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

**DRAFT Meeting Report  
for  
TSG RAN WG4  
meeting: 98bis-e**

**Electronic Meeting, Online, 12/04/2021 to 20/04/2021**

## 5 Rel-16 non-spectrum related work items for NR

### 5.1 NR-based access to unlicensed spectrum

#### 5.1.2 RRM core requirements maintenance (38.133)

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**Email discussion: [98-bis-e][201] NR\_unlic\_RRM\_1**

**R4-2105671 Email discussion summary: [98-bis-e][201] NR\_unlic\_RRM\_1***Type: other For: Information  
Source: Moderator (Ericsson)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105803 (from R4-2105671).**

**R4-2105803 Email discussion summary: [98-bis-e][201] NR\_unlic\_RRM\_1***Type: other For: Information  
Source: Moderator (Ericsson)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 13, 2021)

**Sub-topic 3-3: SCell activation/deactivation when sCellDeactivationTimer is NOT configured**

* Issue 3-3-1: Applicability of SCell activation requirements when sCellDeactivationTimer is NOT configured
  + Proposals
    - Proposals 1a (Ericsson, Huawei/HiSilicon, Apple, QC): Option 1 supported
      * The SCell activation requirements for NR-U do not apply when the sCellDeactivationTimer is not configured, when the SCell activation delay exceeds some pre-defined time (e.g., equivalent or comparable to the longest possible value of sCellDeactivationTimer).
    - Proposal 1b (Ericsson): The SCell deactivation requirements for NR-U do not apply when the sCellDeactivationTimer is not configured.
    - Proposals 2 (Nokia, ZTE Corporation): Option 2 supported
      * SCell activation delay requirements are applicable in Scenario A (CA with NR PCell and NR SCell) with any LBT type and in Scenario B and C (E-UTRAN-NR-U DC/SA NR-U) with LBT type 2C. Requirements are also applicable in all scenarios, if the UE does not experience any UL LBT failures during SCell activation/deactivation.
      * SCell activation delay requirements are applicable when sCellDeactivationTimer is not configured also in Scenarios B and C (EN-DC and SA) LBT types other than 2C.
    - Proposals 3a (Ericsson, MediaTek inc, Apple, QC, Huawei): Option 3 (possible compromise solution) can be accepted
      * SCell activation delay requirements are applicable in Scenario A (CA with NR PCell and NR SCell) with any LBT type and in Scenario B and C (E-UTRAN-NR-U DC/SA NR-U) with LBT type 2C. Requirements are also applicable in all scenarios, if the UE does not experience any UL LBT failures during SCell activation/deactivation.
      * For all other scenarios the SCell activation requirements for NR-U do not apply when the sCellDeactivationTimer is not configured, when the SCell activation delay exceeds some pre-defined time (e.g., equivalent or comparable to the longest possible value of sCellDeactivationTimer).
    - Proposal 3b (Ericsson): No LS to RAN2 is needed, since requirements applicability is pure RAN4 issue.
  + Discussion
    - MTK: 3a
    - Apple: 1a and 3a
    - Nokia: 2
    - QC: 1a and ok with 3a
    - Huawei: 1a and ok with 3a
    - E///: can compromise to 3a
    - Nokia: Option 3 is still a major problem. It is unclear what is UE behavior when UE requirements do not apply
      * E///: when the requirements do not apply the activation process may take longer time
      * Nokia: is UE assumed to stop SCell deactivation?
        + E///: we think UE is supposed to stop the ongoing SCell activation/deactivation process
        + Nokia: we need to go to RAN2 to check and need to check
        + E///: do not see need to check with RAN2.
        + E///: we make decision on requirements applicability in RAN4
        + Nokia: see no harm to check with RAN2
  + Agreements:
    - Applicability of SCell activation requirements when sCellDeactivationTimer is NOT configured
      * SCell activation delay requirements are applicable in
        + Scenario A (CA with NR PCell and NR SCell) with any LBT type
        + Scenario B and C (E-UTRAN-NR-U DC/SA NR-U) with LBT type 2C.
        + In all scenarios, if the UE does not experience any UL LBT failures during SCell activation/deactivation.
      * For all other scenarios the SCell activation requirements for NR-U do not apply, when the SCell activation delay exceeds the pre-defined time period T = 1280 ms.
        + Note 1: UE behavior for this case is left undefined
        + Note 2: Pre-defined time period T = 1280ms corresponds to the longest possible value of sCellDeactivationTimer
      * Send LS to RAN2 to inform on the agreements

**Sub-topic 9-1: DRX impact on timing**

* Issue 9-1-1: Definition of the reference cell which is not available, with respect to DRX
  + Proposals
    - Proposal 1 (Ericsson, Huawei, HiSilicon, Qualcomm Incorporated): SSB does not have to be within ON duration in a reference cell subject to DL CCA in order to meet UE timing requirements
      * No clarification related to DRX is needed on the current definition of unavailability of a reference cell on a carrier frequency subject to CCA in section 7.1.1.
    - Proposal 3 (MediaTek): If DRX is configured, the availability of the reference NR-U cell is based on DRX cycles.
    - Proposal 4 (Apple):

In the requirements of clause 7.1.2, the term reference cell on a carrier frequency subject to CCA is not available at the UE refers to when at least one SSB is configured by gNB, but the first two successive candidate SSB positions for the same SSB index within the discovery burst transmission window are not available at the UE due to DL CCA failures at gNB during the last max{PHY measurement time interval of reference cell, 160 ms}; otherwise the reference cell on the carrier frequency subject to CCA is considered as available at the UE.

* + - * when UE performs intra-frequency measurement on reference cell without MG, PHY measurement time interval of reference cell in proposal 1 is as below,

|  |  |
| --- | --- |
| DRX cycle | PHY measurement time interval |
| No DRX | Kp x SMTC period x CSSFintra |
| DRX cycle≤ 320ms | 1.5 x Kp x max(SMTC period,DRX cycle)) x CSSFintra |
| DRX cycle>320ms | Kp x DRX cycle x CSSFintra |

* + - * when UE performs intra-frequency measurement on reference cell with MG, PHY measurement time interval of reference cell in proposal 1 is as below,

|  |  |
| --- | --- |
| DRX cycle | PHY measurement time interval |
| No DRX | max(MGRP, SMTC period) x CSSFintra |
|  |  |
| DRX cycle≤ 320ms | 1.5x max(MGRP, SMTC period, DRX cycle) x CSSFintra |
| DRX cycle>320ms | (MGRP, DRX cycle) x CSSFintra |

* + Discussion
    - Apple: Option 4
    - E///: When UE wakes up and SSB is not available, then UE is not expected to meet the requirements. UE needs to wake up a bit earlier before ON duration to make time/freq sync. No different comparing to the legacy case.
    - MTK: Can support option 3 and 4
    - Qualcomm: We agree with Option 1. Same time we share MTK view. Compromise solution is to mention that UE is not expected to measure anything outside the DRX ON window.
    - E///: Compromise approach – do not mention anything in Core requirements, for test cases to verify UE timing requirement we’ll not configure the DRX.
    - Apple: For licensed case UE can wake up any time as long as it meets the requirements. For compromised approach, we do not agree with E/// and think it should be addressed in Core spec. UE should be given opportunity to wake up in longer period.
      * MTK: For NR-U UE will be required to wake up every 160ms. Agree with Apple compromise proposal.
      * E///: We are ok to use longer SSB period but we should not relax the Te requirements
      * Apple: We propose to relax the side condition to 1280ms (how long UE can maintain the timing). No plans to relax the accuracy requirements.
      * Huawei: we are ok with compromised approach. If Te is not relaxed then it may mean that UE may need to maintain the timing for a longer time
      * QC: Cannot agree with such a relaxation. Cannot except anything beyond 160ms. Beyond that point the timing point may be outdated and shall not be used.
      * Apple: UE can still wake up each 160ms. But in case it has better capabilities, then it may wake up with longer periodicity.
      * QC: Network transmits SSB every 160ms. If the SSB is not there then UE is not required to meet the accuracy requirements.
    - E///: UE is not required to wake up every 160ms. If the SSB is not available then UE is not supposed to meet the requirements.
    - Apple: the question is whether we force UE to wake up before DRX ON duration.
    - Chair: continue discussion

1st round email discussion conclusions

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc** | **Title** | **Source** | **Comments** |
| R4-2105699 | LS on SCell activation requirements for NR-U | Nokia | To: RAN2  LS to inform RAN2 about RAN4 agreements related to applicability of SCell activation requirements when sCellDeactivationTimer is not configured. |
| R4-2105700 | WF on NR-U RRM Core Requirements | Ericsson |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2106845 | Updates in SCell activation in NR-U | Ericsson | Revised |  |
| R4-2105005 | Draft CR on SCell activation requirement for NR-U R16 | Apple | Revised |  |
| R4-2106965 | Draft CR on Active TCI state switching for NR-U | Huawei, HiSilicon | Agreeable |  |
| R4-2106966 | Draft CR on RLM requirements for NR-U | Huawei, HiSilicon | Revised |  |
| R4-2106967 | Draft CR on Beam management requirements for NR-U | Huawei, HiSilicon | Agreeable |  |
| R4-2106968 | Draft CR on measurement requirements for NR-U | Huawei, HiSilicon | Revised |  |
| R4-2106969 | Draft CR on CSSF updating for NR-U | Huawei, HiSilicon | Revised |  |
| R4-2106842 | NR-U bands | Ericsson | Agreeable |  |
| R4-2106972 | Draft CR on core requirements maintenance of IDLE mode inter-RAT measurement for NR-U TS 36.133 | Huawei, HiSilicon | Agreeable |  |
| R4-2106973 | Draft CR on PSCell Addition requirements for NR-U | Huawei, HiSilicon | Agreeable |  |
| R4-2106840 | Terminology updates for NR-U in 38.133 | Ericsson | Revised |  |
| R4-2106841 | Terminology updates for NR-U in 36.133 | Ericsson | Revised |  |
| R4-2106961 | Draft CR on SI acquisition for RRC connection mobility control for NR-U TS 36.133 | Huawei, HiSilicon | Postponed | Focus first on resolving the core issue in the 2nd round |
| R4-2106962 | Draft CR on SI acquisition for RRC connection mobility control for NR-U TS 38.133 | Huawei, HiSilicon | Postponed | Focus first on resolving the core issue in the 2nd round |
| R4-2106964 | Draft CR on SCell activation requirements for NR-U | Huawei, HiSilicon | Revised |  |
| R4-2105004 | Draft CR on reference cell availability for NR-U R16 | Apple | Postponed | Focus first on resolving the core issue in the 2nd round |
| R4-2106971 | Draft CR on timing requirements for NR-U | Huawei, HiSilicon | Postponed | Focus first on resolving the core issue in the 2nd round |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation | Comments |
| R4-2105706 | Terminology updates for NR-U in 38.133 | Ericsson | Agreeable |  |
| R4-2105707 | Terminology updates for NR-U in 36.133 | Ericsson | Agreeable |  |
| R4-2105702 | Draft CR on SCell activation requirement for NR-U R16 | Apple | Agreeable |  |
| R4-2105701 | Updates in SCell activation in NR-U | Ericsson | Agreeable |  |
| R4-2105708 | Draft CR on SCell activation requirements for NR-U | Huawei, HiSilicon | Not Pursued | Not available |
| R4-2105703 | Draft CR on RLM requirements for NR-U | Huawei, HiSilicon | Agreeable |  |
| R4-2105704 | Draft CR on measurement requirements for NR-U | Huawei, HiSilicon | Agreeable |  |
| R4-2105705 | Draft CR on CSSF updating for NR-U | Huawei, HiSilicon | Agreeable |  |
| R4-2106974 | Draft CR on SI acquisition for paging interruption for NR-U | Huawei, HiSilicon | Postponed |  |
| R4-2105700 | WF on NR-U RRM Core Requirements | Ericsson | Agreeable |  |

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**R4-2105699 LS on SCell activation requirements for NR-U**

*Type: LS Out For: Approval  
 to RAN2  
 Source: Nokia*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2105700 WF on NR-U RRM Core Requirements**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Approved.**

##### 5.1.2.1 General

**R4-2104430 On terminology updates for measurements in NR-U**

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

**Decision: Noted.**

**R4-2106840 Terminology updates for NR-U in 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Terminology updates for NR-U in 38.133

**Decision: Revised to R4-2105706 (from R4-2106840).**

**R4-2105706 Terminology updates for NR-U in 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Terminology updates for NR-U in 38.133

**Decision: Endorsed.**

**R4-2106841 Terminology updates for NR-U in 36.133**

*Type: draftCR For: Approval  
 36.133 v16.9.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Terminology updates for NR-U in 36.133

**Decision: Revised to R4-2105707 (from R4-2106841).**

**R4-2105707 Terminology updates for NR-U in 36.133**

*Type: draftCR For: Approval  
 36.133 v16.9.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Terminology updates for NR-U in 36.133

**Decision: Endorsed.**

**R4-2106959 Discussion on NR-U terminology clarification**

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

**Decision: Noted.**

**R4-2107087 Discussion on terminology for NR-U RRM requirements**

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

**Decision: Noted.**

##### 5.1.2.2 RRC connection mobility control

**R4-2106960 Discussion on SI reading with LBT**

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

**Decision: Noted.**

**R4-2106961 Draft CR on SI acquisition for RRC connection mobility control for NR-U TS 36.133**

*Type: draftCR For: Endorsement  
 36.133 v16.9.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Postponed.**

**R4-2106962 Draft CR on SI acquisition for RRC connection mobility control for NR-U TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Postponed.**

##### 5.1.2.3 SCell activation/deactivation (delay and interruption)

**R4-2104826 On SCell activation requirement for NR-U**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-16)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2104827 CR on SCell activation requirement for NR-U R16**

*Type: CR For: Agreement  
 38.133 v16.7.0 CR-1804 rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Withdrawn.**

**R4-2104828 CR on SCell activation requirement for NR-U R17**

*Type: CR For: Agreement  
 38.133 v17.1.0 CR-1805 rev Cat: A (Rel-17)  
  
 Source: Apple*

**Decision: Withdrawn.**

**R4-2105005 Draft CR on SCell activation requirement for NR-U R16**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Revised to R4-2105702 (from R4-2105005).**

**R4-2105702 Draft CR on SCell activation requirement for NR-U R16**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Endorsed.**

**R4-2106573 SCell (de)activation requirement applicability when sCellDeactivationTimer is not configured**

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

**Abstract:**

Discussion about Scell activation and deactivation requirement applicability when sCellDeactivationTimer is not configured.

**Decision: Noted.**

**R4-2106844 On remaining issues for SCell activation in NR-U**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

On remaining issues for SCell activation in NR-U

**Decision: Noted.**

**R4-2106845 Updates in SCell activation in NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Updates in SCell activation in NR-U

**Decision: Revised to R4-2105701 (from R4-2106845).**

**R4-2105701 Updates in SCell activation in NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Updates in SCell activation in NR-U

**Decision: Endorsed.**

**R4-2106914 On SCell activation in NR-U**

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

**Decision: Noted.**

**R4-2106963 Discussion on SCell activation and deactivation requirements for NR-U**

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

**Decision: Noted.**

**R4-2106964 Draft CR on SCell activation requirements for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Not pursued.**

**R4-2105708 Draft CR on SCell activation requirements for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Withdrawn.**

**R4-2107088 Discussion on Scell activation requirement in NR-U**

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

**Decision: Noted.**

**R4-2107358 Interruptions during SCell activation in NR-U**

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

**Abstract:**

In this paper, we discuss remaining open issues interruptions during Scell activation in NR-U

**Decision: Noted.**

##### 5.1.2.4 Active TCI state switching

**R4-2106965 Draft CR on Active TCI state switching for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

##### 5.1.2.5 RLM

**R4-2106966 Draft CR on RLM requirements for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105703 (from R4-2106966).**

**R4-2105703 Draft CR on RLM requirements for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

##### 5.1.2.6 Beam management

**R4-2106967 Draft CR on Beam management requirements for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

##### 5.1.2.7 Measurement requirements

**R4-2106968 Draft CR on measurement requirements for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105704 (from R4-2106968).**

**R4-2105704 Draft CR on measurement requirements for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

##### 5.1.2.8 Measurement capability and reporting criteria

**R4-2106969 Draft CR on CSSF updating for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105705 (from R4-2106969).**

**R4-2105705 Draft CR on CSSF updating for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

##### 5.1.2.9 Timing

**R4-2104823 On reference cell availability for NR-U**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-16)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2104824 CR on reference cell availability for NR-U R16**

*Type: CR For: Agreement  
 38.133 v16.7.0 CR-1802 rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Withdrawn.**

**R4-2104825 CR on reference cell availability for NR-U R17**

*Type: CR For: Agreement  
 38.133 v17.1.0 CR-1803 rev Cat: A (Rel-17)  
  
 Source: Apple*

**Decision: Withdrawn.**

**R4-2105004 Draft CR on reference cell availability for NR-U R16**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Postponed.**

**R4-2106970 Discussion on timing requirements for NR-U**

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

**Decision: Noted.**

**R4-2106971 Draft CR on timing requirements for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Postponed.**

**R4-2107089 Discussion on UE Transmit Timing for NR-U**

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

**Decision: Noted.**

**R4-2107138 Further analysis of UE transmit timing under DL LBT failure in reference cell**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

The paper discusses open issues on timing

**Decision: Noted.**

**R4-2107359 Reference cell under CCA for UE transmit timings**

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

**Abstract:**

In this paper, we discuss DRX and measurement gaps related issues w.r.t. reference cell definition for UE transmit timing requirements in NR-U

**Decision: Noted.**

##### 5.1.2.10 Other requirements

**R4-2106839 On SSB availability to meet NR-U requirements in DRX**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

On SSB availability to meet NR-U requirements in DRX

**Decision: Noted.**

**R4-2106842 NR-U bands**

*Type: draftCR For: Approval  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

NR-U bands

**Decision: Endorsed.**

**R4-2106972 Draft CR on core requirements maintenance of IDLE mode inter-RAT measurement for NR-U TS 36.133**

*Type: draftCR For: Endorsement  
 36.133 v16.9.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2106973 Draft CR on PSCell Addition requirements for NR-U**

*Type: draftCR For: Endorsement  
 36.133 v16.9.0 CR- rev Cat: (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2106974 Draft CR on SI acquisition for paging interruption for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Postponed.**

#### 5.1.3 RRM perf. requirements (38.133)

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**Email discussion: [98-bis-e][202] NR\_unlic\_RRM\_2**

**R4-2105672 Email discussion summary: [98-bis-e][202] NR\_unlic\_RRM\_2***Type: other For: Information  
Source: Moderator (Nokia)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105804 (from R4-2105672).**

**R4-2105804 Email discussion summary: [98-bis-e][202] NR\_unlic\_RRM\_2***Type: other For: Information  
Source: Moderator (Nokia)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 13, 2021)

* Issue 2-1-1: FBE and LBE applicability
  + Proposals
    - Option 1 (ZTE):
      * A UE that signals both FBE and LBE capability need to be tested under both modes.
      * A UE that signals FBE only capability is subject to tests only with FBE configuration.
      * A UE that signals LBE only capability is subject to tests only with LBE configuration.
    - Option 2 (Nokia):
      * For a UE that supports both LBE and FBE, all test cases are run with LBE, and additionally some specific test cases are also run with FBE.
    - Option 3 (QC):
      * For a UE that supports both LBE and FBE, all test cases are run with LBE, and additionally some specific test cases are also run with FBE.
      * A UE that signals FBE only capability is subject to tests only with FBE configuration.
      * A UE that signals LBE only capability is subject to tests only with LBE configuration.
  + Discussion
    - ZTE: it is important to ensure the full set of requirements
    - ZTE: why is it assumed that if UE passed LBE test, then it can pass the FBE test?
      * QC: LBE requires monitoring more SSB positions. For LBE in UL UE is required to acquire COT.
    - MTK: Option 3 is ok.
    - E///: Option 3 is fine. To QC, which additional FBE tests are needed?
      * QC: we can further discuss
  + Agreements:
    - For a UE that supports both LBE and FBE, all test cases are run with LBE, and additionally some specific test cases are also run with FBE.
      * The set of test cases is FFS
    - A UE that signals FBE only capability is subject to tests only with FBE configuration.
    - A UE that signals LBE only capability is subject to tests only with LBE configuration.
* Issue 2-3-4: How to avoid exceeding Lmax in RRM tests
  + Proposals
    - Option 1 (Nokia):
      * Proposal 1a: Test environment should not have test runs that are rendered useless due to exceeded LBT failures
      * Proposal 1b: Test equipment should make sure that Lmax is not exceeded during a test by monitoring the number of CCA failures and preventing additional CCA failures from happening after Lmax is reached.
    - Option 2 (Huawei): Add a note in each test cases where no particular behaviour to be verified that a test where Lmax is exceeded shall not be considered in the statistics.
  + Agreements:
    - Test environment should not have test runs that are rendered useless due to exceeded LBT failures
    - Test equipment should make sure that Lmax is not exceeded during a test by monitoring the number of CCA failures and preventing additional CCA failures from happening after Lmax is reached.
* Issue 2-4-1: UL CCA model
  + Proposals
    - Proposal 1 (Nokia) Define baseline UL CCA model as:
      * Use DL FBE model to transmit a OCNG noise pattern with CCA BW in one or more of the scheduled/configured UL resource with probability P.
        + P is FFS
      * The test equipment keeps a count of the number of UL CCA failures it may cause.
      * When the OCNG signal is transmitted, the test equipment does not monitor the UL resource in which the OCNG is transmitted.
      * When the OCNG signal is not transmitted, the test equipment monitors the UL resource for the desired UL signal.
      * Based on whether it receives the signal or not, the test equipment declares the test case pass/fail
      * Consistent UL CCA failures are modelled by means of a low CCA success probability.
    - Proposal 2 (QC): to adopt a baseline UL CCA model as below:
      * TCCA ms prior to each UL transmission burst in the test:
        + The test equipment (TE) generates a uniform random variable p from the range [0, 1].
        + If p<PCCA\_UL, the TE transmits a OCNG noise pattern with a high [TBD] energy within the UE BW scheduled/configured for the UL transmission for at-least TCCA ms.

TCCA is the channel sensing period depending on LBT category being used by the UE

PCCA\_UL is the probability of a successful UL CCA

* + - * The TE keeps a count of the number of UL CCA failures it causes.
      * The TE monitors the UL resource for the desired UL signal.
      * Based on when and/or whether the TE receives the desired UL signal, it deems the test case to pass/fail
    - Proposal 3 (Ericsson): Prior to each UL transmission burst within a time interval i of the test:
      * Generate a uniform random variable p from the range [0, 1].
      * If p<PCCA\_UL,i, then the energy generated by the test system in the corresponding portion of UL slot is equal to or below the energy detection threshold [TBD]; otherwise the energy generated by the test system in the portion of UL slot is above the energy detection threshold [TBD].
  + Discussion
    - Nokia: ok with Proposal 2. May need to include energy detection threshold
    - E///: The energy detection threshold should be above LBT threshold? Is the difference to use OCNG?
    - QC: Energy detection threshold is the LBT threshold. We can use any random signal pattern. OCNG can emulate real field scenario.
  + Agreements:
    - Adopt a baseline UL CCA model as below:
      * TCCA ms prior to each UL transmission burst in the test:
        + The test equipment (TE) generates a uniform random variable p from the range [0, 1].
        + If p<PCCA\_UL, the TE transmits an [OCNG noise pattern] with an energy level X within the UE BW scheduled/configured for the UL transmission for at-least TCCA ms.

TCCA is the channel sensing period depending on LBT category being used by the UE

PCCA\_UL is the probability of a successful UL CCA

Energy level X is FFS and is higher than the LBT detection threshold

* + - * The TE keeps a count of the number of UL CCA failures it causes.
      * The TE monitors the UL resource for the desired UL signal.
      * Based on when and/or whether the TE receives the desired UL signal, it deems the test case to pass/fail
      * Note 1: applicability of OCNG noise pattern is FFS
* Issue 2-4-4: Additional delay in acquiring PRACH resource due to UL LBT failures
  + Proposals
    - Proposal 1 (Qualcomm): RAN4 to define one typical test case to test – Additional delay in acquiring PRACH resource due to UL LBT failures for the following requirements:
      * Handover to target cell using CCA
      * RRC re-establishment using CCA
      * Random access
      * RRC connection release with re-direction
      * BWP switch delay on consistent UL LBT recovery
    - Proposal 2 (Qualcomm): RAN4 to test – Additional delay in acquiring PRACH resource due to UL LBT failures in the following requirement:
      * Random access to a target cell using CCA
    - Proposal 3 (Qualcomm): RAN4 to not test – Additional delay in acquiring PRACH resource due to UL LBT failures in the following requirements:
      * Handover to target cell using CCA
      * RRC re-establishment using CCA
      * RRC connection release with re-direction
      * BWP switch delay on consistent UL LBT recovery
    - Proposal 4 (Huawei): The UL CCA failure in PRACH transmission shall only be considered in RA test cases.
  + Agreements:
    - RAN4 to test additional delay in acquiring PRACH resource due to UL LBT failures in the following requirement:
      * Handover to a target cell using CCA

1st round email discussion conclusions

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105709 | WF on general test configurations for NR-U RRM performance requirements | Nokia | Sub topic 2-1, 2-2 ant Topic #3 |
| R4-2105710 | WF on LBT models for NR-U RRM performance requirements | Qualcomm | Sub topic 2-3 and 2-4 |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2107362 | Updated NR-U RRM Performance Work Plan | Qualcomm Incorporated | Agreeable |  |
| R4-2106848 | Updated test case list for NR-U | Ericsson | revised |  |
| R4-2106846 | Draft Big CR: Introduction of Rel-16 NR-U RRM performance requirements | Ericsson | Revised | No comments in the 1st round |
| [R4-2106847](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106847.zip) | NR-U accuracy requirements | Ericsson | Return to (possibly agreeable) | No comments in the 1st round |
| [R4-2106879](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106879.zip) | DraftCR 36.133 Correction of accuracy requirements for NR-U bands | Ericsson | Return to (possibly agreeable) | No comments in the 1st round |
| [R4-2106975](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106975.zip) | Draft CR on inter-RAT NR measurement accuracy requirements | Huawei | Return to (possibly agreeable) | No comments in the 1st round |
| R4-2106580 | Draft CR on DL CCA model for NR-U | Nokia | Revised | No comments in the 1st round |
| R4-2106850 | CCA model in NR-U test cases | Ericsson | Merged with R4-2106580 |  |
| [R4-2106873](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106873.zip) | Draft CR: Update of RMC for NR-U test cases | Ericsson | Return to (possibly agreeable) | No comments in the 1st round |
| [R4-2106977](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106977.zip) | Draft CR of test case configurations for NR-U | Huawei, HiSilicon | Return to (possibly agreeable) | No comments in the 1st round |
| R4-2107140 | Applicability rules for legacy NR tests for NR-U in 38.133 | Ericsson | Revised |  |
| R4-2106854 | Introduction of NR-U cell reselection tests | Ericsson | Revised |  |
| R4-2106576 | Draft TC NR-U handover test cases | Nokia, Nokia Shanghai Bell | Revised |  |
| R4-2106856 | Introduction of NR-U handover tests | Ericsson | Revised |  |
| R4-2106978 | Draft CR of test cases for HO delay and interruption for NR-U | Huawei, HiSilicon | Revised |  |
| R4-2106577 | Draft TC RRC re-establishment with CCA | Nokia, Nokia Shanghai Bell | Return to (possibly agreeable) | No comments in the 1st round |
| R4-2107142 | RRC re-establishment tests for NR-U in 38.133 | Ericsson | Not pursued |  |
| R4-2106979 | Draft CR on test cases for RRC release with redirection for NR-U | Huawei, HiSilicon | Revised |  |
| R4-2107144 | RRC connetion release with re-direction from NR to NR-U test in 38.133 | Ericsson | Revised |  |
| R4-2106579 | Draft CR NR-U RRM random access performance requirements | Nokia, Nokia Shanghai Bell | Merged with R4-2106579 | No comments in the 1st round |
| R4-2106877 | Draft CR: Random access procedure test cases for NR-U | Ericsson | Revised |  |
| R4-2107146 | Test cases on BWP switching for NR-U SA in TS 38.133 | Ericsson | Revised |  |
| R4-2106981 | Draft CR of test cases for PSCell addition and release for NR-U | Huawei, HiSilicon | Revised |  |
| R4-2106875 | Draft CR: Update of beam management test cases for NR-U | Ericsson | Revised |  |
| R4-2106578 | Draft TC NR-U inter-frequency measurements | Nokia, Nokia Shanghai Bell | Return to (possibly agreeable) | No comments in the 1st round |
| R4-2106982 | Draft CR on test cases for inter-RAT measurement for NR-U | Huawei, HiSilicon | Revised |  |
| R4-2106359 | Introduction of test cases for L1-RSRP measurement accuracy with CCA serving cell | MediaTek inc. | Revised |  |
| R4-2106983 | Draft CR on test cases for intra-frequency measurement accuracy for NR-U | Huawei, HiSilicon | Revised |  |
| R4-2104830 | Test cases for RSSI and CO measurement accuracy in NR-U R16 | Apple | Revised |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation | Comments |
| R4-2105709 | WF on general test configurations for NR-U RRM performance requirements | Nokia | Agreeable |  |
| R4-2105710 | WF on LBT models for NR-U RRM performance requirements | Qualcomm | Agreeable |  |
| R4-2105711 | Updated test case list for NR-U | Ericsson | Agreeable |  |
| R4-2105712 | Draft Big CR: Introduction of Rel-16 NR-U RRM performance requirements | Ericsson | e-mail approval |  |
| [R4-2106847](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106847.zip) | NR-U accuracy requirements | Ericsson | Agreeable |  |
| [R4-2106879](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106879.zip) | DraftCR 36.133 Correction of accuracy requirements for NR-U bands | Ericsson | Agreeable |  |
| [R4-2106975](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106975.zip) | Draft CR on inter-RAT NR measurement accuracy requirements | Huawei | Agreeable |  |
| R4-2105713 | Draft CR on DL CCA model for NR-U | Nokia | Agreeable |  |
| R4-2106873 | Draft CR: Update of RMC for NR-U test cases | Ericsson | Agreeable |  |
| R4-2106977 | Draft CR of test case configurations for NR-U | Huawei, HiSilicon | Agreeable |  |
| R4-2105714 | Applicability rules for legacy NR tests for NR-U in 38.133 | Ericsson | Agreeable |  |
| R4-2105715 | Introduction of NR-U cell reselection tests | Ericsson | Agreeable |  |
| R4-2105716 | Draft TC NR-U handover test cases | Nokia, Nokia Shanghai Bell | Agreeable |  |
| R4-2105717 | Introduction of NR-U handover tests | Ericsson | Agreeable |  |
| R4-2105718 | Draft CR of test cases for HO delay and interruption for NR-U | Huawei, HiSilicon | Agreeable |  |
| R4-2106577 | Draft TC RRC re-establishment with CCA | Nokia, Nokia Shanghai Bell | Agreeable |  |
| R4-2105719 | Draft CR on test cases for RRC release with redirection for NR-U | Huawei, HiSilicon | Agreeable |  |
| R4-2105720 | RRC connetion release with re-direction from NR to NR-U test in 38.133 | Ericsson | Agreeable |  |
| R4-2105721 | Draft CR: Random access procedure test cases for NR-U | Ericsson | Agreeable |  |
| R4-2105722 | Test cases on BWP switching for NR-U SA in TS 38.133 | Ericsson | Agreeable |  |
| R4-2105723 | Draft CR of test cases for PSCell addition and release for NR-U | Huawei, HiSilicon | Agreeable |  |
| R4-2105724 | Draft CR: Update of beam management test cases for NR-U | Ericsson | Agreeable |  |
| R4-2106578 | Draft TC NR-U inter-frequency measurements | Nokia, Nokia Shanghai Bell | Agreeable |  |
| R4-2105725 | Draft CR on test cases for inter-RAT measurement for NR-U | Huawei, HiSilicon | Agreeable |  |
| R4-2105726 | Introduction of test cases for L1-RSRP measurement accuracy with CCA serving cell | MediaTek inc. | Agreeable |  |
| R4-2105727 | Draft CR on test cases for intra-frequency measurement accuracy for NR-U | Huawei, HiSilicon | Agreeable |  |
| R4-2105728 | Test cases for RSSI and CO measurement accuracy in NR-U R16 | Apple | Agreeable |  |

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**R4-2105709 WF on general test configurations for NR-U RRM performance requirements**

*Type: other For: Approval  
 Source: Nokia*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2105710 WF on LBT models for NR-U RRM performance requirements**

*Type: other For: Approval  
 Source: Qualcomm*

**Abstract:**

**Discussion:**

**Decision: Approved.**

##### 5.1.3.1 General

**R4-2106846 Draft Big CR: Introduction of Rel-16 NR-U RRM performance requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Draft Big CR: Introduction of Rel-16 NR-U RRM performance requirements

**Decision: Revised to R4-2105712 (from R4-2106846).**

**R4-2105712 Draft Big CR: Introduction of Rel-16 NR-U RRM performance requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Draft Big CR: Introduction of Rel-16 NR-U RRM performance requirements

**Decision: For email approval.**

**R4-2106848 Updated test case list for NR-U**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

Updated test case list for NR-U

**Decision: Revised to R4-2105711 (from R4-2106848).**

**R4-2105711 Updated test case list for NR-U**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

Updated test case list for NR-U

**Decision: Approved.**

**R4-2107360 SI Reading time during RRC Mobility Control in NR-U**

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

**Abstract:**

In this paper, we discuss the SI reading related issues in RRC mobility control related performance requirements in NR-U

**Decision: Noted.**

**R4-2107362 Updated NR-U RRM Performance Work Plan**

*Type: Work Plan For: Approval  
 Source: Qualcomm Incorporated*

**Abstract:**

In this paper, we present the updated work-plan based on 3 months extension to complete the WI

**Decision: Approved.**

##### 5.1.3.2 Measurement accuracy requirements

**R4-2106843 NR-U conditions**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

NR-U conditions

**Decision: Postponed.**

**R4-2106847 NR-U accuracy requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

NR-U accuracy requirements

**Decision: Endorsed.**

**R4-2106879 DraftCR 36.133 Correction of accuracy requirements for NR-U bands**

*Type: draftCR For: Endorsement  
 36.133 v16.9.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Updates pertaining to supported NR-U band combinations, and to reference to NR band group definitions.

**Decision: Endorsed.**

**R4-2106975 Draft CR on inter-RAT NR measurement accuracy requirements**

*Type: draftCR For: Endorsement  
 36.133 v16.9.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

##### 5.1.3.3 Test cases

###### 5.1.3.3.1 General

**R4-2104431 Configurations for NR-U RRM test cases**

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

**Decision: Noted.**

**R4-2106357 Discussion on RRM test cases in NR-U**

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

**Decision: Noted.**

**R4-2106574 On remaining details of NR-U RRM test configurations**

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

**Abstract:**

Discussion about remaining details of DL and UL CCA model and other test configurations.

**Decision: Noted.**

**R4-2106580 Draft CR on DL CCA model for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Updates to NR-U DL CCA model description.

**Decision: Revised to R4-2105713 (from R4-2106580).**

**R4-2105713 Draft CR on DL CCA model for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell, Ericsson*

**Abstract:**

Updates to NR-U DL CCA model description.

**Decision: Endorsed.**

**R4-2106849 On CCA model in NR-U test cases**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

On CCA model in NR-U test cases

**Decision: Noted.**

**R4-2106850 CCA model in NR-U test cases**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

CCA model in NR-U test cases

**Decision: Merged.**

**R4-2106871 Common test parameters for NR-U RRM tests**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the RMC used for NR-U RRM test cases.

**Decision: Noted.**

**R4-2106873 Draft CR: Update of RMC for NR-U test cases**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

This draft CR define RMCs used for NR-U RRM test cases.

**Decision: Endorsed.**

**R4-2106976 Discussion on RRM performance testing for NR-U**

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

**Decision: Noted.**

**R4-2106977 Draft CR of test case configurations for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2105834 Draft CR of test case configurations for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Withdrawn.**

**R4-2107361 CCA models in NR-U**

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

**Abstract:**

In this paper, we discuss various issues related to CCA models in NR-U

**Decision: Noted.**

###### 5.1.3.3.2 RRC IDLE cell re-selection

**R4-2106853 Discussions on cell reselection test cases for NR-U**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution we provide views on testing of the new cell reselection test cases that were agreed at last meeting.

**Decision: Noted.**

**R4-2106854 Introduction of NR-U cell reselection tests**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

This CR introduces the new cell reselection test cases for NR-U that were agreed at last meeting.

**Decision: Revised to R4-2105715 (from R4-2106854).**

**R4-2105715 Introduction of NR-U cell reselection tests**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

This CR introduces the new cell reselection test cases for NR-U that were agreed at last meeting.

**Decision: Endorsed.**

###### 5.1.3.3.3 HO (delay and interruptions)

**R4-2106575 Discussion about HO test cases with shared core requirements**

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

**Abstract:**

Discussion about how to introduce NR-U test cases that share the same core requirements with existing NR or NR-U test cases.

**Decision: Noted.**

**R4-2106576 Draft TC NR-U handover test cases**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Remaining NR-U handover test cases.

**Decision: Revised to R4-2105716 (from R4-2106576).**

**R4-2105716 Draft TC NR-U handover test cases**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Remaining NR-U handover test cases.

**Decision: Endorsed.**

**R4-2106855 Discussions on handover test cases for NR-U**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution we provide views on testing of the new handover test cases that were agreed at last meeting.

**Decision: Noted.**

**R4-2106856 Introduction of NR-U handover tests**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

This CR introduces the new handover test cases for NR-U that were agreed at last meeting.

**Decision: Revised to R4-2105717 (from R4-2106856).**

**R4-2105717 Introduction of NR-U handover tests**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

This CR introduces the new handover test cases for NR-U that were agreed at last meeting.

**Decision: Endorsed.**

**R4-2106978 Draft CR of test cases for HO delay and interruption for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105718 (from R4-2106978).**

**R4-2105718 Draft CR of test cases for HO delay and interruption for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

###### 5.1.3.3.4 RRC Re-establishment

**R4-2106577 Draft TC RRC re-establishment with CCA**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Endorsed.**

**R4-2104432 Test cases for RRC re-establishment in NR-U**

*Source: ZTE Corporation*

**Decision: Noted.**

**R4-2107141 RRC re-establishment tests for NR-U**

*Source: Ericsson*

**Decision: Noted.**

**R4-2107142 RRC re-establishment tests for NR-U in 38.133 Ericsson**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
 Source: Ericsson*

**Decision: Not pursued.**

###### 5.1.3.3.5 RRC Connection Release with Redirection

**R4-2104433 Test cases for RRC release with re-direction in NR-U**

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

**Decision: Noted.**

**R4-2106979 Draft CR on test cases for RRC release with redirection for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105719 (from R4-2106979).**

**R4-2105719 Draft CR on test cases for RRC release with redirection for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2107143 RRC connetion release with re-direction from NR to NR-U test**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

The paper describes test case on RRC re-direction from NR to NR-U carriers

**Decision: Noted.**

**R4-2107144 RRC connection release with re-direction from NR to NR-U test in 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

The CR contains test case on RRC re-direction from NR to NR-U

**Decision: Revised to R4-2105720 (from R4-2107144).**

**R4-2105720 RRC connection release with re-direction from NR to NR-U test in 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

The CR contains test case on RRC re-direction from NR to NR-U

**Decision: Endorsed.**

###### 5.1.3.3.6 Random access

**R4-2106579 Draft CR NR-U RRM random access performance requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Test cases for NR-U random access requirements.

**Decision: Merged.**

**R4-2106876 Test cases on random access for NR-U**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the test cases for random access procedure in NR-U

**Decision: Noted.**

**R4-2106877 Draft CR: Random access procedure test cases for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

This draft CR introduces the test cases of random access procedure in NR-U.

**Decision: Revised to R4-2105721 (from R4-2106877).**

**R4-2105721 Draft CR: Random access procedure test cases for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson, Nokia*

**Abstract:**

This draft CR introduces the test cases of random access procedure in NR-U.

**Decision: Endorsed.**

###### 5.1.3.3.7 Timing (transmit timing and TA)

**R4-2104434 Test cases for timing in NR-U**

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

**Decision: Noted.**

**R4-2106980 Discussion on test cases for timing requirements for NR-U**

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

**Decision: Noted.**

###### 5.1.3.3.8 BWP switching delay and interruptions

**R4-2104435 Test cases for BWP switching in NR-U**

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

**Decision: Noted.**

**R4-2107145 Test cases on BWP switching for NR-U SA**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

The paper describes test cases on BWP swiching for NR-U SA

**Decision: Noted.**

**R4-2107146 Test cases on BWP switching for NR-U SA in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

The CR on test cases on BWP swiching for NR-U SA. It applies to UE which supports only NR-U bands

**Decision: Revised to R4-2105722 (from R4-2107146).**

**R4-2105722 Test cases on BWP switching for NR-U SA in TS 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

The CR on test cases on BWP swiching for NR-U SA. It applies to UE which supports only NR-U bands

**Decision: Endorsed.**

###### 5.1.3.3.9 PSCell addition/release (delay and interruption)

**R4-2106981 Draft CR of test cases for PSCell addition and release for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105723 (from R4-2106981).**

**R4-2105723 Draft CR of test cases for PSCell addition and release for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

###### 5.1.3.3.10 SCell activation/deactivation (delay and interruption)

###### 5.1.3.3.11 Other interruptions

###### 5.1.3.3.12 RLM

###### 5.1.3.3.13 Beam management (BFD and link recovery)

**R4-2106874 Test cases on link recovery and L1-RSRP reporting for NR-U**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the test cases for beam failure recovery and L1-RSRP reporting in NR-U.

**Decision: Noted.**

**R4-2106875 Draft CR: Update of beam management test cases for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

This draft CR introduces the test cases for bean failure recovery and L1-RSRP reporting in NR-U.

**Decision: Revised to R4-2105724 (from R4-2106875).**

**R4-2105724 Draft CR: Update of beam management test cases for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

This draft CR introduces the test cases for bean failure recovery and L1-RSRP reporting in NR-U.

**Decision: Endorsed.**

###### 5.1.3.3.14 SS-RSRP/SS-RSRQ/SS-SINR/L1-RSRP measurement procedure (intra-frequency, inter-frequency, inter-RAT)

**R4-2106578 Draft TC NR-U inter-frequency measurements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Test cases for inter-frequency measurement procedure.

**Decision: Endorsed.**

**R4-2106982 Draft CR on test cases for inter-RAT measurement for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105725 (from R4-2106982).**

**R4-2105725 Draft CR on test cases for inter-RAT measurement for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

###### 5.1.3.3.15 RSSI/CO measurement procedure (intra-frequency, inter-frequency, inter-RAT)

###### 5.1.3.3.16 SFTD measurement procedure

###### 5.1.3.3.17 SS-RSRP/SS-RSRQ/SS-SINR/L1-RSRP measurement accuracy (intra-frequency, inter-frequency, inter-RAT)

**R4-2106358 Introduction of test cases for NR-U inter-frequency SS-RSRP measurement accuracy**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: MediaTek inc.*

**Decision: Postponed.**

**R4-2106359 Introduction of test cases for L1-RSRP measurement accuracy with CCA serving cell**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: MediaTek inc.*

**Decision: Revised to R4-2105726 (from R4-2106359).**

**R4-2105726 Introduction of test cases for L1-RSRP measurement accuracy with CCA serving cell**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: MediaTek inc.*

**Decision: Endorsed.**

**R4-2106983 Draft CR on test cases for intra-frequency measurement accuracy for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105727 (from R4-2106983).**

**R4-2105727 Draft CR on test cases for intra-frequency measurement accuracy for NR-U**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

###### 5.1.3.3.18 RSSI/CO measurement accuracy (intra-frequency, inter-frequency, inter-RAT)

**R4-2104829 On RSSI and CO testing in NR-U**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-16)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2104830 Test cases for RSSI and CO measurement accuracy in NR-U R16**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Apple*

**Decision: Revised to R4-2105728 (from R4-2104830).**

**R4-2105728 Test cases for RSSI and CO measurement accuracy in NR-U R16**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Apple*

**Decision: Endorsed.**

###### 5.1.3.3.19 SFTD measurement accuracy

###### 5.1.3.3.20 Other

**R4-2106984 Discussion on test cases for TCI switching for NR-U**

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

**Decision: Noted.**

**R4-2107139 Applicability rules for legacy NR tests for NR-U**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

The paper discusses applicability of legacy test cases for NR-U scenario

**Decision: Noted.**

**R4-2107140 Applicability rules for legacy NR tests for NR-U in 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

The draft CR defines applicability of legacy test cases for NR-U scenario

**Decision: Revised to R4-2105714 (from R4-2107140).**

**R4-2105714 Applicability rules for legacy NR tests for NR-U in 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

The draft CR defines applicability of legacy test cases for NR-U scenario

**Decision: Endorsed.**

### 5.3 Integrated Access and Backhaul for NR

#### 5.3.3 RRM perf. Requirements

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**Email discussion: [98-bis-e][203] NR\_IAB\_RRM**

**R4-2105673 Email discussion summary: [98-bis-e][203] NR\_IAB\_RRM***Type: other For: Information  
Source: Moderator (ZTE)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105805 (from R4-2105673).**

**R4-2105805 Email discussion summary: [98-bis-e][203] NR\_IAB\_RRM***Type: other For: Information  
Source: Moderator (ZTE)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

1st round email discussion conclusions

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| [R4-2106951](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106951.zip) | Draft CR on maintenance for IAB-MT RRM test cases | Huawei, HiSilicon | Revised |  |
| [R4-2107133](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107133.zip) | Big CR: IAB-MT RRM test cases in 38.174 | Ericsson | Revised |  |
| [R4-2107135](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107135.zip) | Side conditions for IAB-MT RRM test cases in TS 38.174 | Ericsson | endorsed |  |
| [R4-2104928](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104928.zip) | [draft CR] Test cases for Beam Failure Detection and Link Recovery with CSI-RS in FR1 | ZTE Corporation | to be revised |  |
| [R4-2104929](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104929.zip) | [draft CR] Test cases for Beam Failure Detection and Link Recovery with SSB in FR1 | ZTE Corporation | to be revised |  |
| [R4-2104930](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104930.zip) | [draft CR] Test cases for timing for IAB-MT | ZTE Corporation | to be revised |  |
| [R4-2106952](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106952.zip) | Draft CR on test cases for RRC release with redirection for IAB-MT | Huawei, HiSilicon | endorsed |  |
| [R4-2106953](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106953.zip) | Draft CR to introduce test cases for BFD and LR based on SSB in FR2 for IAB-MT | Huawei, HiSilicon | to be revised |  |
| [R4-2107137](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107137.zip) | CSI-RS based RLM tests for LA IAB-MT in TS 38.174 | Ericsson | endorsed |  |
| [R4-2107220](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107220.zip) | draftCR on test cases for CSI-RS based BFD and LR for IAB-MTs | Nokia, Nokia Shanghai Bell | to be revised |  |

2nd round email discussion conclusions

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| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| [R4-2106951](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106951.zip) | Draft CR on maintenance for IAB-MT RRM test cases | Huawei, HiSilicon | Endorsed | this TDoc was suggested to be revised, but according to 2nd round discussion the original version is agreeable. So no need to revise it, we can endorse the original draft CR |
| [R4-2105](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104928.zip)731 | [draft CR] Test cases for Beam Failure Detection and Link Recovery with CSI-RS in FR1 | ZTE Corporation | Endorsed |  |
| [R4-2105](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104929.zip)732 | [draft CR] Test cases for Beam Failure Detection and Link Recovery with SSB in FR1 | ZTE Corporation | Endorsed |  |
| [R4-2105](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104930.zip)733 | [draft CR] Test cases for timing for IAB-MT | ZTE Corporation | Endorsed |  |
| R4-2105734 | Draft CR to introduce test cases for BFD and LR based on SSB in FR2 for IAB-MT | Huawei, HiSilicon | Endorsed |  |
| R4-2105735 | draftCR on test cases for CSI-RS based BFD and LR for IAB-MTs | Nokia, Nokia Shanghai Bell | Endorsed |  |
| R4-2105847 | WF on test cases for IAB-MTs | ZTE Corporation | Approved | The moderator has asked for a TDoc number in the 1st round summary and also using email (tdoc request), perhaps the request was overwhelmed by lots of other information. The draft WF has been shared and no comment / objection received so far, which means it’s agreeable. Once the TDoc is assigned the WF will be uploaded. |

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##### 5.3.3.1 General

**R4-2105847 WF on test cases for IAB-MTs**

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

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104482 On IAB test cases**

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

**Decision: Noted.**

**R4-2106950 Discussion on RRM performance requirements for IAB**

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

**Decision: Noted.**

**R4-2106951 Draft CR on maintenance for IAB-MT RRM test cases**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2105729 Draft CR on maintenance for IAB-MT RRM test cases**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Withdrawn.**

**R4-2107133 Big CR: IAB-MT RRM test cases in 38.174**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

The draft CR on on three TDD UL/DL configurations for IAB-MT RRM test cases

**Decision: Revised to R4-2105730 (from R4-2107133).**

**R4-2105730 Big CR: IAB-MT RRM test cases in 38.174**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

**Decision: For email approval.**

**R4-2107134 Analysis of side conditions for IAB-MT RRM test cases**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

The paper analyzes side conditions (SSB Es/Iot and SSP\_RP) for IAB-MT requirements

**Decision: Noted.**

**R4-2107135 Side conditions for IAB-MT RRM test cases in TS 38.174**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

The draft CR on side conditions (SSB Es/Iot and SSP\_RP) for IAB-MT requirements

**Decision: Endorsed.**

##### 5.3.3.2 Test cases

###### 5.3.3.2.1 RRC Re-establishment

###### 5.3.3.2.2 RRC Connection Release with Redirection

**R4-2106952 Draft CR on test cases for RRC release with redirection for IAB-MT**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

###### 5.3.3.2.3 IAB-MT transmit timing

**R4-2104930 [draft CR] Test cases for timing for IAB-MT**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: B (Rel-16)  
  
 Source: ZTE Corporation*

**Decision: Revised to R4-2105733 (from R4-2104930).**

**R4-2105733 [draft CR] Test cases for timing for IAB-MT**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: B (Rel-16)  
  
 Source: ZTE Corporation*

**Decision: Endorsed.**

###### 5.3.3.2.4 RLM

**R4-2107136 Analysis of CSI-RS based RLM tests for LA IAB-MT**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

The document describes test cases to verify IAB-MT CSI-RS based RLM requirements for IAB-MT LA class

**Decision: Noted.**

**R4-2107137 CSI-RS based RLM tests for LA IAB-MT in TS 38.174**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

The draft CR on IAB-MT CSI-RS based RLM tests for IAB-MT LA class

**Decision: Endorsed.**

###### 5.3.3.2.5 Beam Failure Detection and Link Recovery

**R4-2104928 [draft CR] Test cases for Beam Failure Detection and Link Recovery with CSI-RS in FR1**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: B (Rel-16)  
  
 Source: ZTE Corporation*

**Decision: Revised to R4-2105731 (from R4-2104928).**

**R4-2105731 [draft CR] Test cases for Beam Failure Detection and Link Recovery with CSI-RS in FR1**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: B (Rel-16)  
  
 Source: ZTE Corporation*

**Decision: Endorsed.**

**R4-2104929 [draft CR] Test cases for Beam Failure Detection and Link Recovery with SSB in FR1**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: B (Rel-16)  
  
 Source: ZTE Corporation*

**Decision: Revised to R4-2105732 (from R4-2104929).**

**R4-2105732 [draft CR] Test cases for Beam Failure Detection and Link Recovery with SSB in FR1**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: B (Rel-16)  
  
 Source: ZTE Corporation*

**Decision: Endorsed.**

**R4-2106953 Draft CR to introduce test cases for BFD and LR based on SSB in FR2 for IAB-MT**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: B (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105734 (from R4-2106953).**

**R4-2105734 Draft CR to introduce test cases for BFD and LR based on SSB in FR2 for IAB-MT**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: B (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2107220 draftCR on test cases for CSI-RS based BFD and LR for IAB-MTs**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: B (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

draftCR on test cases for CSI-RS based BFD and LR for IAB-MTs

**Decision: Revised to R4-2105735 (from R4-2107220).**

**R4-2105735 draftCR on test cases for CSI-RS based BFD and LR for IAB-MTs**

*Type: draftCR For: Endorsement  
 38.174 v16.2.0 CR- rev Cat: B (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

draftCR on test cases for CSI-RS based BFD and LR for IAB-MTs

**Decision: Endorsed.**

### 5.4 Multi-RAT Dual-Connectivity and Carrier Aggregation enhancements

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**Email discussion: [98-bis-e][204] LTE\_NR\_DC\_CA\_RRM\_1\_NWM**

**R4-2105674 Email discussion summary: [98-bis-e][204] LTE\_NR\_DC\_CA\_RRM\_1\_NWM***Type: other For: Information  
Source: Moderator (Nokia)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105806 (from R4-2105674).**

**R4-2105806 Email discussion summary: [98-bis-e][204] LTE\_NR\_DC\_CA\_RRM\_1\_NWM***Type: other For: Information  
Source: Moderator (Nokia)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

1st round email discussion conclusions

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105736 | WF on Test cases for MR-DC Idle mode CA measurements | Nokia, Nokia Shanghai Bell |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2106990 |  | Huawei, HiSilicon | Endorsed |  |
| R4-2106991 |  | Huawei, HiSilicon | Endorsed |  |
| R4-2106390 |  | Nokia, Nokia Shanghai Bell | Revised |  |
| R4-2106391 |  | Nokia, Nokia Shanghai Bell | already reserved in R4-2106391 |  |
| R4-2106992 |  | Huawei, HiSilicon | Endorsed |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2106390 | Draft CR for Idle Mode measurements of inter-frequency RAT CA candidate cells for early reporting  (TC#3) | Nokia, Nokia Shanghai  Bell | Postponed |  |
| R4-2105737 | Draft CR for Idle Mode measurements of inter-frequency RAT CA candidate cells for early reporting  (TC#3) | Nokia, Nokia Shanghai  Bell | Withdrawn |  |
| R4-2106391 | Draft Big CR: Introduction of Rel-16 MR-  DC EMR RRM performance requirements  (TS 38.133) | Nokia, Nokia Shanghai  Bell | email approval |  |
| R4-2105841 | WF on Test cases for MR-DC Idle mode CA  measurements | Nokia, Nokia Shanghai  Bell | Agreeable |  |

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**Email discussion: [98-bis-e][205] LTE\_NR\_DC\_CA\_RRM\_2**

**R4-2105675 Email discussion summary: [98-bis-e][205] LTE\_NR\_DC\_CA\_RRM\_2***Type: other For: Information  
Source: Moderator (Ericsson)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105807 (from R4-2105675).**

**R4-2105807 Email discussion summary: [98-bis-e][205] LTE\_NR\_DC\_CA\_RRM\_2***Type: other For: Information  
Source: Moderator (Ericsson)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 14, 2021)

* Issue 1-1-1: Principle for branching of requirement
  + Proposals
    - Option 1 (Apple): When discussing the replacement of measCycleSCell, the principle “if the target cell has been measured less than ~~160ms~~ X ms before the activation command, then no additional time for AGC is needed” should not be changed.
    - Option 2 (Nokia): Only split requirements based on known/unknown cell status. Do not further split requirements depending on measurement rate etc for known cells.
  + Discussion
    - Nokia: Prefer EUTRAN approach
    - Apple: We use measCycleSCell as one of the conditions to derive that UE needs additional AGC time.
    - Nokia: Option 1 is acceptable
    - QC: there may be some uncertainty on the wording “target cell has been measured” since the measurement is up to UE implementation
      * Apple: we’ll follow the measurement period requirement. From NW perspective UE makes the measurements.
  + Conclusion: Principle in Option 1 is agreeable. Further discussion on exact text is required.
* Issue 1-1-2: Replacement of measCycleSCell
  + Proposals
  + Option 1 (Apple): Replace condition on measCycleSCell with Tsample\_interval defined as follows:
    - If no DRX is configured or DRX cycle>320ms, Tsample\_interval = Max(MGRP, SMTC period, DRX cycle) × CSSFinter
    - Otherwise, Tsample\_interval = 1.5 × Max(MGRP, SMTC period, DRX cycle) × CSSFinter
  + Option 2a (Apple): Replace condition on measCycleSCell as follows:
    - TFirstSSB+ 5ms, if the SCell has been measured within measurement gap before activation and TSSB\_measurement\_period\_inter, as specified in Table 9.3.5-1, is equal to or smaller than 1280ms; or if the SCell has been measured without measurement gap before activation and TSSB\_measurement\_period\_intra, as specified in Table 9.3.9-1, is equal to or smaller than 800ms.
    - TFirstSSB\_MAX + Trs + 5ms, if the SCell has been measured within measurement gap before activation and TSSB\_measurement\_period\_inter, as specified in Table 9.3.5-1, is larger than 1280ms; or if the SCell has been measured without measurement gap before activation and TSSB\_measurement\_period\_intra, as specified in Table 9.3.9-1, is larger than 800ms.
  + Option 2b (Ericsson): Replace condition on measCycleSCell as follows:
    - TFirstSSB+ 5ms, if the measurement period is at most 1280ms,
    - TFirstSSB\_MAX + Trs + 5ms, if the measurement period is longer than 1280ms.
  + Option 3 (Ericsson): Replace condition on measCycleSCell as follows:
    - If the SCell is known and has been reported within last 1280ms, Tactivation\_time is TFirstSSB + 5ms,
    - If the SCell is known and has been reported outside last 1280ms, Tactivation\_time is TFirstSSB\_MAX + Trs + 5ms.
  + Option 4 (Nokia): Replace condition on measCycleSCell in NR FR1 as follows, i.e., only consider known/unknown cell status:
    - If the SCell is known and belongs to FR1, Tactivation\_time is TFirstSSB+ 5ms,
    - If the SCell is unknown and belongs to FR1, TFirstSSB\_MAX + TSMTC\_MAX + 2\*Trs + 5ms
  + Discussion
    - Apple: ok with 2b
    - Nokia: ok with 2b. Put values to []
    - NEC: How was 1280ms derived? Is it 160\*8 with 8 as the scaling factor?
      * Apple: we derived based on the existing inter-frequency measurement. The current equation is for FR1 only.
  + Agreements:
    - Replace condition on measCycleSCell in NR FR1 as follows:
      * TFirstSSB+ 5ms, if the measurement period is at most [1280ms],
      * TFirstSSB\_MAX + Trs + 5ms, if the measurement period is longer than [1280ms].
* Issue 1-1-3: Definition of known cell in Direct SCell activation
  + Proposals
    - Option 1 (Nokia): Use same definition, for known SCell conditions for the NR FR1 cell being directly activated, as in LTE.
      * [36.133:] The SCell is known provided the following conditions are met for the SCell:
      * During the last 5 seconds before the reception of the direct SCell configuration command:
        + the UE has sent a valid measurement report for the SCell being directly activated or directly hibernated, and
        + the SCell being directly activated or directly hibernated remains detectable according to the cell identification conditions specified in section 8.3.3.2,
        + SCell being directly activated or directly hibernated also remains detectable during the SCell activation delay according to the cell identification conditions specified in section 8.3.3.2
      * Otherwise, the SCell is unknown.
  + Discussion
    - Session chair: all companies are fine with Option 1 in general but some wording adjustments are required and will be handled in the email discussion.

1st round email discussion conclusions

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc** | **Title** | **Source** | **Comments** |
| R4-2105738 | WF on maintenance of Direct SCell activation and SCell dormancy | Ericsson | For capturing outstanding issues, if any, for core and performance parts in LTE\_NR\_DC\_CA\_RRM\_2 |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2104861 | CR for core requirement maintenance on direct SCell activation | Apple | Revised | Revise to take outcome of Issue 1-1-2 into account. |
| R4-2106388 | Draft CR Correction of activation delay for Direct activated Scell | Nokia, Nokia Shanghai Bell | Revised | Revise to take outcome of Issue 1-1-3 into account. |
| R4-2106993 | CR on direct SCell activation | Huawei, HiSilicon | Revised | Revise to take outcome of Issue 1-2-1 into account. |
| R4-2106994 | CR on SCell dormancy requirements | Huawei, HiSilicon | Agreeable |  |
| R4-2106884 | Draft Big CR 38.133: Introduction of Rel-16 MR-DC Direct SCell activation and SCell dormancy RRM performance requirements | Ericsson | Revised | Revise to take R4-2106996 into account |
| R4-2106996 | draftCR on SCell dormancy TC | Huawei, HiSilicon | Agreeable |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2105738 | WF on maintenance of Direct SCell activation and SCell dormancy | Ericsson | Agreeable |  |
| R4-2105739  (revision of R4-2104861) | CR for core requirement maintenance on direct SCell activation | Apple | Agreeable |  |
| R4-2105740  (revision of R4-2106388) | Draft CR Correction of activation delay for Direct activated Scell | Nokia, Nokia Shanghai Bell | Agreeable |  |
| R4-2105741  (revision of R4-2106993) | CR on direct SCell activation | Huawei, HiSilicon | Agreeable |  |
| R4-2106994 | CR on SCell dormancy requirements | Huawei, HiSilicon | Agreeable |  |
| R4-2105742  (revision of R4-2106884) | Draft Big CR 38.133: Introduction of Rel-16 MR-DC Direct SCell activation and SCell dormancy RRM performance requirements | Ericsson |  | For email approval. Revise to take R4-2106996 into account |
| R4-2106996 | draftCR on SCell dormancy TC | Huawei, HiSilicon | Agreeable |  |

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#### 5.4.1 RRM core requirements maintenance (38.133/36.133)

##### 5.4.1.1 Early Measurement reporting

**R4-2106990 CR on LTE-NR EMR requirements 36133**

*Type: draftCR For: Endorsement  
 36.133 v16.9.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2106991 CR on EMR requirements correction 38133**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

##### 5.4.1.2 Efficient and low latency serving cell configuration, activation and setup

**R4-2104860 Core requirement maintenance on direct SCell activation**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2104861 CR for core requirement maintenance on direct SCell activation**

*Type: draftCR For: (not specified)  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Revised to R4-2105739 (from R4-2104861).**

**R4-2105739 CR for core requirement maintenance on direct SCell activation**

*Type: draftCR For: (not specified)  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Endorsed.**

**R4-2106387 Discussion on Tactivation\_time for Direct SCell activation**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Noted.**

**R4-2106388 Draft CR Correction of activation delay for Direct activated Scell**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2105740 (from R4-2106388).**

**R4-2105740 Draft CR Correction of activation delay for Direct activated Scell**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Endorsed.**

**R4-2106885 Core maintenance for Direct SCell activation**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Discussion on core requirement maintenance for Direct SCell activation: TCI state indication, and measurement rate.

**Decision: Noted.**

**R4-2106993 CR on direct SCell activation**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105741 (from R4-2106993).**

**R4-2105741 CR on direct SCell activation**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2106994 CR on SCell dormancy requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

#### 5.4.2 RRM perf. requirements (38.133)

##### 5.4.2.1 Early Measurement reporting

###### 5.4.2.1.1 General

**R4-2105736 WF on Test cases for MR-DC Idle mode CA measurements**

*Type: other For: Approval  
 Source: Nokia*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105841 (from R4-2105736).**

**R4-2105841 WF on Test cases for MR-DC Idle mode CA measurements**

*Type: other For: Approval  
 Source: Nokia*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2106389 Measurement Performance Requirements test for MR-DC**

*Type: discussion For: Approval  
 38.133 v CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Noted.**

**R4-2106390 Draft CR for Idle Mode measurements of inter-frequency RAT CA candidate cells for early reporting (TC#3)**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Postponed.**

**R4-2105737 Draft CR for Idle Mode measurements of inter-frequency RAT CA candidate cells for early reporting (TC#3)**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Withdrawn.**

**R4-2106391 Draft Big CR: Introduction of Rel-16 MR-DC EMR RRM performance requirements (TS 38.133)**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: For email approval.**

###### 5.4.2.1.2 Measurement accuracy requirements

###### 5.4.2.1.3 Test cases

**R4-2104859 Testing of measurement performance for RSRP/RSRQ in EMR**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2106992 draftCR to update EMR TC4**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

##### 5.4.2.2 Efficient and low latency serving cell configuration, activation and setup

###### 5.4.2.2.1 General

**R4-2105738 WF on maintenance of Direct SCell activation and SCell dormancy**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2106884 Draft Big CR 38.133: Introduction of Rel-16 MR-DC Direct SCell activation and SCell dormancy RRM performance requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Draft Big CR with test cases for Direct SCell activation and SCell Dormancy.

**Decision: Revised to R4-2105742 (from R4-2106884).**

**R4-2105742 Draft Big CR 38.133: Introduction of Rel-16 MR-DC Direct SCell activation and SCell dormancy RRM performance requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Draft Big CR with test cases for Direct SCell activation and SCell Dormancy.

**Decision: For email approval.**

###### 5.4.2.2.2 Test cases for direct SCell activation

###### 5.4.2.2.3 Test case for SCell Dormancy

**R4-2106995 Discussion on remaining issues for SCell dormancy tests**

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

**Decision: Noted.**

**R4-2106996 draftCR on SCell dormancy TC**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

### 5.5 NR Positioning Support

#### 5.5.1 RRM core requirements maintenance (38.133)

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

**Email discussion: [98-bis-e][206] NR\_pos\_1**

**R4-2105676 Email discussion summary: [98-bis-e][206] NR\_pos\_1***Type: other For: Information  
Source: Moderator (Huawei)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105808 (from R4-2105676).**

**R4-2105808 Email discussion summary: [98-bis-e][206] NR\_pos\_1***Type: other For: Information  
Source: Moderator (Huawei)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 14, 2021)

* 1-1-1: PRS resource muting
  + Proposals
    - Option 1 (CATT, Intel, Nokia)
      * Do not define requirements for the case of PRS resource muting in Rel-16.
    - Option 2a (QC, vivo, HW, OPPO)
      * If muting option 1 is applied, the periodicity of a PRS resource is scaled by N\_muting where N\_muting is X \* dl-prs-MutingBitRepetitionFactor, and X is the size of NR-MutingPattern-r16 for mutingOption1-r16.
    - Option 2b (Nokia)
      * If muting option 1 is applied, the periodicity of a PRS resource is scaled by N\_muting where N\_muting is X \* dl-prs-MutingBitRepetitionFactor, and X is the [maximum] number of consecutive zeros of NR-MutingPattern-r16 for mutingOption1-r16.
  + Discussion
    - Intel: Need to resolve in this meeting.
    - Nokia: Muting may extend the requirements too much. What happens if we don’t agree on anything. Does it mean no requirements in Rel-16?
      * Intel: Option 1 means that we’ll follow the existing requirements.
    - QC: Muting will likely be used in deployments. Current requirements do not address it. Need to have smth simple.
    - vivo: PRS muting requirement need to be defined
    - Huawei: Agree with QC/vivo that lack of requirements will limit the deployments.
    - CATT: no need to extend requirements in case the muting pattern is applied.
    - QC: To Nokia - If no muting is configured, then the scaling is not applied. To CATT – this is not ideal solution but simple enough.
  + Agreements:
    - If muting option 1 is applied, the periodicity of a PRS resource is scaled by N\_muting where N\_muting is X \* dl-prs-MutingBitRepetitionFactor, and
      * Option 1: X is the size of NR-MutingPattern-r16 for mutingOption1-r16.
      * Option 2: X is the [maximum] number of consecutive zeros of NR-MutingPattern-r16 for mutingOption1-r16
      * Note: the decision to be done in RAN4 #98-bis-e
* 1-2-1: Consideration on different resource offsets in measurement period
  + Proposals
    - Option 1a (QC, Intel)
      * Redefine as = + (currently = + )
    - Option 1b (Nokia)
      * If dl-PRS-Periodicity-and-ResourceSetSlotOffset-r16 offset of a single PFL is configured differently, then the requirement is extended by = + .
      * Otherwise, no change is needed due to dl-PRS-ResourceSlotOffset-r16offsets.
    - Option 2 (OPPO)
      * Avoid PRS configurations with different resource offsets on the same PFL
    - Option 3 (HW)
      * RSTD measurement period of a single PRS frequency layer is extended by T ms
  + Agreements:
    - Redefine as = + (currently = + )
* 1-3-1: Observation window
  + Proposals
    - Option 1 (CATT, QC, OPPO, vivo, HW)
    - Option 2a (HW, Intel)
      * TPRS,i
    - Option 2b (Nokia, Intel)
      * TPRS,i
      * The observation window sizes for *Lprs* and for *UE processing capability ‘N’* are identical.
    - Option 3 (vivo)
      * Ti
  + Discussion
    - Intel: 2a/2b are ok
    - vivo: Option 3. Option 1 is fine with clarification that resources are within the MG
    - HW: also ok with Option 1. For measurement PRS resources within MG – this is discussed in a separate issues
    - Nokia: The side condition which we mentioned is important and needs to be clarified. When UE reports the capability, it may not know the MGs and may not be able to calculated the
      * Huawei: the condition puts restriction on the NW side. The capability is addressed in the requirements and UE does not needed to account for MGs when it reports the capability.
      * QC: Capability – number of resources within pre-defined time.
    - Huawei: for condition from Nokia – what does it really limit and how to capture this.
      * Nokia: it does not restrict anything in the NW side. When UE reports the capability then it needs to count the N within the same window
      * Huawei: UE capability is static. UE cannot adjust the reporting based on NW configuration.
    - QC: May need more discussion and clarify Nokia question
    - vivo: that’s the reason we proposed to use Ti. Teffect may already address it.
  + Agreements:
    - Observation window for Lprs
      * Option 1:
      * Option 2: TPRS,i. The observation window sizes for *Lprs* and for *UE processing capability ‘N’* are identical.
* 1-4-2: Requirements for non-overlapping case
  + Proposals
    - Option 1 (CATT, QC, Intel, vivo, HW, Nokia)
      * The requirement of non-overlapping case should be the same as for overlapping case (sum approach)
    - Option 2 (Ericsson)
      * RAN4 agrees that the current measurement period in TS 38.133 is over-defined for the non-overlapping case – it is unnecessarily scaled to account for the overlap which does not exist and thus too long.
      * Measurement period for the non-overlapping case shall be:

TRSTD, Total = maxi (TRSTD,i), where

the measurement period starts with the first MG and it is the same for all frequencies (agreement from RAN4#96-e). Hence, the time to the last sample across all frequencies will correctly determine TRSTD, Total, regardless of the order the frequencies are measured.

* + Agreements:
    - The requirement of non-overlapping case should be the same as for overlapping case (i.e. sum approach)

1st round email discussion conclusions

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc** | **Title** | **Source** | **Comments** |
| R4-2105743 | WF on UE PRS measurement requirements | Huawei, HiSilicon |  |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| [R4-2104427](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104427.zip) | [draft CR] Core maintenance for NR Positioning | ZTE Corporation | Merged |  |
| [R4-2104743](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104743.zip) | CR on PRS RSTD measurement requirements | CATT | Revised |  |
| [R4-2106628](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106628.zip) | CR to 38.133 correction to PRS RSTD measurement requirements | vivo | Merged |  |
| [R4-2106998](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106998.zip) | CR to update RSTD measurement requirements | Huawei, HiSilicon | Merged |  |
| [R4-2107160](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107160.zip) | RSTD measurement requirements | Ericsson | Merged |  |
|  |  |  |  |  |
| [R4-2106629](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106629.zip) | CR to 38.133 correction on PRS-RSRP measurement requirements | vivo | Merged |  |
| [R4-2107000](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107000.zip) | CR to update PRS-RSRP measurement requirements | Huawei, HiSilicon | Merged |  |
| [R4-2107162](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107162.zip) | PRS-RSRP measurement requirements | Ericsson | Revised |  |
|  |  |  |  |  |
| [R4-2104744](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104744.zip) | CR on UE Rx-Tx time difference measurement requirements | CATT | Merged |  |
| [R4-2106517](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106517.zip) | CR to TS 38.133 on UE Rx-Tx time difference measurements | OPPO | Revised |  |
| [R4-2106630](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106630.zip) | CR to 38.133 correction on UE Rx-Tx timing difference measurement requirements | vivo | Merged |  |
| [R4-2107002](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107002.zip) | CR to update UE Rx-Tx time difference measurement requirements | Huawei, HiSilicon | Merged |  |
| [R4-2107164](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107164.zip) | UE Rx-Tx measurement requirements | Ericsson | Merged |  |
|  |  |  |  |  |
| [R4-2106631](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106631.zip) | CR to 38.133 correction on CCSF for NR measurements for positioning | vivo | Revised |  |
| [R4-2107004](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107004.zip) | CR on CSSF, measurement capability and MG for PRS measurement 38.133 | Huawei, HiSilicon | Revised | Focus on general applicability and MG parts, remove the CSSF part |
| [R4-2107005](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107005.zip) | CR to remove measurement gap pattern #25 for LTE measurement in 36.133 | Huawei, HiSilicon | Revised |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2105744 | CR on PRS RSTD measurement requirements | CATT | Agreeable |  |
| R4-2105745 | PRS-RSRP measurement requirements | Ericsson | Agreeable |  |
| R4-2105746 | CR to TS 38.133 on UE Rx-Tx time difference measurements | OPPO | Agreeable |  |
| R4-2105747 | CR to 38.133 correction on CCSF for NR measurements for positioning | vivo | Agreeable |  |
| R4-2105748 | CR on CSSF, measurement capability and MG for PRS measurement 38.133 | Huawei, HiSilicon | Agreeable |  |
| R4-2105749 | CR to remove measurement gap pattern #25 for LTE measurement in 36.133 | Huawei, HiSilicon | Agreeable |  |
| R4-2105743 | WF on UE PRS measurement requirements | Huawei, HiSilicon | Return to | Discuss on Issue 1-1-1 during GTW if possible. Otherwise, the WF is agreeable. |

GTW session (April 20, 2021)

* 1-1-1: PRS resource muting
  + 1st round agreements:
    - If muting option 1 is applied, the periodicity of a PRS resource is scaled by N\_muting where N\_muting is X \* dl-prs-MutingBitRepetitionFactor, and
      * Option 1: X is the size of NR-MutingPattern-r16 for mutingOption1-r16.
      * Option 2: X is the [maximum] number of consecutive zeros of NR-MutingPattern-r16 for mutingOption1-r16
      * Note: the decision to be done in RAN4 #98-bis-e
  + Discussion
    - Nokia: Requirements may be unnecessarily relaxed. Option 2.
    - QC: Option 2 has some issues.
    - Huawei: In the second round 3 companies supported Option 1. One compromise is to define the upper bound for Option 1.
    - vivo: Option 1. Option 2 may have some issues in case different TRPs have different patterns. Open to have upper bound.
    - Intel: Share same view vivo and Nokia. Revised Option 1 is fine.
  + Agreements
    - If muting option 1 is applied, the periodicity of a PRS resource is scaled by N\_muting
      * N\_muting = X \* dl-prs-MutingBitRepetitionFactor
      * X is the size of NR-MutingPattern-r16 for mutingOption1-r16.
      * N\_muting upper bound value is FFS
        + Option A:

If Tprs \* *dl-PRS-MutingBitRepetitionFactor-r16* > 10240 ms

N\_muting = 1 (effectively no type1 muting, corner case that should be avoided by the network)

else

N\_muting = X \* *dl-PRS-MutingBitRepetitionFactor-r16*, where

X = min( L, 10240/( Tprs \* *dl-PRS-MutingBitRepetitionFactor-r16* ) ) and

L is the size of NR-MutingPattern-r16 for mutingOption1-r16.

* + - * + Option B:

If Tprs \* dl-PRS-MutingBitRepetitionFactor-r16 > 10240 ms

N\_muting = 1

Elseif L

N\_muting =min { L, [ X ] }, [X=2]

Elseif L

N\_muting = min { L, [ Y ] }, [Y=8]

* + - * + Other options are not precluded
* Measurement period when configured with PRS-RSRP: PRS-RSRP configured for DL-TDOA
  + Proposal
    - Option 1 (CATT, QC, Intel, OPPO, vivo, HW)
      * RSTD measurement period is not impacted by PRS-RSRP measurement.
    - Option 2 (Ericsson, Nokia)
      * UE behavior when RSTD is configured together with PRS-RSRP and the required PRS-RSRP measurement period is longer than that for RSTD (configured without RSTD): the RSTD measurement continues over the entire PRS-RSRP measurement period
    - Option 3 (Ericsson)
      * Clarify in the spec that when PRS-RSRP is configured for DL-TDOA then the measurement period of RSTD and PRS-RSRP shall be the same.
  + Discussion
    - Huawei: Measurements period for RSRP and RSTD shall be the same. Option 3 is fine as well
    - E///: Option 3 clarification is good to have.
    - QC: Support Option 1. Do not see the difference between Option 1 and 3.
      * E///: improve the spec clarify
    - Nokia: Same view as E///. Can compromise to Option 3.
    - vivo: Measurement period is applicable to all methods. The main issue is whether RSTD and RSRP measurement performed simultaneously.
  + Agreements
    - When PRS-RSRP is configured for DL-TDOA, RSTD and RSRP are performed over the same measurement period.

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**R4-2105743 WF on UE PRS measurement requirements**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105851 (from R4-2105743).**

**R4-2105851 WF on UE PRS measurement requirements**

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

**Abstract:**

**Discussion:**

**Decision: Approved.**

##### 5.5.1.1 PRS-RSTD measurement requirements

**R4-2104427 [draft CR] Core maintenance for NR Positioning**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: ZTE Corporation*

**Decision: Merged.**

**R4-2104741 Discussion on PRS RSTD measurement requirements**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104743 CR on PRS RSTD measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: CATT*

**Decision: Revised to R4-2105744 (from R4-2104743).**

**R4-2105744 CR on PRS RSTD measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: CATT*

**Decision: Endorsed.**

**R4-2106334 On PRS-RSTD measurement requirements**

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

**Decision: Noted.**

**R4-2106452 Further discussion on NR PRS RSTD measurement report requirements**

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

**Decision: Noted.**

**R4-2106515 Discussion on RSTD measurement requirements**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106624 Further discussion on PRS RSTD measurement requirements**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2106628 CR to 38.133 correction to PRS RSTD measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Merged.**

**R4-2106997 Discussion on remaining issues for RSTD measurement requirements**

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

**Decision: Noted.**

**R4-2106998 CR to update RSTD measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Merged.**

**R4-2107159 On RSTD measurement requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

On RSTD measurement requirements

**Decision: Noted.**

**R4-2107160 RSTD measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

RSTD measurement requirements

**Decision: Merged.**

**R4-2107181 On PRS-RSTD measurement period definition**

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

**Abstract:**

Discussion on RSTD measurement period definition for NR positioning

**Decision: Noted.**

##### 5.5.1.2 PRS-RSRP measurement requirements

**R4-2106335 On PRS-RSRP measurement requirements**

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

**Decision: Noted.**

**R4-2106625 Discussion on PRS-RSRP measurement requirements**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2106629 CR to 38.133 correction on PRS-RSRP measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Merged.**

**R4-2106999 Discussion on remaining issues for PRS-RSRP measurement requirements**

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

**Decision: Noted.**

**R4-2107000 CR to update PRS-RSRP measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Merged.**

**R4-2107161 On PRS-RSRP measurement requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

On PRS-RSRP measurement requirements

**Decision: Noted.**

**R4-2107162 PRS-RSRP measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

PRS-RSRP measurement requirements

**Decision: Revised to R4-2105745 (from R4-2107162).**

**R4-2105745 PRS-RSRP measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

PRS-RSRP measurement requirements

**Decision: Endorsed.**

**R4-2107182 On PRS-RSRP measurement period definition**

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

**Abstract:**

Discussion on PRS-RSRP measurement period definition for NR positioning

**Decision: Noted.**

##### 5.5.1.3 UE Rx-Tx time difference measurement requirements

**R4-2104742 Discussion on UE Rx-Tx time difference measurement requirements**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104744 CR on UE Rx-Tx time difference measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: CATT*

**Decision: Merged.**

**R4-2106336 On UE Rx-Tx measurement requirements**

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

**Decision: Noted.**

**R4-2106453 Discussion on UE RX-TX time difference measurement requirements**

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

**Decision: Noted.**

**R4-2106516 Discussion on maintenance for UE Rx-Tx time difference measurements**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106517 CR to TS 38.133 on UE Rx-Tx time difference measurements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: OPPO*

**Decision: Revised to R4-2105746 (from R4-2106517).**

**R4-2105746 CR to TS 38.133 on UE Rx-Tx time difference measurements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: OPPO*

**Decision: Endorsed.**

**R4-2106626 Further discussion on UE RX-TX timing difference measurement requirements**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2106630 CR to 38.133 correction on UE Rx-Tx timing difference measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Merged.**

**R4-2107001 Discussion on remaining issues for UE Rx-Rx time difference measurement requirements**

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

**Decision: Noted.**

**R4-2107002 CR to update UE Rx-Tx time difference measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Merged.**

**R4-2107163 On UE Rx-Tx measurement requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

On UE Rx-Tx measurement requirements

**Decision: Noted.**

**R4-2107164 UE Rx-Tx measurement requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

UE Rx-Tx measurement requirements

**Decision: Merged.**

**R4-2107183 On UE RX-TX measurement period definition**

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

**Abstract:**

Discussion on UE Rx-Tx measurement period definition for NR positioning

**Decision: Noted.**

##### 5.5.1.4 Other requirements

**R4-2106337 On general PRS measurement requirements**

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

**Decision: Noted.**

**R4-2106518 Others requirements: maintenance for general PRS measurements**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106627 Further discussion on general requirements for NR positioning**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2106631 CR to 38.133 correction on CCSF for NR measurements for positioning**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Revised to R4-2105747 (from R4-2106631).**

**R4-2105747 CR to 38.133 correction on CCSF for NR measurements for positioning**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Endorsed.**

**R4-2107003 Discussion on CSSF, measurement capability and MG for PRS measurement**

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

**Decision: Noted.**

**R4-2107004 CR on CSSF, measurement capability and MG for PRS measurement 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105748 (from R4-2107004).**

**R4-2105748 CR on CSSF, measurement capability and MG for PRS measurement 38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2107005 CR to remove measurement gap pattern #25 for LTE measurement in 36.133**

*Type: draftCR For: Endorsement  
 36.133 v16.9.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105749 (from R4-2107005).**

**R4-2105749 CR to remove measurement gap pattern #25 for LTE measurement in 36.133**

*Type: draftCR For: Endorsement  
 36.133 v16.9.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2107184 Discussion on other NR positioning requirements**

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

**Abstract:**

Discussion on RSTD period definition for NR positioning

**Decision: Noted.**

#### 5.5.2 RRM perf. requirements (38.133)

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**Email discussion: [98-bis-e][207] NR\_pos\_2**

**R4-2105677 Email discussion summary: [98-bis-e][207] NR\_pos\_2***Type: other For: Information  
Source: Moderator (Intel Corporation)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105809 (from R4-2105677).**

**R4-2105809 Email discussion summary: [98-bis-e][207] NR\_pos\_2***Type: other For: Information  
Source: Moderator (Intel Corporation)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 14, 2021)

* Sub-topic 2-2 Applicable propagation channel for accuracy requirement
  + Proposals
    - Option 1 (vivo, Intel, Ericsson, OPPO). No need to define the applicability with propagation channels for accuracy requirement. (e.g. TDL-C channel model with 300 ns delay spread shall be considered also)
    - Option 2 (Huawei): Captured in the specification the propagation channel models based on which the accuracy requirements are derived, or the accuracy requirements are applicable only for AWGN
    - Option 2a (CATT): Captured in the specification the propagation channel models based on which the accuracy requirements are derived.
    - Option 3 (Qualcomm): RAN4 to consider defining PRS-RSTD and UE Rx-Tx measurement accuracy requirements only for AWGN
    - WF: Capture in the specification the propagation channel models based on which the accuracy requirements are derived.
  + Discussion
    - E///: In 38.133 Annex we do not specify any propagation conditions, so WF is not clear.
    - vivo: Agree with E///. Requirements shall be based on typical propagation channels.
    - QC: We need to specify for which channels the accuracy requirements will apply. For gNB side the accuracy requirements are defined based on AWGN. We can send a mixed signal to the ecosystem. We can define the requirements for different channels as an alternative approach.
    - Intel: Current spec does not mention the channel model, but it was noted in the last meeting that performance is very sensitive to channel models. So, we are fine to add corresponding clarifications to the specification.
    - Huawei: Do not support to define separate requirement and one set of requirements is preferred. We are fine to define requirements based on fading channel, but it should be explicitly clarified. To vivo – not sure which channel is typical.
    - CMCC: We prefer the legacy requirement approach (i.e. requirements apply to different conditions).
    - R&S: we are concerned on defining the fading test cases for positioning. Typically, these are separate systems.
    - E///: If we don’t define fading test cases, then we need to have 2 set of requirements for fading/AWGN
    - QC: Our preference is to define AWGN requirements only
    - R&S: for FR2 fading was considered for Demod and we need to have radiated 2 stage approach (wireless cable) and emulating fading for multi-cell is very complex.
  + Agreements:
    - PRS-RSTD and UE Rx-Tx measurement accuracy requirements
      * Option 1: Single set of requirements is defined for AWGN and fading conditions
      * Option 2: Two set of requirements are defined for AWGN and fading conditions
    - Test cases for accuracy requirements are defined for
      * AWGN conditions
      * FFS: fading conditions for FR1
* Sub-topic 2-6 RSTD accuracy requirements for FR1/FR2 (ref: simulation results collection)
  + Sub-topics
    - FR1 parameters
      * PRS BW, PRB & SCS
        + Option A1: BW (≥ 24; ≥48; ≥ 132) + all SCS
        + Option A2: BW (≥24; ≥52; ≥104; ≥268) + all SCS
        + Option A3: BW (24-40; 44-84; 88-168; 172-max) + all SCS
        + Option A4: BW (≥ 24; ≥ 52; ≥ 104; ≥ 268) for 15kHz and BW ( ≥ 48; ≥ 132; ≥ 272) for 30kHz SCS
        + …
      * Repetitions
        + Repetition factor [38.211]

Option B1: All

Option B2: 1, 2, 3, 4

* + - * + Repetition within slot (i.e. [38.211])

Option C1: All

* + - * + Comb size [38.211]

Option D1: All

* + - * + PRS\_NormLenthPerSlot

Option E1: 1/3/4/6

* + - * PRS Ês/Iot
        + Option F1: Same requirements for all
        + Option F2: ≥-13dB; ≥-6dB
    - Alignment?
  + Discussion
    - QC: There is a big dependency on BW and we need to have 4-5 ranges. It is also relevant UE capabilities. We suggest to consider min required repetition factor. PRS\_NormLenthPerSlot is a good option. For side conditions, we prefer to keep a single one.
    - Intel: Need to consider PRS BW. Minimize the amount of parameters. Consider min repetition and consider additional repetitions in case the performance is bad.
    - Vivo: Prefer to keep min amount of parameters
    - QC: should we use 90% of absolute error?
    - Chair: what is the source of misalignment
      * Intel: We should consider no oversampling; also there is some different in algo and interference handling. Also, the error should be integer since it is a reported value.
      * E///: We can use a scaling function to make it integer. We have oversampling in our results. We can provide updated results this week.
    - Chair: continue discussion on alignment. How to structure the requirements can be identified based on averaged results.
* Sub-topic 3-1 PRS-RSRP SINR side condition of #1
  + Proposals
    - Option 1(OPPO): -6dB
    - Option 1a (CATT): Define the side condition #1 for PRS RSRP measurement accuracy requirements in DL-AoD as -6dB.
    - Option 2 (Ericsson): -3dB
  + Agreements:
    - PRS-RSRP SINR side condition of #1 is -3dB

1st round email discussion conclusions

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc** | **Title** | **Source** | **Comments** |
| R4-2105750 | WF on NR Positioning UE Performance Requirements | Intel |  |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| [R4-2107158](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2107158.zip) |  | Ericsson, Intel | Revised |  |
| R4-2107007 |  | Huawei, Hi Silicon | Revised |  |
| [R4-2107168](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2107168.zip) |  | Ericsson | Revised |  |
| [[R4-2104747](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2104747.zip)](http://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2100446.zip) |  | CATT | Revised |  |
| [R4-2106921](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2106921.zip) |  | ZTE | Return to |  |
| [R4-2106450](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2106450.zip) |  | Intel | Return to |  |
| [R4-2106451](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2106451.zip) |  | Intel | Return to |  |
| [R4-2107170](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2107170.zip) |  | Ericsson | Return to |  |
| [R4-2107171](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2107171.zip) |  | Ericsson | Return to |  |
| [R4-2107011](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2107011.zip) |  | Huawei | Return to |  |
| [R4-2107012](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2107012.zip) |  | Huawei | Return to |  |
| [[R4-210474](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2104747.zip)](http://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2100446.zip)8 |  | CATT | Return to |  |
| R4-2106457 |  | Intel | Revised |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc No. | Revision from | Source company | Recommendation | Remarks |
| Big CR | | | | |
| R4-2105751 | [R4-2107158](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2107158.zip) | Ericsson, Intel | For email approval |  |
| CR for accuracy requirements | | | | |
| R4-2105829 | R4-2107007 | (Huawei, Hi Silicon) | Revised | To correct the denotation of “PRS resource repetition” as  “PRS resource repetition Note3 |
| R4-2105752 | [R4-2107168](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2107168.zip) | (Ericsson) | Revised | To capture the Editor notes below.  “Editor’s Note: FFS The requirements for SCS=60k in FR2  Editor’s note: The number of PRS BW ranges for each SCS is FFS” |
| R4-2105753 | [[R4-2104747](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2104747.zip)](http://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2100446.zip) | (CATT) | Revised | To remove the notes below since This note is for RSTD/UE Rx-Tx time difference requirements only.  “Editor’s note: FFS: whether to define separate requirements for AWGN and fading channel.” |
|  |  |  |  |  |
|  |  |  |  |  |
| CR for TC | | | | |
|  | [R4-2106921](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2106921.zip) | ZTE | Postponed |  |
| R4-2105837 | [R4-2106450](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2106450.zip) | Intel | Agreeable |  |
|  | [R4-2106451](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2106451.zip) | Intel | Postponed |  |
|  | [R4-2107170](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2107170.zip) | Ericsson | Postponed |  |
|  | [R4-2107171](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2107171.zip) | Ericsson | Postponed |  |
|  | [R4-2107011](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2107011.zip) | Huawei | Postponed |  |
|  | [R4-2107012](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2107012.zip) | Huawei | Postponed |  |
|  | [[R4-210474](file:///C:\Users\rhuang5\OneDrive%20-%20Intel%20Corporation\Documents\my_work\LTE_A\RAN4\98e-b\Docs\R4-2104747.zip)](http://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_98bis_e/Docs/R4-2100446.zip)8 | CATT | Postponed |  |
| WF | | | | |
| R4-2105750 | New | Intel | Agreeable |  |
| Simulation result collection and full set of the simulation parameter list | | | | |
| R4-21xxxxx | R4-2105754 | Intel | Return |  |

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**R4-2105750 WF on NR Positioning UE Performance Requirements**

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

**Abstract:**

**Discussion:**

**Decision: Approved.**

##### 5.5.2.1 General

**R4-2107158 Draft Big CR: Introduction of Rel-16 NR Positioning RRM performance requirements and test cases**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson, Intel*

**Abstract:**

Draft Big CR: Introduction of Rel-16 NR Positioning RRM performance requirements and test cases

**Decision: Revised to R4-2105751 (from R4-2107158).**

**R4-2105751 Draft Big CR: Introduction of Rel-16 NR Positioning RRM performance requirements and test cases**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson, Intel*

**Abstract:**

Draft Big CR: Introduction of Rel-16 NR Positioning RRM performance requirements and test cases

**Decision: For email approval.**

**R4-2107216 Summary of all link level accuracy simulation results for RSTD, PRS-RSRP, and UE Rx-Tx**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

Summary of all link level accuracy simulation results for RSTD, PRS-RSRP, and UE Rx-Tx

**Decision: Noted.**

##### 5.5.2.2 UE requirements and test cases

###### 5.5.2.2.1 General

**R4-2106457 Summary of link level simulation result of RSTD, PRS RSRP and UE Rx-Tx time difference**

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

**Decision: Revised to R4-2105754 (from R4-2106457).**

**R4-2105754 Summary of link level simulation result of RSTD, PRS RSRP and UE Rx-Tx time difference**

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

**Decision: Revised to R4-2105848 (from R4-2105754).**

**R4-2105848 Summary of link level simulation result of RSTD, PRS RSRP and UE Rx-Tx time difference**

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

Chair: Revise to

1. Add sampling rate assumptions
2. Add FR1 60kHz SCS for RSTD and UE RX-TX time difference (repetition 1 and 4; PRS BW – 24, 64, 132).

**Decision: Revised to R4-2105852 (from R4-2105848).**

**R4-2105852 Summary of link level simulation result of RSTD, PRS RSRP and UE Rx-Tx time difference**

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

**Decision: Revised to R4-2105857 (from R4-2105852).**

**R4-2105857 Summary of link level simulation result of RSTD, PRS RSRP and UE Rx-Tx time difference**

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

Agreements:

* Companies are encouraged to bring simulation results for the scenarios listed in R4-2105848 to finalize the requirements definition in RAN4 #99e meeting.
  + The results need to be provided for fading and AWGN propagation conditions
  + Companies are encouraged to use the sampling rate values provided in R4-2105848
  + Companies are encouraged to provide results for at least DL-PRS\_ResourceRepetitionFactor equal to 1 and 4
* RSRP methodology
  + Absolute RSRP accuracy = max(abs(RSRP95), abs(RSRP05)), where RSRPX is the RSRP error value for X-%-tile CDF point
  + Relative RSRP accuracy = (RSRP95 – RSRP05), where RSRPX is the RSRP error value for X-%-tile CDF point

**Decision: Noted.**

**R4-2106519 Simulation results of link level simulation result of RSTD and PRS RSRP**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2107169 On positioning test cases**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

On positioning test cases

**Decision: Noted.**

###### 5.5.2.2.2 Measurement accuracy requirements

**R4-2106343 NR Pos performance simulation results**

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

**Decision: Noted.**

5.5.2.2.2.1 PRS RSTD

**R4-2104745 Discussion on PRS RSTD accuracy requirements**

*Type: discussion For: Discussion  
Source :CATT*

**Decision: Noted.**

**R4-2106338 On PRS-RSTD measurement accuracy requirements**

*Source :Qualcomm Incorporated*

**Decision: Noted.**

**R4-2106454 Further Discussion on NR PRS RSTD Measurement Accuracy Requirements**

*Source: Intel Corporation*

**Decision: Noted.**

**R4-2106520 Discussion on PRS RSTD accuracy requirements**

*Source: OPPO*

**Decision: Noted.**

**R4-2106632 Further discussion on PRS RSTD accuracy requirements**

*Source: vivo*

**Decision: Noted.**

**R4-2106635 Link level simulation results for PRS RSTD**

*Source: vivo*

**Decision: Noted.**

**R4-2107006 Discussion on accuracy requirements for RSTD measurement**

*Source: Huawei, HiSilicon*

**Decision: Noted.**

**R4-2107007 draftCR to introduce accuracy requirements for RSTD measurement**

*Type: draftCR For: Endorsement  
38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105829 (from R4-2107007).**

**R4-2105829 draftCR to introduce accuracy requirements for RSTD measurement**

*Type: draftCR For: Endorsement  
38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105843 (from R4-2105829).**

**R4-2105843 draftCR to introduce accuracy requirements for RSTD measurement**

*Type: draftCR For: Endorsement  
38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2107165 On RSTD measurement accuracy requirements**

*Source: Ericsson*

**Decision: Noted.**

5.5.2.2.2.2 PRS RSRP

**R4-2104746 Discussion on PRS RSRP accuracy requirements**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104747 CR on PRS-RSRP accuracy requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: CATT*

**Decision: Revised to R4-2105753 (from R4-2104747).**

**R4-2105753 CR on PRS-RSRP accuracy requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: CATT*

**Decision: Revised to R4-2105845 (from R4-2105753).**

**R4-2105845 CR on PRS-RSRP accuracy requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: CATT*

**Decision: Endorsed.**

**R4-2106339 On PRS-RSRP measurement accuracy requirements**

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

**Decision: Noted.**

**R4-2106456 Discussion on PRS RSRP accuracy requirements for NR Positioning**

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

**Decision: Noted.**

**R4-2106521 Discussion on PRS RSRP accuracy requirements**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106633 Discussion on PRS-RSRP accuracy requirements**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2106636 Link level simulation results for PRS-RSRP**

*Type: other For: Information  
 Source: vivo*

**Decision: Noted.**

**R4-2107008 Discussion on accuracy requirements for PRS-RSRP measurement**

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

**Decision: Noted.**

**R4-2107166 On PRS-RSRP measurement accuracy requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

On PRS-RSRP measurement accuracy requirements

**Decision: Noted.**

5.5.2.2.2.3 UE Rx-Tx time difference

**R4-2106340 On UE Rx-Tx measurement accuracy requirements**

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

**Decision: Noted.**

**R4-2106455 Discussion on UE RX-TX time difference measurement accuracy requirements**

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

**Decision: Noted.**

**R4-2106522 Discussion on accuracy requirements for UE Rx-Tx time difference**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106634 Discussion on UE Rx-Tx timing difference accuracy requirements**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2106637 Link level simulation results for UE Rx-Tx timing difference**

*Type: other For: Information  
 Source: vivo*

**Decision: Noted.**

**R4-2107009 Discussion on accuracy requirements for UE Rx-Tx time difference measurement**

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

**Decision: Noted.**

**R4-2107167 On UE Rx-Tx measurement accuracy requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

On UE Rx-Tx measurement accuracy requirements

**Decision: Noted.**

**R4-2107168 UE Rx-Tx measurement accuracy requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

UE Rx-Tx measurement accuracy requirements

**Decision: Revised to R4-2105752 (from R4-2107168).**

**R4-2105752 UE Rx-Tx measurement accuracy requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

UE Rx-Tx measurement accuracy requirements

**Decision: Revised to R4-2105844 (from R4-2105752).**

**R4-2105844 UE Rx-Tx measurement accuracy requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

UE Rx-Tx measurement accuracy requirements

**Decision: Endorsed.**

###### 5.5.2.2.3 Test cases

5.5.2.2.3.1 General

**R4-2106341 Design of test cases for NR positioning**

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

**Decision: Noted.**

**R4-2106449 Discussion on NR Positioning test cases configuration**

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

**Decision: Noted.**

**R4-2106450 [draftCR] PRS configurations for NR Pos RRM tests**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Intel Corporation*

**Decision: Revised to R4-2105837 (from R4-2106450).**

**R4-2105837 [draftCR] PRS configurations for NR Pos RRM tests**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Intel Corporation*

**Decision: Endorsed.**

**R4-2106523 Discussion on remaining issues of test cases for NR positioning**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2107010 Discussion on RRM test case for UE positioning requirements**

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

**Decision: Noted.**

**R4-2107048 Test case design principles for NR Positioning**

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

**Decision: Noted.**

5.5.2.2.3.2 Measurement requirements

**R4-2104748 CR on test case for PRS-RSRP measurement requirements for FR2 in SA**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: CATT*

**Decision: Postponed.**

**R4-2106451 [draftCR] Test case of RSTD measurement requirements reporting in SA**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Intel Corporation*

**Decision: Postponed.**

**R4-2107011 draftCR to introduce TC for PRS-RSRP measurement requirements for FR1 in SA**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Postponed.**

**R4-2107170 TC5 and TC6: UE Rx-Tx time difference measurement requirements for FR1 and FR2 in SA**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

TC5 and TC6: UE Rx-Tx time difference measurement requirements for FR1 and FR2 in SA

**Decision: Postponed.**

5.5.2.2.3.3 Accuracy requirements

**R4-2106921 [draft CR] Test cases for PRS-RSRP measurement accuracy**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: ZTE Corporation*

**Decision: Postponed.**

**R4-2107012 draftCR to introduce TC for RSTD measurement accuracy for FR1 and FR2 in SA**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Postponed.**

**R4-2107171 TC11 and TC12: UE Rx-Tx time difference measurement accuracy for FR1 and FR2 in SA**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

TC11 and TC12: UE Rx-Tx time difference measurement accuracy for FR1 and FR2 in SA

**Decision: Postponed.**

###### 5.5.2.2.4 Other

##### 5.5.2.3 gNB requirements

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**Email discussion: [98-bis-e][208] NR\_pos\_3**

**R4-2105678 Email discussion summary: [98-bis-e][208] NR\_pos\_3***Type: other For: Information  
Source: Moderator (Ericsson)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105810 (from R4-2105678).**

**R4-2105810 Email discussion summary: [98-bis-e][208] NR\_pos\_3***Type: other For: Information  
Source: Moderator (Ericsson)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 14, 2021)

* Issue 4-1-2: Reference time definition if the UL RTOA accuracy requirements are defined
  + Proposals
    - Option 1:
      * Option 1a: Ericsson
        + UL RTOA Reference Time used for performing the UL RTOA measurement is locally derived by the gNB
      * Option 1b: CATT
        + The reference time in the ideal UL-RTOA is based on gNB’s interpretation of the SFN initialisation time.
    - Option 2:
      * None.
  + Discussion
    - Nokia: we are not sure if the measurement accuracy can be reused.
    - QC: UL RTOA reference time is already defined in the spec.
      * E///: 38.215 includes a definition but it is ambiguous. If we go with UL RTOA then we prefer to use more clear definition.
      * Nokia: If UL RTOA is defined, then we need to use exactly the definition in 38.215. The reference time is provided by LMF.
      * Huawei: For RAN4 to define the measurement requirement, we need to discuss ideal RTOA. For Options above we need to combine the two above.
      * QC: there should be alignment between gNB and LMF on the reference time. If it is derived locally at the gNB, then how does LMF know this?
        + E///: The signalling is already defined.
      * Chair: are there any plans to adjust RAN1 or measurement definition
        + E///: No
      * E///: current 38.215 definition is ok. The main reason for the change is to make sure that we have reliable source of time.
    - E///: quite many open issues for UL RTOA and difficult to converge
    - QC: can we define a new set of requirements?
      * E///: there may be not enough time.
    - CATT: What is the reference for measured RTOA? Why do we need to discuss ideal RTOA reference? If measured/ideal have same reference, then it is not a problem.
      * Nokia: we may need to discuss definition of ideal RTOA
      * E///: Definition of ideal RTOA is required to check the measurement accuracy performance.
  + Agreements:
    - Do not define UL RTOA performance requirements in Rel-16 NR Pos

1st round email discussion conclusions

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc** | **Title** | **Source** | **Comments** |
| R4-2105755 | WF on gNB positioning measurement requirements | Ericsson | To capture all agreements related to gNB positioning |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2106403 | gNB SRS-RSRP measurement | Ericsson | Revised |  |
| R4-2107018 | draftCR to introduce SRS-RSRP requirements | Huawei, HiSilicon | Merged |  |
| R4-2106405 | gNB Rx-Tx measurement | Ericsson | Merged |  |
| R4-2107016 | draftCR to introduce gNB Rx-Tx time difference requirements | Huawei, HiSilicon | Revised |  |
| R4-2106407 | UL RTOA requirements | Ericsson | Not pursued | No UL RTOA requirements will be defined as agreed at GTW |
| R4-2107014 | Updated link simulation assumptions for gNB positioning measurement | Huawei, HiSilicon | Revised | Update to also include SCS = 60kHz |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2105755 | WF on gNB positioning measurement requirements | Ericsson | Agreeable | Capture all agreements from GTW, first and second rounds |
| R4-2105756 (Rev of [R4-2106403](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106403.zip)) | gNB SRS-RSRP measurement | Ericsson | Agreeable | Update to previously endorsed CR at RAN4#98-e |
| R4-2105757 (Rev of [R4-2107016](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107016.zip)) | draftCR to introduce gNB Rx-Tx time difference requirements | Huawei, HiSilicon | Agreeable | Update to previously endorsed CR at RAN4#98-e |
| R4-2105758 (Rev of [R4-2107014](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107014.zip)) | Updated link simulation assumptions for gNB positioning measurement | Huawei, HiSilicon | Agreeable | Revised simulation assumption for more simulations results at RAN4#99.e |

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**R4-2105755 WF on gNB positioning measurement requirements**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Approved.**

###### 5.5.2.3.1 General

**R4-2106399 Summary of link level simulation results of SRS RSRP and gNB TOA**

*Type: other For: Information  
 Source: Ericsson*

**Abstract:**

This contribution summarizes link level simulation results and can be used to collect results from all companies

**Decision: Noted.**

**R4-2106400 gNB positioning link level simulation results**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution the results of the link level simulation results for gNB TOA and SRS-RSRP are analyzed

**Decision: Noted.**

**R4-2106922 Beam configuration for gNB measurement accuracy**

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

**Decision: Noted.**

**R4-2107013 Discussion on general issues for gNB positioning measurement requirements**

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

**Decision: Noted.**

**R4-2107014 Updated link level simulation assumption for gNB positioning measurement performance**

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

**Decision: Revised to R4-2105758 (from R4-2107014).**

**R4-2105758 Updated link level simulation assumption for gNB positioning measurement performance**

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

**Decision: Approved.**

**R4-2107177 General aspects for gNB measurement accuracy requirements**

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

**Abstract:**

Discussion on general aspects for gNB measurement accuracy requirements

**Decision: Noted.**

###### 5.5.2.3.2 SRS-RSRP requirements

**R4-2106401 gNB SRS-RSRP requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution uses simulation results analysis to propose groupings of SRS parameters for SRS-RSRP requirements definition

**Decision: Noted.**

**R4-2106403 gNB SRS-RSRP measurement**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

(Replaces R4-2104052)

**Abstract:**

draft CR to include SRS parameter groupings findings in a accuracy definition table skeleton

**Decision: Revised to R4-2105756 (from R4-2106403).**

**R4-2105756 gNB SRS-RSRP measurement**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

(Replaces R4-2104052)

**Abstract:**

draft CR to include SRS parameter groupings findings in a accuracy definition table skeleton

**Decision: Endorsed.**

**R4-2106948 Link level simulation results for SRS-RSRP**

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

**Decision: Noted.**

**R4-2107017 Discussion on SRS-RSRP requirements**

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

**Decision: Noted.**

**R4-2107018 draftCR to introduce SRS-RSRP requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Merged.**

**R4-2107178 Link simulation results for SRS-RSRP accuracy**

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

**Abstract:**

Link simulation results for SRS-RSRP accuracy for agreed SRS configurations

**Decision: Noted.**

###### 5.5.2.3.3 gNB Rx-Tx time difference requirements

**R4-2104749 Discussion on gNB Rx-Tx time difference measurement requirements**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2106342 On gNB Rx-Tx measurement accuracy requirements**

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

**Decision: Noted.**

**R4-2106404 gNB Rx-Tx time difference requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution uses simulation results analysis to propose groupings of SRS parameters for gNB TOA requirements definition

**Decision: Noted.**

**R4-2106405 gNB Rx-Tx measurement**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

(Replaces R4-2104053)

**Abstract:**

draft CR to include SRS parameter groupings findings in a accuracy definition table skeleton

**Decision: Merged.**

**R4-2106949 Link level simulation results for gNB TOA measurement**

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

**Decision: Noted.**

**R4-2107015 Discussion on gNB Rx-Tx time difference requirements**

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

**Decision: Noted.**

**R4-2107016 draftCR to introduce gNB Rx-Tx time difference requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105757 (from R4-2107016).**

**R4-2105757 draftCR to introduce gNB Rx-Tx time difference requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2107179 Link simulation results for gNB Rx-Tx time difference accuracy**

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

**Abstract:**

Link simulation results for gNB Rx-Tx time difference accuracy for agreed SRS configurations

**Decision: Noted.**

###### 5.5.2.3.4 UL RTOA requirements

**R4-2106406 UL RTOA requirements**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

This contribution discusses the side conditions for UL RTOA requirement definition

**Decision: Noted.**

**R4-2106407 UL RTOA requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

draft CR to include SRS parameter groupings findings in a accuracy definition table skeleton and adding side condition

**Decision: Not pursued.**

**R4-2107019 Discussion on UL-RTOA requirements**

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

**Decision: Noted.**

**R4-2107020 draftCR to introduce UL-RTOA requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Not pursued.**

**R4-2107180 On UL-RTOA requirements for NR positioning**

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

**Abstract:**

Discussion on introduction of RTOA requirements for NR positioning

**Decision: Noted.**

### 5.6 NR RRM requirement enhancement

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**Email discussion: [98-bis-e][209] NR\_RRM\_Enh\_1**

**R4-2105679 Email discussion summary: [98-bis-e][209] NR\_RRM\_Enh\_1***Type: other For: Information  
Source: Moderator (Intel Corporation)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105811 (from R4-2105679).**

**R4-2105811 Email discussion summary: [98-bis-e][209] NR\_RRM\_Enh\_1***Type: other For: Information  
Source: Moderator (Intel Corporation)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

1st round email discussion conclusions

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc** | **Title** | **Source** | **Comments** |
| R4-2105759 | WF on R16 RRM enhancement part 1 – BWP switching, UL spatial relation switch | Intel |  |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2106460 | CR on RRC based BWP switching on multiple CCs | Intel | Return to | Depend on the conclusion of issue 1-1-2. |
| R4-2106955 | DraftCR on maintenance of BWP Switch on multiple CCs TS38.133 | Huawei, HiSilicon | Return to | Depend on the conclusion of issue 1-1-2. |
| R4-2106956 | DraftCR on maintenance of BWP Switch on multiple CCs TS36.133 | Huawei, HiSilicon | Return to | Depend on the conclusion of issue 1-1-2. |
| R4-2107155 | Correction to RRC based BWP change delay requirements | Ericsson | Return to | Depend on the conclusion of issue 1-1-2. |
| R4-2107222 | Correction on RRC-based BWP switch on multiple CCs requirements | Nokia | Return to | Depend on the conclusion of issue 1-1-2. |
| R4-2105003 | Draft CR on UL spatial relation info switch for PUCCH | Apple | Return to | Depend on the conclusion of issue 2-1-1. |
| R4-2106935 | Update on uplink spatial relation switch delay | Huawei, HiSilicon | Return to | Depend on the conclusion of issue 2-1-1. |
| R4-2106958 | Draft CR on RRC based BWP switch on multiple CCs | Huawei, HiSilicon | Return to | Depend on the conclusion of issue 1-1-2 and issue 3-1-1. |
| R4-2104901 | CR: UL spatial relation TCs | Qualcomm, Inc. | Revised | Suggest companies to align the contents in 2nd round. |
|  |  |  |  |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2105759 | WF on R16 RRM enhancement part 1 – BWP switching, UL spatial relation switch | Intel | Agreeable |  |
| [R4-2106460](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106460.zip) | CR on RRC based BWP switching on multiple CCs | Intel | Postponed |  |
| R4-2105836  (Revised from [R4-2106955](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106955.zip)) | DraftCR on maintenance of BWP Switch on multiple CCs TS38.133 | Huawei, HiSilicon | Agreeable |  |
| [R4-2106956](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106955.zip) | DraftCR on maintenance of BWP Switch on multiple CCs TS36.133 | Huawei, HiSilicon | Agreeable |  |
| [R4-2107155](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107155.zip) | Correction to RRC based BWP change delay requirements | Ericsson | Postponed |  |
| R4-2105835  (Revised from [R4-2107222](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107155.zip) ) | Correction on RRC-based BWP switch on multiple CCs requirements | Nokia | Agreeable |  |
| R4-2105840  (Revised from [R4-2105003](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2105003.zip)) | Draft CR on UL spatial relation info switch for PUCCH | Apple | Agreeable |  |
| [R4-2106935](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2105003.zip) | Update on uplink spatial relation switch delay | Huawei, HiSilicon | Not Pursued |  |
| [R4-2106958](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98_e/Docs/R4-2101635.zip) | Draft CR on RRC based BWP switch on multiple CCs | Huawei, HiSilicon | Postponed |  |
| R4-2105760  (Revised from  [R4-2104901](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104901.zip)) | CR: UL spatial relation TCs | Qualcomm, Inc. | Agreeable |  |

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**Email discussion: [98-bis-e][210] NR\_RRM\_Enh\_2**

**R4-2105680 Email discussion summary: [98-bis-e][210] NR\_RRM\_Enh\_2***Type: other For: Information  
Source: Moderator (ZTE)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105812 (from R4-2105680).**

**R4-2105812 Email discussion summary: [98-bis-e][210] NR\_RRM\_Enh\_2***Type: other For: Information  
Source: Moderator (ZTE)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

1st round email discussion conclusions

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc** | **Title** | **Source** | **Comments** |
| R4-2105761 | WF on R16 RRM enhancement part 2 – SRS Carrier switching, CGI reading, Mandatory MG patterns | ZTE |  |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2106611 | Draft CR to 38.133 correction on SRS carrier based switching core requirements | vivo, Qualcomm, Huawei, HiSilicon, MediaTek Inc., Apple, Nokia | endorsed |  |
| R4-2106930 | Correction on SRS carrier switching | Huawei, HiSilicon | revised |  |
| [R4-2104899](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104899.zip) | CR: SRS carrier switching TCs | Qualcomm, Inc. | merged |  |
| [R4-2106613](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106613.zip) | Draft CR to 38.133 correction on SRS carrier based switching test cases | vivo | revised |  |
| [R4-2104568](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104568.zip) | DraftCR on SA CGI identification of E-UTRA neighbor cell Test Case | MediaTek inc. | merged |  |
| [R4-2104900](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104900.zip) | CR: CGI reading TCs | Qualcomm, Inc. | revised |  |
| [R4-2104863](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104863.zip) | CR for test applicability for mandatory gap patterns | Apple | revised |  |

2nd round email discussion conclusions

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| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2105762 | Correction on SRS carrier switching | Huawei, HiSilicon | Endorsed |  |
| R4-2105763 | Draft CR to 38.133 correction on SRS carrier based switching test cases | vivo | Endorsed |  |
| R4-2105764 | CR: CGI reading TCs | Qualcomm, Inc. | Endorsed |  |
| R4-2105765 | CR for test applicability for mandatory gap patterns | Apple |  | Not available after the deadline. Actually, the related open issue is quite controversial and there is little hope to converge during this meeting. So, the original CR can be postponed. |
| R4-2105761 | WF on R16 RRM enhancement part 2 – SRS Carrier switching, CGI reading, Mandatory MG patterns | ZTE Corporation | Approved |  |
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**Email discussion: [98-bis-e][211] NR\_RRM\_Enh\_3**

**R4-2105681 Email discussion summary: [98-bis-e][211] NR\_RRM\_Enh\_3***Type: other For: Information  
Source: Moderator (Apple)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105813 (from R4-2105681).**

**R4-2105813 Email discussion summary: [98-bis-e][211] NR\_RRM\_Enh\_3***Type: other For: Information  
Source: Moderator (Apple)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

1st round email discussion conclusions

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2105137 | draftCR on TS38.133 for inter-freq meas without gap | Ericsson, MediaTek | Revised |  |
| R4-2106933 | CR on the measurement requirements of needforgap | Huawei, HiSilicon | Revised |  |
| R4-2107022 | CR on remaining issues in multiple SCell activation | Huawei, HiSilicon | Revised |  |
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2nd round email discussion conclusions

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| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2105766 | draftCR on TS38.133 for inter-freq meas without gap | Ericsson, MediaTek | Agreeable | revised from R4- 2105137 |
| R4-2105767 | CR on the measurement requirements of needforgap | Huawei, HiSilicon | Postponed |  |
| R4-2105768 | CR on remaining issues in multiple SCell activation | Huawei, HiSilicon | Agreeable | revised from R4-2106933 revised from R4-2107022 |
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**R4-2105759 WF on R16 RRM enhancement part 1 – BWP switching, UL spatial relation switch**

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

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2105761 WF on R16 RRM enhancement part 2 – SRS Carrier switching, CGI reading, Mandatory MG patterns**

*Type: other For: Approval  
 Source: ZTE*

**Abstract:**

**Discussion:**

**Decision: Approved.**

#### 5.6.1 RRM core requirements maintenance (38.133)

**R4-2104481 Interruption requirements for SRS carrier based switching between different FR**

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

**Decision: Noted.**

**R4-2104630 Regarding RRC based BWP switch for Scell**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2104842 On Core Requirements Maintenance for RRM Enhancements**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2105003 Draft CR on UL spatial relation info switch for PUCCH**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Revised to R4-2105840 (from R4-2105003).**

**R4-2105840 Draft CR on UL spatial relation info switch for PUCCH**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Endorsed.**

**R4-2105137 draftCR on TS38.133 for inter-freq meas without gap**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Decision: Revised to R4-2105766 (from R4-2105137).**

**R4-2105766 draftCR on TS38.133 for inter-freq meas without gap**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson, MediaTek*

**Decision: Endorsed.**

**R4-2106458 Discussion on remaining issues for RRM enhancement in Rel-16**

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

**Decision: Noted.**

**R4-2106460 CR on RRC based BWP switching on multiple CCs**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Intel Corporation*

**Decision: Postponed.**

**R4-2106524 Discussion on remaining issues for BWP switching on multiple CCs**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106611 Draft CR to 38.133 correction on SRS carrier based switching core requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo, Qualcomm, Huawei, HiSilicon, MediaTek Inc., Apple, Nokia*

**Decision: Endorsed.**

**R4-2106612 Further discussion on SRS carrier switching between FR1 and FR2**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2106930 Correction on SRS carrier switching**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105762 (from R4-2106930).**

**R4-2105762 Correction on SRS carrier switching**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2106932 Discussion on the needforgap measurement**

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

**Decision: Noted.**

**R4-2106933 CR on the measurement requirements of needforgap**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Postponed.**

**R4-2105767 CR on the measurement requirements of needforgap**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Withdrawn.**

**R4-2106934 Discussion on uplink spatial relation switch delay for PL-RS**

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

**Decision: Noted.**

**R4-2106935 Update on uplink spatial relation switch delay**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Not pursued.**

**R4-2106954 Discussion on RRM requirements for RRC based BWP switch on multiple CCs**

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

**Decision: Noted.**

**R4-2106955 DraftCR on maintenance of BWP Switch on multiple CCs TS38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105836 (from R4-2106955).**

**R4-2105836 DraftCR on maintenance of BWP Switch on multiple CCs TS38.133**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2106956 DraftCR on maintenance of BWP Switch on multiple CCs TS36.133**

*Type: draftCR For: Endorsement  
 36.133 v16.9.0 CR- rev Cat: (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2107021 Discussion on remaining issues in multiple SCell activation**

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

**Decision: Noted.**

**R4-2107022 CR on remaining issues in multiple SCell activation**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105768 (from R4-2107022).**

**R4-2105768 CR on remaining issues in multiple SCell activation**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2107154 Analysis of RRC based BWP switch on multiple CCs**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

Further analysis based on RAN2 LS response (in R2-2102476) on RRC based BWP switch

**Decision: Noted.**

**R4-2107155 Correction to RRC based BWP change delay requirements**

*Type: draftCR For: Agreement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Ericsson*

**Abstract:**

RRC based BWP switch delay requirements are corrected. Delay requirements for change of other BWP parameter on SCell are added.

**Decision: Postponed.**

**R4-2107221 discussion on RRC-based BWP switch on multiple CCs**

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

**Abstract:**

discussion on RRC-based BWP switch on multiple CCs

**Decision: Noted.**

**R4-2107222 draftCR on RRC-based BWP switch on multiple CCs**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

draftCR on RRC-based BWP switch on multiple CCs

**Decision: Revised to R4-2105835 (from R4-2107222).**

**R4-2105835 draftCR on RRC-based BWP switch on multiple CCs**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

draftCR on RRC-based BWP switch on multiple CCs

**Decision: Endorsed.**

**R4-2107287 Maintenance on FR1 SCell Activation**

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

**Decision: Noted.**

#### 5.6.2 RRM perf. requirements maintenance (38.133)

##### 5.6.2.1 General

##### 5.6.2.2 Test cases

###### 5.6.2.2.1 SRS carrier switching requirements

**R4-2104899 CR: SRS carrier switching TCs**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm, Inc.*

**Decision: Merged.**

**R4-2106613 Draft CR to 38.133 correction on SRS carrier based switching test cases**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Revised to R4-2105763 (from R4-2106613).**

**R4-2105763 Draft CR to 38.133 correction on SRS carrier based switching test cases**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Endorsed.**

###### 5.6.2.2.2 Multiple Scell activation/deactivation

**R4-2107288 Test cases with OTA testability**

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

**Decision: Noted.**

###### 5.6.2.2.3 CGI reading requirements with autonomous gap

**R4-2104568 DraftCR on SA CGI identification of E-UTRA neighbor cell Test Case**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: MediaTek inc.*

**Decision: Merged.**

**R4-2104900 CR: CGI reading TCs**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm, Inc.*

**Decision: Revised to R4-2105764 (from R4-2104900).**

**R4-2105764 CR: CGI reading TCs**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm, Inc.*

**Decision: Endorsed.**

###### 5.6.2.2.4 BWP switching on multiple CCs

**R4-2106957 Discussion on performance requirements on RRC based BWP switch on multiple CCs**

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

**Decision: Noted.**

**R4-2106958 Draft CR on RRC based BWP switch on multiple CCs**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Postponed.**

**R4-2107223 discussion on test cases for RRC-based BWP switch on multiple CCs**

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

**Abstract:**

discussion on test cases for RRC-based BWP switch on multiple CCs

**Decision: Noted.**

###### 5.6.2.2.5 Inter-frequency measurement requirement without MG

###### 5.6.2.2.6 Mandatory MG patterns

**R4-2104480 On test cases for mandatory gap patterns**

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

**Decision: Noted.**

**R4-2104862 Test applicability for mandatory gap patterns**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2104863 CR for test applicability for mandatory gap patterns**

*Type: draftCR For: (not specified)  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Postponed.**

**R4-2105765 CR for test applicability for mandatory gap patterns**

*Type: draftCR For: (not specified)  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Apple*

**Decision: Withdrawn.**

**R4-2104947 Discussion on test cases for mandatory MG patterns**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2106886 On test case applicability for mandatory measurement gaps in R15/R16**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Discussion on test case applicability for measurement gaps.

**Decision: Noted.**

**R4-2106931 Discussion on mandatory gap pattern test**

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

**Decision: Noted.**

###### 5.6.2.2.7 UE-specific CBW change

###### 5.6.2.2.8 Spatial relation switch for uplink

**R4-2104901 CR: UL spatial relation TCs**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm, Inc.*

**Decision: Revised to R4-2105760 (from R4-2104901).**

**R4-2105760 CR: UL spatial relation TCs**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm, Inc.*

**Decision: Endorsed.**

###### 5.6.2.2.9 Inter-band CA requirement for FR2 UE measurement capability of independent Rx beam

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

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**Email discussion: [98-bis-e][212] NR\_CSIRS\_L3meas\_1**

**R4-2105682 Email discussion summary: [98-bis-e][212] NR\_CSIRS\_L3meas\_1***Type: other For: Information  
Source: Moderator (CATT)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105814 (from R4-2105682).**

**R4-2105814 Email discussion summary: [98-bis-e][212] NR\_CSIRS\_L3meas\_1***Type: other For: Information  
Source: Moderator (CATT)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 13, 2021)

* Issue 2-3: Timing offset and upper limit of side condition for specifying CSI-SINR measurement accuracy requirements
  + RAN4 #98 agreement
    - The upper limit of Es/Iot for CSI-SINR measurement with timing offset(T△)
      * Option 1: Es/Iot ≤ [10] dB for the case that timing offset is within CP.
      * Option 2: Es/Iot ≤ [18] dB for the case that timing offset is within CP/2.
  + Proposals
    - Specify CSI-SINR accuracy requirement based on one of the following options on timing offset between the reference measurement timing and the target CSI-RS (TΔ) and Es/Iot side condition
      * When |TΔ |≤ CP/2
        + Option 1: (MTK, vivo)

Es/Iot ≤ 25 dB for AWGN only

* + - * + Option 2: (Qualcomm)

Es/Iot ≤ [18]dB

* + - * When |TΔ |≤ CP
        + Option 3: (MTK)

Es/Iot ≤ 0 dB

* + - * + Option 4: (CATT)

Es/Iot ≤ 15 dB

* + - * When |TΔ |≤ 0.9\*CP
        + Option 5: (OPPO)

Es/Iot ≤ [12] dB

* + - * + Option 6: (Huawei)

Es/Iot ≤ 6dB

* + - * Option 7: (CMCC)
        + Both |TΔ |≤ CP with Es/Iot ≤ [10] dB and |TΔ |≤ CP/2 with Es/Iot ≤ [18] dB are applied. But choose one to design the test cases.
  + Discussion
    - QC: fine with Option 2. See some degradation for > CP/2 and Es/Iot > 10dB
    - Apple: fine with Option 2. Need to consider positive/negative offsets. In this case CP/2 is fine. Prefer a single set of requirements.
    - Huawei: CP/2 and Es/Iot = 15 dB
    - CMCC: Prefer to keep Es/Iot from the last meeting. The requirements shall be applicable for both options and define test cases for single scenario (e.g. CP/2).
    - OPPO: One set of requirements. Option 5 or 2
    - MTK: One set of requirements. CP/2 is preferred.
    - Vivo: CP/2 is preferred to define the requirements. 18dB is a bit challenging. 15dB can be considered. Alternatively, AWGN can be used with higher Es/Iot
    - CATT: requirements can be defined for both sets
    - CMCC: need to have 2 set of requirements
      * Intel: If we define 2 sets of requirements, does UE need to pass both test cases? Single set of requirements is preferred.
      * Huawei: we are ok with 2 set of requirements but only one of them is tested
      * MTK: prefer to follow the previous meeting agreements and keep a single set of requirements.
      * Apple: Agree with MTK
      * CMCC: have strong concerns on going with a single set of side conditions with CP/2.
    - CMCC: for |TΔ|≤ CP/2 prefer to keep 18 dB Es/IoT condition
  + Agreements:
    - Specify CSI-SINR accuracy requirement based on one of the following options on timing offset between the reference measurement timing and the target CSI-RS (TΔ) and Es/Iot side condition(s)
      * Side condition #1:
        + |TΔ|≤ CP/2
        + Es/IoT

Option A: Es/Iot ≤ 18 dB

Option C: Es/Iot ≤ 15 dB

* + - * FFS: Side condition #2
        + |TΔ|≤ CP
        + No dedicated test cases will be introduced for Side condition #2 if introduced
        + Side condition #2 is subject to decision in RAN4 #98-bis-e
* Sub-topic 1-2 Time domain restriction for CSI-RS configuration
  + RAN4 #98e agreements
    - On CSI-RS resources in the same MO with different offset
      * Option 1: All CSI-RS resources in the same MO are configured in the same 5ms window.
      * Option 2: Different CSI-RS resources in the same MO may fall in different 5ms window.
  + Proposals
    - Option 1: (Xiaomi, CATT, Apple, Intel, OPPO, vivo, Qualcomm)
      * No. All CSI-RS resources in the same MO are configured in the same 5ms window.
    - Option 2a: (Nokia, Huawei)
      * Yes. Different CSI-RS resources in the same MO may fall in different 5ms window
    - Option 3a: (CATT)
      * The CSI-RS resources can be configured as
        + where and are time offsets (in millisecond) of CSI-RS resource i and j respectively.
    - Option 3b: (vivo)
      * All CSI-RS resources in the same MO are configured in the same 5ms window for inter frequency measurement, and measurement requirements should allow all CSI-RS resources in the same MO are configured in two separated 5ms windows during one CSI-RS resource period for intra frequency measurement.
  + Discussion
    - CATT: one possible compromise is to have same 5ms window for inter-frequency and different windows for intra-frequency
    - Huawei: Support compromise proposal
    - Nokia: 5ms is the restriction to the network configuration. Prefer Option 2a
    - Apple: Support option 1. To Nokia, we can define a single periodicity and single offset for all CSI-RS in the same MO. It is up to the NW whether to configure all CSI-RS in the 5ms window and if it is outside then UE may not measure it.
    - MTK: Have concerns on CATT suggestion.
    - CMCC: See benefit of having different 5ms window. Support CATT suggestion.
    - vivo: Option 1. Can compromise to CATT suggestion.
    - Xiaomi: Have some concerns on CATT suggestion. It is still not feasible.
    - Qualcomm: Option 1. Not supporting Option 2 does not break the functionality
    - Intel: Option 1.
    - OPPO: Do not agree with CATT suggestion.
    - Nokia/Huawei: Objection on Option 1.
    - Apple: we just say that the requirement are define under certain assumption. We still need to define some applicability rules.
    - Nokia: It may be still be problematic to fit all CSI-RS resources in the same 5ms window
    - Vivo: Option 1 is aligned with current spec
      * MTK: same view with vivo. However, spec may have some ambiguity.
      * Huawei: Current spec does not say “same 5ms” window
      * Nokia: Share the view with Huawei
        + Spec:
        + *The requirements in this clause apply, provided:*
        + *- Only one MO is configured on the CSI-RS layer, and*
        + *- all CSI-RS resources in the same MO are configured with the same csi-rs-MeasurementBW, and*
        + *- associated SSB is QCLed with the corresponding CSI-RS resources in FR2, and*
        + *- the CSI-RS resources on one frequency layer are configured within a window of up to 5ms where the measurements of CSI-RS on the frequency layer are to be performed, and*
  + Agreements:
    - On CSI-RS resources in the same MO with different offset
      * Option 1: Rel-16 L3 CSI-RS requirements are defined under assumption that all CSI-RS resources in the same MO are configured in the same 5ms window
        + Note: It is up to the network whether to configure all CSI-RS in the 5ms window and if CSI-RS resources are configured outside then UE may not measure it and the requirements do not apply.
      * Option 2: Keep the current specification unchanged
      * Option 3: All CSI-RS resources in the same MO are configured in the same 5ms window for inter frequency measurement, and measurement requirements should allow all CSI-RS resources in the same MO are configured in two separated 5ms windows during one CSI-RS resource period for intra frequency measurement.

1st round email discussion conclusions

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc** | **Title** | **Source** | **Comments** |
| R4-2105769 | WF on performance requirements of CSI-RS based L3 measurement | CATT, OPPO |  |
| R4-2105770 | WF on core part maintenance of CSI-RS based L3 measurement requirements | Apple |  |
| R4-2105771 | Draft Big CR: Introduction of Rel-16 CSI-RS based L3 measurement RRM performance requirements | CATT |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2104734 | draft CR on CSI-RS based L3 measurement | CATT | Revised |  |
| R4-2106620 | Draft CR to 38.133 Correction on core requirements for CSI-RS based measurement | vivo | Revised |  |
| R4-2106927 | CR on CSI-RS based intra-frequency scheduling restriction | Huawei | Merged |  |
| R4-2106928 | CR on CSI-RS measurement window and intra-frequency measurements | Huawei | Revised |  |
| R4-2106929 | Adding intra-frequency CSI-RS measurement in CSSF | Huawei | Agreeable |  |
| R4-2104737 | draft CR on performance requirement for CSI-RSRP | CATT | Revised |  |
| R4-2104738 | draft CR on performance requirement for CSI-RSRQ | CATT | Revised |  |
| R4-2104739 | draft CR on performance requirement for CSI-SINR | CATT | Agreeable |  |
| R4-2106412 | 38.133 draftCR on the CSI-RSRP accuracy requirements | Nokia | Revised |  |
| R4-2107025 | draftCR on CSI-SINR accuracy requirements | Huawei | Revised |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2105769 | WF on performance requirements of CSI-RS based L3 measurement | CATT,OPPO | Agreeable |  |
| R4-2105770 | WF on core part maintenance of CSI-RS based L3 measurement requirements | Apple | Agreeable |  |
| R4-2105771 | Draft Big CR: Introduction of Rel-16 CSI-RS based L3 measurement RRM performance requirements | CATT | For email approval |  |
| R4-2105772 | draft CR on CSI-RS based L3 measurement | CATT | Agreeable |  |
| R4-2105773 | Draft CR to 38.133 Correction on core requirements for CSI-RS based measurement | vivo | Agreeable |  |
| R4-2105774 | CR on CSI-RS measurement window and intra-frequency measurements | Huawei | Withdrawn | The previous version R4-2106928 can be postponed |
| R4-2105775 | draft CR on performance requirement for CSI-RSRP | CATT | Agreeable |  |
| R4-2105776 | draft CR on performance requirement for CSI-RSRQ | CATT | Agreeable |  |
| R4-2105777 | 38.133 draftCR on the CSI-RSRP accuracy requirements | Nokia | Agreeable |  |
| R4-2105778 | draftCR on CSI-SINR accuracy requirements | Huawei | Agreeable |  |

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**Email discussion: [98-bis-e][213] NR\_CSIRS\_L3meas\_2**

**R4-2105683 Email discussion summary: [98-bis-e][213] NR\_CSIRS\_L3meas\_2***Type: other For: Information  
Source: Moderator (OPPO)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105815 (from R4-2105683).**

**R4-2105815 Email discussion summary: [98-bis-e][213] NR\_CSIRS\_L3meas\_2***Type: other For: Information  
Source: Moderator (OPPO)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

1st round email discussion conclusions

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| [R4-2106529](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106529.zip) | Discussion on remaining issues for CSI-RS L3 measurement tests | OPPO | Noted |  |
| [R4-2104740](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104740.zip) | draft CR on test case for intra-frequency CSI-RS based measurement | CATT | Revised | Update time offset based on conclusion of [211] and check test requirements |
| [R4-2106413](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106413.zip) | 38.133 CR on the test case of EN-DC event triggered reporting for intra-frequency CSI-RS based measurements in FR1 | Nokia, Nokia Shanghai Bell | Revised | Check the endorsed big CR for alignment.  Update time offset based on conclusion of [211] and check test requirements |
| [R4-2106530](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106530.zip) | Updated CR on CSI-RS based L3 measurement RRM test cases | OPPO | Revised | It is reserved for draft big CR |
| [R4-2107172](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107172.zip) | Draft test case of CSI-RS based intra-frequency test for EN-DC event triggered reporting tests without gap for NR neighbor cell in FR2 | Qualcomm CDMA Technologies | Revised | Update time offset based on conclusion of [211] and check test requirements |
| [R4-2106623](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106623.zip) | Draft CR to 38.133 on SA event triggered reporting tests with gap for NR neighbor cell in FR2 | vivo | Revised | check the endorsed big CR for alignment. Update time offset based on conclusion of [211] and check test requirements |
| [R4-2104579](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104579.zip) | Draft CR to update timing offset in test case for CSI-SINR in SA FR2 | MediaTek inc. | Merged or Postponed | It can be merged into draft big CR, if any conclusion was achieved on time offset. Otherwise, suggest to be Postponed |
| [R4-2106414](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106414.zip) | 38.133 CR on the TC of CSI-RSRP accuracy requirement in EN-DC in FR1 | Nokia, Nokia Shanghai Bell | Merged or Postponed | Similar to the above one. |
| [R4-2106621](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106621.zip) | Draft CR to 38.133 on test cases for EN-DC CSI-SINR measurement accuracy | vivo | Merged or Postponed | Similar to the above one. |
| [R4-2106622](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106622.zip) | Draft CR to 38.133 on CSI-RSRQ measurement accuracy for NR neighbor cell in FR2 | vivo | Merged or Postponed | Similar to the above one. |
| [R4-2107026](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107026.zip) | draft CR to update TC3 and TC12 for CSI-RS accuracy test | Huawei, HiSilicon | Merged or Postponed | Similar to the above one. |
| [R4-2107173](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107173.zip) | Draft test case of measurement performance for EN-DC CSI-RSRP measurement accuracy for NR neighbor cell in FR2 | Qualcomm CDMA Technologies | Merged or Postponed | Similar to the above one. |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| [R4-2105779](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104740.zip) | draft CR on test case for intra-frequency CSI-RS based measurement | CATT | Agreeable |  |
| R4-2105780 | 38.133 CR on the test case of EN-DC event triggered reporting for intra-frequency CSI-RS based measurements in FR1 | Nokia, Nokia Shanghai Bell | Agreeable |  |
| R4-2105781 | Updated CR on CSI-RS based L3 measurement RRM test cases | OPPO | Agreeable |  |
| R4-2105782 | Draft test case of CSI-RS based intra-frequency test for EN-DC event triggered reporting tests without gap for NR neighbor cell in FR2 | Qualcomm CDMA Technologies | Agreeable |  |
| R4-2105783 | Draft CR to 38.133 on SA event triggered reporting tests with gap for NR neighbor cell in FR2 | vivo | Agreeable |  |
| [R4-2104579](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2104579.zip) | Draft CR to update timing offset in test case for CSI-SINR in SA FR2 | MediaTek inc. | Merged | Merged into R4-2105781. |
| [R4-2106414](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106414.zip) | 38.133 CR on the TC of CSI-RSRP accuracy requirement in EN-DC in FR1 | Nokia, Nokia Shanghai Bell | Merged | Merged into R4-2105781. |
| [R4-2106621](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106621.zip) | Draft CR to 38.133 on test cases for EN-DC CSI-SINR measurement accuracy | vivo | Merged | Merged into R4-2105781. |
| [R4-2106622](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2106622.zip) | Draft CR to 38.133 on CSI-RSRQ measurement accuracy for NR neighbor cell in FR2 | vivo | Merged | Merged into R4-2105781. |
| [R4-2107026](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107026.zip) | draft CR to update TC3 and TC12 for CSI-RS accuracy test | Huawei, HiSilicon | Merged | Merged into R4-2105781. |
| [R4-2107173](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107173.zip) | Draft test case of measurement performance for EN-DC CSI-RSRP measurement accuracy for NR neighbor cell in FR2 | Qualcomm CDMA Technologies | Merged | Merged into R4-2105781. |

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#### 5.7.1 RRM core requirements maintenance (38.133)

**R4-2105770 WF on core part maintenance of CSI-RS based L3 measurement requirements**

*Type: other For: Approval  
 Source: Apple*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104692 Discussion on the remaining issues for CSI-RS L3 measurement**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2104733 Discussion on core part maintenance open issues**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104734 draft CR on CSI-RS based L3 measurement**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: CATT*

**Decision: Revised to R4-2105772 (from R4-2104734).**

**R4-2105772 draft CR on CSI-RS based L3 measurement**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: CATT*

**Decision: Endorsed.**

**R4-2104836 On remaining issues of RRM core requirements for CSI-RS based L3 measurement**

*Type: discussion For: Agreement  
 38.133 v CR- rev Cat: (Rel-16)  
  
 Source: Apple*

**Decision: Noted.**

**R4-2106410 Open issues on the CSI-RS based measurement requirements**

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

**Decision: Noted.**

**R4-2106459 Discussion about CSI-RS L3 measurement**

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

**Decision: Noted.**

**R4-2106525 On the remaining issues of CSI-RS based L3 measurement**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106614 Remaining issues on CSI-RS L3 measurement core requirements**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2106620 Draft CR to 38.133 Correction on core requirements for CSI-RS based measurement**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Revised to R4-2105773 (from R4-2106620).**

**R4-2105773 Draft CR to 38.133 Correction on core requirements for CSI-RS based measurement**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Endorsed.**

**R4-2106926 Discussion on remaining issues for CSI-RS based L3 measurement**

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

**Decision: Noted.**

**R4-2106927 CR on CSI-RS based intra-frequency scheduling restriction**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Merged.**

**R4-2106928 CR on CSI-RS measurement window and intra-frequency measurements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Postponed.**

**R4-2105774 CR on CSI-RS measurement window and intra-frequency measurements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Withdrawn.**

**R4-2106929 Adding intra-frequency CSI-RS measurement in CSSF**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2107218 Remaining issues of CSI-RS L3 core requirements**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-16)  
  
 Source: Qualcomm CDMA Technologies*

**Abstract:**

Views on CMTC window and TDD scheduling restriction

**Decision: Noted.**

**R4-2107365 Remaining issues of CSI-RS L3 core requirements**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-16)  
  
 Source: Qualcomm CDMA Technologies*

**Decision: Noted.**

#### 5.7.2 RRM perf. requirements (38.133)

**R4-2105769 WF on performance requirements of CSI-RS based L3 measurement**

*Type: other For: Approval  
 Source: CATT, OPPO*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2105771 Draft Big CR: Introduction of Rel-16 CSI-RS based L3 measurement RRM performance requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: CATT*

**Abstract:**

**Discussion:**

**Decision: For email approval.**

##### 5.7.2.1 General

**R4-2106411 Discussion on the performance of CSI-RS based measurements**

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

**Decision: Noted.**

**R4-2106615 Further discussion on accuracy requirements for CSI-RS based measurement**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

##### 5.7.2.2 Measurement accuracy requirements

###### 5.7.2.2.1 CSI-RSRP requirements

**R4-2104577 CSI-RSRP measurement accuracy requirement**

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

**Decision: Noted.**

**R4-2104735 Discussion on performance requirement for CSI-RSRP**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104737 draft CR on performance requirement for CSI-RSRP**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: CATT*

**Decision: Revised to R4-2105775 (from R4-2104737).**

**R4-2105775 draft CR on performance requirement for CSI-RSRP**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: CATT*

**Decision: Endorsed.**

**R4-2104937 Simulation results for CSI-RSRP**

*Type: discussion For: Information  
 Source: CMCC*

**Decision: Noted.**

**R4-2104940 Discussion on CSI-RSRP measurement accuracy**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2106412 38.133 draftCR on the CSI-RSRP accuracy requirements**

*Type: draftCR For: Discussion  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2105777 (from R4-2106412).**

**R4-2105777 38.133 draftCR on the CSI-RSRP accuracy requirements**

*Type: draftCR For: Discussion  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Endorsed.**

**R4-2106526 Simulation results for CSI-RS RSRP accuracy requirements**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106616 Updated simulation results for CSI-RSRP measurement accuracy**

*Type: other For: Information  
 Source: vivo*

**Decision: Noted.**

**R4-2107023 Discussion on CSI-RSRP accuracy requirements**

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

**Decision: Noted.**

**R4-2107214 Updated simulation results for CSI-RSRP measurement**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-16)  
  
 Source: Qualcomm CDMA Technologies*

**Decision: Noted.**

###### 5.7.2.2.2 CSI-RSRQ requirements

**R4-2104738 draft CR on performance requirement for CSI-RSRQ**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: CATT*

**Decision: Revised to R4-2105776 (from R4-2104738).**

**R4-2105776 draft CR on performance requirement for CSI-RSRQ**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: CATT*

**Decision: Endorsed.**

**R4-2104938 Simulation results for CSI-RSRQ**

*Type: discussion For: Information  
 Source: CMCC*

**Decision: Noted.**

**R4-2104941 Discussion on CSI-RSRQ measurement accuracy**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2106527 Simulation results for CSI-RS RSRQ accuracy requirements**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106617 Updated simulation results for CSI-RSRQ measurement accuracy**

*Type: other For: Information  
 Source: vivo*

**Decision: Noted.**

###### 5.7.2.2.3 CSI-SINR requirements

**R4-2104578 CSI-SINR measurement accuracy requirement**

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

**Decision: Noted.**

**R4-2104736 Discussion on performance requirement for CSI-SINR**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104739 draft CR on performance requirement for CSI-SINR**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: CATT*

**Decision: Endorsed.**

**R4-2104942 Discussion on side condition for CSI-SINR measurement**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2106528 Discussion and simulation results for CSI-RS SINR accuracy requirements**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106618 Updated simulation results for CSI-SINR measurement accuracy**

*Type: other For: Information  
 Source: vivo*

**Decision: Noted.**

**R4-2106619 Further iscussion on CSI-SINR measurement accuracy requirements**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2107024 Discussion on CSI-SINR accuracy requirements**

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

**Decision: Noted.**

**R4-2107025 draftCR on CSI-SINR accuracy requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Revised to R4-2105778 (from R4-2107025).**

**R4-2105778 draftCR on CSI-SINR accuracy requirements**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Endorsed.**

**R4-2107215 Updates on simulation results for CSI-SINR measurement**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-16)  
  
 Source: Qualcomm CDMA Technologies*

**Decision: Noted.**

##### 5.7.2.3 Test cases

###### 5.7.2.3.1 General

**R4-2106529 Discussion on remaining issues for CSI-RS L3 measurement tests**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

###### 5.7.2.3.2 Intra-frequency measurement

**R4-2104740 draft CR on test case for intra-frequency CSI-RS based measurement**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: CATT*

**Decision: Revised to R4-2105779 (from R4-2104740).**

**R4-2105779 draft CR on test case for intra-frequency CSI-RS based measurement**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: B (Rel-16)  
  
 Source: CATT*

**Decision: Endorsed.**

**R4-2106413 38.133 CR on the test case of EN-DC event triggered reporting for intra-frequency CSI-RS based measurements in FR1**

*Type: draftCR For: Discussion  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Revised to R4-2105780 (from R4-2106413).**

**R4-2105780 38.133 CR on the test case of EN-DC event triggered reporting for intra-frequency CSI-RS based measurements in FR1**

*Type: draftCR For: Discussion  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Endorsed.**

**R4-2106530 Updated CR on CSI-RS based L3 measurement RRM test cases**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: OPPO*

**Decision: Revised to R4-2105781 (from R4-2106530).**

**R4-2105781 Updated CR on CSI-RS based L3 measurement RRM test cases**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: OPPO*

**Decision: Endorsed.**

**R4-2107172 Draft test case of CSI-RS based intra-frequency test for EN-DC event triggered reporting tests without gap for NR neighbor cell in FR2**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm CDMA Technologies*

**Abstract:**

Remove the bracket for cell timing difference based on the endorsed big CR R4-2101533

**Decision: Revised to R4-2105782 (from R4-2107172).**

**R4-2105782 Draft test case of CSI-RS based intra-frequency test for EN-DC event triggered reporting tests without gap for NR neighbor cell in FR2**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm CDMA Technologies*

**Abstract:**

Remove the bracket for cell timing difference based on the endorsed big CR R4-2101533

**Decision: Endorsed.**

###### 5.7.2.3.3 Inter-frequency measurement

**R4-2106623 Draft CR to 38.133 on SA event triggered reporting tests with gap for NR neighbor cell in FR2**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Revised to R4-2105783 (from R4-2106623).**

**R4-2105783 Draft CR to 38.133 on SA event triggered reporting tests with gap for NR neighbor cell in FR2**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Endorsed.**

###### 5.7.2.3.4 Measurement performance

**R4-2104579 Draft CR to update timing offset in test case for CSI-SINR in SA FR2**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: MediaTek inc.*

**Decision: Merged.**

**R4-2106414 38.133 CR on the TC of CSI-RSRP accuracy requirement in EN-DC in FR1**

*Type: draftCR For: Discussion  
 38.133 v16.7.0 CR- rev Cat: (Rel-16)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Merged.**

**R4-2106621 Draft CR to 38.133 on test cases for EN-DC CSI-SINR measurement accuracy**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Merged.**

**R4-2106622 Draft CR to 38.133 on CSI-RSRQ measurement accuracy for NR neighbor cell in FR2**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: vivo*

**Decision: Merged.**

**R4-2107026 draft CR to update TC3 and TC12 for CSI-RS accuracy test**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Huawei, HiSilicon*

**Decision: Merged.**

**R4-2107173 Draft test case of measurement performance for EN-DC CSI-RSRP measurement accuracy for NR neighbor cell in FR2**

*Type: draftCR For: Endorsement  
 38.133 v16.7.0 CR- rev Cat: F (Rel-16)  
  
 Source: Qualcomm CDMA Technologies*

**Abstract:**

Remove the bracket for cell timing offset based on endorsed big CR R4-2101533

**Decision: Merged.**

## 6 Rel-16 UE feature list

**R4-2104858 On R16 NR HST UE capabilities**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2106442 Discussion on UE capabilities**

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

**Decision: Noted.**

**R4-2106989 Discussion on per-FR gap capability**

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

**Decision: Noted.**

GTW session (April 16, 2021)

**Topic#1: NR support for high speed train scenario**

* Issue 1-1: Separately support NR HST RRM and NR-LTE inter-RAT HST RRM
  + Proposals
    - Option 1 (ZTE): follow LTE methodology, i.e. to update 10-1 to indicate support of intra-NR HST and introduce 10-4 to indicate support of NR-LTE inter-RAT HST
    - Option 2 (Apple): add two new capabilities to
      * 10-4) indicate the support of intra-NR HST RRM measurement with speed up to 500km/h
      * 10-5) indicate the support of NR-LTE inter-RAT RRM measurement with speed up to 500km/h
      * Note: UE can indicate support of 10-4 or 10-5 only if 10-1 is NOT supported.
    - Option 3 (MTK, vivo): RAN4 can clarify the UE behavior in the note of this feature group, e.g., if UE does not support LTE or does not support LTE in HST, UE does not need to meet the inter-RAT measurement requirement.
    - Option 4 (Huawei): Do not have separate UE capability for support of NR HST RRM and NR-LTE inter-RAT HST RRM.
    - Option 5 (Samsung): Consider to allow UE separate the capability for NR HST RRM and NR-LTE inter-RAT HST RRM in future release, e.g. Rel-17.
  + Discussion
    - Apple: UE are not allowed to separately indicate the support of NR HST RRM and NR-LTE inter-RAT HST RRM. Option 2 aims to resolve possible NBC issues. For Option 3 – in our gNB may not decode UE LTE capabilities and still configure inter-RAT measurements.
    - OPPO: Share same concern on current indication. Support Option 2 and compromise to Option 3.
    - CMCC: This capability was discussed and approved 1 year ago. Option 1 is NBC. Option 2 will affect the gNB implementation. Option 3 – need gNB vendors confirm if they decode the capabilities for LTE.
      * Apple: Option 2 aims to resolve the issue. No drawbacks if BS is not upgraded but it would be helpful if gNB is upgraded.
    - Huawei: We can support Option 2. For Option 3 – gNB may not decode UE LTE capabilities for NR SA at least. For EN-DC it is not clear as well whether all capabilities are exchanged.
    - Intel: Option 3 is aligned with our proposal. Even if gNB does not know the capability, UE can still be allowed not to meet the requirements. Can it work as well? Option 2 is also fine.
      * Apple: In principle we also need to clarify UE behavior.
    - vivo: Option 2 is fine.
    - Intel: We think it is better not to touch the 10-1 and introduce new features.
    - Intel: Some UEs can support NR measurements with 500km/h. But it may have incapable LTE module (e.g. LTE support 350km/h). UE may make the measurements but cannot make HO or redirected to the LTE 500km/h cell. Suggest to adjust the description of capabilities – let gNB know on the respective LTE UE capabilities. Recommend to further look into this.
      * Apple: For this issue the UE shall not indicate 10-5
      * CMCC: It also depends on the network deployment. No need to report UE LTE capabilities to the gNB.
  + Agreements:
    - Add two new UE capabilities to
      * 10-4) Support of intra-NR HST RRM measurement with speed up to 500km/h
      * 10-5) Support of NR-LTE inter-RAT RRM measurement with speed up to 500km/h
      * Note 1: UE can indicate support of 10-4 or 10-5 only if 10-1 is NOT supported.
      * Note 2: The principle of adding the capabilities is to avoid the NBC issues

GTW session (April 19, 2021)

**Topic#2: per-FR gap capability**

* Issue 2-1: Whether to introduce per-BC indication of per-FR measurement gap UE capabilities
  + Proposals
    - Option 1 (Huawei, Intel, QC): Keep the original per UE per-FR gap indication and add new Per BC indication for the per-FR gap capacity in Rel-16.
    - Option 2 (Nokia, MTK, Ericsson): Do not introduce per-BC indication of per-FR measurement gap UE capabilities in Rel-16
  + Discussion
    - Moderator: Companies raised some concerns on the limitations of current per-FR gap
    - E///: Quite late in Rel-16. Impact on the existing requirements needs to be addressed. We should go through the requirements. Fine to discuss in TEI17 or some companies suggested to include in FeRRM.
    - QC: Option 1 is already a compromise for us. We do not see technical reason why Option 1 cannot work
    - Apple: Too late to discuss. We can consider this in FeRRM. Concern on TEI17 since it is expected at a late stage.
    - Intel: To E/// we think that it is not required to revisit the existing requirements. We also agree with Apple’s suggestion to consider alternative capabilities.
    - Huawei: We already defined requirements for current capabilities. There will be no ambiguity in case new capabilities are defined.
    - vivo: We are open to further to discuss in case there is not much impact to the existing requirements.
    - MTK: We think that there are no issues with the existing capabilities.
  + Tentative Agreements:
    - Do not introduce per-BC indication of per-FR measurement gap UE capabilities in Rel-16
    - Add the following statement to the chairman notes: RAN4 has a common understanding that further enhancements to the per-FR measurement gap UE capabilities can be further studied in Rel-17 (e.g. in FeRRM WI) and is subject to RAN plenary approval and available time budget.
  + QC: object. prefer to discuss in the May meeting.
  + Session chair: no consensus reached in this meeting. The discussion can continue in May meeting and shall be concluded.

**R4-2105831 WF on NR HST UE capabilities**

*Type: other For: Approval  
 Source: CMCC*

**Abstract:**

**Discussion:**

Session chair: may need revision (table is wrong)

**Decision: Revised to R4-2105853 (from R4-2105831).**

**R4-2105853 WF on NR HST UE capabilities**

*Type: other For: Approval  
 Source: CMCC*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2105832 Rel-16 UE feature list**

*Type: other For: Approval  
 Source: CMCC*

**Abstract:**

**Discussion:**

Session chair: may need revision (table is wrong)

**Decision: Revised to R4-2105854 (from R4-2105832).**

**R4-2105854 Rel-16 UE feature list**

*Type: other For: Approval  
 Source: CMCC*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2105833 LS on RAN4 UE feature list**

*Type: LS Out For: Approval  
To: RAN2; CC: RAN1  
Source: CMCC*

**Abstract:**

**Discussion:**

Session chair: may need revision (table is wrong)

**Decision: Revised to R4-2105855 (from R4-2105833).**

**R4-2105855 LS on RAN4 UE feature list**

*Type: LS Out For: Approval  
To: RAN2; CC: RAN1  
Source: CMCC*

**Abstract:**

**Discussion:**

**Decision: Approved.**

## 7 Rel-17 spectrum related Work Items for NR

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

**Email discussion: [98-bis-e][214] Spectrum\_RRM**

**R4-2105684 Email discussion summary: [98-bis-e][214] Spectrum\_RRM***Type: other For: Information  
Source: Moderator (Ericsson)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105816 (from R4-2105684).**

**R4-2105816 Email discussion summary: [98-bis-e][214] Spectrum\_RRM***Type: other For: Information  
Source: Moderator (Ericsson)*

**Abstract:**

**Discussion:**

Session chair: not available

**Decision: Noted.**

1st round email discussion conclusions

New tdocs

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105784 | WF on RRM requirements for spectrum WIs | Ericsson | To capture agreements on RRM requirements for all the spectrum related WIs |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| [R4-2107148](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107148.zip) | RRM core requirements for band n262 in 38.133 | Ericsson | Return to | Following up RF group discussion on PC1/2/4 |
| [R4-2107150](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_98bis_e/Docs/R4-2107150.zip) | RRM performance requirements for band n262 in 38.133 | Ericsson | Return to | Following up RF group discussion on PC1/2/4 |
|  |  |  |  |  |
|  |  |  |  |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2105784 | WF on RRM requirements for spectrum WIs | Ericsson | Agreeable |  |
| R4-2107148 | RRM core requirements for band n262 in 38.133 | Ericsson | Agreeable | This is proposed Big CR. It contains only PC3 and is based on agreed CR in R4-2103666, which was converted to endorsed CR at RAN |
| R4-2107150 | RRM performance requirements for band n262 in 38.133 | Ericsson | Agreeable | It contains only PC3. Other PCs, PC1/2/4 will be included in future based on RF agreement |
|  |  |  |  |  |

**R4-2105784 WF on RRM requirements for spectrum WIs**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Approved.**

### 7.25 Introduction of channel bandwidths 35MHz and 45MHz for NR

#### 7.25.5 RRM requirements

**R4-2104602 Discussion on impact of 35MHz and 45MHz introduction on RRM test cases**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2106940 Discussion on RRM impact on channel bandwidths 35MHz and 45MHz for NR FR1**

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

**Decision: Noted.**

**R4-2107156 Impact of new FR1 channel BWs on RRM requirements**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

This document analyzes impact of new channel BWs on RRM requirements

**Decision: Noted.**

### 7.27 Introduction of NR 47 GHz band

#### 7.27.3 RRM (38.133)

**R4-2107147 Analysis of RRM core requirements for band n262**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

This document analysis RRM requirements for new band on 47 GHz (n262) for different UE power classes

**Decision: Noted.**

**R4-2107148 RRM core requirements for band n262 in 38.133**

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

**Abstract:**

This is big CR on RRM core requirements for all power classes for new band in 47 GHz

**Decision: Endorsed.**

**R4-2107149 Analysis of RRM performance requirements for band n262**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

This document analysis RRM performance requirements for new band on 47 GHz (n262) for UE power class 3

Session chair: moved to AI 7.27.3

**Decision: Noted.**

**R4-2107150 RRM performance requirements for band n262 in 38.133**

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

**Abstract:**

This is CR on RRM performance requirements for band n262 for UE power class 3

Session chair: moved to AI 7.27.3

**Decision: Endorsed.**

**R4-2105858 Draft Big CR: RRM requirements for band n262 in 38.133**

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

**Abstract:**

**Discussion:**

Session chair: Include R4-2107150, R4-2107148. Further check with MCC if it is acceptable to have Core/Perf under the same big CR.

**Decision: For email approval.**

### 7.39 Introduction of FR2 FWA UE with maximum TRP of 23dBm for band n259

#### 7.39.2 RRM Perf. requirements

**R4-2107157 Impact of FR2 FWA for band n259 on RRM requirements**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

This document analyzes impact of FR2 FWA with maximum TRP of 23dBm for band n259 on RRM requirements

**Decision: Noted.**

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

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

#### 8.3.7 RRM core requirements

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

**Email discussion: [98-bis-e][215] NR\_RF\_FR2\_req\_enh2\_RRM**

**R4-2105685 Email discussion summary: [98-bis-e][215] NR\_RF\_FR2\_req\_enh2\_RRM***Type: other For: Information  
Source: Moderator (Nokia)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105817 (from R4-2105685).**

**R4-2105817 Email discussion summary: [98-bis-e][215] NR\_RF\_FR2\_req\_enh2\_RRM***Type: other For: Information  
Source: Moderator (Nokia)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 16, 2021)

* Issue 1-1-1: Deployment scenarios assumption for CBM
  + Views after 1st round comments:
    - Option 3: Define MRTD and RRM requirements for CBM capable UEs based on co-located deployment scenarios only. (NEC, LG, Intel, Qualcomm, Huawei, Xiaomi, OPPO, Ericsson, MTK, Apple, Xiaomi, Vivo)
    - Option 4: Define RRM requirements for CBM capable UEs based on co-located deployment scenarios only. This does not mean any implicit MRTD assumptions. (Nokia, Docomo)
  + Moderator’s comments:
    - There is consensus on at least defining RRM requirements for CBM capable UEs based on co-located deployment scenarios only, which is recommended to be agreed.
    - Here is the network deployment assumption agreed in RF session in RAN4#98 meeting. It is suggested to apply the RF conclusion also to RRM requirements.
      * *network deployment restriction for CBM*
        + *There are no deployment restrictions (Non-co-located/co-located) for network to configure inter-band DL CA for CBM UEs.*
        + *UE RF requirements for CBM shall be derived based on co-located deployment scenario only.*
  + Tentative agreements:
    - Define MRTD and RRM requirements for CBM capable UEs based on co-located deployment scenarios only.
      * this does not mean any implicit MRTD assumptions
      * There are no deployment restrictions (Non-co-located/co-located) for network to configure inter-band DL CA for CBM UEs.
  + Discussion
    - QC: Not sure on the meaning of “this does not mean any implicit MRTD assumptions”
      * Nokia: This sentence means that we are not forced to define MRTD based on intra-band CA
    - Apple: At least “co-located” assumption implies that there is no propagation delay
    - vivo: we are ok to discuss MRTD separately
  + Agreements:
    - Define MRTD and RRM requirements for CBM capable UEs based on co-located deployment scenarios only.
      * There are no deployment restrictions (Non-co-located/co-located) for network to configure inter-band DL CA for CBM UEs.
      * Note: this does not imply that MRTD requirements will be defined based on intra-band CA assumptions
* Issue 1-2-1: MRTD value for FR2 inter-band CA
  + Proposals
    - Option 1: Reuse FR2 intra-band MRTD i.e. 260ns (Vivo, Apple, Intel, OPPO, Xiaomi, Qualcomm, LG, MTK)
    - Option 2: 3us (NEC, Ericsson, Nokia, Huawei, Docomo, Softbank, AT&T, Verizon, ZTE)
    - Option 3: Introduce UE capability which informs network whether UE can support 3us MRTD or 260ns MRTD. (Intel, NEC)
  + Discussion
    - AT&T: Option 2
    - E///: for 3us we assume co-location and UE can keep same beam.
    - Verizon: Option 2
    - Nokia: Option 2. Operators may have different vendors for different carriers and it may not be possible to reach good sync
    - ZTE: Option 2.
    - Apple: Not much difference comparing to the previous meeting. Most UE chipset vendors support Option 1. What are the assumptions on gNB beam implementation for different CCs (is it same beam or different beams)? The challenges on the network side are unclear.
    - QC: Same view as Apple. If we go with Option 2, then UE will be forced to achieve the same performance as IBM.
    - Intel: we are repeating the discussions in many previous meetings. Is it possible to reach 260ns for selected gNB implementations? Most likely yes. The UE does not know the timing difference, so we think it is helpful to allow some UE implementations with 260ns. If we go with 3us, then there may be a few UEs which will implement and the whole feature may not get deployed.
    - E///: 3us was used since Rel-15 for NR. For all kinds of BS we always used 3us TAE since LTE for inter-band CA.
    - Nokia: MRTD cannot be smaller than TAE. We can consider some performance degradation for UE supporting 3us.
    - Apple: We would like to get more understanding on the gNB side constraints and limitations?
    - Nokia: For inter-band CA operators may have different vendors. In this case the sync is not ideal. For single vendor, there may be multiple RRHs and it will result in larger TAE.
    - E///: Installed BSs already have 3us and it is difficult to change.
    - Intel: Based on LTE spec the TAE for inter-band CA is 260ns. In TR 38.817-2 the motivation for 3us TAE for FR2 inter-band CA is provided. Based on TR 3us is justified for non-collocated deployments. So, implementations of 260ns should be possible for co-located case.
    - Huawei: Existing BS design is based on 3us.
  + Agreements:
    - Candidate options
      * Option 1: Do not define any requirements for CBM UEs for FR2 inter-band CA
      * Option 2: Introduce UE capability to support MRTD = 260ns and MRTD = 3us (Intel, NEC)
      * Option 3: MRTD = 260ns (Vivo, Apple, Intel, OPPO, Xiaomi, Qualcomm, LG, MTK)
      * Option 4: MRTD = 3us (NEC, Ericsson, Nokia, Huawei, Docomo, Softbank, AT&T, Verizon, ZTE)
      * Other options are not precluded
    - Note 1: Decision shall be made in RAN4 #99-e
    - Note 2: Companies are encouraged to bring further analysis on achievable MRTD from the network and UE perspectives and the possible impact on the implementation and performance

1st round email discussion conclusions

New tdocs

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105785 | WF on the RRM requirements or FR2 Inter-band DL CA and UL CA | Nokia |  |
|  |  |  |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation | Comments |
| R4-2105785 | WF on RRM requirements for FR2 Inter-band DL CA and UL CA | Nokia | Agreeable |  |
|  |  |  |  |  |

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

**R4-2105785 WF on the RRM requirements or FR2 Inter-band DL CA and UL CA**

*Type: other For: Approval  
 Source: Nokia*

**Abstract:**

**Discussion:**

**Decision: Approved.**

##### 8.3.7.1 Inter-band DL CA enhancements

**R4-2104632 Considerations on RRM requirements for inter-band DL CA in NR FR2**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2104837 On the feasiblity of CBM with MRTD more than CP length**

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

**Decision: Noted.**

**R4-2104978 Discussion on FR2 inter-band DL CA enhancements**

*Type: discussion For: Approval  
 Source: NEC*

**Abstract:**

We provide our views on some of the FR2 enhancements and MRTD requirement for FR2 inter-band CA

**Decision: Noted.**

**R4-2105141 Support up to 3 us MRTD**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

In this contribution we develop why at least 3us MRTD is feasible from both from a network perspective and a UE perspective, for co-located deployments.

**Decision: Noted.**

**R4-2106302 Discussion on MRTD requirements for FR2 inter-band CA based on CBM and IBM**

*Type: discussion For: (not specified)  
 Source: LG Electronics Polska*

**Abstract:**

It discusses MRTD requirements for FR2 inter-band CA based on CBM and IBM.

**Decision: Noted.**

**R4-2106393 Discussion on FR2 RF RRM**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Noted.**

**R4-2106394 DraftCR for CBM and IBM applicability**

*Type: draftCR For: Endorsement  
 38.133 v17.1.0 CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Postponed.**

**R4-2106506 Discussion on MRTD requirements for inter-band DL CA in FR2**

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

**Decision: Noted.**

**R4-2106531 RRM requirements for FR2 inter-band DL CA enhancements**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106944 Discussion on FR2 inter-band DL CA enhancement**

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

**Decision: Noted.**

**R4-2107289 FR2 Inter-band DL CA**

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

**Decision: Noted.**

##### 8.3.7.2 Inter-band UL CA

**R4-2106945 Discussion on FR2 inter-band UL CA**

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

**Decision: Noted.**

##### 8.3.7.3 UL gaps for self-calibration and monitoring

**R4-2106395 UL Gaps for PA calibration and proximity detection**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Noted.**

**R4-2106946 Discussion on UL gaps for self-calibration and monitoring**

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

**Decision: Noted.**

**R4-2107078 Discussion on RRM impact of UL gaps for self-calibration and monitoring**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

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

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

**Email discussion: [98-bis-e][216] NR\_RRM\_enh2\_1**

**R4-2105686 Email discussion summary: [98-bis-e][216] NR\_RRM\_enh2\_1***Type: other For: Information  
Source: Moderator (Apple)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105818 (from R4-2105686).**

**R4-2105818 Email discussion summary: [98-bis-e][216] NR\_RRM\_enh2\_1***Type: other For: Information  
Source: Moderator (Apple)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 16, 2021)

**SRS antenna port switching**

* Issue 1-1-1: whether delay requirement would be defined in RRM for SRS antenna port switching
  + Proposals
    - Option 1 (MTK, CATT, Apple, QC, CMCC, LGE, OPPO, HW, Xiaomi): Do not define SRS antenna port switching delay requirement in RRM.
    - Option 1a (Nokia): Do not define SRS antenna port switching delay requirement in RRM if only RF returning time is considered.
    - Option 2 (NEC, Ericsson, vivo): Define SRS antenna port switching delay requirement in RRM
  + Discussion
    - vivo: RF transient period is just a period to relax performance. It is not clear if data can be scheduled. Based on RAN1 specs there is no gap between PUSCH/PUCCH and SRS (there is gap between different SRS).
      * QC: Scheduling restrictions will be taken into consideration in the interruption requirements. For the carriers where the switching is performed there is a transient period and nothing will be scheduled. The transient also applies for PUSCH/PUCCH to SRS transition.
      * vivo: Transient period between PUSCH/PUCCH and SRS does not necessarily mean scheduling restriction
    - Apple: support QC views.
    - Huawei: same view as Apple, QC. RAN4 already confirmed to RAN1 the duration of the switching period in the past.
    - Nokia: Scheduling restriction / interruptions are different from the delay requirements. They can be handled separately.
    - vivo: If there is no scheduling restriction, then what will UE do if there is no gap between PUSCH/SRS.
    - QC: Our assumption is that there will be no scheduling during the transient period.
    - Apple: Transient period is 10 or 15us for FR1. Sounding switching time is same 10 or 15us.
    - NEC: We can specify in the RRM spec that transient period can be specified as the SRS switching delay
  + Agreements:
    - Do not define SRS antenna port switching delay requirement in RRM
    - FFS whether and how to define the scheduling restriction before and after SRS transmission for the cell with SRS antenna port switching
      * There are no further scheduling restrictions for SRS symbols in addition to the restrictions defined in RAN1 specifications

**HO with PSCell**

* Issue 2-2-1: timeline for HO with PSCell
  + Proposals
    - Option 1 (Xiaomi, Apple, ZTE, OPPO): PCell HO and PSCell addition is performed in a sequential order.
    - Option 2 (CATT, CMCC, Huawei, MTK, QC, ZTE, NEC, Ericsson): PCell HO and PSCell addition is performed in parallel.
      * Option 2a (vivo): RAN4 consider parallel processing capable UE in R17 as baseline and further identify the needed sequential processing during HO with PSCell.
      * Option 2b (Qualcomm): PCell HO and PSCell addition are performed in parallel after UE side processing (e.g. RF and SW preparations) is completed.
    - Option 3 (Apple): A new R17 UE capability is introduced to indicate whether UE can support sequential processing or parallel processing for HO with PSCell.
    - Option 4 (NTT DOCOMO, Intel, OPPO, Nokia, Ericsson, NEC): Some of procedures of HO with PSCell should be able to be performed in parallel, but RACH processing is performed in a sequential order (RACH procedure of PSCell will happen after the RACH procedure of PCell).
    - Option 5 (NEC): For NR SA to EN-DC and NE-DC to NE-DC, RAN4 to agree that cell search of PCell and PSCell is performed in sequential order. For NR-DC to NR-DC, RAN4 to agree that cell search is performed in parallel for FR1+FR2 NR-DC and FR1+FR1 NR-DC.
  + Recommendations for 2nd round:
    - Option 1 is a sequential processing. Option 2 and option 4 are parallel processing but the difference is on RACH time relation between PCell and PSCell. Continue discussion in 2nd round, and agreements would be captured in the WF
  + Discussion
    - E///: Based on RAN2 specifications it seems that RACH can be potentially done in parallel. However, there may be some ambiguity. So, recommend to send LS to RAN2 to clarify. Prefer to avoid capability to avoid complexity on the network side.
    - QC: Prefer Option 2. DC-capable UEs should be able to process this in parallel.
    - Nokia: prefer to avoid capabilities. Based on RAN2 specs the RACH processing is performed in sequential order. LS to RAN2 is a good idea.
    - Apple: There are many existing requirements based on sequential order. There are technical issues to support parallel processing.
    - MTK: to Apple this is different from DC capable UE. No new capability is needed.
    - Xiaomi: Option 1. Option 4 is also ok.
    - CATT: Prefer Option 2. Concern on Option 4.
  + Agreements:
    - Timeline for HO with PSCell
      * Option 1 (Xiaomi, Apple, OPPO): PCell HO and PSCell addition is performed in a sequential order.
      * Option 2 (CATT, CMCC, Huawei, MTK, QC, ZTE, NEC, Ericsson): PCell HO and PSCell addition is performed in parallel.
      * Option 3 (NTT DOCOMO, Intel, OPPO, Nokia, Ericsson, NEC): Some of procedures of HO with PSCell should be able to be performed in parallel, but RACH processing is performed in a sequential order (RACH procedure of PSCell will happen after the RACH procedure of PCell).
      * Other options are not precluded
    - Send LS to RAN2 to clarify possible restrictions on parallel or sequential RACH processing from RAN2 perspective

1st round email discussion conclusions

New tdocs

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105786 | WF on further RRM enhancement for NR and MR-DC – SRS antenna port switching | Apple |  |
| R4-2105787 | WF on further RRM enhancement for NR and MR-DC – Handover with PSCell | Apple |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2105786 | WF on further RRM enhancement for NR and MR-DC – SRS antenna port switching | Apple | Agreeable |  |
| R4-2105787 | WF on further RRM enhancement for NR and MR-DC – Handover with PSCell | Apple | Agreeable |  |
| R4-2105830 | LS on RACH procedure for HO with PSCell | Ericsson | Agreeable |  |

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**Email discussion: [98-bis-e][217] NR\_RRM\_enh2\_2**

**R4-2105687 Email discussion summary: [98-bis-e][217] NR\_RRM\_enh2\_2***Type: other For: Information  
Source: Moderator (CATT)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105819 (from R4-2105687).**

**R4-2105819 Email discussion summary: [98-bis-e][217] NR\_RRM\_enh2\_2***Type: other For: Information  
Source: Moderator (CATT)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 16, 2021)

* Issue 1-1-1: The ending point of PUCCH SCell activation ?
  + Proposals
    - The ending point for valid TA case:
      * Option 1:
        + For valid TA case, the ending point of PUCCH SCell activation should be the point when UE transmit valid CSI report on target PUCCH SCell.
      * Option 2:
        + For valid TA case, the ending point of PUCCH SCell activation is the point when UE transmit valid CSI report on a certain cell (SpCell or PUCCH SCell or others, i.e. not to define which cell is used).
    - The ending point for invalid TA case:
      * Option 1:
        + For invalid TA case, the ending point of PUCCH SCell activation should be the point when UE transmit valid CSI report on target PUCCH SCell.
      * Option 2:
        + For invalid TA case, the ending point of PUCCH SCell activation is the point when UE transmit valid CSI report on a certain cell (SpCell or PUCCH SCell or others, i.e. not to define which cell is used).
      * Option 3:
        + For invalid TA case, the ending point of PUCCH SCell activation should be the point when UE transmit PRACH on target PUCCH SCell.
      * Option 4
        + Depends on if the UE has transmitted the CSI reporting e.g. to inform network the beam information during the activation period.
  + Discussion
    - Valid TA case:
      * QC: Option 2 is not spec compliant
      * Apple: For Option 2 cross-PUCCH group CSI reporting is not supported. For LTE spec the reporting is also on target cell
      * DCM: LTE spec does not specify the cell in our understanding.
      * CMCC: It is up to NW configuration whether CSI feedback is transmitted on PCell or SCell. However, QC and Apple mentioned that PCell CSI reporting is not possible?
        + QC: based on RAN1 specs cross group CSI report is not allowed
      * NEC: Agree with QC and Apple. Option 2 is also possible before activation.
      * CATT: Option 1.
  + Agreements:
    - Valid TA case
      * Option 1:
        + For valid TA case, the ending point of PUCCH SCell activation should be the point when UE transmit valid CSI report on target PUCCH SCell.
      * Option 2:
        + For valid TA case, the ending point of PUCCH SCell activation is the point when UE transmit valid CSI report on a certain cell (SpCell or PUCCH SCell or others, i.e. not to define which cell is used).

1st round email discussion conclusions

New tdocs

|  |  |  |  |
| --- | --- | --- | --- |
| **Tdoc** | **Title** | **Source** | **Comments** |
| R4-2105788 | WF on further RRM enhancement for NR and MR-DC - PUCCH SCell activation/deactivation requirements | CATT |  |
|  |  |  |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation | Comments |
| R4-2105788 | WF on further RRM enhancement for NR and MR-DC - PUCCH SCell activation/deactivation requirements | CATT | Agreeable |  |

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#### 8.4.1 General and work plan

#### 8.4.2 RRM core requirements

##### 8.4.2.1 SRS antenna port switching

**R4-2105786 WF on further RRM enhancement for NR and MR-DC – SRS antenna port switching**

*Type: other For: Approval  
 Source: Apple*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104565 Discussion on SRS antenna port switching**

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

**Decision: Noted.**

**R4-2104694 Discussion on SRS antenna switching interruption requirements**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2104758 Further discussion on SRS antenna port switching**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104831 On SRS antenna port switching**

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

**Decision: Noted.**

**R4-2104909 SRS antenna switching discussion**

*Type: discussion For: Discussion  
 Source: Qualcomm, Inc.*

**Decision: Noted.**

**R4-2104945 Discussion on SRS antenna port switching**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2104979 Discussion on SRS antenna port switching**

*Type: discussion For: Approval  
 Source: NEC*

**Abstract:**

We analyze the interruption requirements for SRS antenna port switching

**Decision: Noted.**

**R4-2104991 Discussion on interruption due to SRS antenna port switching**

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

**Decision: Noted.**

**R4-2106409 Discussion on the interruption requirements at SRS antenna port switching**

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

**Decision: Noted.**

**R4-2106462 Discussion about SRS antenna port switching**

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

**Decision: Noted.**

**R4-2106532 RRM requirements for SRS ant port switch**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106881 On RRM requirements for SRS antenna port switching**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Discussion on RRM requirements for antenna port switching

**Decision: Noted.**

**R4-2106986 Discussion on requirements for SRS antenna switching**

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

**Decision: Noted.**

**R4-2107079 Discussion on RRM requirements for SRS antenna port switching**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

##### 8.4.2.2 HO with PSCell

**R4-2105787 WF on further RRM enhancement for NR and MR-DC – Handover with PSCell**

*Type: other For: Approval  
 Source: Apple*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2105830 LS on RACH procedure for HO with PSCell**

*Type: LS Out For: Approval  
To: RAN2; Cc: RAN3  
Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104685 Discussion on RRM requirements for handover with PSCell**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2104759 Further discussion on HO with PSCell**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104832 On RRM requirement for handover with PSCell**

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

**Decision: Noted.**

**R4-2104932 Views on Procedures of HO with PSCell**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: NTT DOCOMO, INC.*

**Decision: Noted.**

**R4-2104943 Discussion on HO with PSCell**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2104980 Discussion on PSCell HO**

*Type: discussion For: Approval  
 Source: NEC*

**Abstract:**

We analyze the requirements for HO with PSCell

**Decision: Noted.**

**R4-2106463 Discussion about HO with PSCell**

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

**Decision: Noted.**

**R4-2106533 RRM requirements for HO with PSCell**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106882 On handover with PSCell**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Discussion on handover with PSCell

**Decision: Noted.**

**R4-2106924 Discussion on handover with PSCell**

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

**Decision: Noted.**

**R4-2106987 Discussion on requirements for HO with PSCell**

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

**Decision: Noted.**

**R4-2107080 Discussion on RRM requirements for HO with PSCell**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2107123 Discussion on HO with PSCell**

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

**Decision: Noted.**

**R4-2107224 discussion on HO with PSCell**

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

**Abstract:**

discussion on HO with PSCell

**Decision: Noted.**

**R4-2107249 Discussion on timelines of HO with PSCell**

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

**Abstract:**

Timeline of joint PCell HO with PSCell change

**Decision: Noted.**

##### 8.4.2.3 PUCCH SCell activation/deactivation

**R4-2105788 WF on further RRM enhancement for NR and MR-DC - PUCCH SCell activation/deactivation requirements**

*Type: other For: Approval  
 Source: CATT*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104564 Discussion on PUCCH SCell activation and deactivation**

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

**Decision: Noted.**

**R4-2104633 Regarding PUCCH SCell activation and deactivation**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2104686 Discussion on SCell activation and deactication requirements for PUCCH Scell**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2104760 Further discussion on PUCCH SCell activation\_deactivation**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104833 On PUCCH SCell activation and deactivation**

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

**Decision: Noted.**

**R4-2104944 Discussion on PUCCH SCell activation/deactivation**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2104981 Discussion on PUCCH SCell activation**

*Type: discussion For: Approval  
 Source: NEC*

**Abstract:**

We analyze the requirements for PUCCH SCell activation/deactivation for single and multiple SCells

**Decision: Noted.**

**R4-2105104 Discussions on PUCCH SCell Activation/Deactivation delay requirements**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: NTT DOCOMO, INC.*

**Decision: Noted.**

**R4-2106408 Discussion on the activation delay for deactivated PUCCH SCell**

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

**Decision: Noted.**

**R4-2106534 RRM requirements for PUCCH SCell ActivationDeactivation**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106883 On SCell (de)activation with PUCCH**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Discussion on SCell activation and deactivation for PUCCH SCell.

**Decision: Noted.**

**R4-2106988 Discussion on requirements for PUCCH SCell activation**

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

**Decision: Noted.**

**R4-2107290 Discussion on PUCCH SCell Activation**

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

**Decision: Noted.**

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

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**Email discussion: [98-bis-e][218] NR\_MG\_enh\_1**

**R4-2105688 Email discussion summary: [98-bis-e][218] NR\_MG\_enh\_1***Type: other For: Information  
Source: Moderator (MediaTek)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105842 (from R4-2105688).**

**R4-2105842 Email discussion summary: [98-bis-e][218] NR\_MG\_enh\_1***Type: other For: Information  
Source: Moderator (MediaTek)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 15, 2021)

* Issue 2-1: Definition of independent gap
  + Proposals
    - Option 1a: (MTK, Xiaomi, Apple, LGE, QC, Nokia, OPPO, ZTE, Huawei)
      * Multiple MGs with their own separate configurations, i.e., MGL, MGRP, time offset.
    - Option 1b: (CMCC, Huawei)
      * Multiple MGs with their own separate configurations, i.e., MGL, MGRP, time offset, MGTA.
    - Option 2: (NEC)
      * Measurement gaps are considered as independent if UE can measure on these gaps simultaneously without impacting the measurement performance requirements of each MG.
    - Option 3: (Intel, E///, vivo, CATT)
      * The definition of independent MG is unnecessary
  + Recommendations for 2nd round: Option 1a gets the most support. At the same time, some companies suggest to drop the term ‘a common period of time’ in Issue 2-2, while the majority of companies prefer to merge the definitions of concurrent gap and independent gap in Issue 2-3. Moderator suggest to use Option 1a/b as a starting point, then try to merge the definitions and to address the concern in Option 3. Also, the discussions on whether the gap may have the same purposes or the gap may fully overlapped in time can be moved to other discussions such as Issue 2-5 and Issue 2-11, respectively. Moderator suggests the following definition:
    - Concurrent gaps are configured by multiple and independent RRC IE MeasGapConfig [during a common period of time]
  + Discussion
    - vivo: Agree with proposed WF. Will fully overlapping MG case be allowed?
      * Intel, E///, CATT, Nokia: this can be allowed
      * MTK: we do not resolve everything and discuss further
    - Apple: for “during a common period of time” – need to consider the case that MG pattern may be deactivated
      * Intel: we can decouple the issues. The concept shall apply to activated MGs.
      * E///, Nokia: it shall apply to activated MGs
      * Huawei: it requires some studies
    - Intel: Ok with WF. Common period needs discussion.
    - NEC: In our understanding the independent MGs means that UE may process them independently. UE behavior aspect needs to be considered in the definition.
      * MTK: we can discuss this further
    - CATT: can multiple MGs be configured by one single RRC?
      * MTK: Current RRC includes a single MeasGapConfig IE. We are proposing several MeasGapConfig IE
      * Nokia: this is more in RAN2 scope
    - CMCC: what is the meaning of independent RRC IE (does it mean that one or more parameters are different)
    - OPPO: Do not need to define the common period of time
    - NEC: change “multiple and independent” to “separate”. Add UE behavior aspect.
  + Agreements:
    - Concurrent gaps are configured by multiple RRC IE MeasGapConfig [during a common period of time]
      * FFS on the definition of the “common period of time” and whether it shall be introduced
      * FFS how to handle fully overlapping multiple MG case
      * FFS how to handle activated/deactivated pre-configured MGs (in case they are defined)
      * Detailed RRC configuration is up to RAN2
      * UE behavior for measurement of multiple MG patterns is FFS

1st round email discussion conclusions

New tdocs

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105789 | WF on R17 NR MG enhancements - Multiple concurrent and independent MG patterns | MediaTek inc |  |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2104581 | Work plan of R17 NR and MR-DC measurement gap enhancements WI | MediaTek inc | Revised |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2105790 | Work plan of R17 NR and MR-DC measurement gap enhancements WI | MediaTek inc. | Agreeable |  |
| R4-2105789 | WF on R17 NR MG enhancements - Multiple concurrent and independent MG patterns | MediaTek inc. | Agreeable |  |

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**Email discussion: [98-bis-e][219] NR\_MG\_enh\_2**

**R4-2105689 Email discussion summary: [98-bis-e][219] NR\_MG\_enh\_2***Type: other For: Information  
Source: Moderator (Intel Corporation)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105846 (from R4-2105689).**

**R4-2105846 Email discussion summary: [98-bis-e][219] NR\_MG\_enh\_2***Type: other For: Information  
Source: Moderator (Intel Corporation)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 15, 2021)

* Issue 1-1-1: Whether can pre-configured MGs be configured per UE/FR or per BWP
  + Proposals
    - Option 1a (Apple, NEC). Pre-configured MGs are configured per BWP. Different MG patterns (or no MG) can be pre-configured for different BWP.
    - Option 2 (Ericsson, Intel, Huawei, Xiaomi, CATT, MTK, CMCC, QC, ZTE, LG). Pre-configured MGs are configured per UE or per FR
    - Option 2a (Nokia, Apple, OPPO): Pre-configured MGs are configured per-UE or per-FR. Pre-configured MGs additionally can be configured per BWP
    - Option 2b (Qualcomm) Pre-configured MGs are configured per-UE or per-FR. The (de)activation indication is pre-configured per BWP.
  + Discussion
    - Chair: further discuss the timelines to discuss pre-configured MGs + multiple concurrent MG scenarios.
  + Agreements:
    - Pre-configured MG(s) are configured per UE or per FR
      * FFS if pre-configured MGs can be additionally configured per BWP
    - FFS on the activation/deactivation mechanism and its signalling indication (if needed)
  + Tentative agreement (for further discussion)
    - A single pre-configured MG is considered for the case of non-concurrent MG scenarios.
    - FFS if more pre-configured MGs shall be considered for the multiple concurrent MG scenarios.
* Issue 1-0-2 Whether the pre-configured MG for the BWP switching on multiple CCs shall be considered?
  + Proposals
    - Option 1 (Ericsson, Qualcomm, CMCC): Yes.
    - Option 1a (ZTE): For NR-CA case, focus on intra-frequency measurement.
    - Option 2 (Apple, Intel, Nokia, CATT, MTK, Huawei): Focus on the application scenarios of the pre-configured gap for single CC BWP switching
  + Discussion
    - Chair: further discuss the timelines to discuss multiple CC BWP switching.
  + Agreements:
    - Focus on the scenarios with the pre-configured MG for single CC BWP switching scenario.
    - FFS whether to define pre-configured MG for multiple CC BWP switching scenario for NR-CA case

1st round email discussion conclusions

New tdocs

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105791 | WF on R17 NR MG enhancements – Pre-configured MG | Intel |  |
| R4-2105792 | WF on R17 NR MG enhancements – NCSG | Intel |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2105791 | WF on R17 NR MG enhancements – Pre-configured MG | Intel | Agreeable |  |
| R4-2105792 | WF on R17 NR MG enhancements – NCSG | Intel | Agreeable |  |

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#### 8.5.1 General and work plan

**R4-2104581 Work plan of R17 NR and MR-DC measurement gap enhancements WI**

*Type: Work Plan For: Approval  
 Source: MediaTek inc.*

**Decision: Revised to R4-2105790 (from R4-2104581).**

**R4-2105790 Work plan of R17 NR and MR-DC measurement gap enhancements WI**

*Type: Work Plan For: Approval  
 Source: MediaTek inc.*

**Decision: Approved.**

#### 8.5.2 RRM core requirements

##### 8.5.2.1 Pre-configured MG pattern(s)

**R4-2105791 WF on R17 NR MG enhancements – Pre-configured MG**

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

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104582 Pre-configured MG pattern(s) per configured BWP**

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

**Decision: Noted.**

**R4-2104635 On pre configured MG patterns**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2104687 Discussion on pre-configured MG pattern for NR**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2104750 Discussion on pre-configured MG pattern**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104854 Consideration on preconfigured measurement gap patterns**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2104921 Views on pre-configured MG patterns**

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

**Decision: Noted.**

**R4-2104936 Discussion on pre-configured MG pattern(s)**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2104983 Discussion on preconfigured measurement gap**

*Type: discussion For: Approval  
 Source: NEC*

**Abstract:**

We provide our view on the definition of pre-configured MG and their activation and deactivation procedures

**Decision: Noted.**

**R4-2106446 Discussion on pre-configured measurement gap**

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

**Decision: Noted.**

**R4-2106535 On pre-configured MG pattern(s) for NR\_MG\_enh**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2107027 Discussion on pre-configured MG**

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

**Decision: Noted.**

**R4-2107151 Analysis of requirements for pre-configured measurement gap pattern**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

This document analyzes RRM requirements for pre-configured MG in NR and MR-DC

**Decision: Noted.**

**R4-2107175 Discussion on Pre-configured MG patterns**

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

**Abstract:**

Discussion on pre-configured MG patterns for NR

**Decision: Noted.**

**R4-2107347 Realizing pre-configured MG via network controlled fast gap(NCFG)**

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

**Decision: Noted.**

##### 8.5.2.2 Multiple concurrent and independent MG patterns

**R4-2105789 WF on R17 NR MG enhancements - Multiple concurrent and independent MG patterns**

*Type: other For: Approval  
 Source: MediaTek*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105856 (from R4-2105789).**

**R4-2105856 WF on R17 NR MG enhancements - Multiple concurrent and independent MG patterns**

*Type: other For: Approval  
 Source: MediaTek*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104583 Multiple concurrent and independent gap patterns**

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

**Decision: Noted.**

**R4-2104636 Consideration on multiple concurrent and independent MG patterns**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2104688 Discussion on multiple concurrent and independent MG patterns for NR**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2104751 Discussion on multiple concurrent and independent MG patterns**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104855 Discussion on multiple concurrent and independent MG patterns**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2104933 Discussion on multiple concurrent and independent MG patterns**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2104982 Discussion on concurrent and independent MG**

*Type: discussion For: Approval  
 Source: NEC*

**Abstract:**

We discuss the principle for defining requirements for multiple concurrent and independent MG patterns

**Decision: Noted.**

**R4-2106303 Discussion on multiple concurrent and independent MG patterns**

*Type: discussion For: (not specified)  
 Source: LG Electronics Polska*

**Abstract:**

It discusses multiple concurrent and independent MG patterns.

**Decision: Noted.**

**R4-2106344 Discussion on mulitple concurrent and independent MG patterns**

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

**Decision: Noted.**

**R4-2106392 Discussion on concurrent and independent MG patterns**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Noted.**

**R4-2106447 Discussion on multiple and independent concurrent measurement gaps in NR**

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

**Decision: Noted.**

**R4-2106536 On multiple concurrent and independent MG patterns for NR\_MG\_enh**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106880 On parallel measurement gap patterns**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Discussion on parallel measurement gap patterns

**Decision: Noted.**

**R4-2106923 Discussion on independent and concurrent MGs**

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

**Decision: Noted.**

**R4-2107028 Discussion on multiple concurrent MGs**

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

**Decision: Noted.**

##### 8.5.2.3 Network Controlled Small Gap

**R4-2105792 WF on R17 NR MG enhancements – NCSG**

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

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104584 Network Controlled Small Gap**

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

**Decision: Noted.**

**R4-2104634 On network controlled small gap**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2104752 Discussion on Network Controlled Small Gap (NCSG)**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104856 On network controlled small gap**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2104934 Discussion on Network Controlled Small Gap**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2106448 Discussion on NCSG in NR**

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

**Decision: Noted.**

**R4-2106537 On NCSG for NR\_MG\_enh**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2107029 Discussion on NCSG**

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

**Decision: Noted.**

**R4-2107152 Analysis of requirements for network controlled small gap**

*Type: other For: Discussion  
 Source: Ericsson*

**Abstract:**

This document analyzes RRM requirements for NCSG in NR and MR-DC

**Decision: Noted.**

**R4-2107176 Discussion on Network Controlled Small Gaps for NR**

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

**Abstract:**

Discussion on introduction of NCSG for NR

**Decision: Noted.**

**R4-2107318 Discussion on open issues of network controlled small gap for NR**

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

**Decision: Noted.**

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

#### 8.6.1 General and work plan

**R4-2104946 Updated work plan for enhancement for NR high speed train scenario in FR1**

*Type: Work Plan For: Approval  
 Source: CMCC*

**Decision: Approved.**

#### 8.6.2 RRM core requirements

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**Email discussion: [98-bis-e][220] NR\_HST\_FR1\_enh\_RRM**

**R4-2105690 Email discussion summary: [98-bis-e][220] NR\_HST\_FR1\_enh\_RRM***Type: other For: Information  
Source: Moderator (CMCC)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105820 (from R4-2105690).**

**R4-2105820 Email discussion summary: [98-bis-e][220] NR\_HST\_FR1\_enh\_RRM***Type: other For: Information  
Source: Moderator (CMCC)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 15, 2021)

* Issue 2-2: Enhancement on CSSFwithin\_gap,i for SCell measurement
  + Background:
    - In last meeting, it was agreed to reuse the PCell enhancement in Rel-16 HST to specify the requirements for activated Scell. *Further enhancement can be further studied.* (R4-2103678):
    - According to the clause 9.1.5.1 of TS 38.133, for the calculation of CSSFoutside\_gap,i, NSCC\_SSB is the number of configured SCell(s) with only SSB based L3 measurement configured
  + Question 1: for CSSFoutside\_gap,i, except the SCell(s) measured without MG, whether the SCell(s) measured with MG are counted in NSCC\_SSB
    - Option 1: Yes, for CSSFoutside\_gap,i, both SCell(s) measured without MG and SCell(s) measured with MG are counted in NSCC\_SSB (Huawei, QC, E///)
    - Option 2: No, for CSSFoutside\_gap,i, only SCell(s) measured without MG are counted in NSCC\_SSB (MTK, Apple, vivo)
  + Discussion
    - Huawei: Option 1
    - Apple: the spec does not say anything. Are we checking the save version?
      * CMCC: this is from the latest version of the Rel-16 spec
    - QC: Option 1. This is an issue but how to fix it requires separate discussion
    - E///: Option 1. Current spec is contradictive.
    - Apple: we are ok to clarify spec. However SCell shall be accounted only once either in CSSFoutside\_gap,i or CSSFinside\_gap,i
      * Huawei: we had a discussion in Rel-15. The original intention was to do some relaxation for CSSFoutside\_gap,i
      * Apple: is there any some intention to count it twice
    - MTK: we are aligned with Apple.
  + Tentative agreements:
    - RAN4 has the following common understanding of the current non-HST specification:
      * For CSSFoutside\_gap,i, both SCell(s) measured without MG and SCell(s) measured with MG are counted in NSCC\_SSB.
        + Both activated and deactivated SCells are included
* Issue 5-1: whether to consider inter-frequency measurement
  + Proposals
    - Option 1 (MTK): NO
    - Option 2 (QC, HW, Nokia, Ericsson, Apple, vivo, CATT, CMCC, OPPO, DCM, Intel): Yes
  + Discussion
    - MTK: NW may know UE position. So NW can pre-configure frequency layers. The measurements can be done without MGs and not sure we need inter-frequency measurements.
    - QC: Theoretically it is possible by network may not necessarily configure this.
    - Apple: Network may deploy > 1 candidate carrier. We want to avoid situation when NW preconfigures all carriers while UE will use only few of them. It will have impact on UE power consumption.
    - MTK: it should not be a problem for NW to pre-configure multiple carriers.
      * Apple: even in this case UE may need to use additional hardware resources for measurements. Same time UE may not use all CCs.
    - Huawei: Inter-frequency is very useful. Pcell and Scell change will happen. We cannot guarantee that target cells will be within the set of pre-configured CCs.
    - CMCC: see the benefit to support inter-frequency measurement report
    - Nokia: Support Option 2. For Option 1 it is not clear on how does NW know when to configure SCell.
    - MTK: We think PCell and SCell are co-located in HST. For HO to the new PCell, the suitable cell will be already known. No additional measurement is needed before the SCell is added.
    - QC: MTK arguments are reasonable. Inter-frequency enhancements may provide more network flexibility.
  + Agreements:
    - Further define RRC Connected state inter-frequency measurement enhancements
      * Support of HST inter-frequency measurement enhancements is up to UE capability. Details are FFS.
    - FFS whether enhancements for RRC IDLE inter-frequency measurements are needed

1st round email discussion conclusions

New tdocs

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105793 | WF on RRM for FR1 HST | CMCC |  |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2104946 | Updated work plan for enhancement for NR high speed train scenario in FR1 | CMCC | The RRM part of the WP is agreeable  Session chair: Demod part is agreeable as well in the other session and document approved. |  |
|  |  |  |  |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2105793 | WF on RRM for FR1 HST | CMCC | Agreeable |  |

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##### 8.6.2.1 UE RRM core requirements for CA scenario

**R4-2105793 WF on RRM for FR1 HST**

*Type: other For: Approval  
 Source: CMCC*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104566 Discussion on Rel-17 HST in FR1**

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

**Decision: Noted.**

**R4-2104753 Discussion on HST RRM for CA in FR1**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104812 On SCell RRM enhancement for NR high speed train scenario in FR1**

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

**Abstract:**

Draft CR on Scell enhancement for HST FR1

**Decision: Noted.**

**R4-2104813 On SCell RRM enhancement for NR high speed train scenario in FR1**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Scell enhancement for HST FR1

**Decision: Noted.**

**R4-2104857 On R17 FR1 HST RRM measurement requirement**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2104904 FR1 HST RRM discussion**

*Type: discussion For: Discussion  
 Source: Qualcomm, Inc.*

**Decision: Noted.**

**R4-2104935 Discussion on NR HST RRM enhancement for FR1 CA scenario**

*Type: discussion For: Approval  
 Source: CMCC*

**Decision: Noted.**

**R4-2106538 RRM requirement for Rel17 FR1 HST**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106936 Discussion on Enhancement for NR high speed train scenario in FR1**

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

**Decision: Noted.**

**R4-2107081 Discussion on R17 NR FR1 HST RRM requirements**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2107250 Discussion on NR FR1 HST RRM open issues for CA**

*Type: other For: Discussion  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

The document has addressed several RRM open issues related to enhancements for CA under HST scenarios.

**Decision: Noted.**

### 8.7 NR support for high speed train scenario in FR2

#### 8.7.4 RRM core requirements

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**Email discussion: [98-bis-e][221] NR\_HST\_FR2\_RRM**

**R4-2105691 Email discussion summary: [98-bis-e][221] NR\_HST\_FR2\_RRM***Type: other For: Information  
Source: Moderator (Nokia)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105821 (from R4-2105691).**

**R4-2105821 Email discussion summary: [98-bis-e][221] NR\_HST\_FR2\_RRM***Type: other For: Information  
Source: Moderator (Nokia)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

1st round email discussion conclusions

New tdocs

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105794 | WF on FR2 HST RRM requirements | Nokia, Nokia Shanghai Bell |  |
|  |  |  |  |

GTW session (April 19, 2021)

* RRC CONNECTED mode requirements for DRX (Issue 1-2-2)
  + Proposals
    - Option 1: Define requirements for non-DRX case only
    - Option 2: Define requirements for the short DRX configurations (≤ [80] ms) and apply existing R16 requirements for longer cycles.
    - Option 3 (Ericsson): Define requirements for the short DRX configurations (≤ [80] ms) and apply them for longer cycles as well.
    - FFS: the lengths of short DRX cycle with new requirements
  + Discussion
    - E///: DRX configuration is up to the NW. We should not limit to the non-DRX case.
    - CMCC: prefer not to limit to non-DRX
    - QC: Option 1. Power consumption is not an issue for CPE devices.
    - Samsung: Same view as QC. Option 3 is unclear.
    - Apple: Not sure on Option 3. This may imply optimization of all configurations.
    - Nokia: Prefer to include short DRX. Exact limit is FFS.
    - Huawei: Support Option 1. Power consumption is not critical.
    - CATT: Concern on Option 2. Current requirements are applied for FR1.
    - E///: For Option 3 the idea is that for longer DRX UE can wake up more often comparing to the configured DRX duration.
  + Agreements:
    - Define requirements for the short DRX configurations (≤ [80] ms)
    - FFS whether to define requirements for long DRX configurations (> [80] ms)
      * Option 1: Do not define any requirements
      * Option 2: Apply existing R16 FR2 requirements
      * Option 3: Apply requirements for short DRX configurations
      * Option 4: Define enhanced requirements
* Discussion of the Number of Rx beams (Issue 1-4-2)
  + Proposals
    - Option 1: The discussion on the number of Rx beams shall continue in the HST FR2 deployments thread.
    - Option 1a: Prioritizing agreement of number in deployments session
    - Option 2: RRM focus on RX beam number.
  + Discussion
    - Samsung: There are some agreements from the online discussion in the Deployment session. Scenario A + uni-directional it was agreed to use 1 beam per panel.
    - E///: We prefer Option 2 and RRM experts shall be involved. Number of beams will have a big impact on RRM.
    - QC: Need to avoid 2 sessions to discuss the same issue. Option 1.
    - Huawei: Main session is discussing the Tx beam number, while we need to evaluate the number of RX beams. We should be careful with reduction of the number of beams. Prefer to keep the existing number of beams to maintain the coverage. It also depends a lot on the deployment.
      * Samsung: In the other email thread the discussion is focused on DL and RX beams from the UE side are considered.
    - Intel: In the deployment session we agreement on the RX beams and companies provided analyss on the link budget.
    - QC: Number of beams for searcher is a separate issue and shall be further discussed. Option 2.
    - Samsung: in the deployment scenario we focus on the number of beams to calculate SNR and for link budget. We can further discuss if the same concept can be used.
    - Apple: In RRM we may have different assumptions on rough beams.
    - Huawei: The other thread assumptions are valid for data reception rather than for measurement..
    - Samsung: The conclusion for Deployment session shall apply for all sessions. 1 beam is sufficient for data reception and do not think that additional beams are needed for RRM.
  + Session chair:
    - Further study and identify the number of RX beams for RRM requirements in the RRM session
    - Reuse the results of discussion in the “FR2 HST Deployment” agenda on the number of RX beams and identify whether any adjustments for RRM searcher are needed
* Requirements on inter-frequency measurements (Issue 1-2-3)
  + Proposals
    - Option 1: Inter-frequency measurements are required for NR single carrier scenario in FR2
    - Option 2: Not applicable to FR2 HST
  + Agreements:
    - Do not define inter-frequency measurements requirements for FR2 HST

2nd round email discussion conclusions

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| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-2105794 | WF on FR2 HST RRM requirements | Nokia | Agreeable |  |

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**R4-2105794 WF on FR2 HST RRM requirements**

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

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104907 FR2 HST RRM discussion**

*Type: discussion For: Discussion  
 Source: Qualcomm, Inc.*

**Decision: Noted.**

##### 8.7.4.1 General

**R4-2104754 Discussion on the maximum supported speed analysis for NR HST FR2**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104814 RRM general considerations for HST FR2**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Discussion on signaling for HST FR2

**Decision: Noted.**

**R4-2104851 Discussion on FR2 HST RRM requirement - geneal**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2105027 Maximum Supported Speed from RRM perspective for FR2 HST**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2106505 General aspects of RRM requirements for HST in FR2**

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

**Decision: Noted.**

**R4-2106583 Simulation analysis for HST in FR2**

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

**Abstract:**

Simulation results and analysis for HST operation in FR2.

**Decision: Noted.**

##### 8.7.4.2 RRM requirements for FR2 HST

**R4-2104755 Discussion on RRM requirements for NR FR2 HST**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104815 RRM requirements for HST FR2**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Discussion on RRM requirememt for HST FR2

**Decision: Noted.**

**R4-2104852 Discussion on RRM requirement for FR2 HST**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2104949 Discussion on RRM requirements for FR2 HST**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2106504 RRM requirements for HST in FR2**

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

**Decision: Noted.**

**R4-2106584 Discussion about RRM requirements for HST in FR2**

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

**Abstract:**

Discussion about RRM requirements and needed changes for HST operation in FR2.

**Decision: Noted.**

**R4-2106836 Further discussion on RRM requirements for FR2 HST**

*Type: discussion For: Discussion  
 Source: BEIJING SAMSUNG TELECOM R&D*

**Decision: Noted.**

**R4-2106838 Further discussion on RRM requirements for FR2 HST**

*Type: discussion For: Discussion  
 Source: Samsung*

**Decision: Noted.**

**R4-2106937 Discussion on NR support for high speed train scenario in FR2**

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

**Decision: Noted.**

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

#### 8.8.4 RRM core requirements

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**Email discussion: [98-bis-e][222] NR\_NTN\_solutions\_RRM\_1**

**R4-2105692 Email discussion summary: [98-bis-e][222] NR\_NTN\_solutions\_RRM\_1***Type: other For: Information  
Source: Moderator (Fraunhofer HHI)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105822 (from R4-2105692).**

**R4-2105822 Email discussion summary: [98-bis-e][222] NR\_NTN\_solutions\_RRM\_1***Type: other For: Information  
Source: Moderator (Fraunhofer HHI)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 15, 2021)

* 2-4: Criteria of GNSS accuracy
  + Proposals
    - Option 1: Criteria of GNSS accuracy must be more stringent than current TA accuracy requirement anyhow. Further evaluation of GNSS needs calculation with available satellite speed and elevation/azimuth angle and UE position in cell and needs to take error introduced between satellite and gateway into account.
    - Option 2: The requirements of UE transmit timing can be defined based on UE capability of GNSS accuracy.
  + Discussion
    - CATT: Option 2. GNSS accuracy can affect timing. Option 1 and 2 are not exclusive.
    - Xiaomi: This is similar to the issue 2-3. Many companies suggested to handle on a case by case basis.
    - MTK: Need to consider total error budget
    - CMCC: Both option 1 and 2 are general guidance and not sure we need to capture. Agree with MTK that total error budget needs to be considered.
    - Apple: Do we plan to have any enhancements for GNSS accuracy or simply consider GNSS accuracy impact on the RRM requirements?
    - Huawei: Option 2 shall be discussed in the other thread. Not sure why we need more stringent requirement.
    - Intel: GNSS accuracy is typically better than what we have in 3GPP. Testability feasibility needs to be assessed. So far we think timing requirements are affected
    - Thales: It is important to understand if we will have any test. GNSS accuracy needs to be considered.
  + Agreements:
    - The impact of GNSS accuracy should be considered when defining each RRM requirement
      * GNSS accuracy (e.g. as a function of UE GNSS capability) and side conditions and exact impact on the RRM requirements are FFS.
      * GNSS accuracy enhancements are out of scope

1st round email discussion conclusions

New tdocs

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105795 | WF on NR NTN RRM general and measurement requirements | Fraunhofer |  |
|  |  |  |  |

2nd round email discussion conclusions

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| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation | Comments |
| R4-2105795 | WF on NR NTN RRM general and measurement requirements | Fraunhofer | Agreeable |  |
|  |  |  |  |  |

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**Email discussion: [98-bis-e][223] NR\_NTN\_solutions\_RRM\_2**

**R4-2105693 Email discussion summary: [98-bis-e][223] NR\_NTN\_solutions\_RRM\_2***Type: other For: Information  
Source: Moderator (Xiaomi)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105823 (from R4-2105693).**

**R4-2105823 Email discussion summary: [98-bis-e][223] NR\_NTN\_solutions\_RRM\_2***Type: other For: Information  
Source: Moderator (Xiaomi)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 15, 2021)

* Reply LS for the incoming LS (R1-2102263)
  + Chair: should we provide any response in this meeting (e.g. RAN4 plans)
  + Xiaomi: no sufficient conclusions in this meeting to send the LS reply
  + CATT: we have concluded on frequency error
  + Chair: we can have 2 LS (one for freq and another for time) due to different timelines for agreements
* Issue 1.2.1-1: How to capture the UE specific TA estimation error
  + Proposals
    - Option 1: the UE specific TA estimation accuracy is counted into the UE transmit timing error requirement (MTK, Xiaomi, CMCC, Huawei, Ericsson, Qualcomm, Apple, Nokia, ZTE, NEC, CATT)
    - Option 2: the UE specific TA estimation accuracy is counted into the timing advance adjustment accuracy requirement. (Xiaomi, Huawei, Ericsson)
    - Option 3: the UE specific TA estimation accuracy is defined as a separate accuracy requirement. (Intel, CMCC, Huawei, Ericsson, THALES)
  + Discussion
    - Intel: Option 1 and 3 are not conflicting each other. The main concern on Option 3 is that it is not testable. Same time, it is good to clearly list Core requirement. UE behavior for UE specific TA estimation need to be considered
    - E///: We support Option 1/2/3. We need to work on the total budget.
    - Thales: Option 1 and 3 are not contradicting each other. For Option 3 UE needs to do some autonomous estimation of UE specific TA estimation.
    - QC: Option 1 and 3 are not contradicting each other.
  + Agreements:
    - The UE specific TA estimation accuracy is counted into the UE transmit timing error requirement
      * UE specific TA estimation accuracy is FFS
      * FFS whether the UE specific TA estimation accuracy shall be also defined as a separate accuracy requirement
      * Specify UE behavior related to UE specific TA estimation and the detailed behavior is FFS

1st round email discussion conclusions

New tdocs

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105796 | WF on timing requirements for NR NTN | Xiaomi |  |
|  |  |  |  |

2nd round email discussion conclusions

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| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation | Comments |
| R4-2105796 | WF on timing requirements for NR NTN | Xiaomi | Agreeable |  |
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**R4-2105795 WF on NR NTN RRM general and measurement requirements**

*Type: other For: Approval  
 Source: Fraunhofer*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2105796 WF on timing requirements for NR NTN**

*Type: other For: Approval  
 Source: Xiaomi*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2107277 NTN UL timing accuracy**

*Type: discussion For: Discussion  
 Source: THALES*

**Abstract:**

The goal of this document is to further clarify NTN UL timing synchronization requirements to be considered by NTN RAN4 work.

**Decision: Noted.**

##### 8.8.4.1 General

**R4-2104603 Discussion on general NTN RRM related issues**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2104763 Discussion on RRM requirements for NTN**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104764 draft LS reply on NTN UL time and frequency synchronization requirements**

*Type: LS out For: Approval  
 to RAN1  
 Source: CATT*

**Abstract:**

This contribution is also related to both email discussions of [98bis-e][309] NTN\_Solutions\_Part3; [98bis-e][223] NR\_NTN\_solutions\_RRM\_2

**Decision: Noted.**

**R4-2105142 Discussion on NTN GNSS requirement**

*Type: discussion For: Discussion  
 Source: LG Electronics UK*

**Decision: Noted.**

**R4-2107030 Discussion on general issues for NTN RRM**

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

**Decision: Noted.**

**R4-2107254 NTN - On reference points**

*Type: other For: Discussion  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Observation 1: Having the time reference point at the satellite means RAN4 has to define timing requirement for both gNB and UE towards the satellite.

Observation 2: Implementation of time reference point at the gNB requires less RAN4 specification work,

**Decision: Noted.**

##### 8.8.4.2 Timing requirements

**R4-2104604 Discussion on NTN timing requirements**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2104689 Discussion on timing requirements for NR NTN**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2104765 Discussion on timing requirements for NTN**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104927 Discussion on timing requirements for NTN**

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

**Decision: Noted.**

**R4-2104985 Discussion on RRM timing related requirements for NTN**

*Type: discussion For: Approval  
 Source: NEC*

**Abstract:**

In this contribution we provide our views on the RRM timing requirements for NTN UE

**Decision: Noted.**

**R4-2105139 Timing requirements**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

RRM timing requirements for UE.

**Decision: Noted.**

**R4-2105140 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.**

**R4-2106360 Discussion on timing requirements in NTN**

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

**Decision: Noted.**

**R4-2106444 Discussion on NTN timing pre-compensation**

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

**Decision: Noted.**

**R4-2106947 Discussion on NTN timing related requirements**

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

**Decision: Noted.**

**R4-2107259 NTN - On timing requirements**

*Type: other For: Discussion  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Proposal 1: Use the existing Te requirements as defined in TS 38.133, Table 7.1.2-1 for NTN

Proposal 2: RAN4 to investigate how open and closed loop TA control impact on the Te requirements

**Decision: Noted.**

**R4-2107291 Timing requirements in NTN Systems**

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

**Decision: Noted.**

##### 8.8.4.3 Measurement requirements

**R4-2104598 NTN RRM measurement requirements**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2104690 Discussion on measurement requirements for NR NTN**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2104766 Discussion on measurement requirements for NTN**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104816 Measurement RRM requirements for NTN**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Discussion on RRM measurement requirememt for NTN

**Decision: Noted.**

**R4-2104834 On GNSS measurement for NTN**

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

**Decision: Noted.**

**R4-2104986 Discussion on RRM measurement requirements for NTN**

*Type: discussion For: Approval  
 Source: NEC*

**Abstract:**

In this contribution we provide our views on measurement requirements of NTN UE

**Decision: Noted.**

**R4-2105143 Discussion on measurement requirements for NTN**

*Type: discussion For: Discussion  
 Source: LG Electronics UK*

**Decision: Noted.**

**R4-2106939 Discussion on measurement in NTN**

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

**Decision: Noted.**

**R4-2107256 NTN - On measurement requirements**

*Type: other For: Discussion  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Abstract:**

Observation 1: A static SMTC window duration may be unable to handle serving and neighbour cell propagation delay variations.

Observation 2: The transparent satellite amplification type impacts UE and network interpretation of measurements.

**Decision: Noted.**

**R4-2107292 Measurement requirements in NTN Systems**

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

**Decision: Noted.**

### 8.9 UE Power Saving Enhancements

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**Email discussion: [98-bis-e][224] NR\_UE\_pow\_sav\_enh\_RRM**

**R4-2105694 Email discussion summary: [98-bis-e][224] NR\_UE\_pow\_sav\_enh\_RRM***Type: other For: Information  
Source: Moderator (MediaTek)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105824 (from R4-2105694).**

**R4-2105824 Email discussion summary: [98-bis-e][224] NR\_UE\_pow\_sav\_enh\_RRM***Type: other For: Information  
Source: Moderator (MediaTek)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 19, 2021)

1st round email discussion conclusions

New tdocs

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105797 | WF on RLM/BM relaxation for NR UE Power saving | MTK |  |
|  |  |  |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation | Comments |
| R4-2105797 | WF on RLM/BM relaxation | Mediatek, vivo | Agreeable |  |

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

#### 8.9.1 General and work plan

**R4-2107082 Considerations on study phase conclusions for R17 RLM BFD relaxation**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

#### 8.9.2 UE measurements relaxation for RLM and/or BFD

**R4-2105797 WF on RLM/BM relaxation for NR UE Power saving**

*Type: other For: Approval  
 Source: MediaTek, vivo*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104605 Discussion on RLM/BFD relaxation for NR power saving enhancement**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2104693 Discussion on RLM/BFD measurement relaxation for power saving**

*Type: discussion For: Discussion  
 Source: Xiaomi*

**Decision: Noted.**

**R4-2104756 Discussion on RLM/BFD relaxation measurement**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104757 Update simulation results for RLM/BFD relaxation**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104850 UE measurements relaxation for RLM and/or BFD**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2104908 Power saving RRM discussion**

*Type: discussion For: Discussion  
 Source: Qualcomm, Inc.*

**Decision: Noted.**

**R4-2106461 Discussions on UE power saving for RLM and BM**

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

**Decision: Noted.**

**R4-2106539 Discussion on RRM requirements for R17 RLM/BFD relaxation**

*Type: discussion For: Discussion  
 Source: OPPO*

**Decision: Noted.**

**R4-2106540 Simulation results for R17 RLM/BFD relaxation**

*Type: discussion For: Information  
 Source: OPPO*

**Decision: Noted.**

**R4-2106581 Simulation results for RLM/BFD measurement relaxation**

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

**Abstract:**

Simulation results for system level and power saving evaluation for RLM and BFD relaxation.

**Decision: Noted.**

**R4-2106582 Discussion about RLM/BFD measurement relaxation**

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

**Abstract:**

Further discussion about RLM/BFD measurement relaxation feasibility and other details.

**Decision: Noted.**

**R4-2106851 Simulation results on UE power saving for RLM and BM**

*Type: discussion For: Information  
 Source: Ericsson*

**Abstract:**

In this contribution we present the SINR difference (delta SINR) for RLM-RS based on SSB for different relaxation factors and UE speeds as in agreed in previous meeting.

**Decision: Noted.**

**R4-2106852 Discussions on UE power saving for RLM and BM**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

In this contribution we continue the discussions on release 17 UE power saving based on the identified issues from last meeting.

**Decision: Noted.**

**R4-2106915 On RLM and RLF relaxation for UE power saving**

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

**Decision: Noted.**

**R4-2106942 Discussion on RLM/BFD measurement relaxation for power saving enhancements**

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

**Decision: Noted.**

**R4-2106943 Updated simulation results for RLM/BFD relaxation evaluation**

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

**Decision: Noted.**

**R4-2107083 Discussion on R17 RLM and BFD relaxation for NR**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2107084 Evaluation results on R17 RLM and BFD relaxation for NR**

*Type: other For: Information  
 Source: vivo*

**Decision: Noted.**

**R4-2107085 Updated evaluation assumptions for R17 RLM and BFD relaxation**

*Type: other For: Approval  
 Source: vivo*

**Decision: Noted.**

**R4-2107124 Evaluation on Rel-17 RLM/BFD measurement relaxation**

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

**Decision: Noted.**

## 12 Liaison and output to other groups

### 12.1 R17 related

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**Email discussion: [98-bis-e][225] LS\_reply\_R1-2009798\_MR\_DC\_NWM**

**R4-2105695 Email discussion summary: [98-bis-e][225] LS\_reply\_R1-2009798\_MR\_DC\_NWM***Type: other For: Information  
Source: Moderator (Huawei)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105825 (from R4-2105695).**

**R4-2105825 Email discussion summary: [98-bis-e][225] LS\_reply\_R1-2009798\_MR\_DC\_NWM***Type: other For: Information  
Source: Moderator (Huawei)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 19, 2021)

**Sub-topic 3: SCell to be activated belongs to FR2**

* Issue 3-1: If there is at least one active serving cell on that FR2 band and temporary RS for the target SCell is provided, no matter whether the SCell to be activated is known or unknown, how many temporary RS bursts are required for time/ frequency tracking?
  + Proposals:
    - Option 1: 1 burst is required based on RAN1 working assumptions on temporary RS design provided in the LS R1-2009798 (“1-slot with two CSI-RSs resources (2 samples)” or “2-slot with four CSI-RSs resources (4 samples)” for FR2).
    - Option 2: 1 burst is required (2-slot with four CSI-RSs resources (4 samples))
  + Agreements:
    - 1 burst is required (2-slot with four CSI-RSs resources (4 samples))
* Issue 3-2: If there is no active serving cell on that FR2 band, and the SCell to be activated is known to UE, how many temporary RS bursts are required for time/ frequency tracking?
  + Proposals:
    - Option 1: 1 burst is required based on RAN1 working assumptions on temporary RS design provided in the LS R1-2009798 (“1-slot with two CSI-RSs resources (2 samples)” or “2-slot with four CSI-RSs resources (4 samples)” for FR2).
    - Option 2: 1 burst is required (2-slot with four CSI-RSs resources (4 samples))
  + Agreements:
    - 1 burst is required (2-slot with four CSI-RSs resources (4 samples))

**Sub-topic 2: SCell being activated is unknown and belongs to FR1**

* Issue 2-3: when SCell is contiguous to an active serving cell in the same band (Intra-band continuous CA), how many temporary RS bursts are required for AGC?
  + Background: In the first round discussion, Issue 2-2 and partial issue 2-3 (for time/frequency tracking) have reached consensus.
  + Proposals:
    - Option 1: Two temporary RS bursts are required. (Huawei, Apple)
    - Option 2: One temporary RS bursts are required. (QC, MTK, Intel)
  + Discussion:
    - QC: This is a very special case. For this case UE can leverage some existing information.
    - Apple: Option 1. It depends on UE implementation. Option 1 is aligned with Rel-15 assumptions (need 2 bursts for AGC)
    - Intel: What is the difference between unknown and known case for intra-band contiguous CA case? For known case we already have 1 burst.
      * Huawei: We just follow legacy principle that UE needs 2 shots to set the AGC.
      * Apple: There may be different requirements for known/unknown case. One shot may be insufficient for AGC gain setting.
    - Huawei: Same view as Apple. Need to clarify AGC performance. For RRM we need to consider the worst case
    - MTK: Option 2. Network already provides sufficient SSB for rough AGC gain tuning. 1 additional burst for fine tuning is enough.
    - Intel: single shot is needed
  + Agreements:
    - One temporary RS bursts are required under assumption that the power difference between the SCell and the serving cell is ≤ 6dB

1st round email discussion conclusions

New tdocs

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105798 | WF on Temporary RS for efficient SCell activation | Huawei, HiSilicon |  |
| R4-2105799 | Reply LS on temporary RS for efficient SCell activation in NR CA | Huawei, HiSilicon |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation | Comments |
| R4-2105798 | WF on Temporary RS for efficient SCell activation | Huawei, HiSilicon | Agreeable |  |
| R4-2105799 | Reply LS on temporary RS for efficient SCell activation in NR CA | Huawei, HiSilicon | Agreeable |  |

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**R4-2105798 WF on Temporary RS for efficient SCell activation**

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

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2105799 Reply LS on temporary RS for efficient SCell activation in NR CA**

*Type: LS out For: Approval  
 to RAN1  
 Source: Huawei, HiSilicon*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104428 On temporary RS for efficient SCell activation**

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

**Decision: Noted.**

**R4-2104631 Considerations on temporary RS for efficient SCell activation in NR CA**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2106443 Discussion on temporary RS for efficient Scell activation**

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

**Decision: Noted.**

**R4-2106887 Temporary RS for Scell activation delay reduction**

*Type: discussion For: Discussion  
 Source: Ericsson*

**Abstract:**

Discussions on TRS for SCell activation delay reduction. In response to RAN1 LS R1-2009798.

**Decision: Noted.**

**R4-2106938 Discussion on temporary RS for efficient SCell activation in NR CA**

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

**Decision: Noted.**

**R4-2107125 Discussion on temporary RS**

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

**Decision: Noted.**

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**Email discussion: [98-bis-e][226] LS\_reply\_R2-2102165\_NBIOT**

**R4-2105696 Email discussion summary: [98-bis-e][226] LS\_reply\_R2-2102165\_NBIOT***Type: other For: Information  
Source: Moderator (Huawei)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105826 (from R4-2105696).**

**R4-2105826 Email discussion summary: [98-bis-e][226] LS\_reply\_R2-2102165\_NBIOT***Type: other For: Information  
Source: Moderator (Huawei)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 19, 2021)

* Issue 1-0-1: Neighbour cell measurement triggering
  + Proposals
    - Option 1: The triggering condition for such measurements can be the deteriorates in the serving cell channel quality. (ZTE P1)
    - Option 2: UE starts detection and measurement upon detecting an X number of out-of-sync indications, X is TDB. (Ericsson revised in the 1st round discussion)
  + Recommended WF
    - Moderator: Companies try to work on general principles and observations from RAN4’s perspective if any and the details are left to RAN2.
  + Discussion
    - HW: this requires further discussion.
* Issue 1-0-3: Feasibility of neighbour cell measurement in enhanced coverage
  + Proposals
    - Option 1: Focus on neighbour cell measurement before RLF in normal coverage and provide the observations to RAN2 in the LS reply. (Huawei, Nokia, Qualcomm)
  + Recommended WF
    - Provide answers for both normal and enhanced coverage and also with observation from RAN4’s perspective that enhanced coverage is not the typical scenarios for this feature.
  + Discussion:
    - Moderator: the key question is whether we should let RAN2 know that enhanced coverage is not typical.
    - E///: We don’t need to provide this information.
    - HW: The measurements for enhanced coverage may take too long and we may need to inform on this.
    - QC: RAN2 should be able to interpret the data which we provide. It is not very controversial.
    - E///: RAN2 can further decide if it is typical or not
    - Nokia: same view with QC and E///.

1st round email discussion conclusions

New tdocs

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105800 | Reply LS on neighbour cell measurement in NB-IoT RRC\_CONNECTED state | Huawei, HiSilicon | To: RAN2 |
| R4-2105801 | WF on neighbour cell measurement in NB-IoT RRC\_CONNECTED state in Rel-17 | Ericsson |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation | Comments |
| R4-2105800 | Reply LS on neighbour cell measurement in NB-IoT RRC\_CONNECTED state | Huawei, HiSilicon | Agreeable |  |
| R4-2105801 | WF on neighbour cell measurement in NB-IoT RRC\_CONNECTED state in Rel-17 | Ericsson | Revised |  |
|  |  |  |  |  |

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**R4-2105800 Reply LS on neighbour cell measurement in NB-IoT RRC\_CONNECTED state**

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

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2105801 WF on neighbour cell measurement in NB-IoT RRC\_CONNECTED state in Rel-17**

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

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105849 (from R4-2105801).**

**R4-2105849 WF on neighbour cell measurement in NB-IoT RRC\_CONNECTED state in Rel-17**

*Type: other For: Approval  
 Source: Ericsson*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104429 Reply LS on neighbour cell measurement in NB-IoT RRC\_CONNECTED state**

*Type: LS out For: Approval  
 to RAN2  
 Source: ZTE Corporation*

**Decision: Noted.**

**R4-2106345 Discussion of neighbor cell measurements in RRC\_CONNECTED for Rel-17 NB-IoT**

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

**Decision: Noted.**

**R4-2106857 Reply LS on neighbour cell measurement in NB-IoT RRC\_CONNECTED state**

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

**Abstract:**

This contribution contains LS response for the RAN2 incoming LS on CONNECTED mode neighbor cell measurements for NB-IOT for reducing the time between UE declaring RLF to the time UE performs RRC re-establishment on another cell.

**Decision: Noted.**

**R4-2106985 Reply LS on neighbour cell measurement in NB-IoT RRC\_CONNECTED state**

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

**Decision: Noted.**

**R4-2107185 Discussion on neighbour cell measurements in NB-IoT RRC\_CONNECTED state**

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

**Abstract:**

Discussion on incoming LS from RAN2

**Decision: Noted.**

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**Email discussion: [98-bis-e][227] LS\_reply\_R1-2102245\_IIoT\_URLLC**

**R4-2105697 Email discussion summary: [98-bis-e][227] LS\_reply\_R1-2102245\_IIoT\_URLLC***Type: other For: Information  
Source: Moderator (Nokia)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105827 (from R4-2105697).**

**R4-2105827 Email discussion summary: [98-bis-e][227] LS\_reply\_R1-2102245\_IIoT\_URLLC***Type: other For: Information  
Source: Moderator (Nokia)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

GTW session (April 19, 2021)

**LS response**

* Background

A Reply LS wording attempt has been collected by the moderator:

* downlink frame timing detection error is already included in UE transmit timing error (i.e. Te);

Interpretation: “the reference point” defined in section 7.1.2 in TS 38.133 for UE transmission timing is  ahead of [Text proposal], and the timing error limit value Te is given taking downlink frame timing detection error into account.

As candidate options for the [Text proposal] following two options have been identified:

*Text proposal 1:* “True arrival timing at UE”

*Text proposal 2: ‘*the first path detected by the UE*’*

* Proposals
  + Option 1: Text proposal 1. ZTE, Huawei, CMCC
  + Option 2: Text proposal 2. Ericsson, Apple, Vivo, Intel, MTK
  + Option 3: true arrival timing at UE (i.e. first path detected by the UE): NEC
  + Option 4: New TP not based on either option 1 or option 2 but on RAN4 specification: Huawei
    - UE determines the UL transmit timing based on the first path detected (in time). Te is the difference between the actual UL transmit timing and an “ideal” UL transmit timing which is determined based on the “True arrival timing at UE”
  + Option 5: New TP not based on RAN1 options: Qualcomm
    - confirm that the timing of the UL transmission is determined as specified in 38.133 section 7.1.1: “The uplink frame transmission takes place before the reception of the first detected path (in time) of the corresponding downlink frame from the reference cell. Te includes the downlink timing error, and for the UL timing error requirement the reference point in 38.133 section 7.1.2 is the true (nominal) downlink frame timing.
  + Option 6: *‘*the arrival of the first path (in time) at the UE”: Nokia
* Recommended WF
  + More discussion needed
  + There seems to a larger amount of companies who think that the reply should indicate that the UL transmit timing is based on the first detected true DL path (DL frame timing) at the UE.
  + There is also a number of companies that propose to not just reply using either of the RAN1 options but instead draft RAN4 reply.
  + TP to include the following parts:
    - downlink frame timing detection error is included in UE transmit timing error (i.e. Te)
    - “the reference point” defined in section 7.1.2 in TS 38.133 for UE transmission timing is  ahead of:
    - the true first detected downlink path (in time).
* Discussion
  + CMCC: Option 1
  + Apple: Option 2 (i.e. reflect what is exactly captured in the spec). We can also add more clarifications.
  + E///: Agree with Apple. The most important is the first answer. Our understanding is the true arrival time is ambiguous. Recommend to refer to the test procedure.
  + R&S: Ideal/True time is unclear. During the test the reference is the transmission time.
  + Intel: RAN1 LS used the wording “true”. The main question is whether Te includes the detection error. From the test perspective, the TE will take the TX timing as the reference.
  + MTK: Same view with E/// and R&S. In the test the TE does not know the exact UE detected path and TE uses its reference.4wf
  + Huawei: Same view as E///, R&S, Intel for ideal timing. For LS reply the most important that Te already includes timing detection error. Another question is whether we include additional clarifications.
* Agreement: LS response
  + RAN4 has the common understanding that downlink frame timing detection error is already included in UE transmit timing error (i.e. Te defined in section 7.1.2 in TS 38.133).

1st round email discussion conclusions

New tdocs

|  |  |  |  |
| --- | --- | --- | --- |
| Tdoc | Title | Source | Comments |
| R4-2105802 | Reply LS on UE transmit timing error | Huawei | To: RAN\_1 |
|  |  |  |  |

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation | Comments |
| R4-2105802 | Reply LS on UE transmit timing error | Huawei | Revised | Discussion is still ongoing on the detailed wording. |

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**R4-2105802 Reply LS on UE transmit timing error**

*Type: LS out For: Approval  
 to RAN1  
 Source: Huawei*

**Abstract:**

**Discussion:**

vivo: Current wording is “ahead of the time of arrival of the first detectable path at the UE antenna.”. Suggest “ahead of the time when the UE detected first path is arrived at the UE antenna” instead.

QC: not agreeable. This is not aligned with the first answer.

E///: Agree with QC.

Intel: Same view with E///

Chair: Suggest to avoid detectable if it is controversial. E.g. “ahead of the time of arrival of the receive signal at the UE antenna”?

MTK: Agree with vivo.

E///: Agree with chair compromise wording. Some update: “ahead of the time of arrival of the first path of the receive signal at the UE antenna”

Nokia: Agree with E///.

ZTE: First path comes from the 3G where we have multi-path searcher. So, it needs to be corrected. In 4G and 5G there is no multi-path search.

QC: we can also discuss in the next meeting.

Huawei: We are not sure on the suggested wording

Apple: RAN4 experts know how the Te is calculated and tested. Suggest to focus on the first question.

Intel: Agree with Apple.

ZTE: we are ok with the first answer.

E///: we should send LS

Chair: Add a note that “RAN4 will further discuss the reference point definition in the future to clarify the term”

**Decision: Revised to R4-2105850 (from R4-2105802).**

**R4-2105850 Reply LS on UE transmit timing error**

*Type: LS out For: Approval  
 to RAN1  
 Source: Huawei*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104609 Discussion and draft LS on UE transmit timing error**

*Type: discussion For: Discussion  
 Source: CMCC*

**Decision: Noted.**

**R4-2104648 Discussion on the reply to LS on UE transmit timing error**

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

**Decision: Noted.**

**R4-2104708 Discussion on UE transmit timing error**

*Type: LS out For: Approval  
 to RAN1  
 Source: Nokia Corporation*

**Decision: Withdrawn.**

**R4-2104725 Discussion on UE transmit timing error**

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

**Decision: Noted.**

**R4-2104767 Discussion on UE transmit timing error**

*Type: discussion For: Discussion  
 Source: CATT*

**Decision: Noted.**

**R4-2104768 Response LS on UE transmit timing error**

*Type: LS out For: Approval  
 to RAN1  
 Source: CATT*

**Decision: Noted.**

**R4-2104822 On UE Tx transmit timing error and the reply LS**

*Type: discussion For: Discussion  
 Source: ZTE Wistron Telecom AB*

**Decision: Noted.**

**R4-2104853 Discussion on RAN1 LS on UE transmit timing error for R17 URLLC**

*Type: discussion For: (not specified)  
 Source: Apple*

**Decision: Noted.**

**R4-2104984 Discussion for reply LS of UE transmit timing error**

*Type: discussion For: Approval  
 Source: NEC*

**Abstract:**

We discuss the potential RAN4 response to RAN1 LS R4-2102245

**Decision: Noted.**

**R4-2106445 Reply to LS on UE transmit timing error**

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

**Decision: Noted.**

**R4-2107031 reply LS on UE transmit timing error**

*Type: LS out For: Approval  
 to RAN1  
 Source: Huawei, HiSilicon*

**Decision: Noted.**

**R4-2107153 LS response on UE transmit timing error**

*Type: LS out For: Approval  
 to RAN1  
 Source: Ericsson*

**Abstract:**

This document analyzes and provide response on RAN1 LS on timing error

**Decision: Noted.**

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**Email discussion: [98-bis-e][228] LS\_reply\_R1-2102248\_feMIMO**

**R4-2105698 Email discussion summary: [98-bis-e][228] LS\_reply\_R1-2102248\_feMIMO***Type: other For: Information  
Source: Moderator (Samsung)*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105828 (from R4-2105698).**

**R4-2105828 Email discussion summary: [98-bis-e][228] LS\_reply\_R1-2102248\_feMIMO***Type: other For: Information  
Source: Moderator (Samsung)*

**Abstract:**

**Discussion:**

**Decision: Noted.**

1st round email discussion conclusions

2nd round email discussion conclusions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Tdoc number | Title | Source | Recommendation | Comments |
| R4-2105838 | WF on feMIMO on TCI State Update for L1/L2-Centric Inter-Cell Mobility | Samsung | Agreeable | To capture RAN4 understanding and consensus for future study |

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**R4-2105838 WF on feMIMO on TCI State Update for L1/L2-Centric Inter-Cell Mobility**

*Type: other For: Approval  
 Source: Samsung*

**Abstract:**

**Discussion:**

**Decision: Approved.**

**R4-2104567 Reply LS on TCI State Update for L1/L2-Centric Inter-Cell Mobility**

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

**Decision: Noted.**

**R4-2104848 Discussion on reply LS on TCI State Update for L1/L2-Centric Inter-Cell Mobility**

*Type: discussion For: Discussion  
 Source: Apple*

**Decision: Noted.**

**R4-2106398 Discussion on incoming L1/L2 mobility LS.**

*Type: discussion For: Discussion  
 38.133 v CR- rev Cat: (Rel-17)  
  
 Source: Nokia, Nokia Shanghai Bell*

**Decision: Noted.**

**R4-2106878 Reply LS on TCI State Update for L1/L2 Centric Inter-Cell Mobility**

*Type: LS out For: Approval  
 to RAN1, cc RAN2, RAN3, RAN  
 Source: Ericsson*

**Abstract:**

Discussion and LS reply on the two questions addressed to RAN4.

**Decision: Noted.**

**R4-2106941 Discussion on TCI State Update for L1/L2-Centric Inter-Cell Mobility**

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

**Decision: Noted.**

**R4-2107086 Discussion on LS on TCI State Update for L1/L2-Centric Inter-Cell Mobility**

*Type: discussion For: Discussion  
 Source: vivo*

**Decision: Noted.**

**R4-2107364 Discussion on incoming RAN1 LS for L1/L2 inter-cell mobility and draft LS out**

*Type: LS out For: Approval* *to RAN1, cc RAN2, RAN3  
 Source: Qualcomm CDMA Technologies*

**Decision: Noted.**

## 14 Any other business

**R4-2105839 Thank Steven for RAN4 Leadership**

*Type: other       For: Information  
                              Source: All of us*

**Abstract:**

**Discussion:**

**Decision: Revised to R4-2105859 (from R4-2105839).**

**R4-2105859 Thank Steven for RAN4 Leadership**

*Type: other       For: Information  
                              Source: All of us*

**Abstract:**

**Discussion:**

**Decision: Noted.**

## 15 Close of the E-meeting