**3GPP TSG-RAN WG4 Meeting #94-e R4-20xxxxx**

**Electronic Meeting, Feb.24th – Mar.6th 2020**

**Agenda item:** 6.10 (except 6.10.8)

**Source:** Huawei, HiSilicon

**Title:** Email discussion summary for RAN4#94e\_#41\_NR\_NewRAT\_RRM\_Core\_Part\_1

**Document for:** Information

# Introduction

According to RAN4 Chairmen arrangement, this contribution provides the summary of topics of Rel-15 NR RRM Core maintenance general (except signalling) under agenda 6.10 (except agenda 6.10.8).

List of candidate target of email discussion for 1st round and 2nd round.

* 1st round: Invite companies to provide the comments for the discussion paper and CRs. According to comments, the possible way forward will be suggested. Based on the possible way forward, the Chair can allocate the Tdoc numbers for way forward or CRs to the responsible companies by the deadline of the first round.
* 2nd round: The responsible companies are expected to provide the way forward or revised/new CRs as soon as possible by capturing the comments in the first round, and companies are encouraged to review them again. The comments in the 2nd round will be captured in this summary. If no further comment for the way forward or CRs, the moderator will report that those documents are agreeable to the Chair. If there is still controversial issues, the moderator will capture the issues and opinions from the companies for the further discussion in the next meetings.

# Topic #1: General

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2001329 | Nokia, Nokia Shanghai Bell | **Proposal 1**: QCL chain depth restriction is for the certain QCL type.**Proposal 2**: Agree to following text proposal to 38.133, section 3.6.7. |
| R4-2001335 | Nokia, Nokia Shanghai Bell | Based on above analysis and the answer 1 from RAN1:[Answer 1] According to RAN1 understanding, it is up to the UE implementation which configured CSI-RS resources it monitors for RLM, BFD, candidate beam detection or L1-RSRP, outside of active time, as long as it can meet the performance requirements set by RAN4 in 38.133 for RLM, BFD, CBD and L1-RSRP.This is already aligned with principles of the RAN4 specification and the current RAN4 UE requirements. Hence, we see no need for any RAN4 actions related to answer 1.[Answer 2]  The UE may assume that CSI-RS resources are available outside DRX active time, if configuredThis enables good UE implementations to take advantage of the additional availability of the CSI-RS resources to perform better than minimum requirements. No actions are needed concerning the RAN4 requirements.Based on this we conclude that the replies from RAN1 related to the LS from RAN4, do not lead to any actions in RAN4.**Observation:** No actions needed in RAN4 related to the reply LS [2]. |

## Open issues summary

### Sub-topic 1-1

**Issue 1-1: Clarification of QCL chain depth restriction is for a certain QCL type**

* Proposals
	+ Proposal 1: QCL chain depth restriction is for the certain QCL type
	+ Proposal 2: Agree to follow text proposal to 38.133, section 3.6.7
* Recommended WF
	+ Invite companies to check if Proposal 1 is agreeable.

### Sub-topic 1-2

**Issue 1-2: Actions to RAN1 reply LS on CSI-RS measurement outside DRX active time**

* Proposals
	+ No action is needed
* Recommended WF
	+ Invite companies’ comments.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| MTK | Issue 1-1: Clarification of QCL chain depth restriction is for a certain QCL typeOK to the changeIssue 1-2: Actions to RAN1 reply LS on CSI-RS measurement outside DRX active timeOk to the proposal |
| Intel | Issue 1-1: support proposals from NokiaIssue 1-2: agree that no action is needed. |
| Ericsson | Sub topic 1-1: Proposal 1 is agreeable and we would like a CR to be agreed in RAN4#94e.Sub topic 1-2: RAN4 existing specification appears to be aligned with the 2 answers from RAN1, so we agree with the proposal that no action is needed in RAN4 |
| Huawei, HiSilicon | Issue 1-1: we are fine with the change.Issue 1-2: we are fine with the proposal. |
| Apple | Sub topic 1-1: it is true that CSI-RS can be QCL-ed to different RS resource(s) and type(s). However, in our view that each QCL chain should be associated with a single QCL type. One CSI-RS resource can be part of multiple QCL chains. Clarification in proposal 1 does not seem very necessary. |

## 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# 1-1** | Tentative agreements:It is agreeable to clarify that QCL chain depth restriction is for the certain QCL typeCandidate options:Recommendations for 2nd round:It is suggested to allocate the new Tdoc number for CR to Nokia in this meeting. |
| **Sub-topic# 1-2** | Tentative agreements:No action is needed for RAN1 reply LS on CSI-RS measurement outside DRX active time. |

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**  |
| R4-200xxxx | A new CR is needed to capture the agreement for sub-Topic 1-1. The new Tdoc number needs be allocated. |

## Discussion on 2nd round (if applicable)

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Apple | We still question the definition of QCL chain and if one QCL chain can be associated with multiple QCL type. Until this can be clarified, we should hold the agreement on the revision  |

## 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**  |
|  |  |

# Topic #2: Editorial CRs

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2000580 | CATT | The value of *timeDurationForQCL* is defined in TS38.331 other than in TS38.306, thus, the reference spec should be revisited in 38.133.Change TS38.306 to TS38.331; |
| R4-2000581 | CATT | Cat A CR corresponding to [R4-2000580](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000580.zip) |
| [R4-2000914](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000914.zip) | MediaTek inc. | Referenced to incorrect specifications and sections |
| R4-2000915 | MediaTek inc. | Cat A CR corresponding to [R4-2000914](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000914.zip) |
| [R4-2000522](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000522.zip) | ZTE Corporation | CR1. In 9.1.1, the reference to the control of reporting is 36.331, should be 38.331.
2. The values in the two tables in 9.4.4.2.2.2 are the minimum numbers of ACK/NACK transmissions. The header of the two tables are wrong currently. Number of transmissions and minimum number of transmissions are two totally different concepts.
3. In 8.10.3, the reference to where THARQ is specified is wrong, it’s specified in clause 9.2.3 in 38.213.
 |
| [R4-2000510](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000510.zip) | ZTE Corporation | Cat A CR corresponding to [R4-2000522](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000522.zip) |
| R4-2000293 | Samsung | CRThe following corrects are provided in this CR:  - Wrong references to TS38.214 are corrected.  - The sentence “The UE shall only send periodic L1-RSRP measurement reports for an active BWP.” is redundant since the same requirement is given for all kinds of reporting.  - other corrections. |
| R4-2000294 | Samsung | Cat A CR to R4-2000293 |

## Open issues summary

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [R4-2000580](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000580.zip) | Ericsson: CR is OK |
| Nokia: Agreeable, but not essential correction for Rel-15. Can be agreed for Rel-16 |
|  |
| [R4-2000914](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000914.zip) | Ericsson: CR is OK |
| Nokia: Agreeable, but not essential correction for Rel-15. Can be agreed for Rel-16 |
|  |
| [R4-2000522](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000522.zip) | Ericsson: CR is OK |
| Nokia: agreeable |
|  |
| R4-2000293R4-2000294 |  |
|  |
|  |

## Summary for 1st round

### CRs/TPs

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

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| [R4-2000580](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000580.zip) | Return to. Content of CR is agreeable. Need check if proponent is OK to withdraw Rel-15 CR. |
| R4-2000581 | Return to. Cat A CR to R4-2000580. |
| [R4-2000914](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000914.zip) | Return to. Content of CR is agreeable. Need check if proponent is OK to withdraw Rel-15 CR. |
| R4-2000915 | Return to. Cat A CR to [R4-2000914](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000914.zip). |
| [R4-2000522](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000522.zip) | CR is agreeable. |
| [R4-2000510](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000510.zip) | Cat A CR to [R4-2000522](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000522.zip). |
| R4-2000293 | Not treated in the 1st round and it is suggested to go directly to 2nd round. But if it is agreeable in 2nd round, it needs revised number since the cover page is incorrect.. |
| R4-2000294 | Not treated. Cat A CR. But the Tdoc is requested as Cat F. It should be withdrawn and new Tdoc number is needed, |

## Discussion on 2nd round (if applicable)

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| [R4-2000580](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000580.zip) | Ericsson: CR is OK |
| Nokia: Agreeable, but not essential correction for Rel-15. Can be agreed for Rel-16 |
| CATT:Can Nokia clarify a little bit why this correction is not OK for Rel-15.This CR is to change the reference in section of Active TCI state switching delay (section 8.10), which was introduced in Rel-15. So, I think this change should be revised from Rel-15. |
| R4-2000293 | Ericsson : Please check for overlap with R4-2000914 now this is included in 2nd round. I received internal comment that they are overlapped. |
| [R4-2000914](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000914.zip) | MTK: Could Nokia clarify the reason why it can be agreed in R16 but not in R15? if it is only corrected in R16 but not R15, it would introduce some misalignment between R15 and R16, and it could lead confusion in future. |

## 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**  |
|  |  |

# Topic #3: UE measurement capability (38.133/36.133)

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2001923](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001923.zip) | Ericsson | Observation 1: From the latest TS 38.133, it follows that is the total number of NR reporting criteria configured by PSCell and E-UTRA PCell, which means that if PCell and PSCell are configuring on the same serving NR carrier frequency, the PCell and PSCell may need to be aware of the still available number of reporting criteria to not exceed the limit specified in TS 38.133.Observation 2: The above observation does not come from the clarifying CR in R4-1907862, rather this approach had been already in both TS 38.133 and TS 36.133.Based on the above observations, a draft response LS is provided in [3]. |
| [R4-2001924](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001924.zip) | Ericsson | LS corresponding to [R4-2001923](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001923.zip) |
| [R4-2001331](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001331.zip) | Nokia, Nokia Shanghai Bell | Observation 1: There is a need to exchange information impacting the reporting criteria configuration, between MN and SN. |
| [R4-2001332](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001332.zip) | Nokia, Nokia Shanghai Bell | LS corresponding to [R4-2001331](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001331.zip) |
| R4-2001278 | ZTE | Proposal 1. Reporting criteria for NR serving cell frequencies, i.e. component in , needs to be coordinated between the MN and the SN in EN-DC operation. |
| R4-2001270 | ZTE | LS corresponding to R4-2001278 |
| [R4-2001333](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001333.zip) | Nokia, Nokia Shanghai Bell | Observation 1: it needs to be clarified what the reporting criteria is for an EN-DC capable UE configured with additional SCells.Proposal 1: For each configured SCell the UE shall support additionally 9 reporting criteria.Proposal 2: UE requirement for reporting criteria when UE is configured with SCells and NR SCells need to be clarified. Proposal 3: RAN4 to select one of the text proposals for clarifying the UE reporting criteria requirement when configured with SCells and NR SCells. |
| [R4-2001259](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001259.zip) | ZTE | Proposal 1. The reporting criteria for EN-DC when E-UTRA SCell(s) are configured is to be specified.Proposal 2. The reporting criteria for NE-DC when E-UTRA SCell(s) are configured is to be specified.Proposal 3. The requirements structure for reporting criteria in TS36.133 is not changed by introducing requirements for CA at E-UTRA side.Proposal 4. Reporting criteria for EN-DC is 36+9\*n when the UE is configured with E-UTRA SCell(s), and n is the number of E-UTRA SCell carrier frequencies.Proposal 5. For NE-DC, the total number of E-UTRA reporting criteria is E\_(cat,NE-DC,E-UTRA)=10+9×n, and is the number of configured E-UTRA serving frequencies, including PSCell and SCells carrier frequencies. |
| [R4-2001261](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001261.zip) | ZTE | CR:For EN-DC, reporting criteria has not been specified when E-UTRA SCell carrier frequencies are configured.For NE-DC, reporting criteria has not been finalized and reporting criteria has not been specified when E-UTRA SCell carrier frequencies are configured* Specified reporting criteria for EN-DC when E-UTRA SCell carrier frequencies are configured.
* Specified reporting criteria for NE-DC when E-UTRA SCell carrier frequencies are configured.
* Change ‘excluding’ to ‘in addition to’
* Change the property of Table 8.2.2-1 so it can be on the same page with the title.
* Editorial changes
 |
| R4-2001262 | ZTE | Cat A CR to [R4-2001261](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001261.zip) |
| [R4-2001922](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001922.zip) | Ericsson | The total numbers of mandatory reporting criteria for EN-DC in TS 36.133 are then:**36** reporting criteria if the UE is not configured with any LTE SCell or NR SCell or NR PSCell carrier frequencies,**36+(10+9\*1)** reporting criteria if the UE is not configured with any LTE SCell or NR SCell but configured with one NR PSCell carrier frequency,**36+9\*k+(10+9\*n)** reporting criteria if the UE is configured with *k* carrier frequencies with LTE SCells, one NR PSCell carrier frequencies, and (*n*-1) carrier frequencies with NR SCells.The total numbers of mandatory reporting criteria for NE-DC in TS 36.133 are then:- **29** reporting criteria if the UE is not configured with any LTE SCell or LTE PSCell or NR SCell, but configured with NR PCell,- **29+(10+9\*1)** reporting criteria if the UE is not configured with any LTE SCell or NR SCell, but configured with LTE PSCell and NR PCell,- **29+(10+9\*k)+9\*n** reporting criteria if the UE is configured with (*k*-1) LTE SCells, LTE PSCell, and *n* NR SCells carrier frequencies. |
| [R4-2001920](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001920.zip) | Ericsson | CRRemoved editor’s note and updated the reporting criteria for EN-DC and NE-DC accordingly |
| R4-2001921 | Ericsson | Cat A CR to [R4-2001920](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001920.zip) |
| [R4-2001260](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001260.zip) | ZTE | The CR (R4-1914771) implementation makes a misalignment between specifications and therefore the different versions of TS38.133 (Rel-15 and Rel-16) are inconsistent.Move the change in R4-1914771 to correct place. |

## Open issues summary

### Sub-topic 3-1

**Issue 3-1: Need of coordination between MN and SN for 9×n in reporting criteria**

RAN2 in-coming LS on whether there is implication that component 9 in needs to be coordinated between the MN and the SN. Related contributions are [R4-2001923](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001923.zip), [R4-2001924](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001924.zip) (LS), [R4-2001331](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001331.zip), [R4-2001332](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001332.zip) (LS)

* Proposals
	+ Option 1 (Nokia [R4-2001923](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001923.zip), [R4-200192](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001923.zip)4, ZTE R4-2001278, R4-2001270 ): RAN4 has been discussing the question raised in the LS and has concluded that regarding question 1, there is a need to exchange information between MN and SN related to configurations impacting the component in .
	+ Option 1a (Ericsson [R4-2001331](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001331.zip), [R4-2001332](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001332.zip)): From the latest TS 38.133, it follows that is the total number of NR reporting criteria configured by PSCell and E-UTRA PCell, which means that if PCell and PSCell are configuring on the same serving NR carrier frequency, the PCell and PSCell may need to be aware of the still available number of reporting criteria to not exceed the limit specified in TS 38.133.
* Recommended WF
	+ To answer RAN2 LS
		- There is a need to exchange information between MN and SN related to configurations impacting the component in
	+ Further discussion on the content of draft LS based in [R4-2001924](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001924.zip) (LS), [R4-2001332](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001332.zip) (LS)

### Sub-topic 3-2

**Issue 3-2: Reporting criteria for EN-DC with more than one LTE and/or NR SCells configured**

The current requirements do not cover the cases when a UE configured with EN-DC is configured with more LTE and/or NR SCells. The related contributions are [R4-2001333](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001333.zip), [R4-2001259](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001259.zip), [R4-2001261](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001261.zip)/2 (CR), [R4-2001922](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001922.zip), [R4-2001920](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001920.zip)/1 (CR)

* Proposals for reporting criteria for EN-DC
	+ Option 1 (Nokia R4-2001333) :

…the UE need not support more than the number of reporting criteria, excluding reporting criteria specified in TS 38.133 [50] that are applicable for the UE configured with EN-DC operation, as follows

* [36] reporting criteria if the UE is not configured with any SCell or PSCell carrier frequency or NR SCell or NR PSCell,
* [36] reporting criteria if the UE is not configured with any SCell or NR SCell but configured with one NR PSCell carrier frequency.
* [36+9xn] reporting criteria if the UE is configured with one or more SCells and with one NR PSCell carrier frequency and not configured with any NR SCell, where n is the number of configured SCells.
* [36+9xn] reporting criteria if the UE is configured with one or more SCells and with one NR PSCell carrier frequency and one or more NR SCells, where n is the number of configured SCells.
	+ Option 1a (Nokia R4-2001333):

…the UE need not support more than the number of reporting criteria, excluding reporting criteria specified in TS 38.133 [50] that are applicable for the UE configured with EN-DC operation, as follows

* [36] reporting criteria if the UE is not configured with any SCell or PSCell carrier frequency or NR SCell or NR PSCell,
* [36] reporting criteria if the UE is not configured with any SCell or NR SCell but configured with one NR PSCell carrier frequency.
* [36+9xn] reporting criteria if the UE is configured with n SCells and with one NR PSCell carrier frequency and not configured with any NR SCell.
* [36+9xn] reporting criteria if the UE is configured with n SCells and with one NR PSCell carrier frequency and one or more NR SCells.
	+ Option 1b (Nokia R4-2001333):

… the UE need not support more than the number of reporting criteria, excluding reporting criteria specified in TS 38.133 [50] that are applicable for the UE configured with EN-DC operation, as follows

* [36] reporting criteria if the UE is not configured with any SCell or PSCell carrier frequency or NR SCell or NR PSCell,
* [36] reporting criteria if the UE is not configured with any SCell but configured with one NR PSCell carrier frequency with or without NR SCells configured.
* [36+9xn] reporting criteria if the UE is configured with n SCells and with one NR PSCell carrier frequency with or without NR SCells configured.
	+ Option 2 (ZTE [R4-2001259](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001259.zip), [R4-2001261](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001261.zip)):

… the UE need not support more than the number of reporting criteria, in addition to reporting criteria specified in TS 38.133 [50] that are applicable for the UE configured with EN-DC operation, as follows:

* [36] reporting criteria if the UE is not configured with any SCell or PSCell or NR SCell or NR PSCell carrier frequency,
* [36] reporting criteria if the UE is not configured with any SCell or NR SCell but configured with one NR PSCell carrier frequency.
* [] reporting criteria if the UE is configured with SCells and one NR PSCell carrier frequencies, and *n* is the number of configured SCells carrier frequencies.
	+ Option 3 (Ericsson [R4-2001922](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001922.zip), [R4-2001920](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001920.zip)):

…the UE need not support more than the number of reporting criteria in total, as specified in TS 38.133 [50]:

* [36] reporting criteria if the UE is not configured with any SCell or NR SCell or NR PSCell carrier frequencies,
* ] reporting criteria if the UE is not configured with any SCell or NR SCell, but configured with one NR PSCell carrier frequency,
* [)] reporting criteria if the UE is configured with *k* carrier frequencies with SCells, one NR PSCell carrier frequencies, and (*n*-1) carrier frequencies with NR SCells.
* Recommended WF
	+ Agreement: UE requirement for reporting criteria for EN-DC when UE is configured with SCells and NR SCells need to be clarified. (Nokia)
	+ Further discussion on how to modify the criteria based on Option 1~Option 3 above.
	+ Decide which CR can be used as baseline.

### Sub-topic 3-3

**Issue 3-3: Reporting criteria for NE-DC with more than one LTE and/or NR SCells configured**

The agreement will be aligned with that for sub-topic 3-2

* Proposals for reporting criteria for NE-DC
	+ Option 2 (ZTE [R4-2001259](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001259.zip), [R4-2001261](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001261.zip)):

…the UE need not support more than the number of reporting criteria, in addition to reporting criteria specified in TS 38.133 [50] that are applicable for the UE configured with NE-DC operation, as follows:

* [19] reporting criteria if the UE is not configured with any SCell or NR SCell.
* [] reporting criteria if the UE is configured with SCells, and *n* is the number of configured SCells carrier frequencies.
	+ Option 3 (Ericsson [R4-2001922](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001922.zip), [R4-2001920](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001920.zip)):

…the UE need not support more than the number of reporting criteria in total, as specified in TS 38.133 [50]:

* [29] reporting criteria if the UE is not configured with any SCell or PSCell or NR SCell, but configured with NR PCell,
* [29+(10+9)] reporting criteria if the UE is not configured with any SCell or NR SCell, but configured with PSCell and NR PCell,
* [ reporting criteria if the UE is not configured with (*k*-1) SCells, PSCell, *n* NR SCell carrier frequencies, and NR PCell.
* Recommended WF
	+ Agreement should be aligned with that for EN-DC case.
	+ Further discussion on number for the reporting criteria based on Option 2 and Option 3.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | Sub topic 3-1: RAN2 asked if coordination on component in between MN and SN is needed. ZTE and Nokia both think coordination is needed. It’s just how to coordinate is up to RAN2. Exchange information between MN and SN is one of approach. There could be other approaches, e.g. hard split. The point is the discussion should happen in RAN2. It is RAN4’s responsibility to confirm whether coordination is needed. So we still prefer the wording in our LS R4-2001270.Sub topic 3-2:The issue has been discussed for three meeting cycles based on ZTE’s discussion papers and CRs only. In the last meeting the decision was further postponed to this meeting.**R4-1915786 CR to 36.133 on NR reporting criteria** 36.133 CR-6727 rev 1 Cat: F (Rel-15) v15.8.0 *Source: ZTE***Abstract:** **Discussion:** E///: object the CRChair: Postpone the decision to Feb. E/// is recommended to also bring detailed analysis / CRs to clarify their proposals.**Decision: Postponed**There is no point to further select the baseline CR.Technically, Nokia’s proposal 1b is aligned with ZTE’s proposal option 2. It can be merged to option 2. Option 1a is slightly different from option 2 from wording, but we think option 2 covers all of cases in option 1a and both options would be the same requirements. Since there is no impact on E-UTRA carrier reporting criteria whether NR SCells has been configured or not, we prefer option 2/1b.Comments to option 31. The total number of reporting criteria for EN-DC is as equation below. 2. The reporting criteria for measurements on NR carrier is specified in 38.133 as 3. The reporting criteria for measurements on E-UTRA carrier is specified in 36.133 as If follows option 3, then will be**36+(10+9\*1)** reporting criteria if the UE is not configured with any LTE SCell or NR SCell but configured with one NR PSCell carrier frequency4. The total number of reporting criteria for EN-DC then will be [36+ (10+9\*1)] () + (10+9\*1) ().So with option 3 the **(10+9\*1)** will be calculated twice, which is not the correct approach.Sub topic 3-3:In our contribution R4-2001259 we provided how the reporting criteria for NE-DC is calculated.*For single carrier case, the number of reporting criteria should be 19 by taking inter frequency and intra frequency E-UTRA measurements into consideration. When CA is configured the number of reporting criteria is scaled by number of serving frequencies, similar to EN-DC case.*However we don’t see any analysis how the number 29 in option 3 is derived.Again similar comments (same logic) on option 3 in topic 3-2 can be applied to option 3 here.….Others: |
| Ericsson | Sub-topic 3-1: The RAN2 LS actually asked about the impact of a specific CR: “whether the changes to UE capabilities for measurements reporting criteria in R4-1907862 imply that the component in needs to be coordinated between the MN and the SN”. We agree that some coordination is needed, however we think any LS should focus on explaining RAN4 specifications to RAN2, and RAN2 can then best judge how the coordination would be addressed. In addition, we would like to clarify that the CR referred to by RAN2, R4-1907862 did not change RAN4 specifications in this regard, so the need for coordination has existed even prior to agreement of R4-1907862. Therefore, we do not agree with the wording in the proposed WF, but prefer:* *From the latest TS 38.133, it follows that is the total number of NR reporting criteria configured by PSCell and E-UTRA PCell, which means that if PCell and PSCell are configuring on the same serving NR carrier frequency, the PCell and PSCell may need to be aware of the still available number of reporting criteria to not exceed the limit specified in TS 38.133.*
* *The above observation does not come from the clarifying text in the CR in R4-1907862 (mentioned in the RAN2 LS), rather this approach had been already in both TS 38.133 and TS 36.133:*
	+ *had been already specified to include the PSCell and SCells carrier frequencies in TS 38.133, and*
	+ *Inter-RAT NR carrier frequency carrier reporting criteria in TS 36.133 had been specified to be only applicable for UE with this capability and measurements on any of the NR carrier frequencies other than the carrier frequency of the NR PSCell or NR SCell.*

Sub-topic 3-2 : We think the issue is not correctly formulated, since it’s not correct to say that “The current requirements do not cover the cases when a UE configured with EN-DC is configured with more LTE and/or NR SCells”, because the entire requirement is already in 38.133 (the formula putting together the numbers from the table in 36.133 and table in 38.133). The “missing requirements” are actually calculable numbers, based on the formulas in 38.133, and are more for information; this was also the reason why the numbers for the other cases were not explicitly specified (since they do not add anything new to the requirement itself). In LTE, we did not have such explicit formulas, that is why we listed the numbers instead.Looking at the numbers, the difference in the approaches among the companies is very clear: it’s the total number of reporting criteria in Ericsson’s approach and it’s a subset of the total reporting criteria in Nokia’s and ZTE’s approach (since some NR reporting criteria [e.g., inter-RAT E-UTRA-NR] are included and some NR reporting criteria [e.g., NR inter-frequency and NR serving carriers], are excluded). The second approach contradicts to the text in 36.133: “For the measurement categories belonging to measurements on: E-UTRA intra-frequency cells, E-UTRA inter-frequency cells, inter-RAT per supported RAT, and NR cells on serving and non-serving carrier frequencies (i.e. without counting other categories that the UE shall always support in parallel), the UE need not support more than the number of reporting criteria…”. If we need to list these numbers at all, then they should be the totals, calculated based on the formulas. For LTE, such numbers are indeed the totals and the requirement says “the UE need not support more than the number of reporting criteria…”, so why for EN-DC this should suddenly become a subset and not the total, given that we do not have corresponding numbers for the remaining NR carriers? What is the use for these incomplete numbers?**Disagree with proposed WF**: If the intention is to show incomplete ambiguous numbers, then we do not even agree that any such “clarification” is needed, since, as explained above, the numbers do not anything new to the requirement (formulas in 38.133), they are calculable, and it’s already obvious that each LTE SCell adds 9 reporting criteria since the intra-frequency LTE reporting criteria are per serving carrier frequency.Sub-topic 3-3 : Inter-RAT NR reporting criteria seem to be missing in ZTE’s approach. The current specification says: “]. For the measurement categories belonging to measurements on: E-UTRA intra-frequency cells and E-UTRA inter-frequency cells, inter-RAT per supported RAT, and NR cells on serving and non-serving carrier frequencies…”, and this is particularly crucial for NE-DC capable UEs.But regardless of the technical aspects, first the issue 3-2 needs to be resolved, then we can discuss further NE-DC. |
| Nokia | Sub topic 3-1: Prefer to keep the reply short and reply the RAN2 question without additional clarifications. If any additional clarifications are needed in addition to what is available in RAN4 specification should be captured in the RAN4 specification (if it is unclear)Sub topic 3-2: There seems to be agreement that number of reporting criteria in EN-DC needs to be updated to cover also configured SCells. We support the recommended WF.Sub topic 3-3: RAN4 would need to define the reporting criteria for NE-DC. Initially it needs to be clear what the basic number is before including LTE PSCell or SCells. We support the recommended WF. |

### CRs/TPs comments collection

CRs R4-2001920/1 and R4-2001261/2 which are included in the above sub-topis are not listed here. Please provide the comment whether CR R4-2001260 is agreeable or not.

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| **CR/TP number** | **Comments collection** |
| [R4-200126](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001261.zip)0 | Ericsson: same comments as above, since the CR is based on the above proposals from ZTE. The CR is not agreeable, causing more confusion and not solving any issue, all the necessary numbers for any combination of carriers can be already just calculated based on the formulas in 38.133. |
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## 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#3-1** | Tentative agreements:In principle, it is agreed that the component in needs to be coordinated between MN and the SN.Candidate options:To reply LS from RAN2 (R2-1916595), the remaining issue is that Ericsson want to clarify *that the CR referred to by RAN2, R4-1907862 did not change RAN4 specifications in this regard, so the need for coordination has existed even prior to agreement of R4-1907862*. In other words, the coordination is needed, but what RAN2 said that the change in R4-1907862 implies the coordination is wrong. Before CR R4-1907862, RAN4 specification has already meant the coordination.More discussion is needed on how to draft reply LS. RAN2 LS action part is that *RAN2 asks RAN4 to confirm whether the changes to UE capabilities for measurements reporting criteria in* [*R4-1907862*](https://portal.3gpp.org/ngppapp/CreateTdoc.aspx?mode=view&contributionUid=R4-1907862) *imply that the component in needs to be coordinated between the MN and the SN*.There would be two options for replied LS:Option 1: (Ericsson)* *From the latest TS 38.133, it follows that is the total number of NR reporting criteria configured by PSCell and E-UTRA PCell, which means that if PCell and PSCell are configuring on the same serving NR carrier frequency, the PCell and PSCell may need to be aware of the still available number of reporting criteria to not exceed the limit specified in TS 38.133.*
* *The above observation does not come from the clarifying text in the CR in R4-1907862 (mentioned in the RAN2 LS), rather this approach had been already in both TS 38.133 and TS 36.133:*
	+ *had been already specified to include the PSCell and SCells carrier frequencies in TS 38.133, and*
	+ *Inter-RAT NR carrier frequency carrier reporting criteria in TS 36.133 had been specified to be only applicable for UE with this capability and measurements on any of the NR carrier frequencies other than the carrier frequency of the NR PSCell or NR SCell.*

Option 2: (Nokia, ZTE)*RAN4 has been discussing the question raised in the LS and has concluded that regarding question 1, there is a need to exchange information between MN and SN related to configurations impacting the component in .*Recommendations for 2nd round:From moderator perspective, RAN4 should merge Option 1 and Option 2 and use a straightforward way to reply RAN2 like as follows:1. Yes. There needs a coordination between MN and SN.
2. Before CR R4-1907862, RAN4 specifications have already implied coordination.

Given ZTE and Nokia versions are more close to providing a straightforward answer, either of them is suggested to use as a baseline. Given Nokia is the author for RAN2 LS, can we use Nokia’s version as the baseline.Companies are encouraged to discuss whether the above recommendation is agreeable or not. |
| **Sub-topic#3-2** | Tentative agreements:No tentative agreement in the 1st round.Candidate options:Three companies made comments. Two companies proposed to explicitly specify the number (or say calculable number) of reporting criteria excluding/in addition to the reporting criteria in TS38.133. One company proposed to specify the total number and couple whether to specify the number with how to specify the number.Need further discussion on the approaches to explicitly specify the number.It is suggested to focus on Option 1b/2 and Option 3 in the second round, and return to CR [R4-2001261](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001261.zip) and CR [R4-2001920](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001920.zip). One of them will be chosen for revision depending on the outcome of discussion on the approaches. If the interested companies had no strong view, from moderator perspective, ZTE CR is suggested to use as a baseline, since ZTE expert proposed this topic for a long time.Recommendations for 2nd round:In order to facilitate the discussion, moderator suggest1. The interested companies are encouraged to provide the total numbers to see whether there is alignment.
2. Further discuss and try to reach a compromise on the approach to specify the numbers, i.e., total number vs part of total numbers.
 |
| **Sub-topic#3-3** | Tentative agreements:No tentative agreement in the 1st round.Candidate options:Similar to sub-Topic 3-2. But need clarification on numbers proposed by companies.Need further discussion on the approaches to explicitly specify the number.It is suggested to continue discuss Option 2 and Option 3.Recommendations for 2nd round:1. To try address the sub-topic 3-2 for the approaches first.
2. The interested companies are encouraged to provide the total numbers to see whether there is alignment.
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Suggestion on WF/LS assignment

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| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| R4-2001332 revised to: R4-200xxxx | LS on UE reporting criteria (revision) | Nokia |

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| **LS number** | **Other LS Status update recommendation**  |
| [R4-2001924](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001924.zip) | Noted |
| R4-2001270 | Noted |

### CRs/TPs

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

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| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| [R4-2001261](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001261.zip) | Return to. Depending on whether there is compromise, the revised Tdoc number for CR would be needed. |
| R4-2001262 | Return to. Cat A CR to [R4-2001261](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001261.zip). |
| [R4-200126](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001261.zip)0 | Return to. One company had comments. |
| [R4-2001920](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001920.zip) | Merged into R4-2001261. |
| R4-2001921 | Withdrawn |

## Discussion on 2nd round (if applicable)

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| --- | --- |
| **Company** | **Comments** |
| ZTE | Sub topic 3-1: Agree the tentative agreements,the component in needs to be coordinated between MN and the SN.Suggest to capture the tentative agreements in LS.In addition, we prefer to add clarification as in LS R4-2001270 for better RAN2 understanding. That is the text copied from latest spec, I think it should be fine.Sub topic 3-2:To be honest, we don’t understand the logic Ericsson provided in the 1st round.Our observation of the entire discussion is as follows.1. We initiate discussion paper and the CRs from RAN4#92 meeting, due to the change in R4-1907862, which was also the cause that RAN2 LS in sub topic 3-1 was sent.
2. Ericsson objected the CR back then for two meeting cycles by saying the EN-DC requirements were there for a long time and no change was needed
3. Then from last meeting Ericsson objected the CR by proposing to have huge change for EN-DC reporting criteria requirements by adding what’s in TS38.133 to TS 36.133, which is totally wrong as the reason we provided in the 1st round.
4. The purpose of the CR is to add requirements when CA is configured at LTE side, which is missing in current spec. Operators showed strong interest to have the requirement. The requirements are to be added on top of current requirements
5. Nokia and ZTE proposed the same value for the requirements in this meeting.
6. Additional change in CR R4-2001261 is as follows. We think this would address the concern that total number is the summation of what’s in TS38.133 and TS 36.133.

*the UE need not support more than the number of reporting criteria, in addition to reporting criteria specified in TS 38.133 [50] that are applicable for the UE configured with EN-DC operation, as follows:*Sub topic 3-3:In NE-DC, there is no inter-RAT measurements can be configured from LTE side since the LTE PSCell can only configure LTE measurements. So the total number should be 19, rather than 29 in which the number for inter-RAT measurements was calculated.Others:For CR R4-2001260, we fully don’t understand the comments from Ericsson. The reason for the change, which is copied from CR cover sheet, is follows*The CR (R4-1914771) implementation makes a misalignment between specifications and therefore the different versions of TS38.133 (Rel-15 and Rel-16) are inconsistent.*So this is spec implementation issue. To be specific, the implementation in Rel-15 is right, but in Rel-16 it is not. I talked with the secretary before the meeting and the reason for change above were suggested by the secretary. How can this not be agreeable? |

## 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

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| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
|  |  |

# Topic #4: RRM measurement and measurement gap

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2001406](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001406.zip) | Ericsson | Observation 1 : With Scell only on FR2, the UE is not required to measure more than one SCC concurrently.Observation 2: Regardless if the same or different SMTC configuration is used on all FR2 CC, the BM requirements need to be updated to capture the impact of measurement operations on a different FR2 CC.Proposal 1 : There are no restrictions on SMTC configuration when SCC only are configured on FR2Proposal 2 : BM requirements are updated to account for measurement operations on any FR2 CCProposal 3 : Klayer1\_measurement definition is updated to account for BM operations on any FR2 CCProposal 4: If an SpCell is configured on FR2- The same SMTC offset is used for different CC on FR2 - If smtc2 is configured on any FR2 CC, * All CCs have the same periodicity for smtc1, and
* All CCs configured with smtc2 have the same periodicity for smtc2

- If smtc2 is not configured on any FR2 CC, * The total number of different SMTC periodicities on all CCs does not exceed 2
 |
| [R4-2001407](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001407.zip) | Ericsson | CR:Update BM requirements (RLM, BFD, CBD and L1-RSRP) to consider measurement configuration on all FR2 carriers.Update measurement requirement to consider BM configuration on all FR2 carriers.Capture the restriction that non gap based measurementy requirements apply, provided that the following conditions are met:Either: There are only SCells configured for FR2 Or:- The same SMTC offset is used for different CC on FR2 and:-If smtc2 is configured on any FR2 CC, all CCs have the same periodicity for smtc1, and all CCs configured with smtc2 have the same periodicity for smtc2-If smtc2 is not configured on any FR2 CC, the total number of different SMTC periodicities on all CCs does not exceed 2 |
| R4-2001408 | Ericsson | Cat A CR to [R4-2001407](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001407.zip) |
| [R4-2000922](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000922.zip) | MediaTek inc., Huawei, HiSilicon | 38.133 CRAdd clarification on TSMTCperiod for multiple FR2 CCs.Add clarification on smtc1 and smtc2 for TSMTCperiod in candidate beam detection. |
| R4-2000923 | MediaTek inc., Huawei, HiSilicon | Cat A CR to [R4-2000922](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000922.zip) |
| [R4-2001330](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001330.zip) | Nokia, Nokia Shanghai Bell | **Proposal 1:** No limitations are introduced on the use of SMTC periodicities for intra-frequency carriers.**Proposal 2:** No limitations are introduced on the use of Offset.**Proposal 3:** Limit the use of SMTC2 for intra-frequency measurements in Rel-15. |
| [R4-2001606](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001606.zip) | Huawei, HiSilicon, MediaTek | Proposal: Agree on the compromise proposal from RAN4#93 with 4 different SMTC periodicities for single SMTC case, and add the following condition for FR2 intra-frequency requirements.

|  |
| --- |
| The requirements in this clause for FR2 measurement objects apply provided that the SMTC on all CCs in FR2 have the same offset, and one of following conditions is met* If *smtc2* is configured on any FR2 CC,
	+ All CCs have the same configuration for *smtc1*, and
	+ All CCs configured with *smtc2* have the same configuration for *smtc2*
* If *smtc2* is not configured on any FR2 CC,
	+ The total number of different SMTC periodicities on all CCs does not exceed 4

*Editor’s Note: The impact of different SMTC offset for different CC on FR2 has not been considered in requirements in this version of the specification.* |

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| [R4-2001607](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001607.zip) | Huawei, HiSilicon, MediaTek | CR:Define applicability for FR2 intra-frequency measurement requirements. |
| R4-2001608 | Huawei, HiSilicon, MediaTek | Cat A CR to [R4-2001607](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001607.zip) |
| [R4-2001789](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001789.zip) | MediaTek inc. | CR:Revise the conditions for Klayer1\_measurement =1, * All of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped with the symbols that UE has to conduct the RSRP measurement, when UE is not requested to measure the RSSI.
* All of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped with the symbols that UE has to conduct the RSRP and RSSI measurement.

 Klayer1\_measurement =1.5 for all the other cases. |
| R4-2001790 | MediaTek inc. | Cat A CR to [R4-2001789](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001789.zip) |
| [R4-2001787](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001787.zip) | MediaTek inc. | CR:Clarify that a cell can only be called a detectable cell only if the cell was detected by the UE within 5 seconds |
| R4-2001788 | MediaTek inc. | Cat A CR to [R4-2001787](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001787.zip) |
| [R4-2001925](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001925.zip) | Ericsson | 38.133 CR:“≤5 seconds” (similar to LTE) was added to replace the mistakenly removed TBD |
| R4-2001926 | Ericsson | Cat A CR to [R4-2001925](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001925.zip) |
| [R4-2001588](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001588.zip) | Huawei, HiSilicon | 38.133 CR:1. Requirements defined in 38.133 clause 9.4.2/9.4.3 and clause 10.2 apply for Inter-RAT LTE measurement configured by NR PCell on serving carrier in NE-DC.2. Requirements defined in 38.133 clause 10.2 apply for Inter-RAT LTE measurement configured by NR PCell on non-serving carrier in NE-DC. |
| R4-2001589 | Huawei, HiSilicon | Cat A CR to [R4-2001588](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001588.zip) |
| [R4-2001590](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001590.zip) | Huawei, HiSilicon | 36.133 CR:The context “When the E-UTRAN FDD-NR measurement object configured by E-UTRA PCell is on an NR serving frequency carrier, then the NR intra-frequency measurements requirements defined in clause 9.2 of TS 38.133 [50] shall apply” is removed. |
| R4-2001591 | Huawei, HiSilicon | Cat A CR to [R4-2001590](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001590.zip) |
| [R4-2001791](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001791.zip) | MediaTek inc. | Clarify that UE is only required to conduct the neigboring cell measurement on 1 serving carrier in a FR2 band. |
| R4-2001792 | MediaTek inc. | Cat A CR to [R4-2001791](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001791.zip) |

## Open issues summary

### Sub-topic 4-1

**Issue 4-1: SMTC alignment for FR2 intra-frequency measurement**

The conditions when RF2 intra-frequency measurement apply are discussed. The related contributions include [R4-2001406](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001406.zip), [R4-2001407](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001407.zip)/8 (CR), [R4-2001330](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001330.zip), [R4-2001606](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001606.zip), [R4-2001607](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001607.zip)/8 (CR)

* Proposals for conditions under which FR2 intra-frequency measurement requirements (Clause 9.1.5) apply
	+ Option 1 (Ericsson [R4-2001406](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001406.zip), [R4-200140](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001406.zip)7):

The requirements in this clause for FR2 measurement objects apply provided that the following conditions are met

Either:

* There are only SCells configured for FR2

Or:

* The same SMTC offset is used for different CC on FR2 and:
	+ If smtc2 is configured on any FR2 CC, all CCs have the same periodicity for smtc1, and all CCs configured with smtc2 have the same periodicity for smtc2
	+ If smtc2 is not configured on any FR2 CC, the total number of different SMTC periodicities on all CCs does not exceed 2
	+ Option 2 (Nokia R4-2001330):
		- No limitations are introduced on the use of SMTC periodicities for intra-frequency carriers.
		- No limitations are introduced on the use of Offset.
		- Limit the use of SMTC2 for intra-frequency measurements in Rel-15. (proposed text as follows)

For a Rel-15 UE, the requirements in this clause apply provided following related to use of *smtc2*:

* If *smtc2* is configured on any FR2 CC,
	+ All CCs configured with *smtc2* have the same configuration for *smtc2*
	+ Option 3 (Huawei, Mediatek, [R4-2001606](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001606.zip), [R4-2001607](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001607.zip))
		- Agree on the compromise proposal from RAN4#93 with 4 different SMTC periodicities for single SMTC case, and add the following condition for FR2 intra-frequency requirements.

The requirements in this clause for FR2 measurement objects apply provided that the SMTC on all CCs in FR2 have the same offset, and one of following conditions is met

* If *smtc2* is configured on any FR2 CC,
	+ All CCs have the same configuration for *smtc1*, and
	+ All CCs configured with *smtc2* have the same configuration for *smtc2*
* If *smtc2* is not configured on any FR2 CC,
	+ The total number of different SMTC periodicities on all CCs does not exceed 4

*Editor’s Note: The impact of different SMTC offset for different CC on FR2 has not been considered in requirements in this version of the specification.*

* Recommended WF
	+ TBA

### Sub-topic 4-2

**Issue 4-2: Time sharing between RRM and BM measurement (P factor)**

Issue description is as follows. The related contributions are R4-2001406, R4-2001407/8 (CR)

*When defining the time sharing between RRM and BM measurement (P factor), RAN4 has only considered single carrier case, but since UE only has one Rx beam at a time across all CCs, RRM measurement on SCell1 and BM measurement on SCell2 also need to be TDMed.*

Although it is argued in [1] that it is not necessary or beneficial to solve this issue in specifications, we would like to emphasize that even if the L3 measurement SMTCs on CC1 and CC2 are identical, it could happen that there is a 3rd CC, CC3 which does not have L3 measurements configured, but still has BM. In this case, the problem would also occur in that the BM requirements on CC3 do not L3 consider measurement operations on CC1 and CC2.

* Proposals (Ericsson)
	+ Proposal 1: BM requirements are updated to account for measurement operations on any FR2 CC
	+ Proposal 2: Klayer1\_measurement definition is updated to account for BM operations on any FR2 CC
	+ Proposal 3: the text changes are as follows (R4-2001407)

For FR2,

Klayer1\_measurement=1,

* if all of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any FR2 serving frequency outside measurement gap are not fully overlapped by intra-frequency SMTC occasions, or
* if all of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any FR2 serving frequency outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped by with the SSB symbols indicated by *SSB-ToMeasure* and 1 symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured;
* Recommended WF
	+ TBA

### Sub-topic 4-3

**Issue 4-3: modification of the layer 3 and layer 1 measurement sharing factor**

Ran4 does extend the measurement requirement when the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are overlapped with the symbols that UE has to conduct the RSSI measurement.

The related contributions are R4-2001789.

* Proposals (Mediatek) in CR

For FR2,

Klayer1\_measurement=1,

- if all of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap are not fully overlapped by intra-frequency SMTC occasions, or

- if all of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped with the SSB symbols and 1 symbol before each consecutive SSB symbols and 1 symbol after each consecutive SSB symbols, given that *SSB-ToMeasure* is configured and UE is not requested to measure the RSSI, where SSB symbols are indicated by *SSB-ToMeasure*, or- if all of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped with any of the SSB symbols and the RSSI symbols, and 1 symbol before each consecutive SSB symbols and RSSI symbols and 1 symbol after each consecutive SSB symbols and RSSI symbols , given that *SSB-ToMeasure* and *SS-RSSI-Measurement* are configured and UE is requested to measure the RSSI, where SSB symbols are indicated by *SSB-ToMeasure* and RSSI symbols are indicated by *SS-RSSI-Measurement*;

Klayer1\_measurement=1.5, otherwise.

### Sub-topic 4-4

**Issue 4-4: definition of detectable cell**

* Proposals for conditions under which FR2 intra-frequency measurement requirements (Clause 9.1.5) apply
	+ Mediatek (R4-2001787): Clarify that a cell can only be called a detectable cell only if the cell was detected by the UE within 5 seconds
	+ Ericsson (R4-2001925) : “≤5 seconds”
* Recommended WF
	+ A cell can only be called a detectable cell only if the cell was detected by the UE within 5 seconds
	+ Both CRs are agreeable.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| MTK | Issue 4-1: SMTC alignment for FR2 intra-frequency measurement Support Option 3. Option 1 is also fine to us. If the FR2 band has no SpCell, the UE’s scheduling complexity can be largely reduced. Both Option 1 and Option 3 suggest to have same SMTC offset of all CCs in the same band. This assumption has already been used in Rel-15 in certain requirements like SCell activation. We should at least keep this assumption here also. Regarding Option 2, the analysis in R4-2001330 does not consider other factors that UE has to deal with. For example, SMTC puncturing by measurement gap and the sharing factor when both L1 and L3 measurements are conducted on the same OFDM symbol from the same CC or from different multiple CCs. The real situation that UE has to consider is far more complicated. Issue 4-2: Time sharing between RRM and BM measurement (P factor)We slightly prefer the solution in R4-2001407. CR R4-2001407 is addressing the same issue as R4-2000922, but with different approaches. If we go with [R4-2001407](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001407.zip), we still need a note saying that the SMTC offsets of CCs in the same FR2 band are the same, which is the basic assumption we used also in SCell activation.Another issue is that this proposal covers the case when SSB occasions are fully overlapped by measurement gap. But actually this particular case should be left as no requirement.Issue 4-3: modification of the layer 3 and layer 1 measurement sharing factorThis CR R4-2001789 is focusing on L3 measurement, while another CR R4-2001584 from Huawei in RLM session is addressing similar issue. Issue 4-4: definition of detectable cellAgree with the WF. Both CR are addressing the same issue. |
| Intel | Issue 4-1: we support option 1Issue 4-2: we are fine with proposals from Ericsson  |
| Ericsson | Sub topic 4-1: We can support either option 1 (Ericsson proposal) or option 2. Option 3 seems too restrictive on NW configurationSub topic 4-2: The biggest problem for FR2 we see with the current specification where BM requirements depend on measurement on the same frequency layer is when no FR2 measurement is configured on a certain layer. So we think a CR is definitely needed. Sub topic 4-3: Generally the Mediatek CR in 1789 is acceptable for us, however the sentence is becoming extremely long and difficult to read so it would be better to break it up into a number of sentence or bullets which describe the conditions for which K=1 in this case. Another editorial aspect would be to clarify that the RSSI measurement referred to is the RSSI used as an intermediate step for SS-RSRQ evaluation, since there may be the possibility for confusion later when NR-U RSSI measurements are added in 38.133.Sub topic 4-4: Mediatek and Ericsson CRs are equivalent. |
| Huawei, HiSilicon | Issue 4-1: Our first preference is option 3, and option 1 is also fine. For option 2, one reason mentioned in R4-2001330 is that current UE requirements has some margin. However, it does not help to address the UE complexity. The scheduling of measurements still has to be done for each allowed combination, and the number of configurations that UE needs to deal with would be huge if SMTC configuration is fully flexible, and that is the complexity issue as want to address. The example in R4-2001330 is still based on same offset, but we can imagine how many cases there would be if SCCs can take arbitrary SMTC offsets.Issue 4-2: We agree that the sharing factor needs to be updated, and we prefer the approach in MediaTek CR R4-2000922. The problem of R4-2001407 is that it is not consistent with the current P factor definition for the following cases. With current definition P=6 while with the approach in R4-2001407 P=3.- , when the RLM-RS is partially overlapped with measurement gap and the RLM-RS is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and TSMTCperiod = MGRP and TSSB = 0.5 × TSMTCperiod- , when the RLM-RS is partially overlapped with measurement gap and the RLM-RS is partially overlapped with SMTC occasion (TSSB < TSMTCperiod) and SMTC occasion is not overlapped with measurement gap and TSMTCperiod = MGRP and TSSB = 0.5 × TSMTCperiodIf option 1 is agreed for issue 4-1, R4-2000922 can be updated by defining an effective SMTC, which is the union of the SMTC of all SCCs.Issue 4-3: We have two comments on R4-20017891) the case in the 2nd bullet does not exist because in sec 5.5.3.1 of 38.331 it is specified that UE would always perform RSRP and RSRQ measurement for the serving cell, so the 2nd bullet should be removed.2) for the 3rd bullet, the condition that deriveSSB-IndexFromCell = true should be added. |
| QC | Issue 4-1 Agree with option 1. We would also want to keep the same offset in addition to reducing the periodicity options. Issue 4-3: modification of the layer 3 and layer 1 measurement sharing factorThe wording in MTK CR would need to be updated. Right now it is hard to parse the second sentence. Issue 4-4Either is acceptable |
| Nokia | Sub topic 4-1: As discussed in our paper we see that it should be feasible for the UE to support the current SMTC configurations and hence limiting the possible SMTC configurations for the NR system does not seem justified. Secondly, we see that in some cases it may be necessary to use different offset values. However, as long as the SSB burst is within the SMTC this should not further complicate the UE search under the discussed conditions.Sub topic 4-2: For FR2 Rel-15 device it should be common understanding that the device can only receive with one spatial setting at a time and hence the proposed correction is already understood as being covered. The specification may benefit from clarifications in this area but we do not see it essential for Rel-15.Sub topic 4-3: We do think this needs more discussion. We do not have any definition of RSSI symbol. Additionally, there are conditions depending on the configuration when any relaxation is needed.Sub topic 4-4: Clarification is acceptable. Slight preference for Ericsson CR wording which re-use LTE requirements wording. Although the CR is not an ‘editorial’ change (change of cover page might be needed) |
| Apple | Sub topic 4-1: Considering all FR2 CC share the same Rx chain with the same spatial signature, UE is not expected to simultaneously measure SMTC and receive data. In this case, there is no motivation for the network to configure different SMTC for different CC. The same logic can be extended to intra-frequency FR2 cells. We should assume that all FR2 CC have single (i.e. no smtc2) and same SMTC configuration including periodicity and offset. Sub topic 4-2: In general, we are fine with the proposed revision. However, for Rel-16, two independent beams are possible for L-H inter-band FR2 CA. That means we cannot directly extend Rel-15 agreements to Rel-16. Sub topic 4-3: Suggest combine MTK proposals with Ericsson’s in Sub-topic 4-2 with assumption that SS-RSSI-Measurement is configured and not configured. Sub topic 4-4: OK with both proposals….Others: |

### CRs/TPs comments collection

The CRs included in the above sub-topics are not listed here.

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [R4-2001588](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001588.zip)R4-2001589 | MTK: No. In our understanding CSSFoutside\_gap,i does not consider any EUTRA intra-frequency, because the searchers between EUTRA and NR are not shared. In that case, the sentence should not be deleted, because this inter-RAT carrier somehow becomes a EUTRA intra-frequency layer. Not sure if there is any technical reason we missed here? |
| Ericsson : do not agree since the proposal suggests a completely different concept of how the measurements are defined, |
| Nokia: Not agreeable as it would need further discussion. Would benefit from a discussion paper. |
| [R4-2001590](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001590.zip)R4-2001591 | MTK: No. Similar view as the comment for 1588. The sentence should not be deleted, because this inter-RAT carrier somehow becomes a EUTRA intra-frequency layer. |
| Ericsson : As for 1588, do not agree since the proposal suggests a completely different concept of how the measurements are defined, |
| Nokia: This CR needs more discussion. From the actual change it removes the intra-frequency measurement requirement when the LTE PCell configures NR inter-RAT measurements on an NR serving cell. This was agreed like this because the UE will measure the NR serving cell according to intra-frequency measurement requirements |
| [R4-2001791](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001791.zip)R4-2001792 | Nokia: We cannot agree this CR. Our understanding is that current requirements are according to RAN4 agreements. This was discussed for a long time during the early stage of RAN4 requirements. RAN4 has lower measurement requirements for additional carriers on the same FR2 band than for PSCell (or the first SCell in the band). This is clear from: The UE shall also be capable of performing SS-RSRP, SS-RSRQ, and SS-SINR measurements for at least 2 SSBs on serving cell for each of the other serving carrier(s) in the same band |
| Company B |
|  |
| [R4-2000922](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000922.zip)R4-2000923 | Ericsson: OK |
| Nokia: More discussion is needed. We understand the intention but the wording is not clear. E.g. when saying multiple SMTC's – would this be among CCs with activated Scell or any configured CC? Additionally, can MTK clarify the line 'given the SMTC offset of all CCs are the same on the same band'. |
|  |

## 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#4-1** | Tentative agreements:It is suggested to agree on Option 1.Five companies made comments. Four companies are OK with Option 1. Not sure if it is OK for Nokia.Candidate options:Recommendations for 2nd round: |
| **Sub-topic#4-2** | Tentative agreements:It is suggested to agree on that time sharing factor between RRM and BM measurement needs be updated.The following proposals in [R4-2001406](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001406.zip)/7 can be agreed:* + Proposal 1: BM requirements are updated to account for measurement operations on any FR2 CC
	+ Proposal 2: Klayer1\_measurement definition is updated to account for BM operations on any FR2 CC
	+ Proposal 3: the text changes are as follows ([R4-2001407](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001407.zip))

For FR2, Klayer1\_measurement=1, * + if all of the reference signals configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any FR2 serving frequency outside measurement gap are not fully overlapped by intra-frequency SMTC occasions, or
	+ if all of the reference signal configured for RLM, BFD, CBD or L1-RSRP for beam reporting on any FR2 serving frequency outside measurement gap and fully-overlapped by intra-frequency SMTC occasions are not overlapped by with the SSB symbols indicated by *SSB-ToMeasure* and 1 symbol before each consecutive SSB symbols indicated by *SSB-ToMeasure* and 1 symbol after each consecutive SSB symbols indicated by *SSB-ToMeasure*, given that *SSB-ToMeasure* is configured;

Candidate options:Recommendations for 2nd round:How to capture the tentative agreement of Proposal 1 above for BM requirements needs more discussion based on CR [R4-2001407](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001407.zip) and CR [R4-2000922](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000922.zip).Ericsson comment on [R4-2000922](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000922.zip) is “Ericsson: OK”. More clarification would be needed in 2nd round whether Ericsson is OK to agree on [R4-2000922](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000922.zip) and take note of [R4-2001407](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001407.zip), or need additional changes from [R4-2001407](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001407.zip). |
| **Sub-topic#4-3** | Tentative agreements:It seems that in principle technique part of CR R4-2001789 is agreeable but needs modifications. Concrete comments were received from companies. Candidate options:Recommendations for 2nd round:It is suggested to allocate revised number for CR R4-2001789 to capture the comments from companies and further discuss in the 2nd round. |
| **Sub-topic#4-4** | Tentative agreements:The third company except for two proponents showed the preference. It is suggested to agree on CR R4-2001925 to align with LTE wording.Candidate options:Recommendations for 2nd round: |

Suggestion on WF/LS assignment

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

### CRs/TPs

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

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| [R4-2001407](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001407.zip) | Return to. To be discussed together with R4-2000922. |
| R4-2001408 | Return to. Cat A CR to R4-2001407. |
| [R4-2000922](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000922.zip) | Return to. To be discussed together with [R4-2001407](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001407.zip). Nokia had comments which should be addressed. |
| R4-2000923 | Return to. Cat A CR to [R4-2000922](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000922.zip). |
| [R4-2001607](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001607.zip) | Merged. Merged into tentative revised version of either 1407 or 922. |
| R4-2001608 | Withdrawn. Cat A CR to [R4-2001607](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001607.zip). |
| [R4-2001789](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001789.zip) | Revised. |
| R4-2001790 | Return to. Cat A CR to [R4-2001789](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001789.zip). |
| [R4-2001787](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001787.zip) | Merged. Merged into 1925. |
| R4-2001788 | Withdrawn. |
| [R4-2001925](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001925.zip) | Agreed. |
| R4-2001926 | Agreed. Cat A CR to [R4-2001925](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001925.zip). |
| [R4-2001588](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001588.zip) | Return to. Need proponent to provide the response in 2nd round. |
| R4-2001589 | Return to. Cat A CR to [R4-2001588](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001588.zip). |
| [R4-2001590](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001590.zip) | Return to. Need proponent to provide the response in 2nd round. |
| R4-2001591 | Return to. Cat A CR to [R4-2001590](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001590.zip). |
| [R4-2001791](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001791.zip) | Return to. Need proponent to provide the response in 2nd round. |
| R4-2001792 | Return to. Cat A CR [R4-2001791](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001791.zip). |

## Discussion on 2nd round (if applicable)

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| --- | --- |
| Apple | Sub topic 4-1: unlike FR1, why we should consider two SMTC? For the reason summarized in the 1st round comment, we propose * The same SMTC offset is used for different CC on FR2 and the SMTC periodicity on all CCs should be the same.

Sub topic 4-2: In general, we are fine with the WF. But we cannot directly extend Rel-15 agreements to Rel-16 due to independent beams for 28+39 cases. Sub topic 4-3: Suggest combine MTK proposals with Ericsson’s in Sub-topic 4-2 with assumption that SS-RSSI-Measurement is configured and not configured.  |
| Huawei, HiSilicon | Sub topic 4-1: The issue has been discussed for quite some time. What Apple mentioned above is definitely our first preference, and we are fine with option 1 as a compromises solution.Sub topic 4-2: The update to the P sharing factor depends on the conclusion from Sub-topic 4-1, i.e. what kinds of SMTC configurations are we going to address in the requirements. Sub topic 4-3: From the 1st round discussion for both MTK R4-2001789 and Huawei R4-2001584, we have the following comment to R4-2001789. As UE always needs to measure RSRQ for the serving cell it will always have to measure RSSI. - the case in the 2nd bullet does not exist because in sec 5.5.3.1 of 38.331 it is specified that UE would always perform RSRP and RSRQ measurement for the serving cell, so the 2nd bullet should be removed.Our CR R4-2001588 is revised based on the received comments.Our CR R4-2001590 can be postponed. |
| MTK | Sub topic 4-1: Similar comment as HW. Apple’s proposal was our proposal in 4 meetings ago. The current version Option 1 (in Ericsson’ 1407) is a compromised solution. Sub topic 4-2: Actually sub topics 4-1, 4-2 and 4-3 are all related. CR should be provided to consider the conclusion of these 3 sub-topics. To us the minimum agreement we need is to have same offset for SMTCs of all CCs in the same band. Otherwise, the existing requirement for SCell activation Sub topic 4-3: * To Nokia’s previous comment in 1st round. RAN4 alreayd have RSSI symbol in TS38.133 at least in the schedule restriction requirement in 9.2.5.3.

|  |
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| The UE is not expected to transmit PUCCH/PUSCH/SRS on SSB symbols to be measured, RSSI measurement symbols, and on 1 data symbol before each consecutive SSB to be measured/RSSI symbols and 1 data symbol after each consecutive SSB to be measured/RSSI symbols within SMTC window duration. … |

* To HW’s comment in 2nd round. Yes, HW is right. After checking TS38.331, UE always has to perform RSRQ on serving cell if MO is configured. Therefore we think the changes in 1789 can be somehow simplified. This should also address Ericsson’s comment.

The revision will be shared soon.  |
| Nokia | Sub-topic 4-1: we have discussed this for some time. We thoroughly analyzed the issue but we did not really identify any problem. We cannot agree to such limitation in the use of SMTC.Issue 4-2: As commented in round the wording needs to be clarified. Also deactivated SCells are serving cells but in our view they would not impose similar constraint. Likely enough to clarify that serving cells are PCell, PSCell and activated SCells.Issue 4-3: we will have a look at the draft CR but keep our comment from round 1. If this is agreed too early, we will have confusion in the specification which will be difficult to resolve. |
| Ericsson | Subtopic 4-1 : We proposed option 1 as a compromise. The spec currently allows any SMTC configuration for FR2 and UE vendors have concern on the complexity of supporting this due to RX beamsweeping. Firstly we think such concerns are not justified if there are only SCCs on FR2; the requirements already assume only 1 SCC searcher shared between all the SCCs from baseband perspective so the spatial RX beamforming can be done for the SCC being measured under the assumption that no other SCC is measured at the same time. If there is a PCC/PSCC and SCCs on FR2 then the issue is somewhat justified, and this was also one of our motivations for allowing 2 different periodicities in this case; we think that PCC/PSCC performance and RRM delays may be differentiated from the SCC RRM delays, motivating different SMTC periodicity, but the SCCs would not need to be differentiated from each other. We do not agree to Apple’s proposal given that option 1 is already a compromise.Issue 4-2 : Generally we are OK with the agreements. Regarding the changes in R4-2000922 for BM we could agree this CR, provided that additionally proposal 3 above (based on R4-2001407) is captured in a revised R4-2000922. This would then capture the dependency on all FR2 frequencies for Klayer1\_measurement and P in beam management which is an independent issue from any discussion on SMTC limitations. In our understanding this correction is needed regardless, as we pointed out in our discussion paper, there can be some FR2 SCC where MO is not configured at all, but L1 measurements are configured, which is a bug in the current release 15 spec.Regarding Apple commemt for release 16, our view is that the correct way to proceed would be to agree release 15 cat F CR considering intraband FR2 operation only, and a release 16 cat A shadow CR which aligns the current release 16 wording with the release 15 wording. If necessary we can add an editor’s note in release 16 that only intraband FR2 has been considered. Then we discuss in the corresponding release 16 WI what we need to change for interband FR2 operation.  |

## 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**  |
|  |  |

# Topic #5: Connected state mobility

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2000030 | ZTE Corporation | **Observation 1:** For NR to NR handover, Dhandover is defined as the maximum RRC procedure delay to be defined in clause 12 in TS 38.331 [2] plus the interruption time.**Proposal 1**: In TS 38.133, change the requirement for NR to NR handover to:“When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within Dhandover from the end of the last TTI containing the RRC command.Where:Dhandover equals the RRC procedure delay of RRC reconfiguration defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.X.2.”**Proposal 2**: Agree on CR [] which captures the above proposals. |
| R4-2000031 | ZTE Corporation | 38.133 CR:There are several details need to be corrected:1. Dhandover is not in the units of seconds
2. The RRC procedure delay is not described in a correct way
3. The only RRC command which can trigger an NR to NR handover is RRC reconfiguration.

Clarify on the above issues. |
| R4-2000032 | ZTE Corporation | Cat A CR to R4-2000031 |
| R4-2000033 | ZTE Corporation | **Observation 1**: According to TS 38.133 [1], TRRC\_procedure\_delay is specified in TS 38.331.**Observation 2**: TRRC\_procedure\_delay is not specified in TS 38.331.**Proposal 1:** For TS 38.133 R15, remove the wrong reference and keep the value of TRRC\_procedure\_delay unchanged.**Proposal 2**: Open the discussion in RAN4 regarding the value of TRRC\_procedure\_delay for R16 and/or later releases and further study at least the following options:Option 1: Send LS to RAN2 for a suggested value of TRRC\_procedure\_delay for RRC release.Option 2: Modify the overall delay requirement so that TRRC\_procedure\_delay is not needed.Option 3: Specify TRRC\_procedure\_delay = X ms based on internal RAN4 discussion.**Proposal 3:** Open the discussion in RAN4 regarding where to specify TRRC\_procedure\_delay for R16 and/or later releases and further study at least the following options:Option 1. TRRC\_procedure\_delay = X ms specified in test casesOption 2. TRRC\_procedure\_delay = X ms specified in core requirements and test casesOption 3. TRRC\_procedure\_delay = X ms specified in TS 38.331 by RAN2 |
| R4-2000034 | ZTE Corporation | LS:RAN4 thinks RAN2 is at a better position determining the RRC procedure delay for RRC Release message.**Question:** Can RAN2 suggest a proper value of the RRC procedure delay for RRC Release message? |
| R4-2000511 | ZTE Corporation | **Observation 1**: The UE is not aware of whether the network contains UE context before sending RRCReestablishmentRequest. Thus, the UE has to fulfill the delay requirement defined in clause 6.2.1.2.1 in TS 38.133 always.**Observation 2:** Having a line saying “There is no requirement if the target cell does not contain the UE context” in the specification gives impression to readers that under some cases, the UE is certain that the network doesn’t have UE context, which can be misleading.**Proposal 1:** The UE shall meet the delay requirement always since it can’t be sure whether the network has UE context or not.**Proposal 2:** Agree on the CRs to remove the statement “There is no requirement if the target cell does not contain the UE context” in the specification. |
| R4-2000512 | ZTE Corporation | 38.133 CR:Remove the statement “There is no requirement if the target cell does not contain the UE context”. |
| R4-2000513 | ZTE Corporation | Cat A CR to R4-2000512 |
| R4-2002075 | Ericsson | CR:Introducing the following corrections:* Modifying the wording to “Dhandover equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2]”
* Removing self-references to “TS 38.133 [50]”

Removing “NOTE 1:The actual value of TIU shall depend upon the PRACH configuration used in the target cell” |
| R4-2002076 | Ericsson | Cat A CR to R4-2002075 |

## Open issues summary

### Sub-topic 5-1

**Issue 5-1: Dhandover definition update**

* Proposals (ZTE R4-2000030, R4-2000031/2 CR, Ericsson R4-2002075/6)
	+ Alt 1

**6.1.1.2.1 Handover delay**

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within Dhandover msec from the end of the last TTI containing the RRC command.

Where:

Dhandover equals the RRC procedure delay of RRC reconfiguration defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.2.2.

* + Alt 2

Procedure delays for all procedures that can command a handover are specified in TS 38.331 [2].

When the UE receives a RRC message implying handover the UE shall be ready to start the transmission of the new uplink PRACH channel within Dhandover seconds from the end of the last TTI containing the RRC command.

Where:

Dhandover equals the applicable RRC procedure delay defined in clause 12 in TS 38.331 [2] plus the interruption time stated in clause 6.1.1.2.2.

* Recommended WF
	+ TBA

### Sub-topic 5-2

**Issue 5-2: Re-open discussion on TRRC\_procedure\_delay for requirements of RRC release with redirection**

* Proposals (ZTE, R4-2000033/4)
	+ Proposal 1: For TS 38.133 R15, remove the wrong reference and keep the value of TRRC\_procedure\_delay unchanged.
	+ Proposal 2: Open the discussion in RAN4 regarding the value of TRRC\_procedure\_delay for R16 and/or later releases and further study at least the following options:
		- Option 1: Send LS to RAN2 for a suggested value of TRRC\_procedure\_delay for RRC release.
		- Option 2: Modify the overall delay requirement so that TRRC\_procedure\_delay is not needed.
		- Option 3: Specify TRRC\_procedure\_delay = X ms based on internal RAN4 discussion.
	+ Proposal 3: Open the discussion in RAN4 regarding where to specify TRRC\_procedure\_delay for R16 and/or later releases and further study at least the following options:
		- Option 1. TRRC\_procedure\_delay = X ms specified in test cases
		- Option 2. TRRC\_procedure\_delay = X ms specified in core requirements and test cases
		- Option 3. TRRC\_procedure\_delay = X ms specified in TS 38.331 by RAN2
* Recommended WF
	+ TBA

### Sub-topic 5-3

**Issue 5-3: removal of the statement about no requirement if UE context not contained for RRC re-establishment requirement**

* Proposals (ZTE, R4-2000511, R4-2000512/3 CR)
	+ Proposal 1: The UE shall meet the delay requirement always since it can’t be sure whether the network has UE context or not.
	+ Proposal 2: Agree on the CRs to remove the statement “There is no requirement if the target cell does not contain the UE context” in the specification.

------------- CR Text ------------------

Nfreq: It is the total number of NR frequencies to be monitored for RRC re-establishment; Nfreq = 1 if the target intra-frequency NR cell is known, else Nfreq = 2 and Tidentify\_intra\_NR = 0 if the target inter-frequency NR cell is known.

In the requirement defined in the below tables, the target FR1 cell is known if it has been meeting the relevant cell identification requirement during the last 5 seconds otherwise it is unknown.

* Recommended WF
	+ TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| MTK  | Issue 5-1: Dhandover definition updateAgree with ZTE. The reason behind is that we just copied the wording from LTE. In LTE, the longest RRC procedure delay is just 20ms, but in NR, RAN2 introduced the ‘UE capability transfer’ which delay is 80ms. It’s better to have a CR to update the wording. This proposal is addressing the same issue as CR [R4-2002075](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2002075.zip). We slightly prefer the wording in [R4-2002075](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2002075.zip).Issue 5-2: Re-open discussion on TRRC\_procedure\_delay for requirements of RRC release with redirectionWe don’t agree to remove the reference. It’s not a wrong reference in RAN2 by the value of NA. The reason is that there is no response message to network and actually the network don’t know the end point of RRC Release. It’s not necessary to define this time in RAN2. For current value 110ms in test case is just copied from legacy LTE. If some companies think it's too long, it’s fine for discussing this value internally in RAN4 test case, but we don’t think we need to update the Core requirement or send LS to RAN2.Issue 5-3: removal of the statement about no requirement if UE context not contained for RRC re-establishment requirementThis requirement is for RRC re-establishment. If the network doesn’t send the *RRCreestablishment* message to UE, it means the overall procedure is not a RRC re-establishment, but a RRC setup. ‘There is no requirement if the target cell does not contain the UE context.’ It also implies that the network should guarantee the UE context is not released before the time UE sending the RACH.So we don’t think it’s necessary to remove this wording. |
| ZTE | Issue 5-1: Suggest to merge CRs from ZTE and Ericsson. Please also see our comments for the CRs below.Issue 5-2: We think that the problem is pretty clear as described and analyzed in our paper. We’re a bit confused by MediaTek’s comment because now in 38.133, it says “TRRC\_procedure\_delay: It is the RRC procedure delay for processing the received message “*RRCRelease*” as defined in clause 6.2.2 of TS 38.331 [2]” while in 38.331 it’s not defined. “NA” is not a value to be used when calculating the overall delay. We think that it’s clear that a hole exists in the current spec and it needs fixing. As to whether to send a LS or not, we don’t have strong opinions to send the LS (or not to send), we’re just listing all possible options which would be of help to resolve this problem.Also to MTK’s comment “It’s not necessary to define this time in RAN2”, we’re not suggesting to define it in RAN2. We just said it’s one possible solution to this problem. Then I guess MTK favors Option 1 or 2 over Option 3 for the question raised in proposal 3 in our paper.Also to MTK’s comment “For current value 110ms in test case is just copied from legacy LTE. If some companies think it's too long, it’s fine for discussing this value internally in RAN4 test case, but we don’t think we need to update the Core requirement or send LS to RAN2.”: this is one of the possible ways to solve this problem, which means MTK favors Option 1 for the question raised in proposal 3 in our paper. Somehow other companies might have different views on this.Again, the intention of this paper is to trigger discussions on this problem by listing all possible solutions without suggesting preference of ZTE. We volunteer to lead an offline discussion to collect views from companies and prepare a draft WF. This could be done using email reflector RAN4\_Drafts (like during a face-to-face meeting). Need instructions from the chair / moderator on how to move on.Issue 5-3: Thank MediaTek for the comments. We don’t agree on the following part in your comment:*‘There is no requirement if the target cell does not contain the UE context.’ It also implies that the network should guarantee the UE context is not released before the time UE sending the RACH.*We can’t see a relationship between that statement, which focuses on requirements for the UE, and requirement for the network. We agree with your comment that “If the network doesn’t send the *RRCreestablishment* message to UE, it means the overall procedure is not a RRC re-establishment, but a RRC setup”, this is also pointed out and illustrated with figures in our paper R4-2000511. The point is , the UE would not know if network contains the UE context before it goes through the whole process.We’re not trying to relax or tighten any requirements, but just to remove a statement that’s useless. The UE will have to meet the requirements anyway since the UE doesn’t know if network has UE context. |
| Ericsson | Issue 5-1 As a proponent of one of the CRs, we support correction of the RRC procedure delay used in handover. We also think the self reference to 38.133 needs to be corrected. These issues are relatively minor.Issue 5-2 We agree with Meditek comment that this was specified as NA on purpose by RAN2 and we do not support sending an LS to RAN2. We also agree that 110ms was copied from LTE, and our preference would be to keep core requirements and test cases aligned. We think we should discuss a lower, fixed value in RAN4 such as 60ms because many other delays are significantly shorter (eg 50%) in NR compared to LTE..Issue 5-3 We agree with Mediatek that there seems no need to remove the wording at this time. Although we also agree with ZTE that the UE does not know if the network has released the context, so it will behave in the same way in either case, we think it is reasonable to leave this sentence since the procedure overall cannot succeed if the UE context has been released before completion. |
| NEC | Issue 5-2: We also feel that in RAN2 spec, it is intentionally left NA. However, we also agree with ZTE that there is a need to correct the value. We prefer Option 1 of ZTE proposal 3 (that is Option 1. TRRC\_procedure\_delay = X ms specified in test cases) |
| ZTE | Issue 5-2: Thank MTK, Ericsson and NEC for commenting. I want to repeat my point here. As pointed out in our discussion paper R4-2000033, the NA in RAN2 spec is correct since the definition depends on a response message from UE, which is absent in RRC release process. I never implied that RAN2 spec is wrong.However, NA is not something can be used to calculate the overall delay:Tconnection\_release\_redirect\_NR = TRRC\_procedure\_delay + Tidentify-NR + TSI-NR + TRACHIf TRRC\_procedure\_delay is NA, then what is Tconnection\_release\_redirect\_NR? We think it’s pretty clear that the current spec is broken. Regarding how to resolve this problem, as can be seen from above discussions, companies have different views. We volunteer to lead an offline discussion to collect views from companies and prepare a draft WF.Issue 5-3: Thank Ericsson for commenting. Honestly I’m a bit confused by your suggestion. You agree that the UE would not know so it has to meet this requirement anyhow, indicating that this Note is useless. Then why should we keep it? It’s confusing for people who read the spec because it implicitly implies that at least under some cases, the UE would know if network has UE context, which is not true. |
| Huawei, HiSilicon | Issue 5-2: We share the same views as MTK. The NA in 38.331 is not a mistake but on purpose. We think a proper way is to remove the reference to 38.331 but keep the core requirement unchanged, and the value of 110ms could be reconsidered. Issue 5-3: We agree with ZTE’s point that UE shall meet the requirement defined in 38.133 anyway since it cannot tell whether the UE context is released or not. |
| Nokia | Sub topic 5-1: CR seems acceptable although not essential for Rel-15Sub topic 5-2: We prefer not to re-open Rel-15. If this needs to be discussed it should be done within Rel-16.Sub topic 5-3: This would need more discussion. But also here discussion should be in Rel-16 time frame. |
| Apple | Sub topic 5-2: there is no need to re-open this discussion in RAN4 since all references come from RAN2. RAN4 can further discuss in test case setup for a proper value.Sub topic 5-3: we should not remove this. If the target cell does not have UE context, it will be a random cell and it won’t be called as re-establishment. ….Others: |

### CRs/TPs comments collection

CRs included in the above sub-topics are not listed here.

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [R4-2002075](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2002075.zip)R4-2002076 | ZTE: This CR intends to resolve the same problems as R4-2000031, while missing some corrections for example “within Dhandover seconds” should be changed to “within Dhandover milliseconds”. But basically these two CRs are very similar. Suggest to merge these two CRs. We volunteer to take care of it. |
| Ericsson : We agree the CRs address the same basic issues. There are also corrections in 2075 which need to be included in the revised CR such as the references in 38.133 to itself. We have no strong view on the correct units for Dhandover, and we are happy if ZTE handles the update. |
| ZTE: Thank Ericsson for coordinating on this. We’re happy to merge two CRs if chairman / moderator agrees to do so.Nokia: This is not an essential change. Can be agreed for Rel-16. |

## 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#5-1** | Tentative agreements:The rationale behind updates for Dhandover definition is agreeable. CR R4-2000031 is agreeable. CR [R4-200003](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000030.zip)1 merge CR R4-2002075.Candidate options:Recommendations for 2nd round: |
| **Sub-topic#5-2** | Tentative agreements:No tentative agreements. Companies commented that it re-open Rel-15 discussion.Candidate options:For TS 38.133 R15, whether to remove the wrong reference and keep the value of TRRC\_procedure\_delay unchanged.* Yes: ZTE, NEC,
* No: Mediatek, Ericsson, Huawei, Nokia, Apple

Open the discussion in RAN4 regarding the value of and where to specify TRRC\_procedure\_delay for R16 and/or later releases.* Option 1: Discuss the value internally in RAN4 test case but no update for core requirement and no LS to RAN2 are needed (Mediatek)
* Option 2: Keep the current 110ms for core requirement and test case. Further discuss the lower, fixed value in RAN4 such as 60ms. (Ericsson)
* Option 3: Open the discussion for core requirements and/or test cases and consider sending LS to RAN2 (ZTE, Huawei (may partially support))
* Option 4: More discussion is needed (Nokia).

Recommendations for 2nd round:Further discussion is needed.1. Whether to need change core requirement
2. Whether to need change test cases
3. Whether to need sending LS to RAN2.

ZTE can lead a way forward discussion. Depending on outcome of way forward, decide how to treat LS. |
| **Sub-topic#5-3** | Tentative agreements:No tentative agreements. Candidate options:Whether to agree on CR R4-2000512/3, i.e., remove the statement about no requirement.* Yes/supportive: ZTE, Huawei
* No: Mediatek, Ericsson, Apple

Recommendations for 2nd round:More discussion is needed. We return to the CRs. |

Suggestion on WF/LS assignment

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| New WF R4-200xxxx | Way forward on TRRC\_procedure\_delay for requirements of RRC release with redirection | ZTE |

|  |  |
| --- | --- |
| **LS number** | **LS Status update recommendation**  |
| R4-2000034 | Return to. |

### CRs/TPs

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

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| R4-2000031 | Revised. Check if Nokia is OK with Rel-15 CR. |
| R4-2000032 | Return to. Cat A CR to R4-2000031. |
| R4-2000512 | Return to. |
| R4-2000513 | Return to.  |
| R4-2002075 | Merged. Merged into R4-2000031. |
| R4-2002076 | Withdrawn. Cat A CR to R4-2002075. |

## Discussion on 2nd round (if applicable)

|  |  |
| --- | --- |
| ZTE | Issue 5-1: From the feedback I think most companies can agree on the CR. I have uploaded the merged one (draft R4-2002205) to the ftp folder. Issue 5-2: Draft way forward has been uploaded to the folder. We slightly prefer to send an LS to RAN2 since their knowledge on the structure and processing of the RRC message would be of help when specifying the delay of such message (which, essentially, depends on the content and structure of the message itself). We would suggest to send an LS to RAN2 for a suggested value of the RRC procedure delay. If time is not enough to decide on whether to send LS, we can keep it as an option in WF and come back next meeting with more companies bringing in papers and views and then decide whether to send LS.Issue 5-3: To Apple: We agree with your view, however the UE shall meet the requirements anyways since it cannot tell whether the UE context is released or not at the network. Thus, the statement is not really necessary. |
| Ericsson | Issue 5-1 : We are fine with the merged HO CRIssue 5-2 : We have provided feedback on the way forward directly. We do not think RAN2 can help with the processing delay for RRC connection release for redirection, since from their point of view the procedure ends when the release message is sent, despite that RAN4 is interested in when the UE starts to perform, and completes cell search for the redirection target. We also think it would not be suitable to define a test case which was not based on a corresponding core requirement, so if we discuss shorter X than 110ms, it needs to be changed in both core requirements and test.Issue 5-3 : It seems there has not been much progress on this discussion. Generally we understand ZTE’s point that the UE has no knowledge of whether the target cell has a UE context so the UE will behave exactly the same way in either case. However, the counterargument is that if the target cell has released the context, reestablishment will fail anyway and we don’t really need to specify requirements on the UE for failure cases. Actually, it doesn’t seem like a very critical issue either way, so we can be neutral on whether a CR is agreed or not in this meeting. However, in the event that there is no consensus to change the spec this time around, we prefer not to spend a lot of time discussing in future.  |

## 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**  |
| R4-2002205 | (Revised from R4-2000031) |
| R4-2002286 | (Cat A CR for R4-2002205) |
| R4-2002206 | (WF on TRRC\_procedure\_delay for requirements of RRC release with redirection) |

# Topic #6: Timing

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2001567](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001567.zip) | Huawei, HiSilicon | Observation 1: When the timing difference between before and after beam transition is smaller than 2Te, UE may not observe the timing change due to timing error.Proposal 1: The timing threshold H used for one-shot adjustment should be larger than 2Te.Observation 2: when the magnitude of the T is within (H-2Te, H+2Te], it is difficult for the UE to correctly determine when to perform a one-shot timing adjustment.Proposal 2: It is suggested to remove the one-shot timing adjustment requirements due to implementation difficulties. |
| [R4-2001568](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001568.zip) | Huawei, HiSilicon | CR:1. To remove one-shot timing adjustment requirements. |
| R4-2001569 | Huawei, HiSilicon | Cat A CR to [R4-2001568](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001568.zip) |
| [R4-2001843](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001843.zip) | Ericsson | Observation # 1: The threshold, H, beyond which the UE applies one shot adjustment should be small fraction of UL CP length (e.g. not more than 10%) to prevent BS reception problem. Proposal # 1: The threshold, H, beyond which the UE applies single shot adjustment shall be small fraction of UL CP length as shown in table below:

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | SCS of SSB signals (KHz) | SCS of uplink signals s(KHz) | H [Tc] |
| 1 | 15 | 15 | 768 |
| 30 | 320 |
| 60 | 160 |
| 30 | 15 | 512 |
| 30 | 512 |
| 60 | 224 |
| 2 | 120 | 60 | 224 |
| 120 | 112 |
| 240 | 60 | 192 |
| 120 | 96 |

Observation # 2: Relaxation of Te after the one-shot adjustment will increase the BS reception error resulting in BS reception problem.Proposal # 2: The transmission after the one-shot adjustment shall meet the existing timing error, Te, defined in Table 7.1.2-1Observation # 3: Upon applying one-shot timing adjustment the UE may rarely cause interruption. Proposal # 4: No interruption requirement due to one-shot timing adjustment is specified. |
| [R4-2001844](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001844.zip) | Ericsson | CR:The value of threshold (H) above which the UE adjusts its transmission timing in one adjustment are missing. The value of H are specified. |
| R4-2001845 | Ericsson | Cat A CR to [R4-2001844](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001844.zip) |
| [R4-2000458](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000458.zip) | MediaTek inc. | Observation 1: As long as Te1 is smaller than TΔ, BS will always benefit from UE’s one-shot adjustmentObservation 2: When H is somehow within the range of 25~30% of the UL CP, then the overall BS error could be roughly controlled around half of CP.Observation 3: From UE’s perspective, reasonable H is within the range of 40~56%.Proposal 1: The threshold H is 33% of the CP for all SCSs.Proposal 2: No explicit accuracy requirement is specified for UL Tx transmit timing on non-serving beam, because it is already implicitly considered in the threshold H.Proposal 3: No requirements are specified for one-shot UL timing adjustment due to UE’s autonomous Rx beam change.Proposal 4: If requirements (H, Te1 and interruption) are not finalized in RAN4 #94-e then remove one shot timing adjustment requirements from Rel-15. |
| R4-2001009 | NEC | Proposal 1: UE transmit timing error after one shot timing adjustment shall be within ±Te.Proposal 2: Threshold for one shot timing adjustment is CP/3Proposal 3: If proposal 1 and 2 are not agreeable, then RAN4 should remove one shot timing adjustment requirements from Rel-15. |
| [R4-2001328](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001328.zip) | Nokia, Nokia Shanghai Bell | Observation 1: Rel-15 gNB’s are already available in the field.Observation 2: Existing Rel-15 gNB’s assume that UEs follow the existing specified time adjustment requirements.Observation 3: A one-shot adjustment is agnostic to gNB when the timing error, Te, after one-shot adjustment is within the ±Te of the reference timing used before the one-shot adjustment.Observation 4: UE autonomous UL transmit timing can only be applied assuming UL/DL reciprocity.And we propose following:Proposal 1: One-shot timing adjustment is only allowed when gradual timing adjustment cannot be applied.Proposal 2: H = Te+Tq.Proposal 3: Any one-shot UL transmit timing adjustment due to UE autonomous beam change shall be agnostic to the gNB.Proposal 4: No additional relaxation in UL transmit error relaxation is introduced when applying one-shot adjustment.Proposal 5: When applying one-shot timing adjustment, the transmission timing error shall stay within ±Te of the reference timing after the adjustmentProposal 6: No interruptions are allowed for UE autonomous Rx beam Change. |
| [R4-2002062](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2002062.zip) | Qualcomm Incorporated | Observation 1: UE behavior on how it corrects for timing change is different above and below the threshold H.Observation 2: In scenario where DL timing jumps by a larger amount, even with a relaxed Te after one-shot adjustment, the system performance is better in case one-shot timing adjustment than where UE slews its timing adjustment. Observation 3: The relaxed Te applies only from the time when the UE sees the large timing change till the next SSB is received. Observation 4: At large timing jump, the UE applies one-shot timing adjustment. At the reception of new SSB, it reverts to gradual adjustment to bring error within Te. Proposal 1: The threshold H should be 0.5\*CPProposal 2: UE shall adjust its UL timing in one-shot if the value of the correction is less than the maximum value of TA command for that SCS. Proposal 3: The value of Te1 should be Te+5Ts in FR1 and Te+4Ts in FR2 |
| [R4-2001258](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001258.zip) | ZTE | Proposal 1. The threshold H to trigger one shot timing adjustment is 15% UL CP.Proposal 2. The threshold H is calculated as in Table below.

|  |  |  |
| --- | --- | --- |
| **Frequency Range** | **SCS of uplink signals (kHz)** | **H [Tc]** |
| 1 | 15 | 20\*64\*Tc |
| 30 | 10\*64\*Tc |
| 60 | 5.5\*64\*Tc |
| 2 | 60 | 5.5\*64\*Tc |
| 120 | 2.5\*64\*Tc |

Proposal 3. The accuracy of one-shot timing adjustment (Te1) is the same as initial uplink transmission accuracy Te.Proposal 4. No interruption is allowed during one shot timing adjustment. |
| [R4-2001265](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001265.zip) | ZTE | CR:• The threshold value of H is proposed• The definition of T1 and T2 are corrected• “x Tc” is added in the formula. |
| R4-2001266 | ZTE | Cat A CR to [R4-2001265](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001265.zip) |
| [R4-2001570](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001570.zip) | Huawei, HiSilicon | CR:1. To add the MRTD/MTTD requirements for inter-band synchronous EN-DC and NE-DC to new sub-sections.

The Rel-16 version of MRTD and MTTD requirements for inter-band EN-DC and NE-DC are inconsistent with the Rel-15 version. |

## Open issues summary

### Sub-topic 6-1

**Issue 6-1: Threshold for one shot timing adjustment requirements for FR2**

The threshold (H) values above which the UE adjusts its transmission timing in on adjustment is discussed. The BS performance loss, UE implementation, DL timing estimation errors and etc are taken into consideration in the companies’ contributions. The related contributions are R4-2001567, [R4-2001568](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001568.zip)/9 (CR), [R4-2001843](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001843.zip), [R4-200184](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001843.zip)4/5 (CR), [R4-2000458](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000458.zip), [R4-200](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000458.zip)1009, [R4-2001328](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001328.zip), [R4-200](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001328.zip)2062, [R4-2001258](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001258.zip), [R4-2001265](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001265.zip)/6 (CR)

* Proposals
	+ Option 1 (Huawei R4-2001567, R4-2001568/9):
		- The timing threshold H used for one-shot adjustment should be larger than 2Te.
		- It is suggested to remove the one-shot timing adjustment requirements due to implementation difficulties.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Frequency Range** | **SCS of SSB signals ( kHz)** | **SCS of uplink signals ( kHz)** | **Te** | **H > 2Te (Tc)** |
| 1 | 15 | 15 | 12\*64\*Tc | 1536 |
| 30 | 10\*64\*Tc | 1280 |
| 60 | 10\*64\*Tc | 1280 |
| 30 | 15 | 8\*64\*Tc | 1024 |
| 30 | 8\*64\*Tc | 1024 |
| 60 | 7\*64\*Tc | 896 |
| 2 | 120 | 60 | 3.5\*64\*Tc | 448 |
| 120 | 3.5\*64\*Tc | 448 |
| 240 | 60 | 3\*64\*Tc | 384 |
| 120 | 3\*64\*Tc | 384 |
| Note 1: Tc is the basic timing unit defined in TS 38.211 [6] |

* + Option 2 (Ericsson R4-2001843, R4-2001844/5):
		- The threshold, H, beyond which the UE applies single shot adjustment shall be small fraction of UL CP length as shown in table below:

|  |  |  |  |
| --- | --- | --- | --- |
| Frequency Range | SCS of SSB signals (KHz) | SCS of uplink signals s(KHz) | H [Tc] |
| 1 | 15 | 15 | 768 |
| 30 | 320 |
| 60 | 160 |
| 30 | 15 | 512 |
| 30 | 512 |
| 60 | 224 |
| 2 | 120 | 60 | 224 |
| 120 | 112 |
| 240 | 60 | 192 |
| 120 | 96 |

* + Option 3 (Mediatek R4-2000458)
		- The threshold H is 33% of the CP for all SCSs.
		- If requirements (H, Te1 and interruption) are not finalized in RAN4 #94-e then remove one shot timing adjustment requirements from Rel-15.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Frequency Range** | **SCS of SSB signals ( kHz)** | **SCS of uplink signals ( kHz)** | **Te** | **H = 33%\*CP (Tc)** |
| 1 | 15 | 15 | 12\*64\*Tc | 3041.28 |
| 30 | 10\*64\*Tc | 1520.64 |
| 60 | 10\*64\*Tc | 760.32 |
| 30 | 15 | 8\*64\*Tc | 3041.28 |
| 30 | 8\*64\*Tc | 1520.64 |
| 60 | 7\*64\*Tc | 760.32 |
| 2 | 120 | 60 | 3.5\*64\*Tc | 760.32 |
| 120 | 3.5\*64\*Tc | 380.16 |
| 240 | 60 | 3\*64\*Tc | 760.32 |
| 120 | 3\*64\*Tc | 380.16 |
| Note 1: Tc is the basic timing unit defined in TS 38.211 [6] |

* + Option 3a (NEC R4-2001009)
		- Threshold for one shot timing adjustment is CP/3
	+ Option 4 (Nokia R4-2001328)
		- One-shot timing adjustment is only allowed when gradual timing adjustment cannot be applied.
		- H = Te+Tq.
		- Any one-shot UL transmit timing adjustment due to UE autonomous beam change shall be agnostic to the gNB.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Frequency Range** | **SCS of SSB signals ( kHz)** | **SCS of uplink signals ( kHz)** | **Te** | **Tq (Tc)** | **H = Te+Tq (Tc)** |
| 1 | 15 | 15 | 12\*64\*Tc | 5.5\*64 | 1120 |
| 30 | 10\*64\*Tc | 5.5\*64 | 992 |
| 60 | 10\*64\*Tc | 2.5\*64 | 800 |
| 30 | 15 | 8\*64\*Tc | 5.5\*64 | 864 |
| 30 | 8\*64\*Tc | 5.5\*64 | 864 |
| 60 | 7\*64\*Tc | 2.5\*64 | 608 |
| 2 | 120 | 60 | 3.5\*64\*Tc | 2.5\*64 | 384 |
| 120 | 3.5\*64\*Tc | 2.5\*64 | 384 |
| 240 | 60 | 3\*64\*Tc | 2.5\*64 | 352 |
| 120 | 3\*64\*Tc | 2.5\*64 | 352 |

* + Option 5 (Qualcomm R4-2002062)
		- The threshold H should be 0.5\*CP
		- UE shall adjust its UL timing in one-shot if the value of the correction is less than the maximum value of TA command for that SCS.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Frequency Range** | **SCS of SSB signals ( kHz)** | **SCS of uplink signals ( kHz)** | **Te** | **H = 50%\*CP (Tc)** |
| 1 | 15 | 15 | 12\*64\*Tc | 4608 |
| 30 | 10\*64\*Tc | 2304 |
| 60 | 10\*64\*Tc | 1152 |
| 30 | 15 | 8\*64\*Tc | 4608 |
| 30 | 8\*64\*Tc | 2304 |
| 60 | 7\*64\*Tc | 1152 |
| 2 | 120 | 60 | 3.5\*64\*Tc | 1152 |
| 120 | 3.5\*64\*Tc | 576 |
| 240 | 60 | 3\*64\*Tc | 1152 |
| 120 | 3\*64\*Tc | 576 |

* + Option 6 (ZTE R4-2001258, R4-2001265/6)
		- The threshold H to trigger one shot timing adjustment is 15% UL CP.
		- The threshold H is calculated as in Table below.

|  |  |  |  |
| --- | --- | --- | --- |
| **Frequency Range** | **SCS of uplink signals (kHz)** | **H [Tc]** | **H (Tc)** |
| 1 | 15 | 20\*64\*Tc | 1280 |
| 30 | 10\*64\*Tc | 640 |
| 60 | 5.5\*64\*Tc | 352 |
| 2 | 60 | 5.5\*64\*Tc | 352 |
| 120 | 2.5\*64\*Tc | 160 |

* Recommended WF
	+ Summary: Should we agree that H should be larger than 2\*Te considering the UE DL timing estimation error?
		- ≥ 2\*Te: Option 1, 3, 3a, 5
		- < 2\*Te: Option 2, 4, 6
	+ If no agreement in this meeting, remove the single shot requirement

**Issue 6-2: Accuracy of timing after one shot timing adjustment**

* Proposals
	+ Option 1 (Ericsson R4-2001843, R4-2001844/5, NEC R4-2001009, Nokia [R4-2001328](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001328.zip), ZTE R4-2001258, [R4-2001265](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001265.zip)/6) : The transmission after the one-shot adjustment shall meet the existing timing error, Te, defined in Table 7.1.2-1
	+ Option 2 (Mediatek [R4-2000458](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000458.zip)): No explicit accuracy requirement is specified for UL Tx transmit timing on non-serving beam, because it is already implicitly considered in the threshold H.
	+ Option 3 (Qualcomm [R4-2002062](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2002062.zip)): The value of Te1 should be Te+5Ts in FR1 and Te+4Ts in FR2
* Recommended WF
	+ Tentative agreement: The transmission after the one-shot adjustment shall meet the existing timing error, Te, defined in Table 7.1.2-1.

**Issue 6-3: Interruption requirements**

* Proposals
	+ Option 1 (Ericsson R4-2001843, R4-2001844/5, Mediatek [R4-2000458](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000458.zip), Nokia [R4-2001328](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001328.zip), ZTE [R4-2001258](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001258.zip), [R4-2001265](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001265.zip)/6): No interruption requirement due to one-shot timing adjustment is specified.
* Recommended WF
	+ Tentative agreement: No interruption requirement due to one-shot timing adjustment is specified.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| ZTE | Sub topic 6-1: We observed the same situation as in the last meeting. It was agreed in R4-1915947,* Further discuss one shot timing adjustment in RAN4 #94. If requirements are not finalized in RAN4 #94 then remove one shot timing adjustment requirements from Rel-15.

To move forward we can compromise to * H < 20% CP
* No explicit uplink transmission accuracy requirements for one shot timing adjustment is specified.

 In addition we are also fine to remove one shot timing adjustment requirements from Rel-15 if no consensus can be reached.Sub topic 6-2:Sub topic 6-3:….Others: |
| MTK | First of all, we should follow the principle agreed in last meeting: if this feature cannot be finalized in RAN4#94-e meeting, then this feature should be removed from Rel-15Issue 6-1: Threshold for one shot timing adjustment requirements for FR2H < 2\*Te means that the sum of UL timing error from both beam pairs is larger than H. If this H value is agreed, this feature will not work at all, because UE behaviour becomes unstable and dominated by timing error. Issue 6-2: Accuracy of timing after one shot timing adjustment Both Option 2 and 3 are OK to usIssue 6-3: Interruption requirementsOne thing to clarify here. No requirements could still allow interruption. It is only the interruption duration and the staring time of the interruption is not defined. For this case, interruption is definitely needed if one-shot timing advance is larger than CP. We suggest to have no requirement because this interruption timing is never to be known by network. Therefore, network has no way to leverage this requirement to optimize OLLA or some others. |
| Ericsson | Sub topic 6-1: Our view is that H needs to be very significantly less than 2\*Te (eg as in option 2 or perhaps option 6).Sub topic 6-2: Tentative agreement: *The transmission after the one-shot adjustment shall meet the existing timing error, Te, defined in Table 7.1.2-*1 is acceptable for EricssonSub topic 6-3: *Tentative agreement: No interruption requirement due to one-shot timing adjustment is specified.* Is acceptable for Ericsson |
| NEC | Issue 6-1: Option 3 or 3a (both are same)Issue 6-2: Option 1 |
| Huawei, HiSilicon | Issue 6-1:We suppose that the threshold H should be larger than 2\*Te. It is acceptable to define H as 0.5CP.If the threshold H was smaller than 2\*Te, then UE may trigger one-shot timing adjustment frequently by mistake, due to UE detection error on DL reception timing for both old beam and new beam.Issue 6-2:If the UE makes a correct judgment, the timing accuracy after one-shot adjustment can be defined as Te. However, the timing accuracy due to error judgments need to be considered.For example, when the DL timing change is H+0.1Te, UE is required to perform one-shot timing adjustment. Due to detection error, UE observed DL timing change is H-0.1Te. Then UE would perform gradual adjustments by mistake. The timing adjustment error due to wrong judgments will be larger than Te.Issue 6-3:If the one-shot timing adjustment requirements are removed, then the interruption requirement due to one-shot timing adjustment does not need to be specified. Otherwise, the interruption due to one-shot timing adjustment for Tx beam switch (i.e. TCI-state switch) shall be defined. |
| QC | At this point the companies seem to be too far in terms of discussion of threshold and Te1. We can compromise to H being around 30% CP and but would need relaxed Te1 as compared to Te. If the above it not acceptable, we are fine removing this from Rel-15 and discussing in Rel-16 context. Note that without this feature the performance overall system performance and BS demod performance will be worse as compared to with this feature with any H and Te1<H.  |
| Nokia | Sub topic 6-1: Our understanding is that it is important that the UE behavior is agnostic to gNB as these are already deployed. Hence, if the UE cannot adjust (using current gradual adjustment) the transmit timing, error after autonomous RX beam change, to be within Te, one shot change is allowed. This means H=Te+Tq as Tq is the current largest one step adjustment allowing the UE to adjust just to be fulfilling the current requirements of ±Te. If agreement is not reached, we support removing this feature from Rel-15 and continue the discussion in Rel-16.Sub topic 6-2: Support the recommended WF.Sub topic 6-3: Support the recommended WF. |
| Apple | Sub topic 6-1: 0.5\*CPSub topic 6-2: Agree with Qualcomm’s proposalSub topic 6-3: No interruption requirement due to one-shot timing adjustment is specified….Others: |

### CRs/TPs comments collection

CRs included in the above sub topics are not listed here.

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| [R4-2001570](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001570.zip) | MTK: OK |
| Ericsson agrees with this CR |
| Nokia: CR looks acceptable. |

## 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#6-1** | Tentative agreements:Given that the agreement in last meeting is if this feature cannot be finalized in RAN4#94-e meeting, then this feature should be removed from Rel-15. According to the companies’ proposals and feedbacks, it seems impossible to conclude on this topic.It is suggested to agree to remove the one-shot timing adjustment requirements from Rel-15 and continue discussion on it in Rel-16.Candidate options:According to proposals and feedback, companies provide very diverse numbers. Even one company will provide multiple numbers. It is difficult to figure out a compromised value. We translate the proposals approximately in terms of fraction of CP length as below:Option 1: about 2Te = 16.7% CPOption 2: about Te = 8.3% CPOption 3: 33% CPOption 3a: 33.3% CPOption 4: Te+Tq = 12%~30% CP depending on SCSOption 5: 50% CPOption 6: 15% CPAccording to the feedbacks from companies, no proposals can be down-selected.As recommended WF, we categorize the options into two categories. Companies are encouraged to further discuss which category needs be selected:Category 1: ≥ 2\*Te: Option 1, 3, 3a, 5* Support: NEC, Huawei, Mediatek, Qualcomm (need relax Te1), Apple
* Against: Ericsson

Category 2: < 2\*Te: Option 2, 4, 6* Support: ZTE, Ericsson, [Nokia]
* Against: Mediatek, Huawei, Apple

Recommendations for 2nd round:1. Discuss and agree whether the UE behavior is unstable and dominated by timing error when H<2\*Te.
2. Try to down-select one category.
 |
| **Sub-topic#6-2** | Tentative agreements:No tentative agreement.Candidate options:Continue discussion on Option 1, Option 2, and Option 3. Companies still have diverse view according to feedback in 1rst round. Generally there are three directions: reuse the same accuracy requirement, no requirement, or relax the requirements.Recommendations for 2nd round:Further discussion is needed. |
| **Sub-topic#6-3** | Tentative agreements:No tentative agreement.Candidate options:According to the feedback, more options are provided.Option 1: No interruption requirement due to one-shot timing adjustment is specified. (Ericsson, Mediatek, Nokia, ZTE, Apple)Option 2: No interruption requirement but interruption is allowed. (Mediatek)Option 3: If the one-shot timing adjustment requirements are removed, then the interruption requirement due to one-shot timing adjustment does not need to be specified. Otherwise, the interruption due to one-shot timing adjustment for Tx beam switch (i.e. TCI-state switch) shall be defined. (Huawei). [in other words, for Rel-16 interruption requirement is needed if one-shot timing adjustment requirements defined].Recommendations for 2nd round:Further discussion is needed. |

Suggestion on WF/LS assignment

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
| New WFR4-200xxxx | Way forward on one-shot timing adjustment requirement | Huawei |

### CRs/TPs

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

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| [R4-2001568](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001568.zip) | Return to. If the tentative agreement for sub-topic #6-1 is agreeable, this CR can be agreed. |
| R4-2001569 | Return to. Check if Rel-16 one-shot timing adjustment requirement can be removed. |
| [R4-2001844](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001844.zip) | Return to. If the tentative agreement for sub-topic #6-1, i.e, remove Rel-15 requirement, is agreeable, the status of this CR should be Not pursued. |
| R4-2001845 | Return to. Cat A CR to [R4-2001844](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001844.zip). |
| [R4-2001265](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001265.zip) | Return to. If the tentative agreement for sub-topic #6-1, i.e, remove Rel-15 requirement, is agreeable, the status of this CR should be Not pursued. |
| R4-2001266 | Return to. Cat A CR to [R4-2001265](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001265.zip). |
| [R4-2001570](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001570.zip) | Agreed. |

## Discussion on 2nd round (if applicable)

|  |  |
| --- | --- |
| Huawei, HiSilicon | Issue: Whether one-shot timing adjustment requirement can be removed from Rel-16 specRAN4 has discussed the values of threshold (H) beyond 4 meeting cycles, and no further agreements can be achieved. We also suggest to remove one-shot timing adjustment requirements in Rel-16 spec. |
| MTK | Issue: Whether one-shot timing adjustment requirement can be removed from Rel-16 specNo. We think by default R16 should follow the decision in R15. Whether R16 should have the requirement for on-shot timing adjustment should be discussed in a separate R16 WI (if any), rather than decided in a R15 WI. |
| Ericsson | Given that the one shot requirements are decided to be removed from R15, Ericsson also agrees with Huawei for release 16 that one shot adjustments should be removed by agreeing the corresponding CAT A CR in R4-2001569.Given that timing tracking of release 15 UEs needs to work, it would seem more complicated to deal with two different types of UE from an uplink timing perspective (release 15, release 16) in the network so the bar would need to be rather high in terms of improved performance offered by the release 16 UEs before it would make sense to introduce different behaviour than release 15.Since we have had a long discussion and not agreed on one shot adjustment performance for R15, it seems to us rather unlikely that we could agree a one shot behaviour in R16 which had sufficient performance to justify the handling of these different types of UEs. At the same time, the release 16 enhancement RRM work item already contains many diverse topics and seems very loaded already. |

## 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**  |
|  |  |

# Topic #7: Beam management based on SSB and/or CSI-RS

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2000916](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000916.zip) | MediaTek inc. | 38.133 CR:Add measurement restriction across CCs |
| R4-2000917 | MediaTek inc. | Cat A CR to [R4-2000916](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000916.zip) |
| [R4-2000918](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000918.zip) | MediaTek inc. | 38.133 CRAdd Lower bound for evaluation period of SSB based CBD. |
| R4-2000919 | MediaTek inc. | Cat A CR to [R4-2000918](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000918.zip) |
| [R4-2000920](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000920.zip) | MediaTek inc. | 38.133 CRAdd side condition that *QCL-Type D* should be provided in FR2 for CSI-RS resources in a resource set configured with higher layer parameter *repetition* set to ON. |
| R4-2000921 | MediaTek inc. | Cat A CR to [R4-2000920](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000920.zip) |

## Companies views’ collection for 1st round

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| [R4-2000916](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000916.zip)R4-2000917 | Nokia: agreeable. Endorsed CR R4-1911310 in RAN4#92bis meetingApple: It is not accurate to say that SSB from one CC in the same symbol as SSB or CSI-RS on the different CC, as there won’t be a single OFDM symbol cross multiple CC. The suggested wording… For FR2, when the SSB for RLM is overlapped in time domain with CSI-RS for RLM, BFD, CBD or L1-RSRP measurement on the same CC or different CCs in the same band, UE is required to measure one of but not both SSB for RLM and CSI-RS. Longer measurement period for SSB based RLM is expected, and no requirements are defined.. |
| Company B |
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| [R4-2000918](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000918.zip)R4-2000919 | Ericsson : OK |
| Nokia: agreeable. Endorsed CR R4-1912771 in RAN4#92bis meeting |
|  |
| [R4-2000920](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000920.zip)R4-2000921 | Ericsson: Not clear what 'spatially QCLed' means. And not sure we need such a side condition.  |
| Nokia: Wording is not clear. Can MediaTek explain the intention of the added condition?  |
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## Summary for 1st round

### CRs/TPs

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

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| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| [R4-2000916](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000916.zip) | Agreed |
| R4-2000917 | Agreed. Cat A CR to [R4-2000916](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000916.zip). |
| [R4-2000918](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000918.zip) | Agreed. |
| R4-2000919 | Agreed. Cat A CR to [R4-2000918](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000918.zip) |
| [R4-2000920](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000920.zip) | Return to. Proponent should provide the response to the comments. |
| R4-2000921 | Return to. Cat A CR to [R4-2000920](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000920.zip). |

## Discussion on 2nd round (if applicable)

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| **CR/TP number** | **Comments collection** |
| [R4-2000920](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2000920.zip)R4-2000921 | MTK: the intention is to clarify the requirement for CSI-RS repetition 'ON'. We noticed that for the measurement on CSI-RS repetition 'ON' (in 9.5.4.2 in 38.133), it only states *qcl-InfoPeriodicCSI-RS* should be provided. However, it seems *QCL-Type D* should also be provided, similar as repetition ‘OFF’.  Our understanding is that CSI-RS repetition 'ON' is for beam refinement within a relative small angular area, instead of global beam searching, so the *QCL-Type D* is needed for the determination of rough beam. The wording of 'spatially/type-D QCLed' refers to clause 3.6.7, wherein one RS is typeD QCL-ed to the CSI-RS repetition ‘OFF’, as long as the one RS is in the TCI chain consisting CSI-RS repetition ‘OFF’. |
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## 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

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| **CR/TP/LS/WF number** | **T-doc Status update recommendation**  |
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# Topic #8: Requirements for NE-DC (Option 4) and NGEN-DC

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2001609](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001609.zip) | Huawei, HiSilicon | 36.133 CRIn section 8.19.4 of 36.133, intra-frequency RSTD measurement requirements are specified for NE-DC. However, in NE-DC LPP message can only be transmitted from NR PCell, so LTE PSCell cannot configure RSTD measurement. Therefore, the corresponding requirements should be removed from 36.133.Remove intra-frequency RSTD measurement requirements for NE-DC from 36.133. |
| R4-2001610 | Huawei, HiSilicon | Cat A CR to [R4-2001609](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001609.zip) |

## Companies views’ collection for 1st round

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| [R4-2001609](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001609.zip)R4-2001610 | Ericsson: disagree, our understanding that LPP both ways is supported, i.e., it can be via LTE PSCell or NR PCell in NE-DC (and in principle via any primary cell in any deployment); the CR is not needed. |
| Nokia: Need time to check. |
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## Summary for 1st round

### CRs/TPs

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

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| [R4-2001609](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001609.zip) | Return to. The proponent should provide the response to the comments. |
| R4-2001610 | Return to. Cat A CR to [R4-2001609](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001609.zip). |

## Discussion on 2nd round (if applicable)

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| **CR/TP number** | **Comments collection** |
| [R4-2001609](http://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_94_e/Docs/R4-2001609.zip)R4-2001610 | Huawei, HiSilicon: To Ericsson comment, in NE-DC there is no Control Plane connection from the LTE SN to 5GC. Thus, LPP as NAS message, cannot be conveyed from the LTE SN to UE. |
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## 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**  |
|  |  |