**3GPP TSG-RAN WG4 Meeting # 97-e R4-201xxxx**

**Electronic Meeting, 2 – 13 November, 2020**

**Agenda item:** 7.7.1, 7.7.2

**Source:** Moderator (Huawei, HiSilicon)

**Title:** Email discussion summary for [967][213] NR\_pos\_RRM\_1

**Document for:** Information

# Introduction

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

7.7.1: General

7.7.2: RRM core requirements maintenance (38.133)

7.7.2.1: PRS-RSTD measurement requirements

7.7.2.2 : PRS-RSRP measurement requirements

7.7.2.3: UE Rx-Tx time difference measurement requirements

7.7.2.4: Other requirements

In providing comments, companies are encouraged to:

* Ensure that the comments are inserted in the latest version of the document by checking the folder before uploading
* Use “Track changes” to help identify added comments/changes
* Append the company name and round number before uploading

# Topic #1: RSTD measurement

## Companies’ contributions summary

*Note: Proposal 1 of R4-2016390 is to be treated in email 214. Proposal 4 of R4-2015750 is to be treated under Topic 4.*

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| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2014004 | ZTE Corporation | N.A. |
| [**R4-2014445**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014445.zip) | CATT | **Proposal 1: The calculation of PRS sample duration should be based on the type (type 1 or type 2) as UE used to report {N,T}.** **Proposal 2: When multiple PRS periodicities are configured, use the maximum PRS resource periodicity among all PRS resource in a same positioning frequency layer.** **Proposal 3: RSTD measurement period to be defined for cases when PRS occasions are not dropped.** **Proposal 4: RSTD measurement period is not impacted by PRS-RSRP measurement.**  |
| [**R4-2014573**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014573.zip) | Intel Corporation | ***Proposal 1: For RSTD measurement delay, the PRS sample duration shall be based on the same type (either type 1 or type 2) as UE used to report {N,T}****.****Proposal 2: Use the maximum PRS resource periodicity among all PRS resource in a same positioning frequency layer.******Proposal 3: The requirement for RSTD measurement reporting in Rel16 need not account the PRS occasion dropping due to PRS and RRM measurement happened simultaneously*.** ***Proposal 4: RSTD measurement period shall not be impacted by PRS-RSRP measurement.*** |
| [**R4-2014799**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014799.zip) | OPPO | **Proposal 1: The total measurement period for RSTD when MGs and processing time T do not have overlap between different positioning frequency layers:*** **If such scenario is considered as a rare case, then adopt option 1 *TRSTD, total* = Σ*TRSTD, i* + *X***
* **If such scenario is considered as a typical case, then adopt option 2 *TRSTD, total* = *max*(*TRSTD, i*) + *max*(*Teffect,i*)**  **to reduce the measurement delay**

**Proposal 2: When more than one PRS resource sets with different periodicities are configured in the same positioning frequency layer, the least common multiple of PRS periodicities in that frequency layer, i.e. *LCM*(TPRS1, TPRS2, …), should be used to derive the measurement period.** **Proposal 3: For the PRS dropping due to SSB collision, we can support either option 1 or option 3:*** **Option 1: RSTD measurement period to be defined for case when PRS are not dropped**
* **Option 3: The same measurement period requirement shall be met, regardless of whether some the PRS symbols are dropped or not during this measurement period**
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| [**R4-2015750**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015750.zip) | Huawei, HiSilicon | **Proposal 1: RAN4 not to define separate requirements for the case when measurement gaps and processing time T do not have overlap between different positioning frequency layers in Rel-16.****Proposal 2: Calculation of PRS sample duration L is based the type (type 1 or type 2) UE reported.****Proposal 3: SSB collision is not accounted in PRS measurement period. The PRS measurement requirements apply PRS occasions are not dropped due to collision with SSB.****Proposal 4: RSTD measurement period is not impacted by PRS-RSRP measurement.** |
| [**R4-2015751**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015751.zip) | Huawei, HiSilicon | CR based on [R4-2015750](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015750.zip) |
| [**R4-2016390**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016390.zip) | Ericsson | * ***Proposal 2***: *CSSF is the NR concept which is used for all types of measurements including RRM, scaling based on the number of frequency layers is the LTE concept. Hence, for the gap sharing case, CSSF shall be used in the requirements, but Σ over frequency layers shall be replaced with the max operator*:

TRSTD, Total = maxi (TRSTD,i).* ***Proposal 3****: Measurement period for the non-sharing case shall be:*
* TRSTD, Total = maxi (TRSTD,i).
* ***Proposal 4****: When RSTD is configured together with PRS-RSRP and the required PRS-RSRP measurement period is longer than that for RSTD (configured without RSTD), then the RSTD measurement continues over the entire PRS-RSRP measurement period.*
* ***Proposal 5****: RAN4 decides among the following options for the dropped PRS (which are allowed according to RAN1):*
	+ - *Option 1: UE extends the RSTD measurement period in a specified way, based on the number of dropped PRS.*
		- *Option 2: UE is allowed to extend the RSTD measurement period (clarified in the requirements) if more than N PRS are dropped, but the exact value is not specified.*
		- *Option 3: The RSTD requirements apply, regardless of how many PRS are dropped.*
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| [**R4-2016391**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016391.zip) | Ericsson | CR based on [R4-2016390](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015750.zip) |
| [**R4-2016507**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016507.zip) | Qualcomm Incorporated | **Proposal 1: For the purpose of PRS sample duration, calculate** $L\_{PRS,i}$ **based on the type (type 1 or type 2) used by the UE to report {N,T}.****Proposal 2: Use the maximum PRS resource periodicity among all PRS resources within a given positioning frequency layer.****Proposal 3: RSTD measurement period to be defined for cases when PRS occasions are not dropped.****Proposal 4: PRS-RSTD measurement period is not impacted by PRS-RSRP measurement.** |
| [**R4-2016558**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016558.zip) | Qualcomm Incorporated | CR based on [R4-2016507](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015750.zip) |

## Open issues summary

### Sub-topic 1-1 Calculation of PRS sample duration Lprs

* Option 1 (CATT, Intel, HW, QC): The calculation of PRS sample duration should be based on the type (type 1 or type 2) as UE used to report {N,T}

Recommended WF: Agree on option 1.

### Sub-topic 1-2 Multiple PRS periodicities

* Option 1 (CATT, Intel, QC): Use the maximum PRS resource periodicity among all PRS resources in a single positioning frequency layer
* Option 2 (OPPO): Use the least common multiple of PRS periodicities among all PRS resources in a single positioning frequency layer

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 1-3 Measurement period extension due to SSB collision

* Option 1a (CATT, Intel, HW, QC, OPPO): RSTD measurement period to be defined for cases when PRS samples are not dropped.
* Option 1b (Ericsson): UE is allowed to extend the RSTD measurement period (clarified in the requirements) if more than N PRS are dropped, but the exact value is not specified.
* Option 2 (Ericsson): UE extends the RSTD measurement period in a specified way, based on the number of dropped PRS.
* Option 3 (OPPO, Ericsson): The same measurement period requirement shall be met, regardless of whether some the PRS symbols are dropped or not during this measurement period

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 1-4 Measurement period when configured with PRS-RSRP

* Option 1 (CATT, Intel, HW, QC): RSTD measurement period shall not be impacted by PRS-RSRP measurement.
* Option 2 (Ericsson): When RSTD is configured together with PRS-RSRP and the required PRS-RSRP measurement period is longer than that for RSTD (configured without RSTD), then the RSTD measurement continues over the entire PRS-RSRP measurement period

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 1-5 Measurement period of multiple PRS layers – overlapping case

*Based on existing requirements in 38.133, overlapping case is the case when measurement gaps and processing time T have overlap between different positioning frequency layers.*

* Option 1 (existing requirement): Measurement period of multiple PRS layers is defined as summation of the measurement period in each frequency layer
* Option 2 (Ericsson): Measurement period of multiple PRS layers is defined as maximum of the measurement period in each frequency layer. MG sharing is accounted by CSSF.

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 1-6 Measurement period of multiple PRS layers – non-overlapping case

*Based on existing requirements in 38.133, non-overlapping case is the case when measurement gaps and processing time T do not have overlap between different positioning frequency layers.*

* Option 1 (OPPO): If such scenario is considered as a rare case, then adopt the sum approach; If such scenario is considered as a typical case, then adopt the max approach to reduce the measurement delay
* Option 2 (HW): Same requirements as for overlapping case (sum approach)
* Option 3 (Ericsson): Measurement period of multiple PRS layers is defined as maximum of the measurement period in each frequency layer (max approach)

Recommended WF: Further discussion needed. Collect companies’ views.

## Companies views’ collection for 1st round

### Open issues

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| **Company** | **Comments** |
|  | **Sub-topic 1-1 Calculation of PRS sample duration Lprs****Sub-topic 1-2 Multiple PRS periodicities****Sub-topic 1-3 Measurement period extension due to SSB collision****Sub-topic 1-4 Measurement period when configured with PRS-RSRP****Sub-topic 1-5 Measurement period of multiple PRS layers – overlapping case****Sub-topic 1-6 Measurement period of multiple PRS layers – non-overlapping case** |
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### CRs/TPs comments collection

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2015751 (Huawei) |  |
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| R4-2016391 (Ericsson) |  |
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| R4-2016558 (Qualcomm) |  |
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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.*

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| **Sub-topic#1** |  |

*Recommendations 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 provides recommendation on CRs/TPs Status update*

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

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

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

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

# Topic #2: PRS-RSRP measurement

## Companies’ contributions summary

*Note: R4-2014006 is to be treated in email 214. Proposal 1~3 of R4-2016392 is to be treated in email 214. R4-2014575 is to be treated under Topic 3.*

*Note: For some sub-topics, proposals from companies are same as those for RSTD in Topic 1. For these sub-topics, moderator suggests to avoid duplicating the discussions and follow the same conclusions for RSTD.*

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2015369**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015369.zip) | CATT | CR R4-2009129 was agreed in RAN4#95e meeting but not implemented in 38.133. This CR re-introduces PRS-RSRP measurement report mapping in 38.133 |
| [**R4-2015752**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015752.zip) | Huawei, HiSilicon | **Proposal 1: RAN4 not to define separate requirements for the case when measurement gaps and processing time T do not have overlap between different positioning frequency layers in Rel-16.****Proposal 2: PRS-RSRP measurement period is defined based on Number of PRS samples** $N\_{sample}$ **= 4.****Proposal 3: Same measurement reporting requirements apply for all kinds of positioning measurement reporting.** |
| [**R4-2015753**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015753.zip) | Huawei, HiSilicon | CR based on R4-2015753 |
| [**R4-2016392**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016392.zip) | Ericsson | * ***Proposal 4***: *CSSF is the NR concept which is used for all types of measurements including RRM, scaling based on the number of frequency layers is the LTE concept. Hence, for the gap sharing case, CSSF shall be used in the requirements, but Σ over frequency layers shall be replaced with the max operator*:

TPRS-RSRP, Total = maxi (TPRS-RSRP,i).* ***Proposal 5****: Measurement period for the non-sharing case shall be:*

TPRS-RSRP, Total = maxi (TPRS-RSRP,i).* ***Proposal 6****: When PRS-RSRP is configured together with RSTD/UE Rx-Tx and the required PRS-RSRP measurement period is shorter than that for RSTD/UE Rx-Tx (configured without PRS-RSRP), then the PRS-RSRP measurement continues over the entire RSTD/UE Rx-Tx measurement period.*
* ***Proposal 7****: RAN4 decides among the following options for the dropped PRS (which are allowed according to RAN1):*
	+ - *Option 1: UE extends the PRS-RSRP measurement period in a specified way, based on the number of dropped PRS.*
		- *Option 2: UE is allowed to extend the PRS-RSRP measurement period (clarified in the requirements) if more than N PRS are dropped, but the exact value is not specified.*
		- *Option 3: The PRS-RSRP requirements apply, regardless of how many PRS are dropped.*
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| [**R4-2016393**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016393.zip) | Ericsson | CR based on R4-2016392 |
| [**R4-2016557**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016557.zip) | Qualcomm Incorporated | CR clarifying some aspects of the PRS-RSRP measurement period definition.1. Clarify that the measurement period calculation should be done according to the type of PRS processing capability reported by the UE.2. Clarify the the measurement period calculation should be based on the maximum PRS periodicity in each positioning frequency layer.3. Define the starting point of the PRS-RSRP measurement period. |

## Open issues summary

### Sub-topic 2-1 Measurement period extension due to SSB collision

* Option 1 (Moderator): Follow the same conclusion as RSTD in sub-topic 1-3

Recommended WF: Agree on option 1.

### Sub-topic 2-2 Measurement period of PRS-RSRP

* Option 1 (HW): PRS-RSRP measurement period is defined based on Number of PRS samples Nsample = 4, which is same as RSTD and UE Rx-Tx time difference.
* Option 2 (Ericsson): When PRS-RSRP is configured together with RSTD/UE Rx-Tx and the required PRS-RSRP measurement period is shorter than that for RSTD/UE Rx-Tx (configured without PRS-RSRP), then the PRS-RSRP measurement continues over the entire RSTD/UE Rx-Tx measurement period

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 2-3 Measurement period of multiple PRS layers – overlapping case

* Option 1 (Moderator): Follow the same conclusion as RSTD in sub-topic 1-5

Recommended WF: Agree on option 1.

### Sub-topic 2-4 Measurement period of multiple PRS layers – non-overlapping case

* Option 1 (Moderator): Follow the same conclusion as RSTD in sub-topic 1-6

Recommended WF: Agree on option 1.

### Sub-topic 2-5 Measurement reporting requirements for non-periodic reporting

* Option 1 (HW): Same measurement reporting requirements apply for all kinds of positioning measurement reporting (periodic and non-periodic).

Recommended WF: Further discussion needed. Collect companies’ views.

## Companies views’ collection for 1st round

### Open issues

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| **Company** | **Comments** |
|  | **Sub-topic 2-1 Measurement period extension due to SSB collision****Sub-topic 2-2 Measurement period of PRS-RSRP****Sub-topic 2-3 Measurement period of multiple PRS layers – overlapping case****Sub-topic 2-4 Measurement period of multiple PRS layers – non-overlapping case****Sub-topic 2-5 Measurement reporting requirements for non-periodic reporting** |
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### CRs/TPs comments collection

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2015753 (Huawei) |  |
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| R4-2016393 (Ericsson) |  |
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| R4-2016557 (Qualcomm) |  |
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| R4-2015369 (CATT) |  |
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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.*

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| **Sub-topic#1** |  |

*Recommendations 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 provides recommendation on CRs/TPs Status update*

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

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

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

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

# Topic #3: UE Rx-Tx time difference measurement

## Companies’ contributions summary

*Note: Proposal 2 of R4-2014003 is to be treated in email 214. Proposal 1 of R4-2016394 is to be treated in email 214. Proposal 3 of R4-2015754 is to be treated under Topic 4.*

*Note: For some sub-topics, proposals from companies are same as those for RSTD in Topic 1 or for PRS-RSRP in Topic 2. For these sub-topics, moderator suggests to avoid duplicating the discussions and follow the same conclusions for RSTD or PRS-RSRP.*

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2014003**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014003.zip) | ZTE Corporation | **Proposal 1: The measurement requirements for UE Rx-Tx timing difference is applicable only if the configured parameters SRS-Slot-offset and SRS-Periodicity for SRS resource for positioning are such that any SRS transmission is within [-50, 50] msec of at least one DL PRS resource of each of the TRPs in the assistance data.** |
| [**R4-2014446**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014446.zip) | CATT | **Proposal 1: SRS periodicity should not be accounted in measurement period.** **Proposal 2: SRS dropping should not be accounted in measurement period** **but to clarify in the requirements that the measurement period can be longer if some (or more than X) SRS are dropped.** **Proposal 3: The measurement requirements is applicable only if any SRS transmission is within [-160, 160] msec of at least one DL PRS resource of each of the TRPs in the assistance data. Accuracy requirements are independent of PRS and SRS separation.** **Proposal 4: No need to clarify UE Rx-Tx measurement requirements in case of NTA\_offset change** |
| [**R4-2015754**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015754.zip) | Huawei, HiSilicon | **Proposal 1: RAN4 not to define separate requirements for the case when measurement gaps and processing time T do not have overlap between different positioning frequency layers in Rel-16.****Proposal 2: Same measurement reporting requirements apply for all kinds of positioning measurement reporting.****Proposal 4: SRS periodicity or SRS dropping is not accounted in UE Rx-Tx time difference measurement period.****Proposal 5: The measurement requirements for UE Rx-Tx timing difference is applicable provided that any SRS transmission is within [-160, +160]ms of at least one DL PRS resource of each TRP.****Proposal 6: RAN4 to define Rx-Tx time difference requirements only for the case where SRS resource is in the same band as PRS resource.****Proposal 7: UE should continue Rx-Tx time difference measurement, even the timing of its UL transmissions changes during the measurement period.****Proposal 8: RAN4 not to capture applicability of UE Rx-Tx time difference requirements in case of NTA\_offset change.** |
| [**R4-2015755**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015755.zip) | Huawei, HiSilicon | CR based on R4-2015754 |
| [**R4-2016394**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016394.zip) | Ericsson | * ***Proposal 2***: *CSSF is the NR concept which is used for all types of measurements including RRM, scaling based on the number of frequency layers is the LTE concept. Hence, for the gap sharing case, CSSF shall be used in the requirements, but Σ over frequency layers shall be replaced with the max operator*:

$T\_{UERxTx, Total}=max\_{i}⁡(T\_{UERxTx,i})$.* ***Proposal 3****: Measurement period for the non-sharing case shall be:*

$T\_{UERxTx, Total}=max\_{i}⁡(T\_{UERxTx,i})$.* ***Proposal 4****: When UE Rx-Tx is configured together with PRS-RSRP and the required PRS-RSRP measurement period is longer than that for UE Rx-Tx (configured without PRS-RSRP), then the UE Rx-Tx measurement continues over the entire PRS-RSRP measurement period.*
* ***Proposal 5****: RAN4 decides among the following options for the dropped PRS (which are allowed according to RAN1):*
	+ - *Option 1: UE extends the UE Rx-Tx measurement period in a specified way, based on the number of dropped PRS.*
		- *Option 2: UE is allowed to extend the UE Rx-Tx measurement period (clarified in the requirements) if more than N PRS are dropped, but the exact value is not specified.*
		- *Option 3: The UE Rx-Tx requirements apply, regardless of how many PRS are dropped.*
* ***Proposal 6****: RAN4 decides among the following options for the dropped SRS:*
	+ - *Option 1: UE extends the UE Rx-Tx measurement period in a specified way, based on the number of dropped SRS.*
		- *Option 2: UE is allowed to extend the UE Rx-Tx measurement period (clarified in the requirements), but the exact value is not specified.*
		- *Option 3: The UE Rx-Tx requirements apply, regardless of how many SRS are dropped.*
* ***Proposal 7****: UE Rx-Tx measurement period also depends SRS periodicity, e.g.:*
	+ $T\_{UERxTx,Total}$ *can be extended if the SRS periodicity is longer than max(*$T\_{PRS,i}$*)*
* ***Proposal 8:*** *The requirements for UE Rx-Tx apply regardless of the time separation between SRS and PRS (LTE approach).*
* ***Proposal 9****: It is clarified in UE Rx-Tx measurement requirements (section 9.9.4 in TS 38.133) that the UE shall discard the UE Rx-Tx measurement if the NTA\_offset changes during the measurement period.*
* ***Proposal 10****: The UE shall discard the UE Rx-Tx time difference measurement if the uplink transmission timing (autonomous or based on network-configured TA) changes during the UE Rx-Tx measurement period.*
* ***Proposal 11****: The UE Rx-Tx time difference measurement is restarted if the serving cell (PCell, PSCell, or SCell) configured with the SRS for positioning changes during the measurement period. In this case, the UE shall restart the UE Rx-Tx time difference measurement after the SRS reconfiguration on the target cell is complete. Otherwise, the UE shall continue the on-going UE Rx-Tx time difference measurement after the serving cell change.*
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| [**R4-2016395**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016395.zip) | Ericsson | CR based on R4-2016394 |
| [**R4-2016508**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016508.zip) | Qualcomm Incorporated | **Proposal 1: Given that proximity between SRS transmission and PRS reception is desirable for measurement accuracy, it should not be necessary to account for SRS periodicity in the UE Rx-Tx measurement period formulation.****Proposal 2: The UE Rx-Tx time difference measurement period requirement should not account for SRS dropping.****Proposal 3: The measurement requirements are applicable only if any SRS transmission is within [-X, X] msec of at least one DL PRS resource of each of the TRPs in the assistance data. Accuracy requirements is independent of PRS and SRS separation.****Proposal 4: In proposal 3, we suggest X = 25.****Proposal 5: Basic requirements for UE Rx-Tx time difference measurements shall be based on the assumption that positioning SRS resources are in the same band as PRS frequency layers.****Proposal 6: UE Rx-Tx time difference measurement requirements are not applicable if TA change is received during the measurement period.****Proposal 7: UE Rx-Tx time difference measurement requirements are applicable for UE autonomous adjustment of UL timing.****Proposal 8: No need to clarify UE Rx-Tx measurement requirements in case of NTA\_offset change.** |
| [**R4-2016559**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016559.zip) | Qualcomm Incorporated | CR based on R4-2016508 |
| [**R4-2014575**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014575.zip) | Intel Corporation | ***Proposal 1: UE Rx-Tx measurement delay depends on PRS periodicity, which can be same as that of PRS RSTD [2].******Proposal 2: It needs NOT to take SRS dropping count into UE Rx-Tx measurement delay requirements.******Proposal 3: UE could continue UE/gNB Rx-Tx time difference measurement during which timing adjustment for its UL transmissions. But whether the accuracy requirements shall be applicable to such case can be FFS.*****Observation 5: NR UE Rx-Tx time difference measurement accuracy requirements can be applicable when the following condition was satisfied:** **“The measurement requirements for UE Rx-Tx timing difference is applicable only if the configured parameters SRS-Slot-offset and SRS-Periodicity for SRS resource for positioning are such that any SRS transmission is within [-160, 160] ms”*****Proposal 4: RAN4 to define Rx-Tx time difference requirements only for the case where SRS resource is in the same band as PRS resource*** |

## Open issues summary

### Sub-topic 3-1 Measurement period extension due to SSB collision

* Option 1 (Moderator): Follow the same conclusion as RSTD in sub-topic 1-1

Recommended WF: Agree on option 1.

### Sub-topic 3-2 Measurement period when configured with PRS-RSRP

* Option 1 (Moderator): Follow the same conclusion as RSTD in sub-topic 1-4

Recommended WF: Agree on option 1.

### Sub-topic 3-3 Measurement period of multiple PRS layers – overlapping case

* Option 1 (Moderator): Follow the same conclusion as RSTD in sub-topic 1-5

Recommended WF: Agree on option 1.

### Sub-topic 3-4 Measurement period of multiple PRS layers – non-overlapping case

* Option 1 (Moderator): Follow the same conclusion as RSTD in sub-topic 1-6

Recommended WF: Agree on option 1.

### Sub-topic 3-5 Measurement reporting requirements for non-periodic reporting

* Option 1 (Moderator): Follow the same conclusion as RSTD in sub-topic 2-5

Recommended WF: Agree on option 1.

### Sub-topic 3-6 SRS/PRS proximity

* Option 1 (ZTE, CATT, HW, QC, Intel): The measurement requirements are applicable only if any SRS transmission is within [-X, X] msec of at least one DL PRS resource of each of the TRPs in the assistance data. Accuracy requirements is independent of PRS and SRS separation.
	+ Option 1a (ZTE): X=50ms
	+ Option 1b (CATT, HW, Intel): X=160ms
	+ Option 1c (QC): X=25ms
* Option 2 (Ericsson): The requirements for UE Rx-Tx apply regardless of the time separation between SRS and PRS (LTE approach)

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 3-7 Whether SRS periodicity should be accounted in measurement period

* Option 1 (CATT, HW, QC, Intel): No
* Option 2 (Ericsson): Yes, $T\_{UERxTx,Total}$ can be extended if the SRS periodicity is longer than max($T\_{PRS,i}$)

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 3-8 Whether SRS dropping should be accounted in measurement period

* Option 1a (CATT, HW, QC, Intel): No
* Option 1b (CATT, Ericsson): UE is allowed to extend the UE Rx-Tx measurement period (clarified in the requirements) if some (or more than X) SRS are dropped, but the exact value is not specified
* Option 2 (Ericsson): UE extends the UE Rx-Tx measurement period in a specified way, based on the number of dropped SRS
* Option 3 (Ericsson): The UE Rx-Tx requirements apply, regardless of how many SRS are dropped

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 3-9 SRS/PRS being in same band

* Option 1 (HW, Intel): RAN4 to define Rx-Tx time difference requirements only for the case where SRS resource is in the same band as PRS resource
* Option 2 (QC): Basic requirements for UE Rx-Tx time difference measurements shall be based on the assumption that positioning SRS resources are in the same band as PRS frequency layers

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 3-10 Measurement period in case of UL timing change: TA command

*Note: it is agreed in RAN4#95-e R4-2008664 that UE Rx-Tx time difference accuracy requirements do not apply under TA change during the measurement period.*

* Option 1 (HW, Intel): UE should continue Rx-Tx time difference measurement (existing requirements are applicable)
* Option 2a (Ericsson): UE shall discard the UE Rx-Tx time difference measurement if the uplink transmission timing (autonomous or based on network-configured TA) changes during the UE Rx-Tx measurement period
* Option 2b (QC): UE Rx-Tx time difference measurement requirements are not applicable if TA change is received during the measurement period.

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 3-11 Measurement period in case of UL timing change: UE autonomous adjustment

* Option 1 (HW, Intel, QC): UE should continue Rx-Tx time difference measurement (existing requirements are applicable)
* Option 2 (Ericsson): UE shall discard the UE Rx-Tx time difference measurement if the uplink transmission timing (autonomous or based on network-configured TA) changes during the UE Rx-Tx measurement period

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 3-12 Measurement period in case of UL timing change: *NTA\_offset* change

* Option 1 (CATT, HW, QC): No need to clarify UE Rx-Tx measurement requirements in case of NTA\_offset change
* Option 2 (Ericsson): It is clarified in UE Rx-Tx measurement requirements (section 9.9.4 in TS 38.133) that the UE shall discard the UE Rx-Tx measurement if the NTA\_offset changes during the measurement period.

Recommended WF: Further discussion needed. Collect companies’ views.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  | **Sub-topic 3-1 Measurement period extension due to SSB collision****Sub-topic 3-2 Measurement period when configured with PRS-RSRP****Sub-topic 3-3 Measurement period of multiple PRS layers – overlapping case****Sub-topic 3-4 Measurement period of multiple PRS layers – non-overlapping case****Sub-topic 3-5 Measurement reporting requirements for non-periodic reporting****Sub-topic 3-6 SRS/PRS proximity****Sub-topic 3-7 Whether SRS periodicity should be accounted in measurement period****Sub-topic 3-8 Whether SRS dropping should be accounted in measurement period****Sub-topic 3-9 SRS/PRS being in same band****Sub-topic 3-10 Measurement period in case of UL timing change: TA command****Sub-topic 3-11 Measurement period in case of UL timing change: UE autonomous adjustment****Sub-topic 3-12 Measurement period in case of UL timing change: *NTA\_offset* change** |
|  |  |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2015755 (Huawei) |  |
|  |
|  |
|  |
| R4-2016395 (Ericsson) |  |
|  |
|  |
| R4-2016559 (Qualcomm) |  |
|  |
|  |

## 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.*

|  |  |
| --- | --- |
| **Sub-topic#1** |  |

*Recommendations on WF/LS assignment*

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

### CRs/TPs

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

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

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

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

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

# Topic #4: Other requirements

## Companies’ contributions summary

*Note: Proposal 2 of R4-2014003 is to be treated in email 214. Proposal 1 of R4-2016394 is to be treated in email 214. Proposal 3 of R4-2015754 is to be treated under Topic 4.*

*Note: For some sub-topics, proposals from companies are same as those for RSTD in Topic 1 or for PRS-RSRP in Topic 2. For these sub-topics, moderator suggests to avoid duplicating the discussions and follow the same conclusions for RSTD or PRS-RSRP.*

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2014005**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014005.zip) | ZTE Corporation | **Proposal 1: The measurement gap is split between RRM measurements and PRS measurements by a certain percentage X%.****Proposal 2: The measurement gap is split between RRM measurements and PRS measurements by a certain percentage 70%. The value of X can be further discussed.** |
| [**R4-2014282**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2014282.zip) | Apple | LS on new per-UE MG for NR positioning In R4-2012285, RAN4 has informed about the agreement in RAN4 #96e meeting to specify two new measurement gap patterns for NR positioning measurement. In addition, followings have been concluded in RAN4 as well:These two new MG patterns are applicable for PRS and NR/LTE RRM measurements, i.e. new gaps are not shared between PRS and 2G/3G RRM measurements.These two new MG patterns are defined as per-UE capabilities, i.e., new positioning MG is defined for per-UE MG only. |
| [**R4-2015756**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015756.zip) | Huawei, HiSilicon | **Proposal 1: CSSF is only for the MG sharing between PRS and RRM layers.****Proposal 2: Define CSSF based on PRS resource periodicity.****Proposal 3: A PRS layer is categorized as long periodicity measurement if PRS resource periodicity multiplied by the product of *dl-prs-MutingBitRepetitionFactor* and number of consecutive zeros in *NR-MutingPattern-r16* is >= 160ms.****Proposal 4: Count only a single PRS layer for a gap occasion in CSSF calculation for both PRS and RRM layers.** |
| [**R4-2015757**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015757.zip) | Huawei, HiSilicon | CR based on R4-2015757 |
| [**R4-2015758**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015758.zip) | Huawei, HiSilicon | CR to introduce new measurement gap patterns for positioning in 36.133 |
| [**R4-2016156**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016156.zip) | Nokia, Nokia Shanghai Bell | CR on Refinements on CSSF within gap to include NR positioning measurementsIn sub-clauses 9.1.5 and 9.1.5.2, the term “NR measurements for positioning” is used to cover both NR PRS measurements and NR E-CID measurements in clause 9.9.In sub-clauses 9.1.5.2.5 to 9.1.5.2.7, the term “NR PRS measurements for positioning” is used to cover NR PRS measurements.Applicability of CSSFwithin\_gap,i=1, i.e.long-periodicity NR measurements for positioning, related to PRS periodicities ≤160 ms is fixed taking into account muting patterns, i.e. effective PRS periodicity of 320 ms or larger defines a long-periodicity NR measurement).Sub-clauses 9.1.5.2.5 to 9.1.5.2.7 for PRS measurements point to sub-clauses 9.1.5.2.2 to 9.1.5.2.4 related to CSSF sharing rules within measurement gaps. |
| [**R4-2016505**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016505.zip) | Qualcomm Incorporated | **Proposal: If the time span of a DL PRS resource instance is greater than UE reported capability N, measurement requirements do not apply for this resource.****Proposal: If the time span of a DL PRS resource instance is greater than the configured measurement gap length, measurement requirements do not apply for this resource.****Proposal: For position frequency layers, calculate** $CSSF\_{PRS,i}$ **based on the maximum periodicity across all the PRS resources within each layer and taking into account type2 (inter-period) muting.** |
| [**R4-2016556**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016556.zip) | Qualcomm Incorporated | CR based on R4-2016505 |
| [**R4-2016396**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016396.zip) | Ericsson | * ***Proposal 1****: Long-periodicity NR measurements are the measurements with PRS periodicity >160 ms (with or without muting) or equal 160 ms (with muting).*
 |
| [**R4-2016397**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016397.zip) | Ericsson | CR based on R4-2016396 |
| [**R4-2015750**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015750.zip) | Huawei, HiSilicon | **Proposal 5: The measurement requirements do not apply for a PRS resource if** * **the time span of the PRS resource instance is greater than UE reported capability N, or**
* **the PRS resource is across two sampling duration of N within duration Lprs**
 |
| [**R4-2015751**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015751.zip) | Huawei, HiSilicon | CR based on [R4-2015750](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015750.zip) |

## Open issues summary

### Sub-topic 4-1 Framework in defining CSSF for RRM/PRS MG sharing

* Option 1 (ZTE): The measurement gap is split between RRM measurements and PRS measurements by a certain percentage X%, X=[70]
* Option 2 (existing requirement): If measurement of a PRS layer is considered as long periodicity measurement, CSSF for this PRS layer is 1, otherwise this PRS layer would compete for MG with other MG-based RRM measurement.

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 4-2 Condition of long periodicity PRS measurement

*Note: the sub-topic is related to the FFS in Table 9.1.5.2.2-1 in 38.133.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Table 9.1.5.2.2-1: PRS configurations for long-periodicity NR measurements for positioning

|  |  |
| --- | --- |
| [PRS periodicity] (ms) | DL-PRS-MutingPattern configuration |
| 320, 640, … ,10240 | [With or without muting] |
| Other values (≤ 160) | FFS |

 |

* Option 1a (HW): Tprs \* X \* *dl-prs-MutingBitRepetitionFactor* >=160ms
	+ X is the number of consecutive zeros in *NR-MutingPattern-r16*
* Option 1b (QC): max(Tprs \* X \* *dl-prs-MutingBitRepetitionFactor*) >=320ms
	+ X is the length of *NR-MutingPattern-r16*
* Option 1c (Nokia): Tprs \* X >=320ms
	+ X is the size of MutingPattern
* Option 1d (Ericsson): Long-periodicity NR measurements are the measurements with PRS periodicity >160 ms (with or without muting) or equal 160 ms (with muting)

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 4-3 Different resource periodicities in a PRS layer

*Note: PRS resources in the same PRS layer can have different periodicities. The sub-topic is about which periodicity is used to represent the PRS layer in CSSF calculation. This is related to not only whether measurement of the PRS layer is a long periodicity measurement, but also the MG competition when the PRS layer is not considered as long periodicity measurement.*

* Option 1 (QC): For position frequency layers, calculate $CSSF\_{PRS,i}$ based on the maximum periodicity across all the PRS resources within each layer and taking into account type1 (inter-period) muting

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 4-4 Number of PRS layers to be counted in CSSF calculation

*Note: the sub-topic is related to the TBD in the following texts in 38.133.*

|  |
| --- |
| For each measurement gap *j* not used for a long-periodicity measurement defined above, count the total number of intra-frequency measurement objects and inter-frequency/inter-RAT measurement objects and [TBD for NR positioning measurements] which are candidates to be measured within the gap *j*. |

* Option 1 (HW): CSSF is only for the MG sharing between PRS and RRM layers. Count only a single PRS layer for a gap occasion in CSSF calculation for both PRS and RRM layers.
* Option 2 (Ericsson): frequency layers for PRS-based positioning measurements

Recommended WF: Further discussion needed. Collect companies’ views.

### Sub-topic 4-5 Applicable scenarios for PRS measurement requirements

* Option 1 (HW, QC): The measurement requirements do not apply for a PRS resource, if time span of the PRS resource instance is greater than UE reported capability N.
* Option 2 (QC): The measurement requirements do not apply for a PRS resource, if the time span of a DL PRS resource instance is greater than the configured measurement gap length
* Option 3 (HW): The measurement requirements do not apply for a PRS resource, if the PRS resource is across two sampling duration of N within duration Lprs

Recommended WF: Further discussion needed. Collect companies’ views. Please note that the listed options are not exclusive to each other, and you can indicate support of none, one or more of the options in your comments.

### Sub-topic 4-6 LS on new per-UE MG for NR positioning (R4-2014282)

Recommended WF: Collect companies’ views on the LS.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  | **Sub-topic 4-1 Framework in defining CSSF for RRM/PRS MG sharing****Sub-topic 4-2 Condition of long periodicity PRS measurement****Sub-topic 4-3 Different resource periodicities in a PRS layer****Sub-topic 4-4 Number of PRS layers to be counted in CSSF calculation****Sub-topic 4-5 Applicable scenarios for PRS measurement requirements****Sub-topic 4-6 LS on new per-UE MG for NR positioning (R4-2014282)** |
|  |  |

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2015757 (Huawei) |  |
|  |
|  |
| R4-2015758 (Huawei) |  |
|  |
|  |
| R4-2016156 (Nokia) |  |
|  |
|  |
| R4-2016397 (Ericsson) |  |
|  |
|  |
| R4-2016556 (Qualcomm) |  |
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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.*

|  |  |
| --- | --- |
| **Sub-topic#1** |  |

*Recommendations on WF/LS assignment*

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

### CRs/TPs

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

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

## Discussion on 2nd round (if applicable)

## Summary on 2nd round (if applicable)

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

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