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

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

**Agenda item:** 6.5.1

**Source:** Moderator (Huawei)

**Title:** Email discussion summary for [99-e][214] NR\_pos\_1

**Document for:** Information

# Introduction

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

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| 6.5.1 RRM core requirements maintenance (38.133) [NR\_pos-Core]6.5.1.1 PRS-RSTD measurement requirements [NR\_pos-Core]6.5.1.2 PRS-RSRP measurement requirements [NR\_pos-Core]6.5.1.3 UE Rx-Tx time difference measurement requirements [NR\_pos-Core]6.5.1.4 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
* Pay attention to the rule for shortening file name

# Topic #1: RSTD measurement period

## Companies’ contributions summary

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| **T-doc** | **Company** | **Proposals / Observations** |
| [**R4-2108778**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108778.zip) | ZTE Corporation | **Proposal 1: RSTD measurement period is not impacted by the PRS-RSRP measurement configured for another positioning method, if they are measured on the same set of PRS resources.****Proposal 2: Add the following text to TS 38.133 sections 9.9.2.5, 9.9.3.5 and 9.9.4.5: “If during the measurement period of one or more positioning frequency layers, the MG pattern is reconfigured (at most once for each positioning frequency layer) to enable UE to measure DL PRS resources, the measurement period can be longer.”.****Proposal 3: For MG reconfiguration not per UE request, apply same requirements as MG reconfiguration based on UE request.** |
| [**R4-2109087**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109087.zip) | CATT | **Proposal 1: For N\_muting upper bound value:** * + **If Tprs \* *dl-PRS-MutingBitRepetitionFactor-r16* > 10240 ms**
		- **N\_muting = 1 (effectively no type1 muting, corner case that should be avoided by the network)**
	+ **else**
		- **N\_muting = X \* *dl-PRS-MutingBitRepetitionFactor-r16*, where**
		- **X = min( L, 10240/( Tprs \* *dl-PRS-MutingBitRepetitionFactor-r16* ) ) and**
		- **L is the size of NR-MutingPattern-r16 for mutingOption1-r16.**

**Proposal 2: Considering the integrity of the requirements, the measurement period when muting option 2 is used should be also clarified.** **Proposal 3: The observation window for LPRS,i is** $T\_{available\\_PRS,i}$**.** **Proposal 4: Replace notation LPRS,i with** $L\_{PRS,i}^{K}$**.** **Proposal 5: RSTD measurement period is not impacted by PRS-RSRP measurement.** **Proposal 6: Add the following text to TS 38.133: “*If during the measurement period of one or more positioning frequency layers, MG pattern is reconfigured to enable UE to measure different DL PRS resources, the measurement period can be longer*.”** **Proposal 7: Do not specify the exact extension due to MG reconfiguration.** **Proposal 8: Measurement requirements do not apply if UE cannot perform the PRS measurement after the MG reconfiguration.**  |
| [**R4-2109090**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109090.zip) | CATT | CR |
| [**R4-2109175**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109175.zip) | Nokia, Nokia Shanghai Bell | CR |
| [**R4-2109234**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109234.zip) | Intel Corporation | **Observation 1: RSTD measurement shall be independent with PRS RSRP measurement if the configured PRS resource for them are different.** ***Proposal 1: RSTD measurement period shall not be impacted by PRS-RSRP measurement configured for another positioning method.*** ***Proposal 2: It is necessary to add the applicability side conditions to exclude the current requirements for the case when MG reconfiguration not per UE request.*** ***Proposal 3: The clarification on the potential requirement extension is needed when MG reconfiguration per UE request*.** |
| [**R4-2109858**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109858.zip) | Qualcomm Incorporated | **Proposal 1: (Option A)*** **If Tprs \* *dl-PRS-MutingBitRepetitionFactor-r16* > 10240 ms**
	+ **N\_muting = 1 (effectively no type1 muting)**
* **else**
	+ **N\_muting = X \* *dl-PRS-MutingBitRepetitionFactor-r16*, where**
	+ **X = min( L, 10240/( Tprs \* *dl-PRS-MutingBitRepetitionFactor-r16* ) ) and**
	+ **L is the size of NR-MutingPattern-r16 for mutingOption1-r16.**

**Proposal 2a: The measurement requirements apply for a PRS resource only if at least the minimum number of repetitions specified in the accuracy requirements are covered by the MGL excluding RF switching time.****Proposal 2b: For the purpose of calculating TPRS,i, count only PRS resources for which measurement requirements apply according to Proposal 2a.****Proposal 2c: A** **PFL is counted as candidate for a MG occasion if it has at least one PRS resource for which measurement requirements apply according to Proposal 2a.****Proposal 3: The length of the observation window for calculating LPRS,i should be Tavailable\_PRS,i.****Proposal 4: Replace LPRS,i with** $L\_{PRS,i}^{K}$ **and clarify that it is based on PRS duration *K* defined in TS 38.214 [45] clause 5.1.6.5.****Proposal 5: RAN4 not to specify requirements for scenarios involving concurrent NR positioning methods in Rel-16.****Proposal 6: Measurement period requirements in TS 38.133 sections 9.9.2.5, 9.9.3.5 and 9.9.4.5 do not apply when there are concurrent positioning requests. If there are concurrent positioning requests the starting point and duration of the measurement period may be different.****Proposal 7: Add the following text to TS 38.133 sections 9.9.2.5, 9.9.3.5 and 9.9.4.5: “If during the measurement period of one or more positioning frequency layers, the MG pattern is reconfigured (at most once for each positioning frequency layer) to enable UE to measure DL PRS resources, the measurement period can be longer.”****Proposal 8: Do not specify the exact measurement period extension due to MG reconfiguration.****Proposal 9: If MG is reconfigured during the measurement period without the UE requesting it, the same measurement requirements apply as for MG reconfiguration per UE request (as in Proposal 7).** |
| [**R4-2109934**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109934.zip) | vivo | **Proposal 1: Option 1 is more generic to be used to define upper bound of measurement period.****Proposal 2: The observation window for Lprs is** $T\_{available\\_PRS,i}$ **.****Proposal 3: The notation of** $L\_{PRS,i} $**is replaced with** $L\_{available\\_PRS,i}$**.****Proposal 4: Measurement periods for different positioning methods are independent. RSTD measurement period shall not be impacted by PRS-RSRP measurement for the other positioning method.****Proposal 5: If the MG pattern is reconfigured during the measurement period of one or more positioning frequency layers, longer measurement period is expected.** |
| [**R4-2110012**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110012.zip) | Nokia, Nokia Shanghai Bell | **Proposal 1** : Consider option-A for PRS muting pattern.**Observation 1 :** If *N* is counted within the window *T* ms in the same manner as LPRS,i observation window, that is the aggregating duration of all the PRS resources that fall within MGs and are not muted, there is no problem to define the requirement derived from UE processing capability.**Proposal 2 :** A UE needs to use the observation window for *N* same as LPRS,i observation window that was agreed as the aggregating duration of all the PRS resources that fall within MGs and are not muted.**Observation 2 :** one concern is that a UE may not know about MG configuration at the stage of making UE capability report *{N,T}*. UE venders need to check this.**Proposal 3 :** If the window *T* ms is not set same as the window LPRS,i, the requirement applies another scaler as $\left⌈\frac{L\_{PRS,i}}{N} ×\frac{T}{P}\right⌉$, where $P$ is the observation window of LPRS,i counting.**Proposal 4 :** We support option 1 notation $L\_{PRS,i}^{K}$.**Proposal 5:** Option 1 is agreeable regarding measurement period when configured with PRS-RSRP.* In our analysis, PRS-RSRP is measured and report as same period of RSTD measurement period. See our another PRS-RSRP measurement contribution [R4-2110013]

**Observation 3 :** RSRP measurement and its accuracy are important for all positioning methods. In most of positioning methods, RSRP values should be monitored together for beam correspondence.**Proposal 6 :** If PRS-RSRP is configured for another positioning method, the measurement period in the positioning method is not impacted by PRS-RSRP measurement. (support option-1) * In this case, PRS-RSRP is measured as same period of the measurement period in the positioning method.

**Proposal 7 :** Measurement period may be prolonged or restarted when measurement gap is reconfigured per UE request. Option 1 or Option 3 are supported. **Proposal 8 :** We support option 2 regarding MG reconfiguration not per UE request |
| [**R4-2110039**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110039.zip) | OPPO | **Proposal 1a: When** **Tprs\**dl-PRS-MutingBitRepetitionFactor-r16*>10240ms or Tprs\*L\**dl-PRS-MutingBitRepetitionFactor-r16*>10240ms, support option A and further discuss how to capture it in spec.****Proposal 1b: When Tprs\*L\**dl-PRS-MutingBitRepetitionFactor-r16* <= 10240ms, muting scaling factor should be the ratio of muting pattern size and the number of “1” in the muting pattern, i.e.** $N\_{muting}=\left⌈L/N\_{1}\right⌉$**.****Proposal 2: The observation window for Lprs should be** $T\_{available\\_PRS,i}$**.****Proposal 3: Support option 2 and option 4, which can be merged.****Proposal 4: For MG reconfiguration per UE request, the measurement period can be longer and the exact extension is left to UE and network implementation.** **Proposal 5:** **For MG reconfiguration not per UE request, support same requirements as MG reconfiguration based on UE request.** |
| [**R4-2110870**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110870.zip) | Huawei, HiSilicon | **Proposal 1: If RAN4 is to optimize the requirements for muting, consider to define N\_muting based on the minimum repetition factor of bit ‘1’ in the muting pattern.****Proposal 2: The observation window of Lprs is Tavailable\_PRS,i.****Proposal 3: Change the notation of Lprs to K, provided that RAN1 would align the definition of time period of P to the Lprs observation window agreed in RAN4.****Proposal 4: Capture the following texts in 38.133 section 9.9.1:****“When UE is configured measurement for more than one positioning requests, the measurement period for each requests can be longer than measurement period when UE is configured measurement for that single positioning request.”****Proposal 5: Add the following text to TS 38.133 sections 9.9.2.5, 9.9.3.5 and 9.9.4.5:** **“If during the measurement period of one or more positioning frequency layers, the MG pattern is reconfigured, the measurement period can be longer.”** |
| [**R4-2110871**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110871.zip) | Huawei, HiSilicon | CR |
| [**R4-2111331**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111331.zip) | Ericsson | * ***Proposal 1****: When PRS-RSRP and RSTD are configured using separate OTDOA assistance data then the measurement periods of RSTD and PRS-RSRP may be different.*
* ***Observation 1****: Network can reconfigure the measurement gaps anytime.*
* ***Observation 2****: The time period required to configure or reconfigure measurement gaps is not specified.*
* ***Proposal 2****: If during the measurement period of one or more positioning frequency layers, the MG pattern is reconfigured (at most once for each positioning frequency layer) to enable UE to measure DL PRS resources, the measurement period can be longer.*
* ***Proposal 3****: The requirements in proposal 2 shall apply regardless of whether the measurement gap is reconfigured autonomously by the gNB or based on request from the UE.*
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| [**R4-2111332**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111332.zip) | Ericsson | CR |
| [**R4-2111334**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111334.zip) | Ericsson | CR |

## Open issues summary

*It is noted that Proposal 2a from QC R4-2109858 is discussed in Issue 2-2-3. Proposal 2b and 2c are not listed as open issue because we already have agreement in WF R4-2105851 from RAN4#98-bis-e (Slide 3 and 11) that only PRS resources overlapped with MG or being fully covered by MG is considered, and what remained open is when a PRS resources is considered as overlapped with MG or being fully covered by MG, which is discussed in Issue 2-2-3.*

*It is noted that Proposal 5 from Nokia R4-2110012 is not listed as open issue because it is related to PRS-RSRP measurement period configured for DL-TDOA. For this case, there was already agreement in WF R4-2105851 from RAN4#98-bis-e (Slide 6) that RSTD and RSRP are performed over the same measurement period.*

*It is noted that Proposal 9 and 10 from CATT R4-2109087 are discussed in Issue 2-1-1 and 2-1-2.*

### Sub-topic 1-1: PRS resource muting

#### Issue 1-1-1: Upper bound for N\_muting factor

* Proposals
	+ Option 1 (CATT, QC, Nokia, vivo)
		- Option A in WF R4-2105851 from RAN4#98-bis-e
		- If Tprs \* dl-PRS-MutingBitRepetitionFactor-r16 > 10240 ms
			* N\_muting = 1 (effectively no type1 muting)
		- else
			* N\_muting = X \* dl-PRS-MutingBitRepetitionFactor-r16, where
			* X = min( L, 10240/( Tprs \* dl-PRS-MutingBitRepetitionFactor-r16 ) ) and
			* L is the size of NR-MutingPattern-r16 for mutingOption1-r16.
	+ Option 1 (OPPO)
		- When Tprs \* dl-PRS-MutingBitRepetitionFactor-r16 > 10240 ms or Tprs \* L \* dl-PRS-MutingBitRepetitionFactor-r16 > 10240ms, support option 1
		- When Tprs \* L \* dl-PRS-MutingBitRepetitionFactor-r16 <= 10240 ms, muting scaling factor should be the ratio of muting pattern size and the number of “1” in the muting pattern, i.e. $N\_{muting}=\left⌈L/N\_{1}\right⌉$
	+ Option 2 (HW)
		- If RAN4 is to optimize the requirements for muting, consider to define N\_muting based on the minimum repetition factor of bit ‘1’ in the muting pattern.
* Recommended WF
	+ Further discuss

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| **Company** | **Comments**  |
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#### Issue 1-1-2: Considration on muting option-2

Proposals

* + Option 1 (CATT)
		- Considering the integrity of the requirements, the measurement period when muting option 2 is used should be also clarified
* Recommended WF
	+ Further discuss

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| **Company** | **Comments**  |
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### Sub-topic 1-2: Parameter Lprs

#### Issue 1-2-1: Observation window

* Proposals
	+ Option 1 (CATT, HW, QC, vivo, OPPO)
		- $T\_{available\\_PRS,i}$
	+ Option 2 (Nokia)
		- A UE needs to use the observation window for *N* same as LPRS,i observation window that was agreed as the aggregating duration of all the PRS resources that fall within MGs and are not muted.
		- If the window *T* ms is not set same as the window LPRS,i, the requirement applies another scaler as $\left⌈\frac{L\_{PRS,i}}{N} ×\frac{T}{P}\right⌉$, where $P$ is the observation window of LPRS,i counting.
* Recommended WF
	+ Further discuss

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| **Company** | **Comments**  |
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#### Issue 1-2-1: Notation update

* Proposals
	+ Option 1 (CATT, Nokia, vivo)
		- Replace notation LPRS,i with $L\_{PRS,i}^{K}$ or $L\_{available\\_PRS,i}$
	+ Option 2 (HW)
		- Change the notation of Lprs to K, provided that RAN1 would align the definition of time period of P to the Lprs observation window agreed in RAN4.
	+ Option 3 (QC)
		- Replace LPRS,i with $L\_{PRS,i}^{K}$ and clarify that it is based on PRS duration *K* defined in TS 38.214 [45] clause 5.1.6.5.
* Recommended WF
	+ Further discuss, first focus on whether Lprs (or the new notation) is same as K defined in 38.214 clause 5.1.6.5 or not.

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| **Company** | **Comments**  |
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### Sub-topic 1-3: Measurement period when configured with PRS-RSRP

#### Issue 1-3-1: PRS-RSRP configured for a different method than DL-TDOA

* Proposals
	+ Option 1a (ZTE, OPPO)
		- RSTD measurement period is not impacted by the PRS-RSRP measurement configured for another positioning method, if they are measured on the same set of PRS resources.
	+ Option 1b (CATT, Nokia, vivo, OPPO, Intel)
		- RSTD measurement period is not impacted by PRS-RSRP measurement.
	+ Option 2a (HW)
		- When UE is configured measurement for more than one positioning requests, the measurement period for each requests can be longer than measurement period when UE is configured measurement for that single positioning request.
	+ Option 2b (Ericsson)
		- When PRS-RSRP and RSTD are configured using separate OTDOA assistance data then the measurement periods of RSTD and PRS-RSRP may be different.
	+ Option 2c (QC)
		- RAN4 not to specify requirements for scenarios involving concurrent NR positioning methods in Rel-16.
		- Measurement period requirements in TS 38.133 sections 9.9.2.5, 9.9.3.5 and 9.9.4.5 do not apply when there are concurrent positioning requests. If there are concurrent positioning requests the starting point and duration of the measurement period may be different.
	+ Option 2d (OPPO)
		- PRS measurement requirements do not apply when UE is configured PRS measurement for more than one positioning methods with different sets of PRS resources to measure.
* Recommended WF
	+ Further discuss

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| **Company** | **Comments**  |
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### Sub-topic 1-4: Measurement period with MG reconfiguration

#### Issue 1-4-1: MG reconfiguration per UE request

* Proposals
	+ Option 1a (ZTE, Ericsson, QC, Nokia)
		- Add the following text to TS 38.133 sections 9.9.2.5, 9.9.3.5 and 9.9.4.5:

If during the measurement period of one or more positioning frequency layers, the MG pattern is reconfigured (at most once for each positioning frequency layer) to enable UE to measure DL PRS resources, the measurement period can be longer.”

* + Option 1b (CATT)
		- Add the following text to TS 38.133 sections 9.9.2.5, 9.9.3.5 and 9.9.4.5:

If during the measurement period of one or more positioning frequency layers, MG pattern is reconfigured to enable UE to measure different DL PRS resources, the measurement period can be longer

* + Option 1c (HW, vivo, OPPO)
		- Add the following text to TS 38.133 sections 9.9.2.5, 9.9.3.5 and 9.9.4.5:

If during the measurement period of one or more positioning frequency layers, the MG pattern is reconfigured, the measurement period can be longer.

* + Option 2 (Nokia)
		- Measurement period may be prolonged or restarted when measurement gap is reconfigured per UE request.
	+ Option 3 (Intel)
		- The clarification on the potential requirement extension is needed when MG reconfiguration per UE request.
* Recommended WF
	+ It seems all companies agree that measurement period may be extended, and RAN4 does not need to define the exact extension.
	+ Discuss if the following bullets are agreeable.
		- Add the following text to TS 38.133 sections 9.9.2.5, 9.9.3.5 and 9.9.4.5:

If during the measurement period of one or more positioning frequency layers, the MG pattern is reconfigured, the measurement period can be longer.

* + - RAN4 does not specify the exact measurement period extension due to MG reconfiguration during the measurement period.

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| **Company** | **Comments**  |
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#### Issue 1-4-2: MG reconfiguration not per UE request

*The issue is about whether RSTD measurement period would be impacted by PRS-RSRP measurement configured for another positioning method.*

* Proposals
	+ Option 1 (ZTE, HW, Ericsson, QC, Nokia, OPPO)
		- Apply same requirements as MG reconfiguration based on UE request
	+ Option 2 (CATT, Intel)
		- Measurement requirements do not apply if UE cannot perform the PRS measurement after the MG reconfiguration
* Recommended WF
	+ It is noted that option 1 are option 2 are not exclusive.
	+ Discuss if the following bullet based on option 1 is agreeable:
		- For MG reconfiguration during measurement period not per UE request, apply same requirements as MG reconfiguration based on UE request as in Issue 1-4-1.
	+ Further discuss if option 2 is needed.

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| **Company** | **Comments**  |
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## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

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| **CR/TP number** | **Comments collection** |
| R4-2109090 (CATT) |  |
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| R4-2109175 (Nokia) |  |
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| R4-2110871 (HW) |  |
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| R4-2111332 (Ericsson)38133 |  |
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| R4-2111334 (Ericsson)36133 |  |
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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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|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

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|  | **WF/LS t-doc Title**  | **Assigned Company,****WF or LS lead** |
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### 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: Other issues

## Companies’ contributions summary

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| **T-doc** | **Company** | **Proposals / Observations** |
| [**R4-2108781**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108781.zip) | ZTE Corporation | **Proposal 1: CSSF is derived in Rel-15 approach, and any PFL is counted as a candidate for a MG occasion as long as at least one PRS resource on that PFL is fully covered by the MGL excluding RF switching time.** |
| [**R4-2109861**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109861.zip) | Qualcomm Incorporated | **Proposal 1a: The measurement requirements apply for a PRS resource only if at least the minimum number of repetitions specified in the accuracy requirements are covered by the MGL excluding RF switching time.****Proposal 1b: A** **PFL is counted as candidate for a MG occasion if it has at least one PRS resource for which measurement requirements apply according to Proposal 1a.****Proposal 2:** 1. **CSSF for PFLs should be calculated on a per MG occasion basis (as in Rel-15) considering only one PFL at a time.**
2. **For a PFL that satisfies the long periodicity condition, CSSF = 1.**

**Proposal 3: When only one PFL is configured by the LMF, CSSF for RRM frequency layers should be calculated on a per MG occasion basis (as in Rel-15).****Proposal 4: FFS: CSSF for RRM frequency layers when multiple PFLs are configured by the LMF.****Proposal 5: When multiple PFLs are configured by the LMF, the order of measurement and processing of the PFLs is up to UE implementation.****Proposal 6:*** **Option 1:**
	+ **Define the long periodicity condition as Tavailable\_PRS,i > 160 ms**
	+ **Measurement requirements apply even if some of the PRS resources in the PFL can be measured with periodicity shorter or equal to 160 ms. i.e. all of the PRS resources would be measured with high priority (CSSF = 1).**
* **Option 2:**
	+ **Define the long periodicity condition as Tavailable\_PRS,i > 160 ms**
	+ **Measurement requirements do not apply if some of the PRS resources in the PFL can be measured with periodicity shorter or equal to 160 ms. i.e. none of the PRS resources in the PFL would be measured.**
* **Option 3:**
	+ **Define the long periodicity condition as min(LCM(Tprs \* N\_muting, MGRP))** > **160 ms, where N\_muting is the scaling factor that accounts for PRS muting and the min(⋅) operation is taken across all PRS resource sets in the PFL.**
	+ **If a PFL is not considered to be long periodicity, measurement requirements do not apply to any PRS resource sets in the PFL for which LCM(Tprs \* N\_muting, MGRP))** > **160 ms and said PRS resource sets are excluded in the calculation of CSSF.**

**Proposal 7: Adopt option 1 in Proposal 6.****Proposal 8: Ri is calculated as in Rel-15.****Proposal 9: The measurement requirements do not apply for a PRS resource, if time span of the PRS resource instance (including at least the minimum number of repetitions specified in the accuracy requirements) is greater than UE reported capability N.****Proposal 10: Adopt Proposal 1a as applicability condition based on the overlap of a PRS resource with a MG occasion.** |
| [**R4-2109937**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109937.zip) | vivo | **Proposal 1:** $T\_{available\\_PRS,i}= LCM\left(T\_{PRS,i},MGRP\_{i}\right)$ **is revised to** $T\_{available\\_PRS,i}= LCM\left(N\_{muting}\*T\_{PRS,i},MGRP\_{i}\right)$ **by taking muting into consideration, where** $N\_{muting}$ **is** *X \* dl-prs-MutingBitRepetitionFactor* **and** *X* **is the size of** *NR-MutingPattern-r16* ***for*** *DL-PRS-MutingOption1-r16****.*****Proposal 2: The definition of long periodicity PRS measurement is based on option 2, i.e., the long periodicity of PRS measurement is** $T\_{available\\_PRS,i}$ **>=320ms.****Proposal 3: No further restriction on PRS resource periodicities on a PFL.****Proposal 4: CSSF should be defined on per MG occasion basis and only one candidate PRS frequency layer is counted in CCSF calculation for a MG occasion (Rel-15 approach).****Proposal 5: If time span of the PRS resource instance within MG is greater than UE reported capability N, measurement period requirements shall apply under the condition that corresponding measurement accuracy requirements shall be met. The UE is allowed not to measure the entire PRS resource instance.****Proposal 6: If time span of the PRS resource instance is greater than MGL, measurement period requirements shall apply under the condition that corresponding measurement accuracy requirements shall be met.** **if the time span of a DL PRS resource instance (including at least the minimum number of repetitions specified in the accuracy requirements) is greater than the configured measurement gap length, then measurement requirements do not apply for the PRS resource instance.****Proposal 7: If at least part of the PRS resource including at least the minimum number of repetitions specified in the accuracy requirements is fully covered by MGL, then the PRS resource is considered being fully covered by MGL.** **Proposal 8: RAN4 to further discuss for a PRS resource being fully covered by MGL for RSTD measurement, whether *nr-DL-PRS-ExpectedRSTD-Uncertainty and nr-DL-PRS-ExpectedRSTD*** **should be additionally considered in the definition or not.**  |
| [**R4-2110015**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110015.zip) | Nokia, Nokia Shanghai Bell | 1. We support option 2b, i.e. CSSF is derived in Rel-15 approach, and any PFL is counted as a candidate for a MG occasion as long as at least one PRS resource on that PFL is fully covered by the MGL excluding RF switching time.
2. Regarding long periodicity measurement, we support option 2, i.e. Tavailable\_PRS,i >= 320 ms.
3. We support option 2, i.e. parameter Ri is same as current Ri definition.
4. Regarding time span of PRS resource instance larger than UE reported capability N, we support option 3, i.e. if time span of the PRS resource instance within MG is greater than UE reported capability N, measurement period requirements shall apply.
5. Regarding time span of PRS resource instance larger than MGL, we support option 2, i.e. measurement requirements do not apply for a PRS resource when the time span of PRS resource instance > MGL.
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| [**R4-2110124**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110124.zip) | OPPO | **Observation 1: The Ri calculation in option 1 is beneficial for reducing measurement period only if the max-based approach is used.** **Proposal 1:** $ T\_{available,i}\geq 320ms$ **could be used for the definition of long-periodicity PRS.****Proposal 2: Support the restriction on PRS resource periodicities on in PFL: Measurement requirements apply provided that the resource periodicities after muting are either <= 160ms for all PRS resources on the PFL, or > 160ms for all PRS resources on the PFL.** **Proposal 3: For the CSSF calculation of a PFL, the selection of one PFL is up to UE implementation.****Proposal 4: Further discuss the CSSF calculation of a RRM layer when multiple PFLs are configured.****Proposal 5: Current Ri definition can be reused in Rel-16 and should be based on the selection of PFL in CSSF calculation.****Proposal 6: 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.****Proposal 7: The measurement requirements do not apply for a PRS resource, if time span of the PRS resource instance is greater than the configured measurement gap length.** |
| [**R4-2110879**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110879.zip) | Huawei, HiSilicon | **Proposal 1: Any PFL is counted as a candidate for a MG occasion as long as at least one PRS resource on that PFL is fully covered by the MGL excluding RF switching time. Selection of the one PFL for measurement for the MG occasion is up to UE implementation****Proposal 2: Measurement of PFL i is defined as long periodicity measurement if Tavailable,i ≥320ms.****Proposal 3: Measurement requirements apply provided that the resource periodicities after muting are either <= 160ms for all PRS resources on the PFL, or > 160ms for all PRS resources on the PFL.****Proposal 4: The existing definition of Ri is reused for PRS measurement.** **Proposal 5: Measurement requirements do not apply for a PRS resource if the minimum number of repetitions of a single resource instance is > N, where the minimum number of repetitions is given in the accuracy requirements.****Proposal 6: Measurement requirements do not apply for a PRS resource if the minimum number of repetitions of a single resource instance is > MGL, where the minimum number of repetitions is given in the accuracy requirements.****Proposal 7: Add the following texts in clause 9.9.1 of 38.133:****“a PRS resource is considered to be fully (partially) overlapped with MG if all (some) of its instances are overlapped with an MG occasion. A PRS resource instance is considered to be overlapped with an MG occasion if the minimum number of repetitions of the instance is fully covered by the MGL excluding RF switching time, where the minimum number is given in the accuracy requirements.”** |
| [**R4-2110880**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110880.zip) | Huawei, HiSilicon | CR |

## Open issues summary

*It is noted that Proposal 1 of vivo R4-2109937 is not listed as open issue because in WF R4-2105851 from RAN4#98-bis-e (Slide 4) it was agreed that* $T\_{PRS,i}$ *has already accounted for resource muting.*

*It is noted that Proposal 1b from QC R4-2109861 not listed as open issue because we already have agreement in WF R4-2105851 from RAN4#98-bis-e (Slide 11) that only PRS resources being fully covered by MG is considered, and what remained open is when a PRS resources is considered as being fully covered by MG, and this is discussed in Issue 2-2-3 including Proposal 1a.*

### Sub-topic 2-1 CSSF

#### Issue 2-1-1: Selection of one PFL in CSSF calculation

* Proposals
	+ Option 1 (ZTE, Nokia)
		- CSSF is derived in Rel-15 approach, and any PFL is counted as a candidate for a MG occasion as long as at least one PRS resource on that PFL is fully covered by the MGL excluding RF switching time
	+ Option 2 (QC)
		- CSSF for PFLs should be calculated on a per MG occasion basis (as in Rel-15) considering only one PFL at a time. For a PFL that satisfies the long periodicity condition, CSSF = 1.
		- When only one PFL is configured by the LMF, CSSF for RRM frequency layers should be calculated on a per MG occasion basis (as in Rel-15).
		- FFS: CSSF for RRM frequency layers when multiple PFLs are configured by the LMF.
		- When multiple PFLs are configured by the LMF, the order of measurement and processing of the PFLs is up to UE implementation.
	+ Option 3 (vivo)
		- CSSF should be defined on per MG occasion basis and only one candidate PRS frequency layer is counted in CCSF calculation for a MG occasion (Rel-15 approach).
	+ Option 4 (OPPO)
		- For the CSSF calculation of a PFL, the selection of one PFL is up to UE implementation.
		- Further discuss the CSSF calculation of a RRM layer when multiple PFLs are configured.
	+ Option 5 (HW)
		- Any PFL is counted as a candidate for a MG occasion as long as at least one PRS resource on that PFL is fully covered by the MGL excluding RF switching time. Selection of the one PFL for measurement for the MG occasion is up to UE implementation
	+ Option 6 (CATT)
		- Only one positioning frequency layer can be counted as a candidate for a gap occasion. If multiple positioning frequency layers are covered by a gap occasion, which layer is selected should be addressed.
* Recommended WF
	+ It seems views from all companies are aligned, but are proposed with different wordings.
	+ Discuss if the following bullets are agreeable.
		- CSSF calculation is based on Rel-15 per MG occasion approach
		- For CSSF calculation for a positioning frequency layer, in each MG occasion
			* Only RRM frequency layers are considered, and no other PFL is considered
			* For a PFL that satisfies the long periodicity condition, CSSF = 1.
		- For CSSF calculation for an RRM frequency layer, in each MG occasion
			* Only one PFL is considered
		- When multiple PFLs are configured, which PFL is measured in an MG occasion is up to UE implementation.
		- FFS CSSF calculation for an RRM frequency layer when multiple PFLs are configured.
	+ Further discuss CSSF calculation for an RRM frequency layer when multiple PFLs are configured

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| **Company** | **Comments**  |
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#### Issue 2-1-2: Definition of long periodicity measurement

*The issue is about based on which criteria measurement for a PFL is categorized as long periodicity measurement.*

* Proposals
	+ Option 1 (QC, vivo)
		- Define the long periodicity condition as Tavailable\_PRS,i > 160 ms (or >=320ms)
		- Measurement requirements apply even if some of the PRS resources in the PFL can be measured with periodicity shorter or equal to 160 ms. i.e. all of the PRS resources would be measured with high priority (CSSF = 1).
	+ Option 2 (OPPO, HW)
		- Define the long periodicity condition as Tavailable\_PRS,i > 160 ms (or >=320ms)
		- Measurement requirements do not apply if some of the PRS resources in the PFL can be measured with periodicity shorter or equal to 160 ms. i.e. none of the PRS resources in the PFL would be measured.
	+ Option 3 (Nokia, CATT)
		- Define the long periodicity condition as Tavailable\_PRS,i > 160 ms (or >=320ms)
* Recommended WF
	+ Further discuss

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| **Company** | **Comments**  |
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#### Issue 2-1-3: Parameter Ri

* Proposals
	+ Option 1 (QC, Nokia, OPPO, HW)
		- Same as Rel-15 Ri definition
* Recommended WF
	+ It seems views from all companies are aligned.
	+ Discuss if the following bullet is agreeable.
		- Parameter Ri is defined same as in Rel-15

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| **Company** | **Comments**  |
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### Sub-topic 2-2 Requirements applicability considering UE capability and MGL

#### Issue 2-2-1: Time span of PRS resource instance > N

* Proposals
	+ Option 1 (QC, vivo, HW)
		- The measurement requirements do not apply for a PRS resource, if time span of the PRS resource instance (including at least the minimum number of repetitions specified in the accuracy requirements) is greater than UE reported capability N.
	+ Option 2 (OPPO)
		- 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 3 (Nokia)
		- if time span of the PRS resource instance within MG is greater than UE reported capability N, measurement period requirements shall apply
* Recommended WF
	+ Further discuss

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| **Company** | **Comments**  |
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#### Issue 2-2-2: Time span of PRS resource instance > MGL

* Proposals
	+ Option 1 (vivo, QC, HW)
		- If the time span of a DL PRS resource instance (including at least the minimum number of repetitions specified in the accuracy requirements) is greater than the configured measurement gap length excluding RF switching time, then measurement requirements do not apply for the PRS resource instance.
	+ Option 2 (Nokia, OPPO)
		- The measurement requirements do not apply for a PRS resource, if time span of the PRS resource instance is greater than the configured measurement gap length
* Recommended WF
	+ Further discuss

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| **Company** | **Comments**  |
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#### Issue 2-2-3: PRS resource being overlapped with (or fully covered by) MG

* Proposals
	+ Option 1 (QC)
		- The measurement requirements apply for a PRS resource only if at least the minimum number of repetitions specified in the accuracy requirements are covered by the MGL excluding RF switching time.
	+ Option 2 (vivo)
		- If at least part of the PRS resource including at least the minimum number of repetitions specified in the accuracy requirements is fully covered by MGL, then the PRS resource is considered being fully covered by MGL.
	+ Option 3 (HW)
		- A PRS resource is considered to be fully (partially) overlapped with MG if all (some) of its instances are overlapped with an MG occasion.
		- A PRS resource instance is considered to be overlapped with an MG occasion if the minimum number of repetitions of the instance is fully covered by the MGL excluding RF switching time, where the minimum number is given in the accuracy requirements.
* Recommended WF
	+ It seems the 3 options are technically identical.
	+ The outcome of this issue should be aligned with outcome of Issue 2-2-2.
	+ Further discuss

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| **Company** | **Comments**  |
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#### Issue 2-2-4: Considration of RSTD search window

* Proposals
	+ Option 1 (vivo)
		- RAN4 to further discuss for a PRS resource being fully covered by MGL for RSTD measurement, whether *nr-DL-PRS-ExpectedRSTD-Uncertainty* and *nr-DL-PRS-ExpectedRSTD* should be additionally considered in the definition or not
* Recommended WF
	+ Further discuss

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| **Company** | **Comments**  |
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## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

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| **CR/TP number** | **Comments collection** |
| R4-2110880(HW) |  |
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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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|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**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** |
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### 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**  |
| 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: PRS-RSRP measurement period

## Companies’ contributions summary

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| **T-doc** | **Company** | **Proposals / Observations** |
| [**R4-2108779**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108779.zip) | ZTE Corporation | **Observation 1:** In TS 38.133, current requirements applicability apply to DL-TDOA or Multi-RTT.**Proposal 1: Current requirements in 9.3.3 apply to DL-TDOA or Multi-RTT.** |
| [**R4-2109859**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109859.zip) | Qualcomm Incorporated | **Proposal 1: When PRS-RSRP is configured for multi-RTT, UE Rx-Tx time difference and PRS-RSRP measurements are performed over the same measurement period.** |
| [**R4-2109935**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109935.zip) | vivo | **Proposal 1: When PRS-RSRP is configured for DL-TDOA, RSTD and PRS-RSRP are performed over the same measurement period. Current requirements in clause 9.9.3 also apply for the case when PRS-RSRP is measured for DL-TDOA.****Proposal 2: When PRS-RSRP is configured for multi-RTT, UE Rx-Tx time difference and PRS-RSRP are performed over the same measurement period.** **Proposal 3: Current requirements in clause 9.9.3 also apply for the case when PRS-RSRP is measured for Multi-RTT.** |
| [**R4-2110008**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110008.zip) | Nokia, Nokia Shanghai Bell | CR |
| [**R4-2110013**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110013.zip) | Nokia, Nokia Shanghai Bell | **Observation 1 :** RSRP values are very fundamental values to set up positioning measurements such as beam correspondence and to evaluate measurement reliability.**Observation 2 :** RAN1/2 define separate UE capability on PRS-RSRP measurement when it is combined for other positioning methods (i.e. DL-ToA or RTT).**Proposal 1 :** When PRS-RSRP measurement is required when configured for DL-TDOA or multi-RTT, the measurement period is supposed to be same as DL-TDOA or multi-RTT measurement period respectively. - Accordingly, the DL-TDOA or multi-RTT measurement period are respectively applied to PRS-RSRP in this case, which means that PRS-RSRP measurement period is same as DL-TDOA or multi-RTT measurement period.  |
| [**R4-2110045**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110045.zip) | OPPO | **Proposal 1: UE behaviour is not defined when PRS-RSRP is configured additionally to RSTD or UE Rx-Tx measurement.****Proposal 2: Current requirements in clause 9.9.3 also apply for the case when PRS-RSRP is measured for DL-TDOA or Multi-RTT, except the following scenarios.*** **If handover occurs while PRS-RSRP measurements for Multi-RTT are being performed, or**
* **If other cell change impacting SRS configuration occurs while PRS-RSRP measurements for Multi-RTT are being performed**
 |
| [**R4-2110873**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110873.zip) | Huawei, HiSilicon | **Proposal 1: Add the following texts in clause 9.9.2 (9.9.4) of 38.133:****“When PRS-RSRP is configured for DL-TDOA (multi-RTT), RSTD (UE Rx-Tx) and RSRP measurements are performed over the same measurement period defined in this clause.”** |
| [**R4-2110874**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110874.zip) | Huawei, HiSilicon | CR |
| [**R4-2111336**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111336.zip) | Ericsson | * ***Observation 1****: The following was agreed: When PRS-RSRP is configured for DL-TDOA, RSTD and RSRP are performed over the same measurement period.*
* ***Observation 2****: Define similar UE behavior as in observation # 1, when PRS-RSRP is configured for multi-RTT.*
* ***Proposal 1****: When PRS-RSRP is configured for multi-RTT then PRS-RSRP and UE Rx-Tx time difference measurements are performed over the same measurement period.*
 |

## Open issues summary

*It is noted that Ericsson CR R4-2111337 is moved to Topic#5 because it is resubmission of endorsed CR.*

*It is noted that Proposal 1 in OPPO R4-2110045 is not listed as open issue because there was already agreement in WF R4-2105851 from RAN4#98-bis-e (Slide 6) that RSTD and RSRP are performed over the same measurement period, so there is no need to further discuss the UE behavior.*

### Sub-topic 3-1 Measurement period when configured for DL-TDOA or multi-RTT

#### Issue 3-1-1: Applicable requirements for PRS-RSRP configured for DL-TDOA

* Proposals
	+ Option 1 (HW, Nokia)
		- Requirements for RSTD in clause 9.9.2 apply
	+ Option 2a (ZTE, vivo)
		- Requirements for PRS-RSRP in clause 9.9.3 apply
	+ Option 2b (OPPO)
		- Current requirements in clause 9.9.3 also apply for the case when PRS-RSRP is measured for DL-TDOA, except the following scenarios:
			* If handover occurs while PRS-RSRP measurements for Multi-RTT are being performed, or
			* If other cell change impacting SRS configuration occurs while PRS-RSRP measurements for Multi-RTT are being performed
* Recommended WF
	+ Further discuss

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| **Company** | **Comments**  |
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#### Issue 3-1-2: PRS-RSRP configured for Multi-RTT

* Proposals
	+ Option 1 (Nokia, ZTE, QC, HW, OPPO, vivo, Ericsson)
		- When PRS-RSRP is configured for multi-RTT, UE Rx-Tx time difference and PRS-RSRP measurements are performed over the same measurement period.
* Recommended WF
	+ All companies have same view.
	+ Discuss if the following bullets are agreeable.
		- When PRS-RSRP is configured for multi-RTT, UE Rx-Tx time difference and PRS-RSRP measurements are performed over the same measurement period.
		- The applicable requirements for PRS-RSRP configured for Multi-RTT are defined in the same way as PRS-RSRP configured for DL-TDOA.

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| **Company** | **Comments**  |
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## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

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| **CR/TP number** | **Comments collection** |
| R4-2110008(Nokia) |  |
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| R4-2110874(HW) |  |
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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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|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**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*

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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 #4: UE Rx-Tx time difference measurement period

## Companies’ contributions summary

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| **T-doc** | **Company** | **Proposals / Observations** |
| [**R4-2108780**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2108780.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 [-80, 80] msec of at least one DL PRS resource of each of the TRPs in the assistance data.****Proposal 2: The UE should still measure and report UE Rx-Tx measurement even if PRS/SRS proximity condition is not met. For test cases, we can only test the UE when the condition is met.****Proposal 3: UE shall restart the UE Rx-Tx time difference measurement after the SRS reconfiguration on the target cell is complete.****Proposal 4: UE shall continue the on-going UE Rx-Tx time difference measurement and the current measurement period and accuracy apply.** |
| [**R4-2109088**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109088.zip) | CATT | **Proposal 1: 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.** **Proposal 2: If the PRS/SRS proximity condition is not met, UE can still measure and report the UE Rx-Tx time difference within the measurement period, but the accuracy requirements are not applied due to lack of SRS resources.** **Proposal 3: UE shall continue UE Rx-Tx time difference measurement and the measurement requirements are still applicable when TA changes due to TA command. But the UE Rx-Tx time difference accuracy requirements are not applied.** **Proposal 4: No need to clarify UE Rx-Tx measurement requirements in case of NTA\_offset change.** **Proposal 5: When cell change impacting SRS occurs during the measurement period, UE shall restart the UE Rx-Tx time difference measurement after the SRS reconfiguration on the target cell is complete.** **Proposal 6: When cell change not impacting SRS occurs during the measurement period, UE shall continue the on-going UE Rx-Tx time difference measurement and the current measurement period and accuracy apply. But there is no need to capture it in the specification.** |
| [**R4-2109236**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109236.zip) | Intel Corporation | **Observation 1: If the timing adjustment changes are same for both UE Rx-Tx measurement and gNB Rx-Tx measurement, the positioning estimation error due to TA change can be neglected.****Observation 2: It is also possible to introduce some positioning accuracy error if TA updates when UE Rx-Tx time difference measurement and gNB Rx-Tx time difference measurement are variable.** ***Proposal 1: UE could continue UE/gNB Rx-Tx time difference measurement during which timing adjustment for its UL transmissions. But the accuracy requirements shall not be applicable to such case.*** |
| [**R4-2109860**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109860.zip) | Qualcomm Incorporated | **Proposal 1a: X = 80 ms.****Proposal 1b: If PRS/SRS proximity conditions are not satisfied, UE Rx-Tx time difference measurement requirements do not apply. UE behavior is undefined (up to implementation) and RTT accuracy may be degraded.** **Proposal 2: UE Rx-Tx time difference measurement requirements are not applicable if TA command is received during the measurement period.****Observation 1: The issue with UL timing changes occurring during the UE Rx-Tx measurement period is their effect on gNB Rx-Tx measurements and, ultimately, RTT.****Proposal 3: It is clarified in the specifications (section 9.9.4 in TS 38.133) that UE Rx-Tx measurement requirements are not applicable if the NTA\_offset changes during the measurement period.** **Proposal 4: If the serving cell (PCell, PSCell, or SCell) configured with the SRS for positioning changes during the measurement period, UE Rx-Tx measurement requirements do not apply. The UE may resume the measurements after SRS is configured in the target cell.****Proposal 5: UE Rx-Tx measurement requirements in the case of serving cell changes other than HO that do not impact the configuration of SRS for positioning are FFS.** |
| [**R4-2109936**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109936.zip) | vivo | **Proposal 1:****UE Rx-Tx time difference measurement requirements are 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.****Proposal 2: UE still measures and reports UE Rx-Tx measurement if PRS/SRS proximity condition is not met.****Proposal 3: The UE shall discard the UE Rx-Tx time difference measurement if the uplink transmission timing (based on network-configured TA) changes during the UE Rx-Tx measurement period.****Proposal 4:****UE Rx-Tx time difference measurement requirements are not applicable if TA command is received during the measurement period.****Proposal 5: The UE shall discard the UE Rx-Tx time difference measurement if NTA-offset changes during the UE Rx-Tx measurement period.****Proposal 6:****UE Rx-Tx time difference measurement requirements are not applicable if NTA-offset changes during the measurement period.****Proposal 7: UE shall restart the UE Rx-Tx time difference measurement after the SRS reconfiguration on the target cell is complete.****Proposal 8: For the cell change not impacting SRS configuration, the UE shall continue the on-going UE Rx-Tx time difference measurement and the current measurement period and accuracy apply.** |
| [**R4-2110010**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110010.zip) | Nokia, Nokia Shanghai Bell | **Observation 1 : In certain UL transmission conditions, SRS-P scheduling and transmission may not meet the proximity condition, since SRS-P transmission has the lowest transmission priority in Rel-16.****Observation 2 : As one concern, a UE may not complete a measurement report, if SRS-P scheduling transmission may not meet the proximity condition.**1. Even without PRS/SRS proximity condition, UE RX-TX time measurement and report should work within the required measurement period. Accuracy requirement impact can be FFS.
2. Regarding PRS/SRS proximity, we support X=160ms.

**Observation 3 : Measurement period is not significantly changed due to TA change, and measurement period requirement is still applicable.**1. Regarding TA change due to TA command or autonomous timing adjustment, we support option 1. A UE shall continue UE Rx-Tx time difference measurement and meet accuracy requirements
 |
| [**R4-2110014**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110014.zip) | Nokia, Nokia Shanghai Bell | CR |
| [**R4-2110046**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110046.zip) | OPPO | **Proposal 1: Support X=160ms for PRS/SRS proximity.** **Proposal 2: UE is still expected to measure and report UE Rx-Tx measurement if PRS/SRS proximity condition is not met.** **Proposal 3: In case of cell change impacting SRS configuration, support option 2 that the UE shall restart the UE Rx-Tx time difference measurement after the SRS reconfiguration on the target cell is complete****Proposal 4: In case of cell change not impacting SRS configuration, support option 2 that the UE shall continue the on-going UE Rx-Tx time difference measurement, and longer measurement period is expected.****Proposal 5: In case of TA change due to TA command, the UE shall discard the UE Rx-Tx time difference measurement, and the UE Rx-Tx time difference measurement requirement are not applicable.****Proposal 6: Support option 2a: it is clarified in UE Rx-Tx measurement requirements that measurement requirements are not applicable if NTA\_offset changes during the measurement period** |
| [**R4-2110876**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110876.zip) | Huawei, HiSilicon | **Proposal 1: UE should continue to measure and report UE Rx-Tx but no measurement requirement applies when the proximity condition is not met.****Proposal 2: UE Rx-Tx measurement period is not impacted by UL timing change (either due to network TA, UE autonomous time adjustment or NTA\_offset change). Address the issue in the accuracy requirements.****Proposal 3a: If any of the the serving cell (PCell, PSCell, or SCell) configured with the SRS for positioning changes during the measurement period, UE restarts the Rx-Tx measurement.****Proposal 3b: If any of the the serving cell (PCell, PSCell, or SCell) NOT configured with the SRS for positioning changes during the measurement period, UE continues the Rx-Tx measurement.**  |
| [**R4-2110877**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110877.zip) | Huawei, HiSilicon | CR |
| [**R4-2111339**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111339.zip) | Ericsson | * ***Proposal 1****: The UE Rx-Tx measurement requirements are met provided that the SRS transmission and PRS resource for each TRS is within [-160, 160] ms i.e. X = 160 ms.*
* ***Proposal 2****: If SRS and PRS proximity condition in proposal 1 is not met then it is up to the UE whether to transmit the UE Rx-Tx measurement results while meeting the corresponding UE Rx-Tx measurement requirements.*
* ***Observation 1****: As per agreement the UE continues UE Rx-Tx time difference measurement and the current measurement requirements apply when UL timing change due to UE autonomous adjustment occurs during the measurement period.*
* ***Observation 2****: If is not possible to define that UE continues UE Rx-Tx time difference measurement and the current measurement requirements apply when UL timing change due to UE autonomous adjustment occurs during the measurement period.*
* ***Proposal 3****: 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 4****: If proposal 3 is not acceptable then it is at least clarified in UE Rx-Tx measurement requirements (section 9.9.4 in TS 38.133) that measurement requirements are not applicable if the NTA\_offset changes during the measurement period.*
* ***Proposal 5****: Clarify in the UE Rx-Tx accuracy requirements (section 10.1.25 in TS 38.133) that the UE Rx-Tx accuracy measurement requirements are not applicable if the NTA\_offset changes during the UE Rx-Tx measurement period.*
* ***Observation 3*** *The network configured TA command may require the UE to adjust its uplink timing in very larger adjustment step.*
* ***Observation 4*** *The network configured TA command may require the UE to adjust its uplink timing in any direction wrt the DL timing.*
* ***Observation 5*** *The UE takes multiple samples for the UE Rx-Tx time difference measurement and some may be taken before while others after the TA change inducing large positioning error if used for positioning.*
* ***Proposal 6****: The UE shall discard the UE Rx-Tx time difference measurement if the uplink transmission timing changes due to network-configured TA during the UE Rx-Tx measurement period.*
* ***Proposal 7****: If proposal 6 is not acceptable then it is at least clarified in UE Rx-Tx measurement requirements (section 9.9.4 in TS 38.133) that measurement requirements are not applicable if the uplink transmission timing changes due to network-configured TA during the measurement period.*
* ***Proposal 8****: Clarify in the UE Rx-Tx accuracy requirements (section 10.1.25 in TS 38.133) that the UE Rx-Tx accuracy measurement requirements are not applicable if the uplink transmission timing changes due to network-configured TA during the UE Rx-Tx measurement period.*
* ***Observation 6*** *The SRS used for the UE Rx-Tx time difference measurement may not always be configured on the serving cell which is changed.*
* ***Proposal 9****: When the cell change impacts the SRS, then the UE shall restart the UE Rx-Tx time difference measurement after the SRS reconfiguration on the target cell is complete.*
* ***Proposal 10****: When the cell change does not impact the SRS, then UE shall continue the on-going UE Rx-Tx time difference measurement and the current measurement period and accuracy apply.*
* ***Proposal 11****: The UE Rx-Tx time difference measurement accuracy (section 10.1.25 in TS 38.133) shall apply provided that the configuration of SRS used for UE Rx-Tx measurement is not impacted if the serving cell (PCell, PSCell, or SCell) changes during the UE Rx-Tx measurement period.*
 |
| [**R4-2111340**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111340.zip) | Ericsson | CR |

## Open issues summary

*It is noted that OPPO CR R4-2110112 is moved to Topic#5 because it is resubmission of endorsed CR.*

*It is noted that Proposal 3 from Nokia R4-2110014 mentions accuracy requirements, but all the discussions and the observation is about measurement period requirements. Also, it has been agreed in R4-2008664 that accuracy requirements do not apply in case of TA change.*

*It is noted that Proposal 5, 8 and 11 from Ericsson R4-2111339 are not listed as open issue because they are all being discussed in email #215.*

### Sub-topic 4-1 SRS/PRS proximity

#### Issue 4-1-1: Value for X

* Proposals
	+ Option 1 (ZTE, QC, HW)
		- 80ms
	+ Option 2 (CATT, Nokia, OPPO, vivo, Ericsson, HW)
		- 160ms
* Recommended WF
	+ Further discuss

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| **Company** | **Comments**  |
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#### Issue 4-1-2: UE behaviour and requirements when proximity condition is not met

* Proposals for UE behaviour
	+ Option 1 (ZTE, CATT, Nokia, OPPO, vivo, HW)
		- The UE should still measure and report UE Rx-Tx measurement even if PRS/SRS proximity condition is not met
	+ Option 2 (QC, Ericsson)
		- Up to UE implementation
* Proposals for requirements
	+ Option 1a (CATT, Ericsson)
		- UE Rx-Tx time difference accuracy requirements may not apply
	+ Option 1b (Nokia)
		- Accuracy requirement impact can be FFS.
	+ Option 2 (QC, Ericsson, HW)
		- UE Rx-Tx time difference measurement requirements do not apply.
* Recommended WF
	+ ZTE proposed that for test cases, we can only test the UE when the condition is met. This is aligned with the discussion in last meeting on RRM tests.
	+ Check if the following bullet is agreeable:
		- In RRM tests, test case setup should ensure that the PRS/SRS proximity condition is met
	+ Further discuss the UE behaviour and if the measurement period and accuracy requirements apply.

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| **Company** | **Comments**  |
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### Sub-topic 4-2 Measurement period requirements with UL timing change

#### Issue 4-2-1: TA change due to TA command

* Proposals for UE behaviour
	+ Option 1 (Intel, CATT, Nokia, HW)
		- UE shall continue UE Rx-Tx time difference measurement
	+ Option 2 (OPPO, vivo, Ericsson)
		- UE shall discard the UE Rx-Tx time difference measurement
* Proposals for requirements
	+ Option 1 (CATT, Intel, Nokia, HW)
		- UE Rx-Tx measurement period requirements are not impacted
	+ Option 2 (QC, OPPO, vivo, Ericsson)
		- UE Rx-Tx time difference measurement requirements are not applicable
* Recommended WF
	+ Further discuss

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| **Company** | **Comments**  |
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#### Issue 4-2-2: TA change due to NTA\_offset change

*The issue is about* *UE behavior and requirements when UL timing change due to NTA\_offset change occurs during UE Rx-Tx measurement period.*

* Proposals for UE behaviour
	+ Option 1 (vivo, Ericsson)
		- UE shall discard the UE Rx-Tx time difference measurement
* Proposals for requirements
	+ Option 1a (CATT)
		- No need to clarify UE Rx-Tx measurement requirements in case of NTA\_offset change
	+ Option 1b (HW)
		- UE Rx-Tx measurement period requirements are not impacted
	+ Option 2 (QC, OPPO, vivo, Ericsson)
		- measurement requirements are not applicable if the NTA\_offset changes during the measurement period
* Recommended WF
	+ Further discuss

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| **Company** | **Comments**  |
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### Sub-topic 4-3 Measurement period requirements with cell change

#### Issue 4-3-1: Measurement period requirements with cell change impacting SRS

*The issue is about* *UE behavior and requirements when cell change that impacts SRS transmission occurs during UE Rx-Tx measurement period.*

* Proposals
	+ Option 1 (ZTE, CATT, OPPO, vivo, Ericsson, HW)
		- UE shall restart the UE Rx-Tx time difference measurement after the SRS reconfiguration on the target cell is complete.
	+ Option 2 (QC)
		- UE Rx-Tx measurement requirements do not apply. The UE may resume the measurements after SRS is configured in the target cell
* Recommended WF
	+ Further discuss

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| **Company** | **Comments**  |
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#### Issue 2-3-2: Measurement period requirements with cell change not impacting SRS

*The issue is about* *UE behavior and requirements when cell change that not impacts SRS transmission occurs during UE Rx-Tx measurement period.*

* Proposals
	+ Option 1a (ZTE, CATT, vivo, Ericsson, HW)
		- UE shall continue the on-going UE Rx-Tx time difference measurement, and the current measurement period and accuracy apply.
			* CATT: no need to capture it in the specification
	+ Option 1b (OPPO)
		- UE shall continue the on-going UE Rx-Tx time difference measurement, and longer measurement period is expected.
	+ Option 2 (QC)
		- FFS
* Recommended WF
	+ Further discuss

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| **Company** | **Comments**  |
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## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2110014(Nokia) |  |
|  |
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| R4-2106630(vivo) |  |
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| R4-2110877(HW) |  |
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| R4-2111340(Ericsson) |  |
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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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|  | **Status summary**  |
| **Sub-topic#1** | *Tentative agreements:**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*

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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 #5: Endorsed CRs from RAN4#98-bis-e

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc** | **Company** | **Proposals / Observations** |
| [**R4-2109089**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109089.zip) | CATT | Endorsed CR from RAN4#98-bis-e |
| [**R4-2109931**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2109931.zip) | vivo | Endorsed CR from RAN4#98-bis-e |
| [**R4-2110866**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110866.zip) | Huawei, HiSilicon | Endorsed CR from RAN4#98-bis-e |
| [**R4-2110868**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110868.zip) | Huawei, HiSilicon | Endorsed CR from RAN4#98-bis-e |
| [**R4-2111337**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2111337.zip) | Ericsson | Endorsed CR from RAN4#98-bis-e |
| [**R4-2110122**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_99-e/Docs/R4-2110122.zip) | OPPO | Endorsed CR from RAN4#98-bis-e with new changes. Endorsed changes are accepted (not shown with change marks). |

## Open issues summary

## Companies views’ collection for 1st round

### Open issues

### CRs/TPs comments collection

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2109089(CATT) |  |
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| R4-2109931(vivo) |  |
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| R4-2110866(HW) |  |
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| R4-2110868(HW) |  |
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|  |
| R4-2111337(Ericsson) |  |
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| R4-2110122(OPPO) |  |
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# Recommendations for Tdocs

## 1st round

**New tdocs**

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

**Existing tdocs**

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

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

## 2nd round

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

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