap UE**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision: Noted.**

**R4-2206037 Further analysis of UE transmit timing requirements in RedCap**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Further analysis of UE initial transmit timing requirements for redcap UE

**Decision: Noted.**

**R4-2206080 UE complexity reduction impact on timing requirements**

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

**Decision: Noted.**

###### 10.20.3.1.4 Signalling characteristics

**R4-2203586 On Signalling characteristics of RedCap UEs**

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

**Decision: Noted.**

**R4-2203788 Discussion on signalling characteristics for RedCap**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2204251 Further discussion on signalling characteristics for Redcap UE**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204283 Discussion on measurement requirements for RedCap UE**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204323 On remaining issues for signalling characteristics for Redcap**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204536 Discussion on signalling characteristics for RedCap UEs**

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

**Decision: Noted.**

**R4-2204907 Discussion on signaling characteristics due to UE complexity reduction**

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

**Decision: Noted.**

**R4-2204995 On Signalling characteristics requirements for RedCap UE**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision: Noted.**

**R4-2204996 Draft CR to 38.133 for introducing RedCap requirements on active BWP switch delay, active TCI state switching delay and UE specific CBW change**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: CMCC*

**Decision: Revised to R4-2206962 (from R4-2204996).**

**R4-2206962 Draft CR to 38.133 for introducing RedCap requirements on active BWP switch delay, active TCI state switching delay and UE specific CBW change**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: CMCC*

**Decision: Return to.**

**R4-2205630 Discussions on RedCap signaling characteristics**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution we discuss signaling characteristics for RedCap, e.g. RLM, link recovery etc.

**Decision: Noted.**

**R4-2206081 Discussion on signaling characteristic in RedCap**

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

**Decision: Noted.**

**R4-2206085 DraftCR on reduced capability Ues for RLM for RedCap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: MediaTek Inc.*

**Abstract:**

**Decision: Revised to R4-2206963 (from R4-2206085).**

**R4-2206963 DraftCR on reduced capability Ues for RLM for RedCap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: MediaTek Inc.*

**Abstract:**

**Decision: Return to.**

**R4-2206112 On Fast BWP switching for RedCap UEs**

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

**Decision: Noted.**

###### 10.20.3.1.5 Measurement procedure

**R4-2203587 Measurement procedure of RedCap UEs**

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

**Decision: Noted.**

**R4-2203789 Discussion on cell identification and measurement for RedCap**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2204252 Further discussion on measurement procedure for Redcap UE**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204284 Discussion on signaling characteristics requirements for RedCap UE**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204324 On remaining issues for measurement procedure for Redcap**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204537 Draft CR - Introducing L1-RSRP requirements for RedCap UEs**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2206970 (from R4-2204537).**

**R4-2206970 Draft CR - Introducing L1-RSRP requirements for RedCap UEs**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Return to.**

**R4-2204538 Discussion on measurement procedures for RedCap UEs**

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

**Decision: Noted.**

**R4-2204908 Discussion on measurement requirements due to UE complexity reduction**

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

**Decision: Noted.**

**R4-2204997 On Measurement procedure for RedCap UE**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision: Noted.**

**R4-2205511 draftCR on inter-RAT NR measurement for RedCap**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

To introduce the inter-RAT NR measurement for LTE RedCap

**Decision: Revised to R4-2206971 (from R4-2205511).**

**R4-2206971 draftCR on inter-RAT NR measurement for RedCap**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

To introduce the inter-RAT NR measurement for LTE RedCap

**Decision: Return to.**

**R4-2205631 Discussions on RedCap measurement procedure**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution we discuss CONNECTED mode measurement procedure for RedCap.

**Decision: Noted.**

**R4-2205938 Introduction of RedCap UE in clause 9.11A**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

RedCap UE 1Rx preliminary requirements for autonomous measurement gaps due to CGI reading are added

**Decision: Revised to R4-2206972 (from R4-2205938).**

**R4-2206972 Introduction of RedCap UE in clause 9.11A**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

RedCap UE 1Rx preliminary requirements for autonomous measurement gaps due to CGI reading are added

**Decision: Return to.**

**R4-2206082 Measurement procedure for RedCap**

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

**Decision: Noted.**

**R4-2206087 DraftCR on reduced capability Ues for general measurements and intra-frequency**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: MediaTek Inc.*

**Decision: Revised to R4-2206968 (from R4-2206087).**

**R4-2206968 DraftCR on reduced capability Ues for general measurements and intra-frequency**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: MediaTek Inc.*

**Decision: Return to.**

**R4-2206088 DraftCR on reduced capability Ues for inter-frequency and inter-RAT measurements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: MediaTek Inc.*

**Decision: Revised to R4-2206969 (from R4-2206088).**

**R4-2206969 DraftCR on reduced capability Ues for inter-frequency and inter-RAT measurements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: MediaTek Inc.*

**Decision: Return to.**

**R4-2206113 Measurement procedures for 1Rx UEs**

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

**Decision: Noted.**

##### 10.20.3.2 Extended DRX enhancements

**R4-2203588 On extended DRX enhancements for RedCap**

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

**Decision: Noted.**

**R4-2203790 Discussion on RRM requirement with eDRX for RedCap**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2204246 Further discussion on RRM requirements for extended DRX enhancements for RedCap**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204285 Discussion on eDRX requirements for RedCap UE**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204325 On remaining issues for Redcap eDRX**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204540 Discussion on eDRX enhancements for RedCap**

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

**Decision: Noted.**

**R4-2204909 Discussion on Extended DRX enhancements for RedCap UE**

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

**Decision: Noted.**

**R4-2204910 Draft CR on measurement requirements for Redcap UE in inactive mode**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2206978 (from R4-2204910).**

**R4-2206978 Draft CR on measurement requirements for Redcap UE in inactive mode**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204998 On Extended DRX cycle for RedCap UE**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision: Noted.**

**R4-2205510 Discussions on eDRX requirements for RedCap**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

n this contribution we discuss the eDRX requirements for RedCap

**Decision: Noted.**

**R4-2206083 Extended DRX in IDLE mode and INACTIVE mode**

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

**Decision: Noted.**

##### 10.20.3.3 RRM measurement relaxations

**R4-2203589 Discussions on RRM measurement relaxations for RedCap UEs**

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

**Decision: Noted.**

**R4-2203791 Discussion on RRM relaxation requirement for RedCap**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2204247 Further discussion on RRM measurement relaxations for RedCap UE**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2204286 RRM measurement relaxations for RedCap UE**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204326 On remaining issues for Redcap RRM relaxation**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204911 Discussion on RRM measurement relaxations for RedCap UE**

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

**Decision: Noted.**

**R4-2204999 On RRM measurement relaxation for RedCap UE**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision: Noted.**

**R4-2205632 Discussions on RRM measurement relaxations**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution we discuss RRM measurement relaxation for RedCap.

**Decision: Noted.**

**R4-2205939 On RRM measurement relaxation for neighbouring cells**

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

**Abstract:**

Discussion on RRM relaxation for NR\_redcap

**Decision: Noted.**

**R4-2206084 RRM measurements relaxation for stationary criterion**

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

**Decision: Noted.**

##### 10.20.3.4 Others

**R4-2203792 On capability and NCD-SSB design for RedCap RRM**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2203891 Discussion on other issues to the use of NCD-SSB in RedCap devices**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204248 Draft CR on timing requirements for RedCap UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Xiaomi*

**Decision: Revised to R4-2206960 (from R4-2204248).**

**R4-2206960 Draft CR on timing requirements for RedCap UE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Xiaomi*

**Decision: Return to.**

**R4-2204327 Further considerations on NCD-SSB for RedCap UE**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204328 Reply LS on RSRP measurement before Msg1 or MsgA retransmission**

*Type: LS out For: Agreement  
 to RAN2, cc RAN1  
 Source: vivo*

**Decision: Noted.**

**R4-2204912 Discussion on RSRP measurement before Msg1 or MsgA retransmission**

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

**Decision: Noted.**

**R4-2204913 Clarification on transmit timing before Msg1 or MsgA retransmission**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Noted.**

**R4-2206961 Clarification on transmit timing before Msg1 or MsgA retransmission**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2205000 On NCD-SSB measurement and RedCap capabilitiles**

*Type: discussion For: Decision  
 Source: CMCC*

**Decision: Noted.**

**R4-2205623 Draft CR on RRC\_INACTIVE mode requirements for RedCap for TS 36.133**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

To introduce parts of RRC\_INACTIVE mode requirements.

**Decision: Revised to R4-2206957 (from R4-2205623).**

**R4-2206957 Draft CR on RRC\_INACTIVE mode requirements for RedCap for TS 36.133**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

To introduce parts of RRC\_INACTIVE mode requirements.

**Decision: Return to.**

**R4-2205633 RRM Discussions on RedCap UE capabilities**

*Type: LS out For: Approval  
 to RAN2  
 Source: Ericsson*

**Abstract:**

In this contribution we discuss the RRM aspects of this LS on UE capability and provide our view, and a draft response LS is provided in the Annex.

**Decision: Noted.**

**R4-2206114 NCD-SSB properties and usage for RedCap**

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

**Decision: Noted.**

### 10.21 Positioning enhancements for NR

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**Email discussion: [102-e][230] NR\_pos\_enh\_1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][230] NR\_pos\_enh\_1 | R17 NR ePos (NR\_pos\_enh) | RRM requirements:  - Latency reduction of positioning measurement  - Impact on existing UE positioning and RRM requirements - Others | 10.21.1 10.21.2.2 10.21.2.4 10.21.2.6 | Muhammad Kazmi |

**R4-2206773 Email discussion summary: [102-e][230] NR\_pos\_enh\_1**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207071 (from R4-2206773).**

**R4-2207071 Email discussion summary: [102-e][230] NR\_pos\_enh\_1**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 22, 2022)**

Key open issues

* Topic #1: Latency reduction of positioning measurement
  + Sub-topic 1-1: Reduced number of samples for latency reduction
  + Sub-topic 1-2: PRS measurements without gaps
  + Sub-topic 1-3: Measurement gaps enhancement for PRS measurements
* Topic #2: Impact on existing UE positioning and RRM requirements
  + Sub-topic 2-1: SRS antenna port switching on UE Rx-Tx time difference
  + Sub-topic 2-2: SRS antenna port switching on gNB Rx-Tx time difference
* Topic #3: Others
  + Sub-topic 3-1: PRS-RSRPP
  + Sub-topic 3-2: Measurement requirements
  + Sub-topic 3-3: PRS measurement reporting enhancement
* Topic #5: Feature list for positioning enhancements
* Topic #4: Updated work split and timeline

**Sub-topic 1-1: Reduced number of samples for latency reduction**

Issue 1-1-2: Conditions under which samples for AGC is reduced or not required for PRS measurements

* Previous agreement
  + Additional samples for AGC for PRS measurements are not required in case at least one of the following conditions is met
    - Condition #1:
      * 1A) PRS bandwidth is within the active BWP and
      * 1B) Difference between the serving and neighboring cell [total] RX power is within [6] dB.
      * FFS on the detailed RX power definition.
* Proposals
  + Condition 1B:
    - Option 1: E///, ZTE, HW
      * Difference between the serving cell SSB and neighboring cell PRS RX EPRE is within [6] dB.
    - Option 2: CATT, OPPO, Intel, Vivo, Nokia,
      * Difference between the serving cell signal and neighboring cell PRS RX EPRE is within [6] dB
    - Option 3: QC
      * Difference between the serving cell SS-RSRSP and neighbor cell/TRP PRS-RSRP is within (+6, -18) dB
  + Condition 2 (QCL): E///
    - Condition 2a: CMCC, Nokia, Intel
      * When UE is provided with the QCL information of the PRS (dl-PRS-QCL-Info)
    - Condition 2b:
      * If PRS QCL information is provided with SSB as reference with QCL Type A, Type D and average gain
    - Condition 2c: QC
      * If PRS QCL information is provided with SSB as reference with QCL Type A, Type D and average gain, and
      * the UE was previously configured to measure the reference SSB and measured the reference SSB within X ms (FFS) of the start of the PRS measurement period.
  + Condition 3 (PRS configuration parameters): CATT
    - PRS resource repetitions (in different slots) within one PRS instance. Number of repetitions is FFS
* Agreements
  + Additional samples for AGC for PRS measurements are not required in case at least one of the following conditions is met
    - Condition #1:
      * PRS bandwidth is within the active BWP and
      * Difference between the serving cell SS-RSRP and neighbor cell/TRP PRS-RSRP is within [6] dB

Issue 1-1-3: Need for LMF to configure the UE to measure with a reduced Rx beam sweeping factor

**Sub-topic 1-2: PRS measurements without gaps**

Issue 1-2-2: Related to RAN1 LS on condition of PRS measurement outside the MG

*Response to RAN1 LS in R1-2112883 on condition of PRS measurement outside the MG. Response on if UE needs to calculate the expected Rx time difference and/or compare it against the threshold.*

* Proposals
* Option 1: HW
  + - Expected RTD is defined as max(X1, X2), where
      * X1 = X1’, if X1’ < 0.5 slot; X1 = 1-X1’, otherwise
      * X1’= mod(expected RSTD + expected RSTD uncertainty, slot length)
      * X2 = X2’, if X2’ < 0.5 slot; X2 = 1-X2’, otherwise
      * X2’= mod(expected RSTD - expected RSTD uncertainty, slot length)
    - Introduce UE capability for the maximum Rx timing difference in MG-less PRS measurement, with at least two values {CP length, 0.5 slot}.
    - It is up to UE implementation whether to calculate the expected Rx time difference and/or compare it against the threshold
* Option 2:
  + Proposal 2a: Vivo, Nokia, E///
    - Introduce the UE capability for the threshold which is used to be compared against with the Rx timing difference to determine whether the PRS from the non-serving cell satisfy the condition of PRS measurement outside MG.
  + Proposal 2b: Nokia
    - Timing difference with candidate thresholds {CP length, half of the symbol, half of the slot, 1ms} with corresponding UE capability.
* Option 3: Intel, OPPO, CATT, ZTE
  + The threshold, which is used to be compared against with the Rx timing difference to determine whether the PRS from the non-serving cell satisfy the condition of PRS measurement outside MG can be: [-½ CP length, ½ CP length]
* Option 4: Nokia
  + If single FFT processing is assumed, the condition for PRS measurement without MG is that the expected Rx timing difference between the PRS from the non-serving cell and that from serving cell is within CP.
* Option 5: QC
  + The applicability condition on Rx timing difference between the serving cell and a neighbor cell/TRP for PRS measurements within a PPW is , where
    - is the maximum distance between the start of a symbol containing PRS from the neighbor cell/TRP and the start of the closest symbol from the serving cell, taking into account the timing difference between the serving cell and the reference cell/TRP, the expectedRSTD of the neighbor cell/TRP, and the expectedRSTD-uncertainty of the neighbor cell/TRP.
    - is the selected threshold.
  + The UE is not required to evaluate the applicability condition on Rx timing difference between serving cell and neighbor cells/TRPs for PRS measurements within a PPW. The applicability condition is ensured by the LMF.
  + Introduce a UE capability for the value of the threshold of the applicability condition on Rx timing difference between serving cell and neighbor cells/TRPs for PRS measurements within a PPW.
  + The UE capability for the value of the threshold of the applicability condition on Rx timing difference between serving cell and neighbor cells/TRPs for PRS measurements within a PPW should include the value ¼ of the symbol length.
* Discussion
  + Session chair: come back in the 2nd round.

**GTW session (February 23, 2022)**

**Sub-topic 1-3: Measurement gaps enhancement for PRS measurements**

Issue 1-3-2: Requirements for pre-configured MG for positioning

* Proposals
  + Option 1 (No MG is configured for RRM measurement): (E///, Nokia)
    - Proposal 1: CATT, Nokia, Intel, Vivo, OPPO
      * Define positioning measurement requirement when DL MAC-CE for positioning MG activation command is received and when a legacy MG is not configured
    - Proposal 2: Vivo
      * Existing RRM and positioning requirements can be reused
    - Proposal 3: OPPO
      * POS MG should not be considered as concurrent gaps when defining RRM requirements.
      * NCSG will not be configured for PRS measurement when defining RRM requirements.
  + Option 2: HW
    - RAN4 to define measurement requirements when POS MG(s) are configured with the assumptions that POS MG(s) can only be used for PRS measurement, and only one POS MG can be activated at a time.
    - RAN4 to define measurement requirements when POS MG(s) are configured for the following scenarios.
      * Scenario 1: No MG is configured for RRM measurement
        + POS MG is considered as legacy MG in PRS and RRM measurements when activated
        + POS MG is not considered in RRM requirements when deactivated
      * Scenario 2: One legacy MG is configured for RRM measurement
        + FFS to define requirements for RRM and PRS measurements based on framework of concurrent MGs when POS MG is activated
        + POS MG is not considered in RRM requirements when deactivated
    - Provide reply LS to RAN2 based on above proposals
  + Option 3: QC
    - RAN4 should specify requirements for PRS measurements within MG in the following additional scenarios (not supported in Rel-16):
      * Scenario A: when a per-UE pre-configured MG for positioning is activate and no other MGs are configured and no other pre-configured MGs are activate
      * Scenario B: for a UE that supports the new Rel-17 capability for PRS measurements with per-FR MG, when a per-FR pre-configured MG for positioning is activate and no other per-FR MGs are configured in the same FR and no other per-FR pre-configured MGs are activate in the same FR
      * Scenario C: for a UE that supports Rel-17 concurrent MGs, when a per-UE pre-configured MG for positioning is activate and at most one other MG is configured or at most one other pre-configured MG is activate
      * Scenario D: for a UE that supports Rel-17 concurrent MG and the new Rel-17 capability for PRS measurements with per-FR MG, when a per-FR pre-configured MG for positioning is activate and at most one other per-FR MG is configured in the same FR or at most one other per-FR pre-configured MG is activate.
  + Option 4: E///
    - Scenario 1: No MG is configured for RRM measurement
      * POS MG is considered as legacy MG in PRS and RRM measurements when activated
      * POS MG is not considered in RRM requirements when deactivated
    - Scenario 3:
      * POS MG(s) are configured with the assumptions that POS MG(s) can only be used for PRS measurement, and only one POS MG can be activated at a time.
* Tentative agreements
  + Scenario 1: No MG is configured for RRM measurement
    - Define positioning measurement requirement when DL MAC-CE for positioning MG activation command is received and when a legacy MG is not configured
  + Scenario 2: One legacy MG is configured for RRM measurement
    - Option 1: Define requirements for RRM and PRS measurements based on [framework of concurrent MGs when POS MG is activated]
    - Option 2: Do not define requirements for RRM and PRS measurements
* Discussion
  + Scenario 1: No MG is configured for RRM measurement
    - QC: Support scenario 1. We would like to clarify that this preconfigured MG is different from the one considered in MG Enhancements WI. This MG is for positioning only and has a separate mechanism. Other scenarios shall be considered as well and can be considered as a concurrent gap.
    - Intel: Support scenario 1. We should not consider a mix of positioning preconfigured MG and the other pre-MG
    - Huawei: Support Scenario 1. General principles shall be clarified: 1) do not consider RRM measurements using this gap 2) single pre-configured MG is configured
    - Nokia: Suggest to clarify when no other MG is configured
    - E///: we prefer to limit requirements to scenario 1 only
* Agreements
  + Scenario 1: No MG is configured for RRM measurement
    - Define positioning measurement requirement when DL MAC-CE for positioning MG activation command is received and when other MGs are not configured
  + Scenario 2: One legacy MG is configured for RRM measurement
    - FFS whether to define requirements for RRM and PRS measurements based on framework of concurrent MGs when POS MG is activated

**GTW session (March 01, 2022)**

1-3-2: Requirements for pre-configured MG for positioning

* Background
  + Scenario 1: No MG is configured for RRM measurement
    - Define positioning measurement requirement when DL MAC-CE for positioning MG activation command is received and when a legacy MG is not configured
  + Scenario 2: One legacy MG is configured for RRM measurement
    - Option 1: Define requirements for RRM and PRS measurements based on [framework of concurrent MGs when POS MG is activated]
    - Option 2: Do not define requirements for RRM and PRS measurements
* Proposals
  + Option 1: E///, Intel, Nokia, CATT, Vivo, OPPO
    - Define PRS measurement requirements only for scenario 1
  + Option 2: HW, QC
    - Define PRS measurement requirements for both scenarios 1 and 2
* Discussion
  + QC: Option 1 is too restrictive.
  + Intel: Scenario #2 was not considered in the scope of NR MG Enh WI.
  + Nokia: Scenario #2 is similar to concurrent gap, but it may have some specific. Option 1.
  + E///: Agree with Intel and Nokia.
  + vivo: we think that this should be in the scope of Rel-18.
* Agreement
  + Define PRS measurement requirements only for scenario 1

1-2-2: RAN1 LS on condition of PRS measurement outside the MG

* Proposals
  + Option 1: HW, E///
    - Expected RTD is defined as max(X1, X2), where
      * X1 = X1’, if X1’ < 0.5 slot; X1 = 1-X1’, otherwise
      * X1’= mod(expected RSTD + expected RSTD uncertainty, slot length)
      * X2 = X2’, if X2’ < 0.5 slot; X2 = 1-X2’, otherwise
      * X2’= mod(expected RSTD - expected RSTD uncertainty, slot length)
    - Introduce UE capability for the maximum Rx timing difference in MG-less PRS measurement, with at least two values {CP length, 0.5 slot}.
    - It is up to UE implementation whether to calculate the expected Rx time difference and/or compare it against the threshold
  + Option 2:
    - Proposal 2a: Vivo, Nokia, E///
      * Introduce the UE capability for the threshold which is used to be compared against with the Rx timing difference to determine whether the PRS from the non-serving cell satisfy the condition of PRS measurement outside MG.
    - Proposal 2b: Nokia
      * Timing difference with candidate thresholds {CP length, half of the symbol, half of the slot, 1ms} with corresponding UE capability.
  + Option 3: Intel, OPPO, CATT, ZTE, CATT, E///
    - The threshold, which is used to be compared against with the Rx timing difference to determine whether the PRS from the non-serving cell satisfy the condition of PRS measurement outside MG can be: [-½ CP length, ½ CP length]
  + Option 4: Nokia, E///
    - If single FFT processing is assumed, the condition for PRS measurement without MG is that the expected Rx timing difference between the PRS from the non-serving cell and that from serving cell is within CP.
  + Option 5: QC
    - The applicability condition on Rx timing difference between the serving cell and a neighbor cell/TRP for PRS measurements within a PPW is , where
      * is the maximum distance between the start of a symbol containing PRS from the neighbor cell/TRP and the start of the closest symbol from the serving cell, taking into account the timing difference between the serving cell and the reference cell/TRP, the expectedRSTD of the neighbor cell/TRP, and the expectedRSTD-uncertainty of the neighbor cell/TRP.
        + is the selected threshold.
    - The UE is not required to evaluate the applicability condition on Rx timing difference between serving cell and neighbor cells/TRPs for PRS measurements within a PPW. The applicability condition is ensured by the LMF.
    - Introduce a UE capability for the value of the threshold of the applicability condition on Rx timing difference between serving cell and neighbor cells/TRPs for PRS measurements within a PPW.
    - The UE capability for the value of the threshold of the applicability condition on Rx timing difference between serving cell and neighbor cells/TRPs for PRS measurements within a PPW should include the value ¼ of the symbol length
  + Discussion
    - QC: how do we compare Rx timing difference – is it on symbol boundary or slot boundary?
    - Huawei: introduce UE capability for max timing difference. To QC – this is the 2nd level details.
  + Agreements
    - Introduce UE capability for the maximum Rx timing difference in MG-less PRS measurement
      * Option 1: two values {CP length, 0.5 slot}
      * Other options are not precluded

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206979 | WF on NR Positioning Enhancements (Part 1) | Ericsson |  |
| R4-2206980 | LS on need for LMF configuring reduced Rx beam sweeping factor | Intel | To: RAN1; CC: RAN2 |
| R4-2206981 | LS reply on condition of PRS measurement outside the MG | Vivo | To: RAN1  Reply to RAN1 LS in R4-2200051/R1-2112883 |
| R4-2206982 | LS on PRS measurement reporting enhancement | ~~Huawei~~ Nokia | To: RAN1, RAN2 |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2206025 | Updated work split on RRM core requirements for positioning | Ericsson | Revised |  |
| R4-2203885 | Draft CR on PRS-RSRP measurement period without gaps | CATT | Revised |  |
| R4-2203886 | Draft CR on PRS-RSRPP measurement period without gaps | CATT | Revised |  |
| R4-2204302 | Draft CR to measurement period for UE Rx-Tx time difference measurement without gap | OPPO | Revised |  |
| R4-2204303 | Draft CR to scheduling availability of UE during RSTD measurement without gap | OPPO | Revised |  |
| R4-2204412 | DraftCR to TS 38.133: NR ePos PRS-RSRP with reduced number of samples (9.9.3.5) | Intel | Revised |  |
| R4-2204638 | Draft CR to 38.133 Introduction of RSTD measurement requirements for latency reduction | Vivo | Revised |  |
| R4-2204639 | Draft CR to 38.133 Introduction of scheduling availability of UE during UE Rx-Tx time difference measurement without gaps | Vivo | Revised |  |
| R4-2205382 | CR on requirements for UE Rx-Tx measurement with reduced latency | Huawei, HiSilicon | Revised |  |
| R4-2205605 | Draft CR: PRS-RSRPP measurement requirements including latency reduction | Ericsson | Revised |  |
| R4-2205386 | CR on RSTD measurement period requirements without gaps | Huawei, HiSilicon | Revised |  |
| R4-2205606 | CR: General - PRS measurement without gaps | Ericsson | Revised |  |
| R4-2205388 | CR on RSTD measurement period requirements without gaps | Huawei, HiSilicon | Revised |  |
| R4-2205607 | CR: Scheduling availability of UE during PRS-RSRP measurement | Ericsson | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206979 WF on NR Positioning Enhancements (Part 1)**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206980 LS on need for LMF configuring reduced Rx beam sweeping factor**

*Type: LS out For: Approval  
 to RAN1 cc RAN2  
 Source: Intel Corporation*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206981 LS reply on condition of PRS measurement outside the MG**

*Type: LS out For: Approval  
 to RAN1   
 Source: vivo*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206982 LS on PRS measurement reporting enhancement**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2207088 Reply LS on latency improvement for PRS measurement with MG**

*Type: LS out For: Approval  
 to RAN2, RAN1 cc RAN3  
 Source: Huawei*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**Email discussion: [102-e][231] NR\_pos\_enh\_2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][231] NR\_pos\_enh\_2 | R17 NR ePos (NR\_pos\_enh) | RRM requirements:  - UE Rx/Tx and/or gNB Rx/Tx timing delay mitigation  - Measurement in RRC\_INACTIVE state  - Enhancements of A-GNSS positioning | 10.21.2.1 10.21.2.3 10.21.2.5 | Qiuge Guo |

**R4-2206774 Email discussion summary: [102-e][231] NR\_pos\_enh\_2**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207072 (from R4-2206774).**

**R4-2207072 Email discussion summary: [102-e][231] NR\_pos\_enh\_2**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 22, 2022)**

Key open issues

* Topic #1: UE Rx/Tx and/or gNB Rx/Tx timing delay mitigation
  + Sub-topic 1-1 TEG framework
  + Sub-topic 1-2 The temporal validity of TEG
  + Sub-topic 1-3 RRM requirements
  + Sub-topic 1-4 Report for the measurement without TEG association
* Topic #2: Measurement in RRC\_INACTIVE state
  + Sub-topic 2-1 PRS collision
  + Sub-topic 2-2 The PRS measurement requirements applicability in RRC\_INACTIVE
  + Sub-topic 2-3 SRS measurement requirements in RRC\_INACTIVE state
  + Sub-topic 2-4 Measurement period requirements for positioning measurement in RRC\_INACTIVE state

**Topic #1: UE Rx/Tx and/or gNB Rx/Tx timing delay mitigation**

Issue 1-1-0: The framework of UE/TRP Rx TEG (for information, no need to comment)

* Proposals
  + Option 1: (CATT, Intel, OPPO, vivo, ZTE, Ericsson)
    - Step #1: RAN4 define multiple candidate values {TE1, TE2, …} in the spec.
    - Step #2: UE/TRP has multiple Rx TEGs (TEG#1, TEG#2, …) associated with the same value  M, which means the timing error difference between the measurements within the same Rx TEG is within the margin M.
      * M is selected from {TE1, TE2, …}
    - Step #3: UE/TRP reports selected margin M before the measurement (e.g. after receiving the location request) and only report the Rx TEG ID during the measurement report.
      * FFS LMF may recommend the margin value to UE/TRP and UE reported value can override the value indicated by LMF.
    - Step #4: The applicability of reported UE Rx TEG is limited to the measurements contained within the measurement report in which the Rx TEG information is provided.
    - Step #5: RRM accuracy requirements will be defined based on the different values {TE1, TE2, …}.
  + Option 2: (QC)
    - Step #1: RAN4 define multiple candidate values {TE1, TE2, …} in the spec.
    - Step #2: UE/TRP has multiple Rx TEGs (TEG#1, TEG#2, …) associated with multiple values (M1, M2, …), which means the timing error difference between the measurements within the TEG#i is within the margin Mi where i=1,2,….
      * Mi is selected from {TE1, TE2, …}
      * Mi can be same as or different from each other
    - Step #3: UE/TRP reports the corresponding margin together with Rx TEG ID during the measurement report.
      * For UE-assisted positioning, the LMF may recommend a subset of values or a maximum value of timing error margin that the UE may use when it reports TEGs.
    - Step #4: The applicability of reported UE Rx TEG is limited to the measurements contained within the measurement report in which the Rx TEG information is provided.
    - Step #5: RRM accuracy requirements will be defined based on the different values {TE1, TE2, …}.
  + Option 3 (Nokia):
    - Step #1: RAN4 defines multiple candidate values for the timing error margin {TE1, TE2, …} in the spec.
    - Step #2: UE/TRP has multiple Rx TEGs (TEG#1, TEG#2, …) associated with multiple TE margin values (M1, M2, …), which means the timing error difference between the measurements within the TEG#i is within the TE margin ±Mi where i=1,2,….
      * Mi is selected from {TE1, TE2, …} and is implementation specific for UE/TRP.
      * Mi can be same or different from each other
    - Step #3: UE/TRP reports the corresponding margin as indicated by the Rx TEG ID during the measurement report and associates the respective measurements.
    - Step #4: The applicability of reported UE Rx TEG is limited to the measurements contained within the measurement report in which the Rx TEG information is provided, and only to measurements that are tagged with a Rx TEG ID.
    - Step #5: RRM accuracy requirements will be defined based on the different values {TE1, TE2, …}.
  + Option 4: (HW)
    - Step #1: RAN4 define multiple candidate values {TE1, TE2, …} in the spec.
    - Step #2: LMF selects one value M from {TE1, TE2, …} and indicate to UE/TRP
    - Step #3: UE/TRP has multiple Rx TEGs (TEG#1, TEG#2, …) associated with the same value M, which means the timing error difference between the measurements within the same Rx TEG is within the margin M.
    - Step #4: The applicability of reported UE Rx TEG is limited to the measurements contained within the measurement report in which the Rx TEG information is provided, and only to measurements that are tagged with a Rx TEG ID.
    - Step #5: RRM requirements will be defined based on the different values {TE1, TE2, …}.

Issue 1-1-1 Whether to define different timing error margins for each Rx TEG (FFS for step #2)

* Proposals
  + Option 1: (QC, Nokia)
    - Yes. The UE/TRP can select a different timing error margin value for each Rx TEG
  + Option 2: (CATT, OPPO, Intel, vivo, Huawei, ZTE, Ericsson)
    - No. The same timing margin is used for all Rx TEGs per UE/TRP.
* Discussion
  + QC: not clear on motivation of Option 2.
  + Nokia: same view as QC
  + vivo: not clear how LMF can take advantage of different margins for different TEGs
  + Huawei: one measurement can be associated with one TEG ID. So we do not see value in associating different margins with different TEGs.
  + Intel: we think a single value per UE is sufficient, while different UEs may have different values.
  + CATT: Option 1 does not provide benefits since the actual value of margin for different TEGs does not matter.
  + ZTE: Margin is driven by HW implementation and calibration. Option 2 is more simple from implementation perspective and signalling.
  + E///: Agree with ZTE.
* Agreements
  + The same timing margin is used for all Rx TEGs per UE/TRP

Issue 1-1-2 How to decide the used value of timing error margin(s) associated with Rx TEGs (FFS for step #3)

* Proposals
  + Option 1: (CATT, Intel, OPPO, QC, vivo, ZTE)
    - The timing error margin value is decided by UE/TRP among the candidate values defined in 38.133 based on its implementation.
  + Option 1a: (QC)
    - For UE-assisted positioning, the LMF may recommend a subset of values or a maximum value of timing error margin that the UE may use when it reports TEGs.
  + Option 1b: (CATT, Intel)
    - When the network configured TEG margin is out of UE’s capability, UE can override it and report the new one based on UE implementation itself.
  + Option 1c: (Ericsson, Nokia)
    - No reporting of used margins to NW by UE/TRP based on implementation is needed
  + Option 1d: (Nokia)
    - Deprioritize the issue ‘whether NW can configure requested margins to UE/TRP based on demand’ for Rel-17 (i.e. NW will not configure the requested timing error margins to UE/TRP in R17.)
  + Option 2: (Huawei)
    - Rx TEG margin value is indicated by LMF among the candidate values defined in 38.133
* Discussion
  + Session chair: Continue email discussion on whether agreement can be extended to include any of 1a/1b/1c/1d
* Agreements
  + The timing error margin value is decided by UE/TRP among the candidate values defined in TS 38.133 based on its implementation.

**Topic #2: Measurement in RRC\_INACTIVE state**

Issue 2-4-4 How to define carrier specific scaling factor (Kcarrier\_PRS) for PRS measurement requirements in RRC\_INACTIVE state

* Proposals
  + Option 1: (CATT)
    - If PRS measurement is performed with the same engine as RRM measurement, Kcarrier\_PRS = Kcarrier\_RRM = Kcarrier + 1.
    - PRS measurement is performed with dedicated engine, Kcarrier\_PRS = 1 and Kcarrier\_RRM = Kcarrier
  + Option 2: (CMCC, Nokia)
    - Replace CSSF with Kcarrier for inactive state PRS measurement requirements, Kcarrier is the total number of configured carriers for mobility measurements and CA measurements plus one positioning frequency layer.
  + Option 3: (OPPO, Huawei)
    - Replace CSSF with Kcarrier and Nlayer for RRC\_INACTIVE state measurement requirements, only one positioning frequency layer is accounted into Kcarrier and Nlayer
  + Option 4: (QC)
    - Replace CSSF in the Rel-16 measurement period formula with a factor K with two possible values depending on UE capability.
    - Baseline capability: K = Kcarrier + 1 (or Nlayer + 1 when only higher priority layers need to be measured),
    - Advanced capability: K=1, for a UE that has a dedicated PRS processing engine.
  + Option 5: (vivo)
    - Replace CSSF with Kcarrier for inactive state PRS measurement requirements with some clarification, e.g., if Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, Kcarrier is the total numbers of higher priority carriers plus one positioning frequency layer, otherwise, Kcarrier is the total number of configured carriers for mobility measurements and CA measurements plus one positioning frequency layer.
  + Option 6: (Ericsson)
    - CSSF should be replaced with Kcarrier. Where Kcarriers is sum of NR inter-frequency and inter-RAT LTE carriers configured for mobility measurements, NR inter-frequency and inter-RAT LTE carriers configured for CA/DC measurements and one positioning frequency layer.
* Recommended WF
  + *For the UE sharing the same measurement engine as RRM measurement for PRS measurement:* 
    - *Update the definition of Kcarrier in 4.2.2.4 and Nlayer in 4.2.2.7 by adding one positioning frequency layer.*
    - *If Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, Kcarrier\_PRS equals to updated Nlayer in 4.2.2.7*
    - *If Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ, Kcarrier\_PRS equals to updated Kcarrier in 4.2.2.4 [and Nfreq  in 4.2.2.5]*
  + *~~FFS whether to define:~~ For the UE with dedicated measurement engine for measurement:* 
    - *Do not update the definition of Kcarrier in 4.2.2.4 and Nlayer in 4.2.2.7.*
    - *Kcarrier\_PRS equals to1.*
* Discussion
  + E///: Definition of Kcarrier needs to be clarified and needs to include inter-RAT in addition to inter-frequency.
  + CATT: in our understanding Kcarrier definition includes inter-frequency only
  + vivo: Agree with Ericsson that inter-RAT shall be considered.
  + QC: Prefer to remove the FFS part and keep UE with dedicated engine for measurements
  + E///: Fine to remove FFS. Is it a separate UE capability
    - QC: yes, this is a separate capability
  + Huawei: ok with capability
* Agreements
  + UE capabilities for PRS measurements in RRC\_INACTIVE state
    - Capability #1: UE not performing parallel PRS measurements (note: this is the default capability for UE supporting PRS measurements in RRC\_INACTIVE state)
    - Capability #2: UE performing parallel PRS measurements
    - UE capability signalling details are FFS
  + For Capability #1 UEs:
    - FFS: Update the definition of Kcarrier in 4.2.2.4 and Nlayer in 4.2.2.7 by adding one positioning frequency layer.
    - If Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, Kcarrier\_PRS equals to ~~updated~~ Nlayer + 1 in 4.2.2.7
    - If Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ, Kcarrier\_PRS is FFS
  + For Capability #2 UEs:
    - Do not update the definition of Kcarrier in 4.2.2.4 and Nlayer in 4.2.2.7.
    - Kcarrier\_PRS equals to1.

**GTW session (March 01, 2022)**

1-1-0: The framework of UE/TRP Rx TEG (together with the LS on TEG framework)

* Agreement
  + The framework of UE/TRP Rx TEG
  + Define multiple candidate timing error margin values {TE1, TE2, …, TEN} in the spec.
    - The number of candidate values (i.e. N) and the exact values of {TE1, TE2, …, TEN} will be decided in Perf part.
  + UE/TRP selects one value M from {TE1, TE2, …, TEN} based on its implementation and indicate to LMF.
  + For UE that supports multiple Rx TEGs (TEG#1, TEG#2, …), the associated timing error margin value of each Rx TEG is M, which means the timing error difference between the measurements within the same Rx TEG is within the margin M.
  + The applicability of reported UE Rx TEG is limited to the measurements contained within the measurement report in which the Rx TEG information is provided, and only to measurements that are tagged with the corresponding TEG ID.
  + The RRM accuracy requirements corresponding to the candidate timing error margin values {TE1, TE2, …, TEN} will be defined in Perf part.
  + The framework of UE/TRP Rx TEG can be also applied for UE/TRP RxTx TEG
  + Note: if additional issues are identified based on RAN1/2 progress, then this agreement can be revised

1-3-1 The impact of TEGs (including Rx/Tx/RxTx TEG) on PRS measurement core requirements

* Proposals
  + Subject to UE capability, if the LMF requests the UE to optionally measure the same DL PRS resource of a TRP with N different UE Rx TEGs and report the corresponding multiple RSTD measurements, the measurement period shall be extended.
  + FFS whether a detailed measurement period requirement is specified in that case.
    - Option 1: The existing measurement period is scaled by N/k if UE is requested to measure same PRS resource with N different UE Rx TEGs, where k is the value UE reports for 27-1-4a.
    - Option 2: The existing measurement period is scaled by N if UE is requested to measure same PRS resource with N different UE Rx TEGs.
    - Option 3: Do not define the exact measurement period requirements for the case when UE is requested to measure same PRS resource with N different UE Rx TEGs.
* Agreement
  + Subject to UE capability, if the LMF requests the UE to optionally measure the same DL PRS resource of a TRP with N different UE Rx TEGs and report the corresponding multiple RSTD measurements, the measurement period shall be extended.
  + For UE that only supports RAN1 Rel-17 feature 27-1-4 and does not support 27-1-4a
    - The existing measurement period is scaled by N if UE is requested to measure same PRS resource with N different UE Rx TEGs.
  + For UE that supports both RAN1 Rel-17 feature 27-1-4 and 27-1-4a
    - Option 1: The existing measurement period is scaled by if UE is requested to measure same PRS resource with N different UE Rx TEGs, where k is the value UE reports for 27-1-4a.

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2206997 | WF on NR Positioning Enhancements (Part 2) | CATT | WF to capture all the agreements and open issues. |
| R4-2206998 | LS on the UE/TRP TEG framework | CATT | To: RAN1/2  Capture the agreements about TEG |
| R4-2206999 | LS on the UE behavior under cell selection during PRS measurement period | Ericsson | To: RAN2  Whether the LS is needed depends on the 2nd round discussion |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2203888 | Draft CR on PRS-RSRPP measurement requirements in RRC\_INACTIVE state | CATT | Revised |  |
| R4-2204466 | DraftCR – RSTD measurement requirements in RRC\_INACTIVE state | Qualcomm | Revised |  |
| R4-2204637 | Draft CR to 38.133 Introduction of PRS RSRP measurement requirements in RRC\_INACTIVE state | vivo | Revised |  |
| R4-2205380 | CR on measurement period requirements with multiple Rx TEGs | Huawei | Revised |  |
| R4-2205384 | CR on general requirements for PRS measurements in RRC Inactive | Huawei | Revised |  |
| R4-2206028 | UE Rx-Tx measurement requirements in RRC inactive state (clause 5.5.4) | Ericsson | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2206997 WF on NR Positioning Enhancements (Part 2)**

*Type: other For: Approval  
 Source: CATT*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206998 LS on the UE/TRP TEG framework**

*Type: LS out For: Approval  
 to RAN1, RAN2  
 Source: CATT*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2206999 LS on the UE behavior under cell selection during PRS measurement period**

*Type: LS out For: Approval  
 to RAN2  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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#### 10.21.1 General

**R4-2206025 Updated work split on RRM core requirements for postioning**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

The paper provides updated work split for CRs. The original work split was approved in R4-2202776.

**Decision: Revised to R4-2206983 (from R4-2206025).**

**R4-2206983 Updated work split on RRM core requirements for postioning**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

The paper provides updated work split for CRs. The original work split was approved in R4-2202776.

**Decision: Return to.**

**R4-2206026 Big DraftCR on Positioning Enhancement**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Revision of the Big DraftCR template on Positioning Enhancement in R4-2202683 endorsed at RAN4#101-bis-e. The updated version will incorporate draft CRs endorsed at RAN4#102-e.

**Decision: Return to.**

#### 10.21.2 RRM core requirements

##### 10.21.2.1 UE Rx/Tx and/or gNB Rx/Tx timing delay mitigation

**R4-2203883 Discussion on UE Rx/Tx and/or gNB Rx/Tx timing delay mitigation**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2204300 Discussion on UE Rx/Tx and/or gNB Rx/Tx timing delay mitigation**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204408 Discussion on timing mitigating for NR positioning enhancements**

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

**Decision: Noted.**

**R4-2204463 On UE Rx/Tx timing error mitigation**

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

**Decision: Noted.**

**R4-2204642 Further discussion on timing delay error mitigation**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2205379 Discussion on timing error mitigation for positioning**

*Type: LS out For: Approval  
 to RAN2, RAN3, RAN1  
 Source: Huawei, HiSilicon*

**Decision: Noted.**

**R4-2205380 CR on measurement period requirements with multiple Rx TEGs**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2207003 (from R4-2205380).**

**R4-2207003 CR on measurement period requirements with multiple Rx TEGs**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205396 UE RxTx and gNB RxTx timing delay mitigation**

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

**Decision: Noted.**

**R4-2205602 On Rx/Tx timing delay mitigation**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

addresses remaining issues on Rx/Tx timing delay mitigation identified in R4-2202684

**Decision: Noted.**

**R4-2205940 Discussion on timing error mitigation for NR positioning**

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

**Abstract:**

Discussion on timing error mitigation for NR positioning

**Decision: Noted.**

##### 10.21.2.2 Latency reduction of positioning measurement

**R4-2203884 Discussion on latency reduction of positioning measurement**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2203885 Draft CR on PRS-RSRP measurement period without gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Revised to R4-2206984 (from R4-2203885).**

**R4-2206984 Draft CR on PRS-RSRP measurement period without gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2203886 Draft CR on PRS-RSRPP measurement period without gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Revised to R4-2206985 (from R4-2203886).**

**R4-2206985 Draft CR on PRS-RSRPP measurement period without gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2204262 Discussion on latency reduction of positioning measurement**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2204301 Discussion on latency reduction of positioning measurements**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204302 Draft CR to measurement period for UE Rx-Tx time difference measurement without gap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Revised to R4-2206986 (from R4-2204302).**

**R4-2206986 Draft CR to measurement period for UE Rx-Tx time difference measurement without gap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Return to.**

**R4-2204303 Draft CR to scheduling availability of UE during RSTD measurement without gap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Revised to R4-2206987 (from R4-2204303).**

**R4-2206987 Draft CR to scheduling availability of UE during RSTD measurement without gap**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Return to.**

**R4-2204409 Discussion on latency reduction for NR positioning enhancements**

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

**Decision: Noted.**

**R4-2204412 DraftCR to TS 38.133: NR ePos PRS-RSRP with reduced number of samples (9.9.3.5)**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Revised to R4-2206988 (from R4-2204412).**

**R4-2206988 DraftCR to TS 38.133: NR ePos PRS-RSRP with reduced number of samples (9.9.3.5)**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Return to.**

**R4-2204464 On latency reduction of NR positioning measurements**

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

**Decision: Noted.**

**R4-2204638 Draft CR to 38.133 Introduction of RSTD measurement requirements for latency reduction**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Revised to R4-2206989 (from R4-2204638).**

**R4-2206989 Draft CR to 38.133 Introduction of RSTD measurement requirements for latency reduction**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Return to.**

**R4-2204639 Draft CR to 38.133 Introduction of scheduling availability of UE during UE Rx-Tx time difference measurement without gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Revised to R4-2206990 (from R4-2204639).**

**R4-2206990 Draft CR to 38.133 Introduction of scheduling availability of UE during UE Rx-Tx time difference measurement without gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Return to.**

**R4-2204640 Further discussion on latency reduction of positioning measurement**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2205038 Discussion on latency reduction of positioning measurement**

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

**Decision: Noted.**

**R4-2205381 On latency reduction for positioning measurement**

*Type: LS out For: Approval  
 to RAN2, RAN1, cc RAN3  
 Source: Huawei, HiSilicon*

**Decision: Noted.**

**R4-2205382 CR on requirements for UE Rx-Tx measurement with reduced latency**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206991 (from R4-2205382).**

**R4-2206991 CR on requirements for UE Rx-Tx measurement with reduced latency**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205397 Discussions on latency reduction of positioning measurement**

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

**Decision: Noted.**

**R4-2205603 On latency reduction of positioning measurement**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

addresses remaining issues on latency reduction of positioning measurement identified in R4-2202776

**Decision: Noted.**

**R4-2205605 PRS-RSRPP measurement requirements including latency reduction**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

captures Rel. 17 agreements on PRS-RSRPP requirements.

**Decision: Revised to R4-2206992 (from R4-2205605).**

**R4-2206992 PRS-RSRPP measurement requirements including latency reduction**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

captures Rel. 17 agreements on PRS-RSRPP requirements.

**Decision: Return to.**

##### 10.21.2.3 Measurement in RRC\_INACTIVE state

**R4-2203887 Discussion on measurement in RRC\_INACTIVE state**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2203888 Draft CR on PRS-RSRPP measurement requirements in RRC\_INACTIVE state**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Revised to R4-2207000 (from R4-2203888).**

**R4-2207000 Draft CR on PRS-RSRPP measurement requirements in RRC\_INACTIVE state**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: CATT*

**Decision: Return to.**

**R4-2204261 Discussion on positioning measurement in RRC\_INACTIVE state**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2204304 Discussion on PRS measurements in RRC\_INACTIVE state**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204410 Discussion on measurements in RRC\_INACTIVE for NR positioning enhancements**

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

**Decision: Noted.**

**R4-2204465 On NR positioning measurements in RRC\_INACTIVE**

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

**Decision: Noted.**

**R4-2204466 DraftCR - RSTD measurement requirements in RRC\_INACTIVE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision: Revised to R4-2207001 (from R4-2204466).**

**R4-2207001 DraftCR - RSTD measurement requirements in RRC\_INACTIVE**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Qualcomm Incorporated*

**Decision: Return to.**

**R4-2204637 Draft CR to 38.133 Introduction of PRS RSRP measurement requirements in RRC\_INACTIVE state**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: vivo*

**Decision: Revised to R4-2207002 (from R4-2204637).**

**R4-2207002 Draft CR to 38.133 Introduction of PRS RSRP measurement requirements in RRC\_INACTIVE state**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: vivo*

**Decision: Return to.**

**R4-2204641 Further discussion on PRS based measurement in RRC\_INACTIVE state**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2205383 Discussion on PRS measurement in RRC\_INACTIVE**

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

**Decision: Noted.**

**R4-2205384 CR on general requirements for PRS measurements in RRC Inactive**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2207004 (from R4-2205384).**

**R4-2207004 CR on general requirements for PRS measurements in RRC Inactive**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205398 Positioning measurements in RRC\_INACTIVE state**

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

**Decision: Noted.**

**R4-2205941 Discussion on measurement in RRC\_INACTIVE state**

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

**Abstract:**

Discussion on positioning measurements in RRC\_Inactive

**Decision: Noted.**

**R4-2206027 Further analysis PRS measurement requirements in RRC inactive state**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

The paper further analyzes the positioning requirements in RRC inactive state

**Decision: Noted.**

**R4-2206028 UE Rx-Tx measurement requirements in RRC inactive state (clause 5.5.4)**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

The draft CR on UE Rx-Tx time difference measurement requirements in RRC inactive state. It is based on work split approved in R4-2201776.

**Decision: Revised to R4-2207005 (from R4-2206028).**

**R4-2207005 UE Rx-Tx measurement requirements in RRC inactive state (clause 5.5.4)**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

The draft CR on UE Rx-Tx time difference measurement requirements in RRC inactive state. It is based on work split approved in R4-2201776.

**Decision: Return to.**

##### 10.21.2.4 Impact on existing UE positioning and RRM requirements

**R4-2205385 Discussion on MG-less PRS measurement**

*Type: LS out For: Approval  
 to RAN1  
 Source: Huawei, HiSilicon*

**Decision: Noted.**

**R4-2205386 CR on RSTD measurement period requirements without gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206993 (from R4-2205386).**

**R4-2206993 CR on RSTD measurement period requirements without gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205399 Impact on existing UE positioning and RRM requirements**

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

**Decision: Noted.**

**R4-2205606 General - PRS measurement without gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

captures gapless PRS measurement in the introduction to NR measurements for positioning in chapter 9.9 of specification

**Decision: Revised to R4-2206994 (from R4-2205606).**

**R4-2206994 General - PRS measurement without gaps**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

captures gapless PRS measurement in the introduction to NR measurements for positioning in chapter 9.9 of specification

**Decision: Return to.**

##### 10.21.2.5 Enhancements of A-GNSS positioning

##### 10.21.2.6 Others

**R4-2204305 Other issues of positioning enhancements for NR**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204643 Other issues of positioning enhancement**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2205387 Discussion on other issues for positioning enhancement**

*Type: LS out For: Approval  
 to RAN2, RAN1  
 Source: Huawei, HiSilicon*

**Decision: Noted.**

**R4-2205388 CR on scheduling restriction for PRS-RSRPP measurement**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2206995 (from R4-2205388).**

**R4-2206995 CR on scheduling restriction for PRS-RSRPP measurement**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205400 on PRS measurement outside the measurement gap**

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

**Abstract:**

This paper discusses the matter of PRS measurement outside the measurement gap based on RAN1 LS.

**Decision: Noted.**

**R4-2205604 Impact of enhanced positioning on existing RRM**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

addresses remaining issues on impact of enhanced positioning on RRM identified in R4-2202776

**Decision: Noted.**

**R4-2205607 Scheduling availability of UE during PRS-RSRP measurement**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

captures scheduling restriction of UEs during gapless PRS meaurement

**Decision: Revised to R4-2206996 (from R4-2205607).**

**R4-2206996 Scheduling availability of UE during PRS-RSRP measurement**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

captures scheduling restriction of UEs during gapless PRS meaurement

**Decision: Return to.**

### 10.22 Multi-Radio Dual-Connectivity enhancements

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**Email discussion: [102-e][232] LTE\_NR\_DC\_enh2**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][232] LTE\_NR\_DC\_enh2 | R17 MR-DC enhacements (LTE\_NR\_DC\_enh2) | RRM Core requirements | 10.22 | Han Jing |

**R4-2206775 Email discussion summary: [102-e][232] LTE\_NR\_DC\_enh2**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207073 (from R4-2206775).**

**R4-2207073 Email discussion summary: [102-e][232] LTE\_NR\_DC\_enh2**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 24, 2022)**

Key open issues

* Topic #1: Efficient activation/de-activation mechanism for SCells (i.e., temporary RS for efficient SCell activation)
  + Sub-topic 1-1: Temporary RS based SCell activation delay
  + Sub-topic 1-2: Multiple SCell activation enhancement
* Topic #2: Efficient activation/de-activation mechanism for one SCG
  + Sub-topic 2-1: Measurement requirements for deactivated SCG
  + Sub-topic 2-2: SCG Activation/deactivation delay
  + Sub-topic 2-3: Interruption requirements
  + Sub-topic 2-4: RLM/BFD/BFR/Beam management on deactivated PSCell
  + Sub-topic 2-5: Others
* Topic #3: Conditional PSCell change and addition

**Sub-topic 2-2: SCG Activation/deactivation delay**

Issue 2-2-1: UE processing time (Tprocessing) in PSCell activation delay

* Proposals
  + Option 1 (Apple, vivo): If any PSCell parameter is modified,
    - Tprocessing = 20ms NR PSCell is in FR1 in EN-DC.
    - Tprocessing = 40 ms if NR PSCell is in FR2 in EN-DC or NR-DC
    - Otherwise:
      * Option **1a** (Apple): Tprocessing = 10ms
      * Option **1b** (vivo): Tprocessing =1ms
  + Option 2 (MTK, Ericsson):
    - For the case that PSCell change and PSCell activation command happen simultaneously
      * Tprocessing = 20 ms when source and target cells are in the same FR,
      * Tprocessing = 40 ms when source and target cells are in different FRs.
    - For PSCell activation from deactivated state,
      * Option **2a** (MTK): Tprocessing =20ms.
      * Option **2b** (Ericsson): Tprocessing =0ms.
  + Option 3 (QC): UE processing time (Tprocessing) in PSCell activation delay is
    - Tprocessing = 10ms NR PSCell is in FR1 in EN-DC
    - Tprocessing = 20 ms if NR PSCell is in FR2 in EN-DC or NR-DC
    - If any PSCell parameter is modified, Tprocessing shall not be less than 20ms.
  + Option 4 (OPPO):
    - Tprocessing = 20ms NR PSCell is in FR1 in EN-DC.
    - Tprocessing = 40 ms if NR PSCell is in FR2 in EN-DC or NR-DC
  + Option 5 (Huawei): Tprocessing = 10ms
  + Option 6 (Nokia):
    - If the PSCell is activated from deactivated state, Tprocessing is not applicable as delay parameter.
    - PSCell activation delay should allow UE RF warm up delay
    - RAN4 need to define a separate parameter accounting the RF warm up delay- TRF\_warmup.
* Moderator proposal
  + Do not consider simultaneous PSCell change and PSCell activation case
  + When PSCell is activated from deactivated state, Tprocessing = [20ms, 10ms, 0ms].
* Discussion
  + Apple: Is RACH procedure needed for SCG activation?
    - QC: UE needs to acquire new TA and it should be always RACH based
      * Huawei: same view
  + Nokia: We do not see difference between SCG activation and PSCell activation. Why do we need extra Tprocessing?
    - MTK: The difference is whether RRC or MAC CE activation is used. Tprocessing = 20ms
    - Apple: Same view as MTK. Suggest to follow the legacy way and differentiate whether target cell is in the same FR
  + vivo: Tprocessing includes SW processing and RF warm up. We can exclude 0ms as we need RF warm up. 10ms is ok for us.
  + OPPO: Tprocessing > 10ms
  + Huawei: For PSCell activation from the deactivated state – this applies to the same FR. To Apple – we suggest no to mention in the spec that some parameters are changed. Ok with 20ms.
  + Nokia: The cell is already configured and difference is not clear.
    - Huawei: Need to consider RF warm up and also SW processing time
    - Apple: Agree with Huawei.
  + E///: PSCell activation is very different from PSCell addition. We can compromise to 0ms without parameter change and 10ms with parameter change
  + Apple:
* Agreements
  + When PSCell is activated from deactivated state
    - If any PSCell parameter is modified
      * Tprocessing = [20ms].
    - Otherwise
      * Tprocessing = [5 or 10ms].
    - Note: further discuss if Tprocessing or a different term shall be used

Issue 2-2-3: whether Tsearch is needed for RACH-less based PSCell activation delay

* Moderator note
  + RACH-less PSCell activation delay is defined as
    - Tconfig\_PSCell = TRRC\_delay + Tprocessing + [Tsearch] + T∆+ TIU + 2 ms
* Proposals
  + Option 1 (Apple, OPPO, Huawei, QC): Tsearch is needed in RACH-less based PSCell activation delay
  + Option 2 (MTK, vivo): Tsearch = 0ms in RACH-less based PSCell activation delay.
  + Option 3 (Nokia):
    - During PSCell activation, if UE is configured with RLM/BFD, allowed T∆ is allowed and Tsearch is conditioned the RLM and BFD status:
      * A UE configured to perform RLM and BFD on the deactivated PSCell: when PSCell is activated, if UE has not declared RLF or BFD (TCI state is known), Tsearch = 0 while time frequency tracking is allowed. Hence, T∆ = 1xTrs
      * A UE configured to perform RLM on the deactivated PSCell: when PSCell is activated, if UE has not declared RLF (PSCell is known), Tsearch =0, while additional time for beam search (L1-RSRP) is allowed, Tsearch = TL1-RSRP, measure, T∆ = 1xTrs.
      * A UE configured to perform RLM on the deactivated PSCell: when PSCell is activated, if UE has declared RLF (PSCell is unknown), Tsearch =24xTrs, and additional time for beam search (L1-RSRP) is allowed. Hence, Tsearch = 24xTrs, additional TL1-RSRP, measure and T∆ = 1xTrs.
    - A UE not configured to perform either RLM or BFD on the deactivated PSCell will follow known/unknown conditions for the PSCell
  + Option 4 (Ericsson): There is no need in RACH-less based PSCell activation, and propose to remove Tsearch
* Discussion
  + Moderator: Suggest to split into two cases
    - Case 1: RLM and BFD are configured
    - Case 2: RLM and BFD are not configured
  + Apple: Tsearch is needed since UE may loose track of serving cell and it is not relevant to RLM/BFD. We cannot guarantee that we don’t need it for all cases
  + MTK: Ok to split into case 1/2. For Case 1 – Tsearch is not needed.
  + vivo: RLM and BFD shall be always configured for RACH-less activations. So, Case 1 always applies. Do not need Tsearch.
  + Huawei: For Case 1 and no failure is detected then Tsearch = 0. For Case 2 Tsearch > 0. There is ongoing discussion in RAN2 on RLM/BFD for RACH-less.
  + Nokia: Ok to split into case 1 and 2. Case 2 – PSCell activation will be similar to SCell activation. For Case 1 – Tsearch can be 0 for some cases.
  + E///: we are ok with the split. Case 1 – Tsearch = 0.
* Agreements
  + Case 1: RLM and BFD are configured and no failure is detected
    - Option 1A
      * Tsearch = 0 ms if the target cell is ‘known’
      * Tsearch = [X] ms if the target cell is ‘unknown’
    - Option 1B:
      * Tsearch = 0 ms provided that TBD side conditions are fulfilled
  + Case 2: RLM and BFD are not configured
    - Tsearch is FFS
  + Note: whether Case 2 shall be supported may be revisited based on RAN2 decision

Issue 2-1-1: Min value and range for measCyclePSCell

* Proposals
  + Option 1 (Apple, MTK, Ericsson, Huawei, QC): existing min value and range of measCycleSCell can be reused for measCyclePSCell (i.e., {sf160, sf256, sf320, sf512, sf640, sf1024, sf1280})
  + Option 2 (QC, vivo):
    - The minimum value of measCyclePSCell shall not be smaller than the minimum value of measCycleSCell,
  + Option 2a (QC): preferably 320ms as the minimum value, that is
    - {sf320, sf512, sf640, sf1024, sf1280}
  + Option 2b (vivo): preferably 640ms as the minimum value, that is
    - {sf640, sf1024, sf1280}
  + Option 3 (Nokia): add 40ms and 80ms, the range is {sf40, sf80, sf160, sf256, sf320, sf512, sf640, sf1024, sf1280}
* Discussion
  + TBA
* Agreements
  + TBA

**GTW session (March 01, 2022)**

Issue 2-2-3: whether Tsearch is needed for RACH-less based PSCell activation delay

* Proposals
  + Case 1: RLM and BFD are configured and no failure is detected
    - Option 1A
      * Tsearch = 0 ms if the target cell is ‘known’
      * Tsearch = [X] ms if the target cell is ‘unknown’
    - Option 1B:
      * Tsearch = 0 ms provided that TBD side conditions are fulfilled
    - Option 1c (new):
      * Tsearch = 0 ms if the target cell is ‘known’ , assuming SINR>=-2dB,
      * Do not define requirements for the case when target cell is unknown.
  + ~~Case 2: RLM and BFD are not configured~~
    - ~~T~~~~search~~ ~~is FFS~~
  + ~~Note: whether Case 2 shall be supported may be revisited based on RAN2 decision~~

Issue 2-3-1: Baseline for interruption due to PSCell activation/deactivation

* Proposals
  + If PSCell is activated from a deactivated status
    - Option 1 (Nokia, Ericsson): Existing requirements for interruption due to Scell activation/deactivation can be used as a baseline.
    - Option 2 (QC, MTK, Huawei, Apple, vivo): Existing requirements for interruption due to PSCell addition/release can be used as baseline, i.e., 1ms interruption length.

Sub-topic 1-2: Multiple SCell activation enhancement

Issue 2-1-3: L3 measurement period on deactivated PSCell

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2207006 | WF on R17 further Multi-RAT Dual-Connectivity enhancements | Huawei, HiSilicon |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204897 | Draft CR on A-TRS based fast SCell activation | Huawei, HiSilicon | Revised |  |
| R4-2204901 | CR on interruption due to A-TRS based fast SCell activation | Huawei, HiSilicon | Revised |  |
| R4-2203746 | CR on TS38.133 interruptions due to SCG activation/deactivation | Apple | Revised |  |
| R4-2203747 | CR on TS36.133 for interruptions due to SCG activation/deactivation | Apple | Revised |  |
| R4-2204289 | Draft CR to TS 38.133 on SCG Activation and deactivation delay | OPPO | Revised |  |
| R4-2204290 | Draft CR to TS 36.133 on SCG Activation and deactivation delay | OPPO | Revised |  |
| R4-2204345 | Draft CR on Te requirement for the first transmission of RACH-less SCG activation | MTK | Return to |  |
| R4-2204416 | DraftCR to 38133 for interruptions due to RRM measurements on deactivated SCG | Intel | Revised |  |
| R4-2204417 | DraftCR to 36133 for interruptions due to RRM measurements on deactivated SCG | Intel | Revised |  |
| R4-2204632 | DraftCR on L1/L3 measurement requirements for deactivated SCG | vivo | Revised |  |
| R4-2204899 | Draft CR on measurement requirements on deactivated PSCell | Huawei, HiSilicon | Revised |  |
| R4-2205648 | Draft CR: RRM requirements for efficient activation of SCG | Nokia | Revised |  |
| R4-2204478 | Draft CR for implement new parameter measCyclePSCell for measurement on deactivated SCG | Ericsson | Revised |  |
| R4-2204477 | LS reply on UE behaviour for deactivated SCG and value range for measCycle | Ericsson | Revised |  |
| R4-2204900 | Correction on Conditional PSCell Addition Delay | Huawei, HiSilicon | Return to |  |
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**2nd round email discussion conclusions**

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| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2207006 WF on R17 further Multi-RAT Dual-Connectivity enhancements**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

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#### 10.22.1 General

**R4-2204477 Reply LS to RAN2: on UE behaviour during deactivated SCG status and value range for measCyclePSCell**

*Type: LS out For: Approval  
 to RAN2  
 Source: Ericsson*

**Abstract:**

LS to RAN2 regaring the deactivated SCG UE behavior and requirement setting

**Decision: Revised to R4-2207019 (from R4-2204477).**

**R4-2207019 Reply LS to RAN2: on UE behaviour during deactivated SCG status and value range for measCyclePSCell**

*Type: LS out For: Approval  
 to RAN2  
 Source: Ericsson*

**Abstract:**

LS to RAN2 regaring the deactivated SCG UE behavior and requirement setting

**Decision: Return to.**

#### 10.22.2 RRM core requirements

##### 10.22.2.1 Efficient activation/de-activation mechanism for SCells

**R4-2203744 On efficient activation/de-activation mechanism for SCells**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2203858 Efficient activation and deactivation mechanism for SCells**

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

**Decision: Noted.**

**R4-2204206 Discussion on efficient activation/de-activation mechanism for SCell**

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

**Decision: Noted.**

**R4-2204287 Discussion on efficient activation/de-activation mechanism for Scells**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204476 Discussion On efficient (de)activation mechanism for Scells**

*Type: discussion For: Approval  
 Source: Ericsson*

**Abstract:**

Further discussion of the requirement setting for scell activation delay

**Decision: Noted.**

**R4-2204896 Discussion on efficient activation/de-activation mechanism for Scells**

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

**Decision: Noted.**

**R4-2204897 Draft CR on A-TRS based fast SCell activation**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2207007 (from R4-2204897).**

**R4-2207007 Draft CR on A-TRS based fast SCell activation**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2205646 Efficient activation/de-activation mechanism for Scells**

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

**Decision: Noted.**

##### 10.22.2.2 Efficient activation/de-activation mechanism for one SCG

**R4-2203745 On efficient activation/de-activation mechanism for one SCG**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2203746 CR on TS38.133 interruptions due to SCG activation/deactivation**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Revised to R4-2207009 (from R4-2203746).**

**R4-2207009 CR on TS38.133 interruptions due to SCG activation/deactivation**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2203747 CR on TS36.133 for interruptions due to SCG activation/deactivation**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Revised to R4-2207010 (from R4-2203747).**

**R4-2207010 CR on TS36.133 for interruptions due to SCG activation/deactivation**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Return to.**

**R4-2203859 Efficient activation and deactivation mechanism for one SCG**

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

**Decision: Noted.**

**R4-2204207 Discussion on efficient activation/de-activation mechanism for one SCG**

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

**Decision: Noted.**

**R4-2204288 Discussion on efficient activation/de-activation mechanism for one SCG**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204289 Draft CR to 38133 on SCG Activation and deactivation delay**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Revised to R4-2207011 (from R4-2204289).**

**R4-2207011 Draft CR to 38133 on SCG Activation and deactivation delay**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Return to.**

**R4-2204290 Draft CR to 36133 on SCG Activation and deactivation delay**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Revised to R4-2207012 (from R4-2204290).**

**R4-2207012 Draft CR to 36133 on SCG Activation and deactivation delay**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Return to.**

**R4-2204345 CR on 38.133 for Te requirement for first transmission of RACH-less SCG activation**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: F (Rel-17)  
  
 Source: MediaTek (Shenzhen) Inc.*

**Decision: Return to.**

**R4-2204416 DraftCR to TS 38.133 for interruptions due to RRM measurements on deactivated SCG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Revised to R4-2207013 (from R4-2204416).**

**R4-2207013 DraftCR to TS 38.133 for interruptions due to RRM measurements on deactivated SCG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Return to.**

**R4-2204417 DraftCR to TS 36.133 for interruptions due to RRM measurements on deactivated SCG**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Revised to R4-2207014 (from R4-2204417).**

**R4-2207014 DraftCR to TS 36.133 for interruptions due to RRM measurements on deactivated SCG**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Return to.**

**R4-2204475 Discussion On efficient (de)activation mechanism for one SCG**

*Type: discussion For: Approval  
 Source: Ericsson*

**Abstract:**

Further discussion for the requirement setting of deactivated SCG

**Decision: Noted.**

**R4-2204632 DraftCR on L3 and RLM/BFD measurement requirements for deactivated SCG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Revised to R4-2207015 (from R4-2204632).**

**R4-2207015 DraftCR on L3 and RLM/BFD measurement requirements for deactivated SCG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: vivo*

**Decision: Return to.**

**R4-2204633 Further discussion on efficient activationde-activation mechanism for one SCG**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204898 Discussion on efficient activation/de-activation mechanism for one SCG**

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

**Decision: Noted.**

**R4-2204899 Draft CR on measurement requirements on deactivated PSCell**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2207016 (from R4-2204899).**

**R4-2207016 Draft CR on measurement requirements on deactivated PSCell**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2205647 Efficient activation/de-activation mechanism for one SCG.**

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

**Decision: Noted.**

**R4-2205648 Draft CR: RRM requirements for efficient activation of SCG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2207017 (from R4-2205648).**

**R4-2207017 Draft CR: RRM requirements for efficient activation of SCG**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Return to.**

##### 10.22.2.3 Conditional PSCell change and addition

**R4-2204900 Correction on Conditional PSCell Addition Delay**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

##### 10.22.2.4 Others

**R4-2204478 Draft CR for introduction of new parameter measCyclePSCell**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

CR for introducing the requirements by using new measurement parameter

**Decision: Revised to R4-2207018 (from R4-2204478).**

**R4-2207018 Draft CR for introduction of new parameter measCyclePSCell**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

CR for introducing the requirements by using new measurement parameter

**Decision: Return to.**

**R4-2204901 CR on interruption due to A-TRS based fast SCell activation**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2207008 (from R4-2204901).**

**R4-2207008 CR on interruption due to A-TRS based fast SCell activation**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

### 10.23 Enhanced IIoT and URLLC support

================================================================================

**Email discussion: [102-e][233] NR\_IIOT\_URLLC\_enh**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][233] NR\_IIOT\_URLLC\_enh | R17 NR IIoT/URLLC (NR\_IIOT\_URLLC\_enh) | RRM Core requirements | 10.23 | Lars Dalsgaard |

**R4-2206776 Email discussion summary: [102-e][233] NR\_IIOT\_URLLC\_enh**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207074 (from R4-2206776).**

**R4-2207074 Email discussion summary: [102-e][233] NR\_IIOT\_URLLC\_enh**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 25, 2022)**

Key open issues

* Topic #1: Propagation Delay Compensation Enhancements
* Topic #2: Timing reference point for UE UL timing
* Topic #3: UE features for enhanced IIoT and URLLC

Issue 2-1: TP for downlink timing definition

* Proposals

TP Option 1:

The downlink timing is defined as the time when the first detected path (in time) of the corresponding downlink frame is received from the reference cell at the UE antenna

TP Option 2:

The downlink timing is defined as the time when the first path (in time) of the corresponding downlink frame from the reference cell arrives at the UE antenna

TP Option 3:

The downlink timing is defined as the time when the first ~~detected~~ path (in time) of the corresponding downlink frame used by the UE to determine downlink timing is received from the reference cell at the UE antenna

* Proposed WF

TP Option 3: The downlink timing is defined as the time when the first ~~detected~~ path (in time) of the corresponding downlink frame used by the UE to determine downlink timing is received from the reference cell at the UE antenna

* Agreements
  + Update the downlink timing definition as follows
    - *The downlink timing is defined as the time when the first path (in time) of the corresponding downlink frame used by the UE to determine downlink timing is received from the reference cell at the UE antenna*

Session chair: Further discuss applicable release for the change (e.g., starting from Rel-15 or Rel-17)

Issue 1-6: Number of samples assumed for deriving the accuracy requirements (for PRS based measurements)

* Proposals
  + Option 1: 1 sample (HW (FR1), vivo)
  + Option 2: 4 samples (Nokia, E///, QC)
  + Option 3: other
* Moderator proposal
  + Option 1: 1 sample (assuming Rel-16 or Rel-17)
  + Option 2: 4 samples (assuming Rel-16 or Rel-17)
* Discussion
  + E///: 4 samples provide improvement
  + QC: we have agreed to reuse accuracy and need to reuse the same assumptions
* Agreements
  + Rel-17 PDC RTT-based method with PRS-based measurements
    - Reuse Rel-16 PRS accuracy requirements and number of samples (i.e., 4)
    - Define requirements for AWGN conditions. FFS for requirements for fading conditions.
    - Do not consider Rel-17 PRS accuracy requirements for Rel-17 PDC RTT-based method

Issue 1-18: Channel conditions

* Proposals
  + Option 1: AWGN only
  + Option 2: AWGN and TDL-A
* Agreement
  + Channel model simulation assumptions
    - AWGN
    - TDL-A
  + FFS for channel model for requirements definition and whether to include both models

Issue 1-19: TRS Resource number

* Proposals
  + Option 1: Only 4 TRS resources over 2 slots
  + Option 2: 4 TRS resources over 2 slots and 2 TRS resources over 2 slots
* Agreement
  + 4 TRS resources over 2 slots

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2207020 | WF on NR\_IIOT\_URLLC\_enh RRM requirements | Nokia, Nokia Shanghai Bell |  |
| R4-2207021 | Reply LS on propagation delay compensation | Huawei | To: RAN1, RAN2 |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204423 | draftCR to clarify timing reference point for UE UL timing test cases R15 | Intel | Revised |  |
| R4-2206022 | Correction to reference point defintion for UE timing in TS 38.133 | Ericsson, Intel, Huawei, HiSilicon, Qualcomm | Revised |  |
| R4-2205390 | CR on requirements for UE Rx-Tx measurement for PDC | Huawei, HiSilicon | Revised |  |
| R4-2205815 | draftCR on requirements for UE Rx-Tx measurement for propagation delay compensation | Nokia, Nokia Shanghai Bell | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2207020 WF on NR\_IIOT\_URLLC\_enh RRM requirements**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2207021 Reply LS on propagation delay compensation**

*Type: LS out For: Approval  
 to RAN1, RAN2  
 Source: Huawei, HiSilicon*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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#### 10.23.1 General

**R4-2206015 UE features for enhanced IIoT and URLLC**

*Type: discussion For: Discussion  
 Source: Nokia*

**Decision: Noted.**

#### 10.23.2 RRM core requirements

##### 10.23.2.1 Propagation delay compensation enhancements

**R4-2203655 Discussion of RRM Requirements for Propagation Delay Compensation Enhancements**

*Type: discussion For: Discussion  
 Source: Nokia*

**Decision: Noted.**

**R4-2204306 Discussion on propagation delay compensation enhancements**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204472 On RTT-based propagation delay compensation**

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

**Decision: Noted.**

**R4-2204647 Further discussion on propagation delay compensation enhancements**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204648 Simulation results for TRS based PDC**

*Type: discussion For: Information  
 Source: vivo*

**Decision: Noted.**

**R4-2205389 On RRM requirements for PDC enhancements**

*Type: LS out For: Approval  
 to RAN1, RAN2  
 Source: Huawei, HiSilicon*

**Decision: Noted.**

**R4-2205390 CR on requirements for UE Rx-Tx measurement for PDC**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2207024 (from R4-2205390).**

**R4-2207024 CR on requirements for UE Rx-Tx measurement for PDC**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205418 Propagation Delay Compensation Enhancements for Time Synchronization**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

Requirements for RTT PDC.

**Decision: Noted.**

**R4-2205419 Simulation results for Propagation Delay Compensation**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

UE RX-Tx time difference results, based on TRS

**Decision: Noted.**

**R4-2205815 draftCR on requirements for UE Rx-Tx measurement for propagation delay compensation**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia*

**Decision: Revised to R4-2207025 (from R4-2205815).**

**R4-2207025 draftCR on requirements for UE Rx-Tx measurement for propagation delay compensation**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia*

**Decision: Return to.**

##### 10.23.2.2 Reference point for Te requirements

**R4-2203656 Further discussion on the reference point**

*Type: discussion For: Discussion  
 Source: Nokia*

**Decision: Noted.**

**R4-2204423 draftCR to clarify timing reference point for UE UL timing test cases R15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: (Rel-15)  
  
 Source: Intel Corporation*

**Decision: Revised to R4-2207022 (from R4-2204423).**

**R4-2207022 draftCR to clarify timing reference point for UE UL timing test cases R15**

*Type: draftCR For: Endorsement  
 38.133 v15.16.0 CR- rev Cat: (Rel-15)  
  
 Source: Intel Corporation*

**Decision: Return to.**

**R4-2204424 draftCR to clarify timing reference point for UE UL timing test cases R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: (Rel-16)  
  
 Source: Intel Corporation*

**Decision: Return to.**

**R4-2204425 draftCR to clarify timing reference point for UE UL timing test cases R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Return to.**

**R4-2204649 Further discussion on reference point for Te requirements**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2205391 On reference point for Te requirements**

*Type: LS out For: Approval  
 to RAN1  
 Source: Huawei, HiSilicon*

**Decision: Noted.**

**R4-2206021 LS response on UE transmit timing error**

*Type: LS out For: Approval  
 to RAN1  
 Source: Ericsson*

**Abstract:**

This document further analyze the remaining issue of the reference point definition for UE timing error requirements. It is continuation of LS response to RAN1 in R4-2105850.

**Decision: Noted.**

##### 10.23.2.3 Others

### 10.24 NR Sidelink Relay

================================================================================

**Email discussion: [102-e][234] NR\_SL\_relay**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][234] NR\_SL\_relay | R17 NR SL Relay (NR\_SL\_relay) | RRM Core requirements | 10.24 | Roy Hu |

**R4-2206777 Email discussion summary: [102-e][234] NR\_SL\_relay**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207075 (from R4-2206777).**

**R4-2207075 Email discussion summary: [102-e][234] NR\_SL\_relay**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 28th)**

Sub-topic 1-1: Interruption requirements

* Proposals:
  + Option 1 (5 companies): For R17 NR sidelink relay, RAN4 does not consider additional conditions for the interruption requirements at NR sidelink discovery configuration
  + Option 2 (1 companies): The interruption requirements in this clause shall not apply if at least one of the following conditions is met:
    - ~~T310 timer is running for RLF on PCell,~~
    - ~~Performing candidate beam detection on PCell/serving cell as specified in section 8.5.5 and 8.5.6,~~
    - While receiving paging and
    - While receiving system information.
* Agreements
  + Do not introduce additional conditions for the interruption requirements at NR sidelink discovery configuration

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2207026 | WF on RRM requirements for SL relay | OPPO |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2205340 | DraftCR on interruption requirements for NR sidelink relay | Huawei | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2207026 WF on RRM requirements for SL relay**

*Type: other For: Approval  
 Source: OPPO*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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#### 10.24.1 General

**R4-2204291 Big CR: RRM requirements for NR SL Relay**

*Type: CR For: Agreement  
 38.133 v17.4.0 CR-2252 rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: Revised to R4-2207082 (from R4-2204291).**

**R4-2207082 Big CR: RRM requirements for Rel-17 NR SL Relay**

*Type: CR For: Agreement  
 38.133 v17.4.0 CR-2252 rev Cat: B (Rel-17)  
  
 Source: OPPO*

**Decision: For email approval.**

#### 10.24.2 RRM core requirements

**R4-2203720 On NR SL relay RRM Requirement Scope**

*Type: discussion For: Discussion  
 Source: Qualcomm, Inc.*

**Decision: Noted.**

**R4-2204292 RRM requirements for SL relay (re)selection**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2205339 Discussion on RRM remaining issues for NR sidelink relay**

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

**Decision: Noted.**

**R4-2205340 DraftCR on interruption requirements for NR sidelink relay**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2207027 (from R4-2205340).**

**R4-2207027 DraftCR on interruption requirements for NR sidelink relay**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

### 10.25 NR small data transmissions in INACTIVE state

================================================================================

**Email discussion: [102-e][235] NR\_SmallData\_INACTIVE\_NWM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][235] NR\_SmallData\_INACTIVE\_NWM | R17 NR small data transmissions in INACTIVE state (NR\_SmallData\_INACTIVE) | RRM Core requirements | 10.25 | Aijun Cao |

**R4-2206778 Email discussion summary: [102-e][235] NR\_SmallData\_INACTIVE\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207076 (from R4-2206778).**

**R4-2207076 Email discussion summary: [102-e][235] NR\_SmallData\_INACTIVE\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 28th)**

Issue 1-1-7 Which of the option for X1/Y1 (assuming the answer to Issue 1-1-1 is Yes) for FR2

* Proposals
  + Option 1: 480ms (QC, ZTE)
  + Option 2: M DRX cycles (Apple)
  + Option 5: 400ms for FR2 (Nokia, QC, MTK, ZTE)
* Discussion
  + Apple: Propose 1280ms = 8\*160ms
  + Nokia: 8\*SMTC and 160ms for 1-2-2
  + ZTE: 480ms can accommodate 6 SSB occasions
  + Huawei: we have agreed a longer value for FR1. Support Option 2 and 1280ms is ok for us.
  + E///: can be ok with 1280ms
* Agreements
  + X1 for FR2
    - Option 5: 400ms
    - Option 6: 1280ms

Issue 1-1-8 Which of the option for X2/Y2 (assuming the answer to Issue 1-1-1 is Yes) for FR2

* Proposals
  + Option 1: N1\*M1\*TDRX, N1 from Table 4.2.2.2-1 in 38.133
    - Option 1c: M1, as specified in clause 4.2.2.2, M1=2 if SMTC periodicity (TSMTC) > 20 ms and DRX cycle ≤ 0.64 second, otherwise M1=1.
  + Option 2: unlimited (i.e., removed from the formula) (Nokia, QC, Apple, MTK)
* Discussion
  + E///: we have concerns on Option 2.
  + ZTE: Unlimited does not mean we remove constraints. Unlimited – the window size us minimum of X1 and X2. If we remove X2 then window will be limited by X1.
  + Apple: N1 = 8 and min TDRX is 320ms, so for the min N1\*M1\*TDRX = 2.56sec
* Agreements
  + Remove term X2/Y2 from FR2 equations

Issue 1-2-2 Whether or not to introduce an additional requirement for the duration between T2 and the actual CG occasion?

* Proposals
  + Option 1: No additional requirement introduced
  + Option 2: 160ms
  + Option 7 (combining Option 3 and 5): 1280ms for FR1, 640ms for FR2

Session chair: come back on Thu

Issue 2-1-2: Whether or not UE is allowed NOT to meet inter-frequency or inter-RAT requirements during subsequent SDT transmission?

* Proposals:
  + Option 1: Yes
    - Option 1a: Clarify that a limitation on how long subsequent SDT transmission can last in this case
  + Option 2: The UE is not required to meet the inter-frequency and inter-RAT neighbour cell measurement requirements during subsequent SDT session except measurement performed on:
    - intra-frequency layers
    - Frequency layers used for EMR measurements
    - Positioning measurements.
* Discussion
  + TBA
* Agreements
  + TBA

Session chair: come back on Thu

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2207028 | WF on RRM requirements for NR SDT | ZTE |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2203535 | Draft CR TA validation for Small Data Transmissions | Nokia, Nokia Shanghai Bell | Revised |  |
| R4-2205393 | CR on SDT RRM requirements | Huawei, HiSilicon | Revised |  |
| R4-2205639 | Draft CR TA validation for Small Data Transmissions | Ericsson | Merged |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2207028 WF on RRM requirements for NR SDT**

*Type: other For: Approval  
 Source: ZTE*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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#### 10.25.1 General and work plan

#### 10.25.2 RRM core requirements

**R4-2203534 TA validation window requirements for CG-SDT**

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

**Decision: Noted.**

**R4-2203535 Draft CR TA validation for Small Data Transmissions**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2207029 (from R4-2203535).**

**R4-2207029 Draft CR TA validation for Small Data Transmissions**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Return to.**

**R4-2203796 On RRM requirement for CG-SDT**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2203867 RRM requirements and TA validation windows for CG-SDT**

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

**Session chair: revised to update conclusion section**

**Decision: Revised to R4-2206784 (from R4-2203867).**

**R4-2206784 RRM requirements and TA validation windows for CG-SDT**

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

**Decision: Noted.**

**R4-2205216 Draft big CR for SDT RRM requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: ZTE Wistron Telecom AB*

**Abstract:**

Worksplit according to the approved workplan for SDT RRM requirements (R4-2120339)

**Session chair: formal CR will be required**

**Decision: Withdrawn.**

**R4-2205217 On RRM requirements for NR SDT**

*Type: discussion For: Discussion  
 Source: ZTE Wistron Telecom AB*

**Decision: Noted.**

**R4-2205392 Discussion on remaining issues for SDT RRM**

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

**Decision: Noted.**

**R4-2205393 CR on SDT RRM requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2207030 (from R4-2205393).**

**R4-2207030 CR on SDT RRM requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Decision: Return to.**

**R4-2205638 Discussions on RRM requirements for Small Data Transmissions**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution we provide an overview of the RRM requirements for CG-SDT that RAN4 needs to introduce.

**Decision: Noted.**

**R4-2205639 Draft CR TA validation for Small Data Transmissions**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Draft CR to show our view on how to capture the TA validation requirements.

**Decision: Merged.**

**R4-2205923 RRM requirements for CG-SDT**

*Type: discussion For: Discussion  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: MediaTek Inc.*

**Decision: Noted.**

### 10.26 Support for Multi-SIM devices for LTE/NR

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**Email discussion: [102-e][236] LTE\_NR\_MUSIM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][236] LTE\_NR\_MUSIM | R17 Support for Multi-SIM devices for LTE/NR (LTE\_NR\_MUSIM) | RRM Core requirements | 10.26 | Xusheng Wei |

**R4-2206779 Email discussion summary: [102-e][236] LTE\_NR\_MUSIM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207077 (from R4-2206779).**

**R4-2207077 Email discussion summary: [102-e][236] LTE\_NR\_MUSIM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 28th)**

1-1-4: Legacy gap pattern for MUSIM

* Proposals:
  + Option 1: Legacy measurements gap patterns 12-23 in TS 38.133, clause 9.1.2 are applicable to MUSIM when the UE is configured in NR SA with a FR2 serving cell in network A (Qualcomm MTK)
  + Option 2: Not support option 1 (Ericsson oppo Huawei)
  + Option 3: Could consider gaps among 12-23 with MGL = 5.5ms, i.e., gap 12-15. Against gap with MGL = 1.5ms. (vivo)
* Agreements
  + Do not define additional legacy MG patterns for MUSIM in Rel-17

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2207031 | WF on R17 Support for Multi-SIM devices for LTE-NR | vivo |  |
| R4-2207032 | Reply LS on RAN2’s agreement for MUSIM gaps | vivo | To: RAN2 |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204422 | Removing square brackets for MUSIM gap patterns | Intel Corporation | Merged |  |
| R4-2205515 | draftCR on New gap pattern for MUSIM | Ericsson | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2207031 WF on R17 Support for Multi-SIM devices for LTE-NR**

*Type: other For: Approval  
 Source: vivo*

**Abstract:**

**Discussion:**

**Decision: Return to.**

**R4-2207032 Reply LS on RAN2’s agreement for MUSIM gaps**

*Type: LS out For: Approval  
 to RAN2  
 Source: vivo*

**Abstract:**

**Discussion:**

**Decision: Return to.**

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#### 10.26.1 General and work plan

**R4-2205513 LS response on gap handling for MUSIM**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the LS on gap handling for MUSIM

**Decision: Noted.**

#### 10.26.2 RRM core requirements

**R4-2203748 On R17 MUSIM**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2204161 Discussion on MUSIM requirements**

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

**Decision: Noted.**

**R4-2204307 Discussion on RRM core requirements for Multi-SIM devices**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2204318 On remaining issues for Rel-17 MUSIM requirements**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204422 Removing square brackets for MUSIM gap patterns**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: (Rel-17)  
  
 Source: Intel Corporation*

**Decision: Merged.**

**R4-2205394 Discussion on remaining issues for MUSIM**

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

**Decision: Noted.**

**R4-2205514 New gap pattern for MUSIM**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the new MGPs for MUSIM

**Decision: Noted.**

**R4-2205515 draftCR on New gap pattern for MUSIM**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draftCR introduce the new MGPs for MUSIM

**Decision: Revised to R4-2207033 (from R4-2205515).**

**R4-2207033 draftCR on New gap pattern for MUSIM**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: F (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draftCR introduce the new MGPs for MUSIM

**Decision: Return to.**

**R4-2206094 Second reply LS on gaps for MUSIM**

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

**Decision: Noted.**

## 11 Rel-17 Study Items for NR

## 12 Rel-17 Work Items for LTE

### 12.8 Upper 700MHz A Block new E-UTRA band in US

#### 12.8.5 Others

**R4-2205993 CR to TS 36.133: implementation of LTE\_upper\_700MHz\_A band 103**

*Type: CR For: Agreement  
 36.133 v17.4.0 CR-7141 rev Cat: B (Rel-17)  
  
 Source: Huawei, HiSilicon*

**Abstract:**

[Formal CR with CR number] In this draft CR to TS 36.133, band 103 is introduced for the LTE\_upper\_700MHz\_A WI.

**Decision: Endorsed.**

### 12.9 Additional enhancements for NB-IoT and LTE-MTC

#### 12.9.4 RRM core requirements

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**Email discussion: [102-e][237] NB\_IOTenh4\_LTE\_eMTC6\_RRM\_NWM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][237] NB\_IOTenh4\_LTE\_eMTC6\_RRM\_NWM | R17 NB-IoT and LTE-MTC (NB\_IOTenh4\_LTE\_eMTC6) | RRM Core requirements | 12.9.4 | Zhongyi Shen |

**R4-2206780 Email discussion summary: [102-e][237] NB\_IOTenh4\_LTE\_eMTC6\_RRM\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207078 (from R4-2206780).**

**R4-2207078 Email discussion summary: [102-e][237] NB\_IOTenh4\_LTE\_eMTC6\_RRM\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (February 28th)**

Issue 1-3-1: Additional triggering conditions

* Proposals:
  + Option 1 (Ericsson):
    - RAN4 to discuss the consequences of UE triggering RLM out-of-sync before the neighbour cell measurement triggering conditions is met.
    - In addition to the already agreed triggering conditions, the UE shall initiate the neighbour cell measurements if K (e.g. K=1) number of out-of-sync indications are detected in the cell.
  + Option 2: Follow RAN2 design about neighbour cell measurement triggering and no need to have further discussion in RAN4 (Huawei, Nokia, QC)
* Discussion
  + TBA
* Agreements
  + Do not define additional triggering conditions

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2207034 | WF on RRM requirements for Rel-17 NB-IoT and LTE-MTC | Huawei, Hisilicon |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2204883 | Draft CR on intra-frequency measurement requirements for Rel-17 NB-IoT | Huawei, Hisilicon | Revised |  |
| R4-2205634 | Draft CR on Connected mode inter-frequency neighbour cell measurement before RLF for Rel-17 NB-IoT | Ericsson | Revised |  |
| R4-2205090 | draft CR: Introduction of channel quality report for NB-IoT supporting 16QAM | Ericsson | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2207034 WF on RRM requirements for Rel-17 NB-IoT and LTE-MTC**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

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##### 12.9.4.1 Neighbour cell measurement in RRC Connected state for NB-IoT

**R4-2204470 On NB-IoT neighbor cell measurements in RRC\_CONNECTED**

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

**Decision: Noted.**

**R4-2204882 Discussion on RRM requirements for Rel-17 NB-IoT**

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

**Decision: Noted.**

**R4-2204883 Draft CR on intra-frequency measuremnet requiremensts for Rel-17 NB-IoT**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2207035 (from R4-2204883).**

**R4-2207035 Draft CR on intra-frequency measuremnet requiremensts for Rel-17 NB-IoT**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2204884 Big CR of RRM requirements for Rel-17 NB-IoT and eMTC**

*Type: CR For: Agreement  
 36.133 v17.4.0 CR-7137 rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2207083 (from R4-2204884).**

**R4-2207083 Big CR: RRM requirements for Rel-17 NB-IoT and eMTC**

*Type: CR For: Agreement  
 36.133 v17.4.0 CR-7137 rev Cat: B (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: For email approval.**

**R4-2205634 Draft CR on Connected mode inter-frequency neighbour cell measurement before RLF for Rel-17 NB-IoT**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Following the work split in R4-2202764, thic CR contains changes to introduce the CONNECTED mode inter-frequency neighbour cell measurement requirements applicable before RLF.

**Decision: Revised to R4-2207036 (from R4-2205634).**

**R4-2207036 Draft CR on Connected mode inter-frequency neighbour cell measurement before RLF for Rel-17 NB-IoT**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Following the work split in R4-2202764, thic CR contains changes to introduce the CONNECTED mode inter-frequency neighbour cell measurement requirements applicable before RLF.

**Decision: Return to.**

**R4-2205635 Discussions on remaining issues of RRM requirements for NB-IoT**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contriution we discuss the open issues of Rel-17 NB-IoT.

**Decision: Noted.**

#### 12.9.5 Others

**R4-2205090 draft CR: Introduction of channel quality report for NB-IoT supporting 16QAM**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR introduces the channel quality reporting requiremetns for NB-IoT supporting 16QAM

**Decision: Revised to R4-2207037 (from R4-2205090).**

**R4-2207037 draft CR: Introduction of channel quality report for NB-IoT supporting 16QAM**

*Type: draftCR For: Endorsement  
 36.133 v17.4.0 CR- rev Cat: B (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

This draft CR introduces the channel quality reporting requiremetns for NB-IoT supporting 16QAM

**Decision: Return to.**

## 13 Liaison and output to other groups

### 13.1 R17 related

### 13.2 R15, R16 related

#### 13.2.6 RAN2 LS on RRM relaxation for Rel-16 power saving (R2-2108877)

================================================================================

**Email discussion: [102-e][239] LS\_reply\_NR\_UE\_pow\_sav\_R2-2108877\_NWM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][239] LS\_reply\_NR\_UE\_pow\_sav\_R2-2108877\_NWM | R16 NR UE power saving | RAN2 LS on RRM relaxation for Rel-16 power saving (R2-2108877) | 13.2.6 | Yanze Fu |

**R4-2206782 Email discussion summary: [102-e][239] LS\_reply\_NR\_UE\_pow\_sav\_R2-2108877\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207080 (from R4-2206782).**

**R4-2207080 Email discussion summary: [102-e][239] LS\_reply\_NR\_UE\_pow\_sav\_R2-2108877\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (March 1st)**

**[102-e][239] LS\_reply\_NR\_UE\_pow\_sav\_R2-2108877\_NWM**

Issue 1-1-1: When UE fulfils both low mobility and not-at-cell edge criteria, how to  handle the inconsistency issue raised by RAN2?

* Proposals:
  + Option 1: Modify requirements in 4.2.2.10.4 & 4.2.2.11.4 as below (CATT, Huawei, MTK, QC, vivo)
    - * When Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ,

the UE shall search for, measure and evaluate inter-frequency layers of higher, equal or lower priority at least every 1 hour

the UE shall search for, measure and evaluate inter-RAT E-UTRAN layers of higher or lower priority at least every 1 hour

* + - * When Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, the UE shall search for inter-frequency /E-UTRA inter-RAT frequency layers of higher priority at least every K2\*Thigher\_priority\_search where

Thigher\_priority\_search = (60 \* Nlayers) in clause 4.2.2.7 of 38.133,

Nlayers is the total number of higher priority NR and E-UTRA carrier frequencies broadcasted in system information,

K2 = 60.

* + Option 2 (Vivo, ZTE, Apple, MTK, QC, E///): Change “1 hour” to “Nlayers \* 1 hour” in clause 4.2.2.10.4 & 4.2.2.11.4
  + Option 3 (Ericsson): Maintain existing requirements defined in clauses 4.2.2.10.4 and 4.2.2.11.4 and add clarification which the relaxation of higher priority carriers in scenario when UE fulfills both *lowMobilityEvalutation* and *not-at-cell edge* criterion is allowed only when *highPriorityMeasRelax* is configured.
* Agreements
  + Modify requirements in 4.2.2.10.4 & 4.2.2.11.4 as below
  + When Srxlev ≤ SnonIntraSearchP or Squal ≤ SnonIntraSearchQ, the UE shall search for inter-frequency /E-UTRA inter-RAT frequency layers of higher priority at least every 1 hour
  + When Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ, the UE shall search for inter-frequency /E-UTRA inter-RAT frequency layers of higher priority at least every “Nlayers \* 1 hour”

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
| R4-2203910 | Draft reply LS to RAN2 on RRM relaxation in power saving | CATT | Revised |  |
| R4-2204801 | Draft CR for requirement alignment for UE power saving measurement requirements | vivo | Return to |  |
| R4-2205207 | Correction on measurement requirements in relaxed measurement | Huawei, Hisilicon | Revised |  |
| R4-2205643 | Correction to Rel-16 UE relaxed measurement requirements | Ericsson | Revised |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

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**R4-2203909 Discussion on the inconsistency issue of power saving for higher priority frequency layer**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2203910 Draft reply LS to RAN2 on RRM relaxation in power saving**

*Type: LS out For: Approval  
 to RAN2  
 Source: CATT*

**Decision: Revised to R4-2207038 (from R4-2203910).**

**R4-2207038 Draft reply LS to RAN2 on RRM relaxation in power saving**

*Type: LS out For: Approval  
 to RAN2  
 Source: CATT*

**Decision: Return to.**

**R4-2204801 Draft CR for requirement alignment for UE power saving measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Return to.**

**R4-2204805 Considerations on remaining issue for Rel-16 UE power saving**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2204914 Reply LS on RRM relaxation in power saving**

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

**Decision: Noted.**

**R4-2204915 Correction on measurement requirements in relaxed measurement R16**

*Type: CR For: Agreement  
 38.133 v16.10.0 CR-2254 rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Withdrawn.**

**R4-2204916 Correction on measurement requirements in relaxed measurement R17**

*Type: CR For: Agreement  
 38.133 v17.4.0 CR-2255 rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Withdrawn.**

**R4-2205207 Correction on measurement requirements in relaxed measurement R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Revised to R4-2207039 (from R4-2205207).**

**R4-2207039 Correction on measurement requirements in relaxed measurement R16**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2205208 Correction on measurement requirements in relaxed measurement R17**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Huawei, Hisilicon*

**Decision: Return to.**

**R4-2205436 On RAN2 LS on RRM relaxation for Rel-16 power saving**

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

**Decision: Noted.**

**R4-2205642 Reply LS on Rel-16 UE power saving requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

RAN4 has received a reply LS in [1] asksing RAN4 for clarification about UE requirements for the scenario when UE fulfills both low mobility and not-at-cell edge criterion.

**Session chair: moved from AI 10.14.2 to AI 13.2.6**

**Decision: Noted.**

**R4-2205643 Correction to Rel-16 UE relaxed measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Parameter highPriorityMeasRelax was introduced by RAN2 to enable the NW to control whether the UE is allowed to relaxed RRM measurements for higher priority frequency for all use cases. In current requirements, high-priority carriers are relaxed regardles

**Session chair: moved from AI 10.14.2 to AI 13.2.6**

**Decision: Revised to R4-2207040 (from R4-2205643).**

**R4-2207040 Correction to Rel-16 UE relaxed measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.10.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Parameter highPriorityMeasRelax was introduced by RAN2 to enable the NW to control whether the UE is allowed to relaxed RRM measurements for higher priority frequency for all use cases. In current requirements, high-priority carriers are relaxed regardles

**Session chair: moved from AI 10.14.2 to AI 13.2.6**

**Decision: Return to.**

**R4-2205659 Correction to Rel-16 UE relaxed measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v17.4.0 CR- rev Cat: A (Rel-17)  
  
 Source: Ericsson*

**Abstract:**

Parameter highPriorityMeasRelax was introduced by RAN2 to enable the NW to control whether the UE is allowed to relaxed RRM measurements for higher priority frequency for all use cases. In current requirements, high-priority carriers are relaxed regardles

**Session chair: moved from AI 10.14.2 to AI 13.2.6**

**Decision: Return to.**

#### 13.2.7 RAN2 LS on L3 filter configuration (R2-2111590)

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**Email discussion: [102-e][238] LS\_reply\_L3\_filter\_R2-2111590\_NWM**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Email title** | **WI** | **Topic areas** | **AI** | **Moderator** |
| [102-e][238] LS\_reply\_L3\_filter\_R2-2111590\_NWM | NR\_newRAT | RAN2 LS on L3 filter configuration (R2-2111590) | 13.2.7 | Jerry Cui |

**R4-2206781 Email discussion summary: [102-e][238] LS\_reply\_L3\_filter\_R2-2111590\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2207079 (from R4-2206781).**

**R4-2207079 Email discussion summary: [102-e][238] LS\_reply\_L3\_filter\_R2-2111590\_NWM**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
| R4-2207041 | Reply LS to RAN2 on L3 filter configuration | Apple |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

**R4-2207041 Reply LS to RAN2 on L3 filter configuration**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

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**R4-2204351 Discussion on L3 filter configuration**

*Type: discussion For: Discussion  
 38.133 v15.16.0 CR- rev Cat: (Rel-15)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2205395 Reply LS on L3 filter configuration**

*Type: LS out For: Approval  
 to RAN2  
 Source: Huawei, HiSilicon*

**Decision: Noted.**

**R4-2205525 LS reply to RAN4 on L3 filter configuration**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the L3 filter configuration.

**Decision: Noted.**

**R4-2205653 Incoming LS from RAN2 on L3 filter**

*Type: discussion For: Discussion  
 38.133 v15.16.0 CR- rev Cat: (Rel-15)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Noted.**

## Backup

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**Email discussion: [101-bis-e][2xx] TBA (AI TBA)**

**R4-22xxxxx Email discussion summary: [101-bis-e][2xx] TBA**

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

**Abstract:**

**Discussion:**

**Decision: Return to.**

**GTW session (TBA)**

**1st round email discussion conclusions**

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Comments** |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**2nd round email discussion conclusions**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Decision** | **Comments** |
|  |  |  |  |  |

**WF/LS for approval**

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**R4-22AAAAA WF on XXXX**

*Type: other For: Approval  
 Source: TBA*

**Abstract:**

**Discussion:**

**Decision: Return to.**