**3GPP TSG-RAN WG4 Meeting #99-eR4-21xxxxx**

**Electronic Meeting, 19 – 27 May, 2021**

**Agenda item:** 4.1.7

**Source:** Moderator (Huawei)

**Title:** Email discussion summary for [99-e][201] NR\_RRM\_maintenance\_R15\_Core

**Document for:** Information

# Introduction

The scope of this email discussion includes the following agenda items:

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| 4.1.7 RRM core requirements maintenance (38.133/36.133) [NR\_newRAT-Core] |

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# Topic #1: Rel-15 NR RRM core requirements

## Companies’ contributions summary

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| **T-doc** | **Company** | **Proposals / Observations** |
| [**R4-2109294**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109294.zip) | Apple, Huawei, HiSilicon | CR  (1) The CSSF requirement has been updated for EN-DC to consider the MOs configured from both LTE MN and NR SN in EN-DC.  (2) Introduce Kp in measurement requirements for deactivated SCC.  (3) Correct the typo in title of Table 9.2.5.1-5. |
| [**R4-2109319**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109319.zip) | Apple | CR  (1) Update condition for SCell activation delay in FR1.  (2) Update applicability of RRC based BWP switch for SCell. |
| [**R4-2109621**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109621.zip) | vivo | CR  Clarify that RRC-based BWP switch on single CC applys for SpCell, applys for all cells when the paramter of BWP is changed except for the modification of parameters firstActiveDownlinkBWP-Id and firstActiveUplinkBWP-Id for SCell(s).  Remove the related editor’s note |
| [**R4-2109848**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109848.zip) | MediaTek inc. | CR  Add scheduling restriction on aperiodic CSI-RS for L1-RSRP, during during intra-frequency measurements on FR2. |
| [**R4-2109983**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109983.zip) | Ericsson | CR  Delete the related capability wordings (for inter-frequency without gaps). |
| [**R4-2110358**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110358.zip) | Huawei, HiSilicon | CR  For Issue 1: deactivated SCell measurement:  Adding scaling factor Kp for deactivated SCell measurement requirements without gap;  For Issue 2: interruption due to measurement on deactivated SCC  1. interruption requirements for measurement on deactivated SCell is corrected.  2. Wording in 8.2.4.2.3 is updated to add missing requirements for PSCell |
| [**R4-2110769**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110769.zip) | Huawei, Hisilicon | CR  Interruption requirements for measurement on deactivated NR SCell under EN-DC/NE-DC are corrected. |
| [**R4-2110846**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110846.zip) | Huawei, HiSilicon | **Proposal 1: Update the calculation of CSSF outside MG to account for inter-RAT measurement configured by LTE PCell on NR serving carriers. Measurements configured by LTE PCell and NR PSCell on the same NR serving carrier are counted as one measurement if they satisfy MO merging condition, otherwise they are counted as two measurements.**  **Proposal 2: Rel-15 SCell activation requirements, except those for SSB-less SCell, apply provided that the SSB of the to-be-activated SCell is within the first active DL BWP of the SCell.**  **Proposal 3: For branching of delay requirements, the following shall replace condition on measCycleSCell for known SCell in FR1**   * **TFirstSSB+ 5ms, if the measurement period is at most [800]ms,** * **TFirstSSB\_MAX + Trs + 5ms, if the measurement period is longer than [800]ms**   **Proposal 4: If UE is not provided with SSB (*absoluteFrequencySSB*) nor SMTC configuration for the target SCell in FR1, Tactivation\_time is 3 ms provided**   * **The target SCell is contiguous to an active serving cell in the same band, and** * **The RTD between the target SCell and the contiguous active serving cell is <= CP/2, and** * **The difference of the reception power with the contiguous active serving cell is <= 6dB, and** * **The RS(s) of SCell being activated is (are) QCL-TypeA with TRS(s) of the SCell being activated, and the TRS(s) is (are) further QCL-TypeC with SSB(s) of with the contiguous active serving cell.**   **Proposal 5: When SMTC configuration is not provided within the corresponding command (e.g. Handover, RRC release with redirection, SCell activation and PSCell addition/change), and MN and SN configure measObjectNR having same SSB frequency and subcarrier spacing with different SMTC configurations, the corresponding requirements are derived based on the SMTC with larger SMTC periodicity.**  **Proposal 6: Kp shall also apply for measurement requirements on deactivated SCell, where Kp = 1/(1- (SMTC period /MGRP)).** |
| [**R4-2110927**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110927.zip) | Huawei, HiSilicon | CR  1. Update the SCell activation requriements  a) Clarifiy that current activation requirements do not apply when SCellSSB is outside first active BWP  b) Add FR1 SSB-less SCell activation requirements  c) Clarifythe meaning of “SCell measurement cycle” in FR1 known SCell activation requirements  2. Add the clarification that Trs is the SMTC with larger SMTC periodicity if MN and SN configure measObjectNR with different SMTC configurations.  3. Update the definition of “reference point” in clause 7.1.2. |
| [**R4-2110928**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110928.zip) | Huawei, HiSilicon | CR  1. Remove the applicability related to intra- or inter-freqeuncy E-UTRA RSTD measurement for NE-DC.  2. Add the clarification that Trs is the SMTC with larger SMTC periodicity if MN and SN configure measObjectNR with different SMTC configurations. |
| [**R4-2111028**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111028.zip) | Nokia, Nokia Shanghai Bell | **Observation 1:** Allowing any reconfiguration of BWP parameters to cause "BWP switch" will impact NR system performance as UE cannot be scheduled during interruption time allowed by BWP switching.   1. Clarify that RRC-based BWP switch on single CC is appliable for SCells with any parameter change except the parameters *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* both in Rel-15 and Rel-16 2. Clarify that RRC-based BWP switch on single CC is only applicable for SpCell in Rel-15 and Clarify that RRC-based BWP switch on single CC is appliable for SCell with any parameter change except the parameters *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* both in Rel-16. |
| [**R4-2111029**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111029.zip) | Nokia, Nokia Shanghai Bell | CR  Clarify that RRC-based BWP switch on single CC is applied for SCell except the modification of parameters firstActiveDownlinkBWP-Id and firstActiveUplinkBWP-Id for SCell |
| [**R4-2111032**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111032.zip) | Nokia, Nokia Shanghai Bell | CR  Correction delay unit to slot level for NR-DC PSCell addition and release delay in Rel15 |
| [**R4-2111313**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111313.zip) | Ericsson, Nokia, Intel | CR  The definition of the reference point for the UE initial transmit timing control requirement is clarified. |

## Open issues summary

### Sub-topic 1-1: Measurement requirements

#### Issue 1-1-1: CSSF for NR inter-RAT measurement on NR serving carriers in EN-DC

* Proposals
  + Option 1 (Apple, HW)
    - Update the spec based on following agreements from RAN4#98-e.

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| * Option 2a: Remove the inter-RAT MOs counted in CSSF outside MG from CSSF within MG, and further discuss allowing existing implementations not to meet the updated requirements. * CSSF calculation   + CSSF outside MG     - to consider merging of intra-frequency MO configured by NR SN and inter-RAT MO configured by LTE MN on the same serving frequency that are measured without MG, based on [MO merging conditions in clause 9.1.3.2 of 38.133].   + CSSF within MG     - to consider merging of two MOs configured by LTE MN and NR SN on the same frequency that are measured within MG, based on [MO merging conditions in clause 9.1.3.2 of 38.133].   + Note: companies can further check the exact MO merging conditions * Allow requirements relaxation for Rel-15 UEs to avoid compatibility issue   + Option 1: “longer delays for cell identification and measurement periods derived based on CSSFwithin\_gap,i can be expected, if the UE is configured with inter-RAT MO on NR serving CC by E-UTRAN PCell in EN-DC mode”. |

* + - Related changes are as shown in Change#1 and Change#2 in R4-2109294 (Apple)
* Recommended WF
  + Further discuss if Change#1 and Change#2 in R4-2109294 are agreeable.

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| **Company** | **Comments** |
| MTK | These Changes are agreeable |
| Apple | The revisions are based on the agreements in RAN4#98 meeting, and in order to make the CSSF table as simple as possible, we added one note in the table to clarify the MO counting. |
| Ericsson | We are fine with changes #1 and #2 in R4-2109294. |
| Nokia | Change #1:  Not agreeable.  The newly added Note #6 seems to be contradictive with the earlier agreed requirement. Note #6 should be aligned with earlier agreement.  Change #2:  Agreeable |
| Qualcomm | We are fine with change #1 and #2 in R4-2109294. |
| Apple2 | Clarification to Nokia comment:  In the existing MO merging requirement in EN-DC, if the merging criteria cannot be met, we count MOs(on same frequency layer) from MN and SN as two layers; otherwise we count MOs from MN and SN as one single layer. We are wondering why note 6 is contradicted with existing requirement. |
| Huawei | We support Change#1 and Change#2 in R4-2109294.  To Nokia, we understand that if the merging condition is not met, UE needs to take separate measurements for the PCell configured MO and the PSCell configured MO, so they need to be counted separately. In our view, Note 6 is aligned with the following agreement from RAN4#98-e.   * + CSSF outside MG     - to consider merging of intra-frequency MO configured by NR SN and inter-RAT MO configured by LTE MN on the same serving frequency that are measured without MG, based on [MO merging conditions in clause 9.1.3.2 of 38.133]. |

#### Issue 1-1-2: Kp factor for measurement on deactivated SCC

Proposals

* + Option 1 (HW, Apple)
    - Kp shall also apply for measurement requirements on SCC with deactivated SCell, where Kp = 1/(1- (SMTC period /MGRP))
    - Related changes are as shown in
      * Change#1 in R4-2110358 (HW)
      * Change#3 in R4-2109294 (Apple)
* Recommended WF
  + Further discuss if option 1 is agreeable.

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| **Company** | **Comments** |
| MTK | agreeable |
| Apple | We support the change with justification mentioned in our contribution R4-2109294. We are fine to use Huawei’s CR to capture this part. |
| Ericsson | We do not support this change for Rel-15 UEs. There are already Rel-15 UEs in field that are operating according to the stricter requirements (without Kp scaling), and which would have a disadvantage from this change. |
| Nokia | We agree with the issue raised and discussed that the measurement requirements on the deactivated SCell should not be stricter than the measurement requirements on an activated SCell. Hence, we can agree to the principle of accounting the Kp factor for cell detection, Index reading and measurement period for a deactivated SCell.  However, the Kp factor should be applied to DRX cycle part of the equation to reflect 1) the basic principle also applied in LTE and the DRX and Kp factor applied for the same requirements for activated cells.  Example (Time period for PSS/SSS detection, deactivated SCell (FR1)):  5 x max(measCycleSCell, Kpx1.5xDRX cycle) x CSSFintra |
| Qualcomm | We support these changes. |
| Huawei | We proposed this issue for three meeting cycles. The motivation and justification which are elaborated in R4-2110846 are duplicated herein,  1. For activated cells, Kp is scaled to consider the case SMTC and gap are partially overlapped. In order to save power, even with large DRX cycle Kp is scaled as well.  2. For deactivated SCell measurement requirement, no Kp is scaled in existing specification. Although UE performs measurements on deactivated SCell without gap, the SMTC occasion may be partially overlapped with gap as well. For the partial overlapping case, it is reasonable to scale Kp where Kp = 1/(1- (SMTC period /MGRP)).  One can argue that when *measCycleSCell* is larger or equal to 160ms, there is sufficient opportunity for measurement on deactivated SCell during *measCycleSCell*. Thus the necessity of adding Kp scaling factor is not clear. However it is a principle that the measurement on deactivated SCell can not be tighten than on activated cells. It is observed that in some cases, the measurement delay on deactivated SCell without scaling Kp is smaller than that of activated cells, which is contradictory with the principle. Therefore the Scaling factor Kp shall be added for deactivated SCell measurement requirements without gap. |

#### Issue 1-1-3: Scheduling restriction for intra-frequency measurements on FR2

Proposals

* + Option 1 (MTK)
    - When aperiodic CSI-RS for L1-RSRP is on 1 data symbol before/after SSB or RSSI symbols, it is unclear that UE shall measure on the SSB/RSSI or on the aperiodic CSI-RS for L1-RSRP
    - It is proposed to add scheduling restriction on aperiodic CSI-RS for L1-RSRP, during intra-frequency measurements on FR2.
    - Related changes are as shown in Change#1 in R4-2109848 (MTK)
* Recommended WF
  + Further discuss if option 1 is agreeable.

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| **Company** | **Comments** |
| MTK | We realize in clause 9.2.5.1 Intrafrequency cell identification, the following statements already addressed this issue in cell identification :  "If the above-mentioned reference signal configured for L1-RSRP measurement is aperiodic CSI-RS resource, longer cell identification delay would be expected."  However, the such clarification on Klayer1\_measurement is missing in clause 9.2.5.2 measurement, while the same principle should apply.  Thus, we would like to update the proposal to add the similar clarification for clause 9.2.5.2 measurement period as below:  "For FR2, longer measurement period would be expected, if aperiodic CSI-RS resource is configured for L1-RSRP measurement on any FR2 serving frequency in the same band outside measurement gap are overlapped with any of the SSB symbols and the RSSI symbols, and 1 symbol before each consecutive SSB symbols and the RSSI symbols, and 1 symbol after each consecutive SSB symbols and the RSSI symbols, given that SSB-ToMeasure and SS-RSSI-Measurement are configured, where SSB symbols are indicated by the union set of SSB-ToMeasure from all the configured measurement objects on the same serving carrier which can be merged and RSSI symbols are indicated by SS-RSSI-Measurement."  Thus, we would like to request a revision for this CR. |
| Apple | We have different view on this. In the previous discussion for aperiodical CSI-RS based L1-RSRP, we think the aperiodical CSI-RS for L1-RSRP shall be prioritized, and we have some description in intra-freq measurement in section 9.2.5.1 that:  If the above-mentioned reference signal configured for L1-RSRP measurement is aperiodic CSI-RS resource, longer cell identification delay would be expected.  We are open to discuss the wording as mentioned by MTK. |
| Ericsson | We do not see a need for Option 1/CR R4-2109848, since it has already been agreed that measurements on aperiodic CSI-RS has higher priority than L3 measurements on SSBs. |
| Nokia | Agreeable |
| MTK2 | Yes, the option Option 1/CR R4-2109848 in not needed, since it has already been agreed that measurements on aperiodic CSI-RS has higher priority than L3 measurements on SSBs.  However, we observed this clarification only in 9.2.5.1, and it should also be in 9.2.5.2.  So we would like to request a revision or a new CR to capture such clarification in 9.2.5.2, as the wording above. If possible, we would like also revise CR title as “CR on ~~scheduling restriction of UE during~~ intra-frequency measurements on FR2 in R15”, because it is irrelevant to scheduling restriction now. |
| Qualcomm | Proposal is agreeable to us |
| Huawei | The original proposal (option 1) is not needed as AP-CSI-RS is prioritized and there is already clarification in L3 requirements.  We are in general fine with MTK’s updated proposal to add similar clarification also in 9.2.5.2, and we can work on the wording with the CR. |

#### Issue 1-1-4: Removal of MG-less inter-frequency measurement from Rel-15

Proposals

* + Option 1 (Ericsson)
    - The spec. specifies the capability for inter-frequency without gaps, but no such capability was introduced in Rel-15 for inter-frequency measurements
    - It is proposed to delete the descriptions related to the capabiliteis.
    - Related changes are as shown in Change#1 in R4-2109983 (Ericsson)
* Recommended WF
  + Further discuss if Change#1 in R4-2109983 is agreeable.

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| **Company** | **Comments** |
| MTK | Agreeable |
| Apple | Agree with option 1 |
| Ericsson | We support this change (proponent) since it causes confusion when references are made to capabilities that do not exist in the concerned release. |
| Nokia | Not agreeable.  Specification is not incorrect.  This line has been added since beginning of Rel-15 (and also used in LTE) to ensure that the requirements apply for a UE which can monitor the listed multiple layers without need of measurement gaps – if UE support such capability. Otherwise, there would be no UE requirements defined for such UE. |
| Huawei | Fine with Change#1 in R4-2109983 |
| Ericsson2 | Reply to Nokia:  According to our understanding, starting from Rel-16 several capabilities have been introduced for supporting measurements without gaps. One such example is inter-frequency measurements without gap, NeedForGap.  We had this open in the beginning of Rel-15 since it was excpected that the group would define such capability in Rel-15. However, to our knowledge, in the end none such capability was introduced in Rel-15.  If Nokia can point out which Rel-15 capability would apply for measurements without gaps, and in which specification it is captured, we would be fine not pursuing the CR. Otherwise we prefer to have this change. |

### Sub-topic 1-2: SCell activation requirements

#### Issue 1-2-1: Condition for FR1 known SCell activation

* Proposals
  + Option 1 (Apple, HW)
    - Use the following condition to branch the FR1 known SCell activation requirements
      * TFirstSSB+ 5ms, if the measurement period is at most [800]ms,
      * TFirstSSB\_MAX + Trs + 5ms, if the measurement period is longer than [800]ms
    - Related changes are as shown in
      * Change#1 in R4-2109319 (Apple)
      * Change#3 in R4-2110927 (HW)
* Recommended WF
  + Further discuss if option 1 is agreeable.

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| **Company** | **Comments** |
| MTK | Agreeable |
| Apple | We support the change with justification mentioned in our contribution R4-2109319. |
| Ericsson | We do not agree to the proposed value [800]ms. It needs to be larger, since it does not account for CSSF. If going with 800ms, it would only allow single SCC and no other measurements, for which CSSF = 1 (see further 38.133 clause 9.1.5). Existing requirement does not have such limitation.  Table 9.2.5.2-3: Measurement period for intra-frequency measurements without gaps (deactivated SCell) (FR1)   |  |  | | --- | --- | | DRX cycle | T SSB\_measurement\_period\_intra | | No DRX | 5 x measCycleSCell x CSSFintra | | DRX cycle≤ 320ms | 5 x max(measCycleSCell, 1.5xDRX cycle) x CSSFintra | | DRX cycle> 320ms | 5 x max(measCycleSCell, DRX cycle) x CSSFintra |   We prefer to keep as is, with modification of “SCell measurement cycle” to “measCycleSCell”  If the SCell is known and belongs to FR1, Tactivation\_time is:  - TFirstSSB+ 5ms, if the ~~SCell measurement cycle~~ measCycleSCell is equal to or smaller than 160ms.  - TFirstSSB\_MAX + Trs + 5ms, if the ~~SCell measurement cycle~~ measCycleSCell is larger than 160ms.  or to have a larger threshold for measurement period, e.g. 5.12 seconds. |
| Nokia | Not agreeable.  First, this change is not an essential correction.  Secondly, this relates to a deactivated SCell (and hence not similar to direct activated SCell), where the measurement period for intra-frequency measurements without gaps (deactivated SCell) (FR1) is defined in table 9.2.5.2-3. Example, for no DRX:  5 x measCycleSCell x CSSFintra  Following the current requirements, if the network configures the measCycleScell to 160ms and ensures that the SCell is known at activation time, the activation delay is known.  With the proposed change, using same measCycleScell the activation time would depend on if other measurements are active and the CSSFintra. Additionally, the delay would be in many scenarios be prolonged and according to ‘longer than [800}ms’. |
| Qualcomm | We believe it is better to stick to SCellMeasurementCycle since this parameter is configured. To clarify, it would be best to reference exactly the parameter signaled through RRC. |
| Huawei | We support option 1.  If the condition is based on measCycleSCell, the problem is that the actual measurement period could be quite large if CSSF and DRX are considered, which means UE may have not measured the SCell for a long time, and the AGC setting may be invalid.  On the threshold, our first preference is to keep 800ms, which is aligned with the original motivation to have this branched requirements. On the other hand, we can understand the concern from NW side, so we are open to discuss a larger threshold. |

#### Issue 1-2-2: SSB not in first active BWP

* Proposals
  + Option 1 (HW)
    - Rel-15 SCell activation requirements, except those for SSB-less SCell, apply provided that the SSB of the to-be-activated SCell is within the first active DL BWP of the SCell.
    - Related changes are as shown in Change#3 in R4-2110927 (HW)
* Recommended WF
  + Further discuss if option 1 is agreeable.

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| **Company** | **Comments** |
| MTK | Agreeable |
| Apple | Agree with option 1. |
| Ericsson | Whether Option 1 is acceptable would depend on outcome from the discussion on UE supporting bwp-WithoutRestriction. According to our understanding, that discussion has not yet been concluded. |
| Nokia | We’re in general fine but have a few clarifying questions:   * first bullet says ‘The target SCell is contiguous to an active serving cell in the same band’ is this the same as saying ‘The target SCell is an intra-band contiguous SCell to an active serving cell’? * now it states <=CP/2. Is this the same as +-CP/2?   when considering 2nd time why are the QCL assumptions needed? |
| Huawei | We support option 1.  To Ericsson, when defining Rel-15 requirements RAN4 has not discussed UE behaviors for this scenario, for either UE capable of bwp-WithoutRestriction or UE incapable of it. Considering that we already have many Rel-15 UEs in the field, we think it is too late to define requirements for this scenario in Rel-15, so we suggest to define applicability condition as in option 1. We are open discuss requirements for Rel-16 and the dependence on bwp-WithoutRestriction capability. Hope this is fine.  To Nokia, it seems the comments are for Issue 1-2-3, could you please double check? |

#### Issue 1-2-3: SSB-less activation in FR1

* Proposals
  + Option 1 (HW)
    - Define requirements for FR1 SSB-less SCell activation in Rel-15 as follows
      * If UE is not provided with SSB (absoluteFrequencySSB) nor SMTC configuration for the target SCell in FR1, Tactivation\_time is 3 ms provided
        + The target SCell is contiguous to an active serving cell in the same band, and
        + The RTD between the target SCell and the contiguous active serving cell is <= CP/2, and
        + The difference of the reception power with the contiguous active serving cell is <= 6dB, and
        + The RS(s) of SCell being activated is (are) QCL-TypeA with TRS(s) of the SCell being activated, and the TRS(s) is (are) further QCL-TypeC with SSB(s) of with the contiguous active serving cell.
    - Related changes are as shown in Change#3 in R4-2110927 (HW)
* Recommended WF
  + Further discuss if option 1 is agreeable.

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| **Company** | **Comments** |
| MTK | Agreeable |
| Apple | The RTD is within 260ns based on the agreement in RAN4 #98 meeting. We also see that this topic in TEI16, and we slightly prefer to specify it from R16. |
| Ericsson | We are fine with Option 1. |
| Nokia | Same comment as for the former issue.  We’re in general fine but have a few clarifying questions:   * first bullet says ‘The target SCell is contiguous to an active serving cell in the same band’ is this the same as saying ‘The target SCell is an intra-band contiguous SCell to an active serving cell’? * now it states <=CP/2. Is this the same as +-CP/2?   when considering 2nd time why are the QCL assumptions needed? |
| Qualcomm | Not clear why QCL assumptions are needed, the issue is actual time difference of arrival at UE and power difference. as long as these are compliant with intra-band contiguous CA, it should be fine.  We agree with the first bullet in the Nokia comment, best to use something like “part of a intra-band contiguous CA band combination” |
| Huawei | Support option 1 with RTD changed from CP/2 to 260ns.  To Apple, you are right, RTD should be changed 260ns based on agreements from RAN4#98-e. On which release to introduce this requirement, we prefer to introduce it from Rel-15 since based on past discussions all UE vendors can support it from Rel-15, so it is better to define the requirement compared to leaving no requirement for this case in Rel-15. Of course, we are open to further discuss if there is a strong opinion to start from Rel-16.  To Nokia/QC, we are fine to update wording to like “part of an intra-band contiguous CA band combination”.  To Nokia, on the RTD, it should be changed to 260ns based on following agreement in RAN4#98-e. And we agree that it should be +-260ns.  Agreements   * Reception power difference with the contiguous active serving cell is smaller than or equal to 6dB * RTD is smaller than or equal to 260ns   To QC, the QCL assumption is needed because if P-TRS on the SCell is QCLed to the SSB on the contiguous active serving cell, then UE cannot derive the fine timing for CSI measurement and demodulation. |

### Sub-topic 1-3: Other signaling characteristic related requirements

#### Issue 1-3-1: Applicability of RRC based BWP switching requirements

* Proposals
  + Option 1a (Apple)
    - Update the applicability of RRC based BWP switching requirements as follows
    - Related changes is as shown in
      * Change#2 in R4-2109319 (Apple)

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| The requirements in this clause only apply to the case that the BWP switch is performed on a single CC with   * Active BWP switching or parameter change of its active BWPs with one or more than one BWP configuration(s) configured for SpCell * Parameter change of its active BWPs except parameter *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* with one BWP configuration for SCell |

* + Option 1b (vivo)
    - Update the applicability of RRC based BWP switching requirements as follows
    - Related changes is as shown in
      * Change#1 in R4-2109621 (vivo)

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| The requirements in this clause only apply to the case that the BWP switch is performed on a single CC with one or more than one BWP configuration(s) configured.  The requirements in this clause shall apply:   * Active BWP switching or parameter change of its active BWPs for SpCell * Parameter change of its active BWPs except parameter *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* for SCells |

* + Option 1c (Nokia)
    - Update the applicability of RRC based BWP switching requirements as follows
    - Related changes is as shown in
      * Change#1 in R4-2111029 (Nokia)

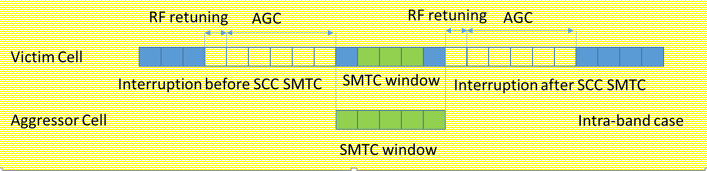
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| The requirements in this clause apply to the case that the BWP switch is performed on a single CC with one or more than one BWP configuration(s) configured.  For RRC-based BWP switch, after the UE receives RRC reconfiguration involving active BWP switching or parameter change of its active BWP except the parameters *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* for an SCell, UE shall be able to receive PDSCH/PDCCH (for DL active BWP switch) or transmit PUSCH (for UL active BWP switch) on the new BWP on the serving cell on which BWP switch occurs on the first DL or UL slot right after a time duration of slots which begins from the beginning of DL slot n, where |

* + Option 2 (Nokia)
    - Clarify that RRC-based BWP switch on single CC is only applicable for SpCell in Rel-15 and Clarify that RRC-based BWP switch on single CC is appliable for SCell with any parameter change except the parameters firstActiveDownlinkBWP-Id and firstActiveUplinkBWP-Id both in Rel-16.
* Recommended WF
  + Companies’ views are aligned based on RAN2 reply LS. Option 1a, 1b and 1c are technically identical but just different wordings. The proponent company of option 2 is also fine with option 1.
  + It is suggested to agree the following bullets based on option 1:
    - From Rel-15 onwards, the requirements for single CC BWP switching shall apply for
      * Active BWP switching or parameter change of its active BWPs for SpCell
      * Parameter change of its active BWPs except parameter *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* for SCells
  + Further discuss which option among option 1a, 1b and 1c is to be used to update the spec

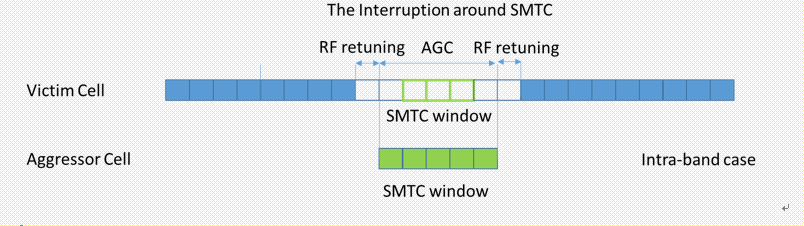
|  |  |
| --- | --- |
| **Company** | **Comments** |
| MTK | Agreeable with the Recommended WF. Slightly prefer to 1c since it seems more concise. |
| Apple | We would like to propose the following wording to update the spec based on views from companies: 8.6.3 RRC based BWP switch delay on a single CC The requirements in this clause only apply to the case that the BWP switch is performed on a single CC with one or more than one BWP configuration(s) configured, with   * Active BWP switching or parameter change of its active BWPs for SpCell * Parameter change of its active BWPs except parameter *firstActiveDownlinkBWP-Id* and *firstActiveUplinkBWP-Id* for SCell |
| Ericsson | Our preference is Option 1b (vivo), which also is in line with the endorsed draftCR R4-2105835 by Nokia from RAN4#98bis-e for the related switching on multiple CCs. |
| Nokia | Agree with the recommended WF. We prefer option 1c which is more concisely clear. |
| vivo | Agree with the WF. We prefer option 1b and we have the same reason as Eric since option 1b is more aligned with the endorse CR for “RRC based BWP switch delay on multiple CCs” case, which ensure similar wording on the same issue for different scenarios.  We are also ok with Apple’s suggestion above, which is quite similar to option 1b except for some wordings. We are ok to update 1b if there is consensus on wording to make progress. |
| Huawei | Agree with the recommended WF.  Slightly prefer option 1b or the updated wording from Apple. |

#### Issue 1-3-2: Interruption for measurement on deactivated SCC

* Proposals
  + Option 1 (HW)
    - Based on current requirements, for serving cells in the same band the as deactivated SCC, two interruptions are allowed, one before SMTC window and one after SMTC window, and each with length X + TSMTC\_duration slots

 Figure 1

* + - It is proposed to update the requirements such that one interruption is allowed around SMTC window, with length 2\*X + TSMTC\_duration slots

 Figure 2

* + - Related changes is as shown in
      * Change#1 and Change#2 in R4-2110358 (HW) for 38133
      * Change#1 and Change#2 in R4-2110769 (HW) for 36133
* Recommended WF
  + Further discuss is option 1 is agreeable

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | Fine with the proposal. |
| Ericsson | The proposal is not agreeable in its current form.  We do agree with that there is one interruption before and one interruption after the measurement occasion, and that each of those shall be short i.e. X and not contain SMTC\_duration.  However, we do not agree that there shall be an interruption *during* the SCC SMTC window, since here we are talking about measurements on deactivated SCell. An interruption for finding a suitable VGA setting has already been accounted for at SCell addition, and is also accounted for in SCell activation.  So we propose to allow interruption before and after, where each interruption is X=1, 1, 2, 4 slots for µ=0, 1, 2, 3, respectively. |
| Nokia | Not agreeable  We do not see a need for this change. In our view the specification is already clear and allows the UE ‘interruptions immediately before and immediately after an SMTC’.  And the requirement does distinguish between SCell in same band and not in same band as the active cells. |
| Qualcomm | We support the changes |
| Huawei | Support option 1.  To Ericsson, we can understand your point but we prefer to keep the exiting requirements in Rel-15, i.e. the interruption length for intra-band serving cell is X + SMTC duration. Of course, we are open to hear other views.  To Nokia, for active serving cell in the same band as the SCell, the current requirements allow ‘interruptions immediately before and immediately after an SMTC’, and the length of each interruption is X + SMTC duration as in Figure 1. This is too much than needed. |

#### Issue 1-3-3: SMTC configuration determination in DC

* Proposals
  + Option 1 (HW)
    - When UE is configured with DC, it is possible that MN and SN both configure MO on the same frequency and the SMTC configuration could be different provided that the measurement window of one SMTC should include the other one or vice-versa
    - It is proposed that when SMTC configuration is not provided within the corresponding command (e.g. Handover, RRC release with redirection, SCell activation and PSCell addition/change), and MN and SN configure measObjectNR having same SSB frequency and subcarrier spacing with different SMTC configurations, the corresponding requirements are derived based on the SMTC with larger SMTC periodicity.
    - Related changes is as shown in
      * Change#1, Change#2, Change#3 and Change#4 in R4-2110927 (HW) for 38133
      * Change#2 and Change#3 in R4-2110928 (HW) for 36133
* Recommended WF
  + Further discuss is option 1 is agreeable

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| **Company** | **Comments** |
| MTK | Agreeable |
| Apple | Fine with the proposal. |
| Ericsson | The proposal is not agreeable in its current form.  We do not agree to the logic used here to use the larger of the SMTC periodicities provided by MN and SN. Rather, we find it more logical to go for the shorter SMTC period of the two, since one of the network nodes has configured, and is expecting, measurements with lower latency than the other node.  So we propose to instead go for the shorter of SMTC period provided by MN and SN for corresponding MOs for the same target. |
| Nokia | Change #1:  Need more discussion  Initially, this is likely a corner case which RAN4 may not need to cover. If RAN4 would choose to cover this scenario our view would be that as the UE has information about the SMTC periodicities this should also be used by the UE. Hence, the UE should use shortest SMTC periodicity.  Change #2:  Same comment as change #1  Change #3:  Seems to include changes related to other issues addressed above. Hence, it is difficult to agree to as it is not related only to option1. For the aspect related to Option 1 – same comment as for change #1.  Change #4:  Same comment as change #1 |
| Qualcomm | Agreeable |
| Huawei | We support option 1.  Response to Ericsson and Nokia:  Considering the coordination between MN and NS may be not tight enough, and some Rel-15 UEs are already in the market, at least for Rel-15 UE, it should be allowed to follow the larger SMTC which is a more conservative and compatible approach. We are open to further discuss this issue for Rel-16/17 UE whether the shorter one is feasible to have shorter delay. |

#### Issue 1-3-4: Correction on NR-DC PSCell addition and release requirements

* Proposals
  + Option 1 (Nokia)
    - Correct delay unit to slot level for NR-DC PSCell addition and release delay
    - Related changes is as shown in
      * Change#1 in R4-2111032 (Nokia)
* Recommended WF
  + Further discuss is Change#1 in R4-2111032 is agreeable

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| **Company** | **Comments** |
| MTK | Agreeable |
| Apple | Fine with the change. |
| Ericsson | We are fine with Option 1. |
| Qualcomm | Not clear to us that this change is needed. the time is in ms which is the subframe length. |
| Huawei | Fine with the change. |

### Sub-topic 1-4: Others

#### Issue 1-4-1: Update definition of ’reference point’ in UL timing requirements

* Proposals
  + Option 1a (Ericsson, Nokia, Intel)
    - Update the definition of ’reference point’ as follows
    - Related changes is as shown in
      * Change#1 in R4-2111313 (Ericsson, Nokia, Intel)

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| The UE shall meet the Te requirement for an initial transmission provided that at least one SSB is available at the UE during the last 160 ms. The reference point for the UE initial transmit timing control requirement shall be the downlink timing of the reference cell minus . The downlink timing is defined as the time when the first detectable path (in time) of the corresponding downlink frame is received from the reference cell at the UE antenna. *N*TA for PRACH is defined as 0. |

* + Option 1b (HW)
    - Update the definition of ’reference point’ as follows
    - Related changes is as shown in
      * Change#1 in R4-2110927 (HW)

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| --- |
| The UE shall meet the Te requirement for an initial transmission provided that at least one SSB is available at the UE during the last 160 ms. The reference point for the UE initial transmit timing control requirement shall be the downlink timing of the reference cell minus . The downlink timing is defined as the time when the first detectable path (in time) of the corresponding downlink frame from the reference cell arrives at the UE antenna. *N*TA for PRACH is defined as 0. |

* Recommended WF
  + The issue was triggered by discussion on reply LS to R1-2102245 in Rel-17 URLLC WI. Therefore, it is suggested to have the technical discussions in email thread #239, so no technical discussion is expected here.

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| **Company** | **Comments** |
| Moderator | No technical discussion is expected here. |
|  |  |

#### Issue 1-4-2: Applicability of RSTD requirements for NE-DC operation

* Proposals
  + Option 1 (HW)
    - There is no intra- or inter-freqeuncy E-UTRA RSTD measurement requirements defined for NE-DC.
    - It is proposed to remove intra-frequency and inter-frequency RSTD requirements as applicable requirements for NE-DC
    - Related changes is as shown in
      * Change#1 in R4-2110928 (HW)
* Recommended WF
  + Further discuss if option 1 is agreeable.

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| **Company** | **Comments** |
| Ericsson | We are fine with Option 1. |
|  |  |

## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

*All the proposed changes are captured as open issues in section 1.2, so in this section please provide additional comments, e.g. on the exact wording for a particular change, if any.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2109294 (Apple, HW) | Moderator: Related to 1-1-1, 1-1-2 |
| Ericsson: We do not agree to introduce Kp in Rel-15, hence parts of this CR pertaining to Issue 1-1-2 are not agreeable to us at this point. |
| Nokia: Not agreeable in current form. More discussion needed. |
| R4-2109319 (Apple) | Moderator: Related to 1-2-1, 1-3-1 |
| Ericsson: We do not agree with the proposed value [800] ms as it would be highly limiting to single SCC compared to existing requirement. We suggest leave as is (i.e. no change) or at least use a significantly larger value. Hence this CR is not agreeable to us at this point. |
| Nokia: Not agreeable |
| Qualcomm: for the 1st change, it would be better to stick to SCellMeasurementCycle because it is the parameter configured in RRC. maybe to clarify it would be good to reference exactly the parameter from 331. |
| R4-2109621 (vivo) | Moderator: Related to 1-3-1 |
| Ericsson: We are in principle fine with this CR but would suggest slight updating of the wording. |
| Nokia: We shared the similar view in this requirement, we would prefer the wording in option 1c in issue 1-3-1, which is more concisely clear. |
| R4-2109848 (MTK) | Moderator: Related to 1-1-3 |
| Ericsson: We do not see a need for this CR. It has already been agreed that apriodic CSI-RS measurements have higher priority than L3 measurements on SSBs. |
| Nokia: Change #1 is agreeable |
| R4-2109983 (Ericsson) | Moderator: Related to 1-1-4 |
| Nokia: Not agreeable |
|  |
| R4-2111313 (Ericsson, Nokia, Intel) | Moderator: No discussion expected, this CR is handled in email #239 |
|  |
|  |
| R4-2110358 (HW, 38) | Moderator: Related to 1-1-2, 1-3-2 |
| Ericsson: We do not agree to the CR in its current state. We do not support introducing Kp in Rel-15. We do support correcting the interruption requirements for measurements on deactivated SCell, but do not agree with current proposal which includes an interruption that spans SCC SMTC window. In our view there shall only be interruption before and after, not during. See further our comment for Issue 1-3-2. |
| Nokia: Not agreeable. |
| Qualcomm: we support the changes |
| R4-2110927 (HW, 38) | Moderator: Related to 1-2-1, 1-2-2, 1-2-3, 1-3-3  Moderator: No discussion on change #5 expected, this change is handled in email #239 |
| Nokia: In general change #3 is fine, but more discussion is needed based on comments. |
|  |
| R4-2110769 (HW, 36) | Moderator: Related to 1-3-2 |
| Ericsson: We do not agree to the CR in its current state. We do support correcting the interruption requirements for measurements on deactivated SCell, but do not agree with current proposal which includes an interruption that spans SCC SMTC window. In our view there shall only be interruption before and after, not during. See further our comment for Issue 1-3-2. |
| Nokia: Not agreeable (same as for R42110358). |
| R4-2110928 (HW, 36) | Moderator: Related to 1-3-3, 1-4-2 |
| Ericsson: We do not agree to the CR in its current state. We are fine with the change pertaining to RSTD, but not with the change pertaining to using the *larger* of SMTC configured by MN and SN. In our view it shall be the *smaller* of the two. See further our comment for Issue 1-3-3. |
| Nokia: In general change #3 is fine, but more discussion is needed based on comments (same as for R4-2110927) |
| R4-2111029 (Nokia) |  |
| Moderator: Related to 1-3-1 |
| Ericsson: We are in general fine with the change but prefer the original structure of related R4-2105835 |
| R4-2111032 (Nokia) | Moderator: Related to 1-3-4 |
| Ericsson: We are fine with the CR. |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
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Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents