3GPP TSG RAN WG1 Meeting #109e R1-2205161

**e-meeting, May 9th – 20th, 2022**

**Source: Moderator (CATT)**

**Title: FL Summary for mitigating UE/gNB Rx/Tx timing delays**

**Agenda item: 8.5.1**

**Document for: Discussion and Decision**

# Introduction

This document provides a summary of the following email discussion:

 [109-e-R17-ePos-02] Email discussion under 8.5.1 for maintenance on accuracy improvements by mitigating UE Rx/Tx and/or gNB Rx/Tx timing delays, for issues 1-1, 1-2, 1-6, 1-9, 1-13, 1-14, 1-15, 1-16 in [R1-2205097](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2205097.zip), including discussion on LS in [R1-2203024](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203024.zip) – Ren Da (CATT)

* 1st check point: May 13 (any RRC impact by May 12)
* Final check point: May 20

# Aspects related to RAN4 LS [R1-2203024](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203024.zip)

**Issue #1-1 in** [**R1-2205097**](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2205097.zip)

Submitted Proposals

* ***(Huawei [1][12])) Proposal 1:*** *Define the following framework for Tx TEG reporting.*
* *The framework of UE/TRP Tx TEG:*
	+ *Define multiple candidate timing error margin values {TE1, TE2, …, TEN} in the spec.*
		- *The number of candidate values (i.e. N) and the exact values of {TE1, TE2, …, TEN} will be decided in Perf part.*
	+ *UE/TRP selects one value M from {TE1, TE2, …, TEN} based on its implementation and indicate to LMF per report.*
	+ *For UE that supports multiple Tx TEGs (TEG#1, TEG#2, …), the associated timing error margin value of each Tx TEG is M, which means the timing error difference between the transmission within the same Tx TEG is within the margin M.*
		- *The applicability of reported UE Tx TEG is limited to all the SRS in a UEPositioningAssistanceInfo message in RRC or in a Multi-RTT-ProvideLocationInformation IE in LPP that are tagged with the corresponding TEG ID.*
	+ *For TRP that supports multiple Tx TEGs, it is up to RAN3 to define the corresponding signaling if needed.*
* ***(Qualcomm [8]) Proposal 4:*** *The applicability of reported UE Rx TEG, RxTx TEGs, is limited to the measurements contained within the single measurement instance of a measurement report in which the Rx TEG information is provided, and only to measurements that are tagged with the corresponding TEG ID.*
	+ *Send an LS to RAN4*
* ***(Qualcomm [8]) Proposal 5:*** *Add the following sentence in TS 38.214 Section 5.1.6.5*
	+ *The applicability of reported UE Rx TEG, RxTx TEGs, is limited to the measurements contained within the single measurement instance of a measurement report in which the Rx TEG, RxTx TEG, information is provided, and only to measurements that are tagged with the corresponding TEG ID.*
* ***(CATT [10][11]) Proposal 1: Send a reply LS to RAN4 with the following questions of clarification:***
	+ *Question 1: Does a UE/TRP always support the same timing error margin value for Rx TEGs (or RxTx TEGs), or can a UE/TRP support different timing error margin values at different times?*
	+ *Question 2: If a UE/TRP supports both Rx and RxTx TEGs, will the selected timing error margin value for Rx TEG(s) be the same as the timing error margin value for RxTx TEG(s), or can a UE/TRP select different timing error margin values for Rx TEG(s) and RxTx TEG(s)?*

FL Comments

Given that RAN4 has defined the framework for Rx TEG/RxTx TEG, one may expect RAN4 will further discuss the framework for Tx TEG. Another option, as proposed in [1][12], is RAN1 defines the framework for Tx TEG, and them inform other WGs on RAN1’s decision.

About the validity of the UE Rx TEG, RxTx TEGs, it seems there are some questions [8][10][11], which need RAN4 to provide the clarifications.

Based on the inputs from RAN4’s LS, it seems there is a need to add the corresponding changes to TS 38.214 as suggested in [8].

### Proposal 2-1

* *Consider one of the following options on the framework for Tx TEG:*
	+ *Option 1: RAN1 will discuss and define the framework for Tx TEG based on RAN4’s LS R1-2203024 in RAN1#109e, e.g., as proposed in [1][12]*
	+ *Option 2: RAN1 is expecting RAN4 will define the framework for Tx TEG, i.e., RAN1 will not discuss and define the framework for Tx TEG in RAN1#109e.*

Comments

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| --- | --- |
| **Company** | **Comments**  |
| **Huawei, HiSilicon** | Prefer Option 1. |
| **Nokia/NSB** | We think it is up to RAN2/4 to finish this feature and if they have a specific question/action for RAN1 they need to send an LS.  |
| **ZTE** | We think this issue will be further discussed in RAN4. Hence, we prefer Option 2. |
| **OPPO** | We think it is up to RAN4. Thus, we prefer Option 2 |
| **CATT** | Prefer Option 2 |
| **Qualcomm** | Option 2 (unless RAN4 explicitly sends an LS with actions to RAN1)  |
| **vivo** | Option 2. We think RAN4 will further discuss the issues related Tx TEG, then duplicated work should be avoided. |

### Proposal 2-2

* *The applicability of reported UE Rx TEG, RxTx TEGs, is limited to the measurements contained within the single measurement instance of a measurement report in which the Rx TEG information is provided, and only to measurements that are tagged with the corresponding TEG ID.*
	+ *Include above statement in reply LS to RAN4*

Comments

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| --- | --- |
| **Company** | **Comments**  |
| **Huawei, HiSilicon** | We interpret the intention of this proposal is for combining the feature with the batch reporting? FL: Yes. |
| **Nokia/NSB** | Okay.  |
| **ZTE** | Support. |
| **OPPO** | Ok |
| **CATT** | Ok |
| **Qualcomm** | Support |
| **vivo** | The proposal may be updated as the follows.* *The applicability of reported UE Rx TEG, RxTx TEGs, is limited to the measurements contained within the single measurement instance of a measurement report in which the Rx TEG, RxTx TEGs information is provided, and only to measurements that are tagged with the corresponding TEG ID.*
 |

### Proposal 2-3

* *Include the following questions of clarification in reply LS to RAN4:*
	+ *Question 1: Does a UE/TRP always support the same timing error margin value for Rx TEGs (or RxTx TEGs), or can a UE/TRP support different timing error margin values at different times?*
	+ *Question 2: If a UE/TRP supports both Rx and RxTx TEGs, will the selected timing error margin value for Rx TEG(s) be the same as the timing error margin value for RxTx TEG(s), or can a UE/TRP select different timing error margin values for Rx TEG(s) and RxTx TEG(s)?*

Comments

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| **Company** | **Comments**  |
| **Huawei, HiSilicon** | Q1: We believe a single margin per TEG type is provided within a single LPP ProvideLocationInformation.Q2: The margin of Rx TEG and RxTx TEG could be different. |
| **Nokia/NSB** | Same understanding as Huawei.  |
| **ZTE** | Support. |
| **OPPO** | Does it have any impact on RAN1 spec? If not, we can just wait for RAN4’s final design. At that time, the answers to these question would be clear.  |
| **CATT** | Support. To OPPO, Q1 is related to how to deal with the TEG changes discussed in Section 3, and Q2 is related to whether there is a need to have two set of RRC parameters for the error margins one for Rx TEG and one set for RxTxTEG. |
| **Qualcomm** | Same understanding & replies as Huawei |
| **vivo** | OK |

### Proposal 2-4

* *Add the following TP in TS 38.214 Section 5.1.6.5:*

*The applicability of reported UE Rx TEG, RxTx TEGs, is limited to the measurements contained within the single measurement instance of a measurement report in which the Rx TEG, RxTx TEG, information is provided, and only to measurements that are tagged with the corresponding TEG ID.*

Comments

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| --- | --- |
| **Company** | **Comments**  |
| **Huawei, HiSilicon** | Not sure this should be in 214. We may wait for RAN2 and RAN4. |
| **Nokia/NSB** | Agree with Huawei. This is not needed in 214. |
| **ZTE** | Support. |
| **OPPO** | Agree with Huawei/Nokia |
| **CATT** | Support. It helps to clarify when UE Rx TEG, RxTx TEGs are valid, i.e, in single measurement instance of a measurement report, or all measurement instances of a measurement report. |
| **Qualcomm** | We think it makes sense to put in 38.214 |
| **vivo** | OK |

# UE Tx TEG Reporting (TEG changes/updates/Reset)

**Issue #1-2 in** [**R1-2205097**](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2205097.zip)

Submitted Proposals

* ***(Huawei,*** [***R1-2203099***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203099.zip)***[1]) Proposal 2:*** *Define the following reporting principle and include it in the LS to RAN2.*
	+ *UE is not required to report the same association of a TEG ID for an occasion (via the timestamp) compared with the previous occasion.*
	+ *The timestamp corresponds to the slot when the association is valid, which may not be a slot containing the actual SRS transmission.*
	+ *Both the original TEG and target TEG need to be included for an occasion via the timestamp in the report if UE switches SRS from the original TEG to the target TEG, e.g. delist the SRS from the original TEG and include the SRS to the target TEG.*
	+ *For SRS not associated with any TEG in case UE is not able to determine the association, UE may not report the SRS resource ID in any of the TEG within the report*
	+ *For SRS that has been previously associated with a TEG, but is no longer associated with any TEG in case UE is not able to determine the association after a given occasion, the UE may update the TEG by delisting the concerned SRS, without including the SRS to any target TEG.*
* ***(Huawei,*** [***R1-2203099***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203099.zip)***[1]) Proposal 3: Include the following change suggestion in the LS to RAN2.***
	+ *The field description of nr-TimeStamp in the TEG association reporting should be the earliest time instance instead of the latest time instance.*
	+ *The field srs-PosResSetAssociationList in the TEG association reporting should be optional to allow updating a TEG that is no longer associated with any SRS.*
* ***(ZTE,*** [***R1-2203519***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203519.zip) ***[4]) Proposal 2:*** *In each measurement instance, a time span including starting time and ending time of the measurement instance is reported together with the measurement results, where no group delay change is assumed during the time span.*
* ***(ZTE,*** [***R1-2203519***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203519.zip) ***[4]) Proposal 3:*** *For each UE Rx-Tx time difference measurement instance, if a Tx TEG ID is reported, the UE should also report the association of the Tx TEG ID to the UL SRS resource(s) that have already been transmitted and are associated with the Tx TEG ID during the time span of the measurement instance.*
* ***(InterDigital,*** [***R1-2204127***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2204127.zip)***[7]) Proposal 1:*** *Support the UE to report the association information between UE Tx TEG and SRS resource for UL-TDOA only if there is a change in the Tx TEG association compared to the last reporting.*

*FL: The proposal was intensively discussed in previous meeting w/o consensus.*

* ***(InterDigital,*** [***R1-2204127***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2204127.zip)***[7]) Proposal 2:*** *Support the UE to report the association information between UE Tx TEG and SRS resource whenever the UE determines the previous association information is no longer valid.*

*FL: The proposal was intensively discussed in previous meeting w/o consensus.*

* ***(Qualcomm,*** [***R1-2204985***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2204985.zip) ***[8]) Proposal 1****: The Timestamp of the TxTEG<->SRS association is needed and should be kept in the LPP measurement report for M-RTT.*

*FL: This seems to be RAN2’s issue. Not sure if RAN1 needs to discuss it.*

FL Comments

It is important to properly handle the change/updates of the UE Tx TEG association in higher-layer ignalling. It is also quite complicated to properly handle the changes/updates and the Tx TEG association. However, RAN1 has made the decision to let RAN2 to handle the change/updates, and at this moment it is unclear whether RAN2 needs RAN1’s help on this issue, since so far RAN2 does not send LS to request RAN1’s inputs. Most of the above proposals are related to the details related to the signalling design and some of the methods were discussed in the previous meeting. Thus, in FL’s view, it is important for RAN1 to have a consistent view on which of the issues related to the reporting details need to be further discussed in RAN1.

### Proposal 3-1

Companies are invited to provide their opinions on which of the following proposals needs to be further discussed and decided by RAN1 in this meeting.

* *Option 1: Define the following reporting principle and include it in the LS to RAN2.*
	+ *UE is not required to report the same association of a TEG ID for an occasion (via the timestamp) compared with the previous occasion.*
	+ *The timestamp corresponds to the slot when the association is valid, which may not be a slot containing the actual SRS transmission.*
	+ *Both the original TEG and target TEG need to be included for an occasion via the timestamp in the report if UE switches SRS from the original TEG to the target TEG, e.g. delist the SRS from the original TEG and include the SRS to the target TEG.*
	+ *For SRS not associated with any TEG in case UE is not able to determine the association, UE may not report the SRS resource ID in any of the TEG within the report*
	+ *For SRS that has been previously associated with a TEG, but is no longer associated with any TEG in case UE is not able to determine the association after a given occasion, the UE may update the TEG by delisting the concerned SRS, without including the SRS to any target TEG.*
* *Option 2: Include the following change suggestion in the LS to RAN2.*
	+ *The field description of nr-TimeStamp in the TEG association reporting should be the earliest time instance instead of the latest time instance.*
	+ *The field srs-PosResSetAssociationList in the TEG association reporting should be optional to allow updating a TEG that is no longer associated with any SRS.*
* *Option 3: In each measurement instance, a time span including starting time and ending time of the measurement instance is reported together with the measurement results, where no group delay change is assumed during the time span.*
* *Option 4: For each UE Rx-Tx time difference measurement instance, if a Tx TEG ID is reported, the UE should also report the association of the Tx TEG ID to the UL SRS resource(s) that have already been transmitted and are associated with the Tx TEG ID during the time span of the measurement instance.*
* *Option 5: Support the UE to report the association information between UE Tx TEG and SRS resource for UL-TDOA only if there is a change in the Tx TEG association compared to the last reporting.*
* *Option 6: Support the UE to report the association information between UE Tx TEG and SRS resource whenever the UE determines the previous association information is no longer valid.*
* *Option 7: The Timestamp of the TxTEG<->SRS association is needed and should be kept in the LPP measurement report for M-RTT.*

Comments

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| **Company** | **Comments**  |
| **Huawei, HiSilicon** | Support Option 1 and Option 2. They are the reasonable interpretation respecting the existing RAN2 signaling design with minimum change to the signaling structure.Do not support Option 3, which changes RAN2 signaling structure.Support Option 4.Do not support Option 5. We consider in each report, the “configuration” should be reset.Do not support Option 6. There is already periodic reporting, and we not support linking two reports.Do not support Option 7. It already has time stamp in LPP. |
| **Nokia/NSB** | Not sure what the spec impact of any of these options are? Seems like RAN2 should send specific questions if they have them or we should propose specific changes. |
| **ZTE** | It is better to separately discuss TDOA and RTT. For RTT, we think the time span/duration should be defined for a measurement instance in which SRS-TEG association is not changed. Otherwise, it is hard to let network know how long the report SRS-TEG association lasts. Hence, we prefer Option 4. In such case, SRS-TEG association is only reported for the SRS within the time span of the measurement instance. For TDOA, SRS-TEG association via RRC is reported independently from measurement results, the existing RAN2 TS 38.331 seems clear enough.  |
| **InterDigital** | We support Option 5 and Option 6. We also agree with “UE is not required to report the same association of a TEG ID for an occasion (via the timestamp) compared with the previous occasion” in Option 1. Our motivation for proposing Option 5 or Option 6 is that the reporting of TEG ID should be done only when there’s something new to report, to improve efficiency in reporting. |
| **OPPO** | Share similar view as Nokia |
| **CATT** | Similar view as Nokia and OPPO. RAN2 is working on the signaling. It is unclear whether RAN2 needs any inputs from RAN1 in this moment. |
| **vivo** | RAN2 is working on this issue, duplicated work should be avoided. |

# Error margins for Rx/RxTx TEGs

**Issue #1-6 in** [**R1-2205097**](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2205097.zip)**.**

Submitted Proposals

* ***(CATT,*** [***R1-2203436***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203436.zip) ***[1]) Proposal 3:*** *Suggest adding the following RRC parameters for Rx/RxTx TEGs according to the LS from RAN4 (*[*R1-2203024*](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203024.zip)*).*
	+ *ueRxTEG-margin with the values as “FFS: RAN4”*
	+ *ueRxTxTEG-margin with the values as “FFS: RAN4”*
* ***(vivo,*** [***R1-2203515***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203515.zip) ***[3]) Proposal 2:*** *Support the UE capability of timing error margin for Rx TEG and RxTx TEG.*
	+ *The capability type is per UE.*
* ***(ZTE,*** [***R1-2203519***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203519.zip) ***[4])*** *Proposal 4: Send a reply LS to RAN4 to ask whether timing error margin value is reported to LMF by UE capability signaling or other signaling, e.g. by ProvideLocationInformation.*
* ***(Huawei, R1-2204924[12]) Proposal 2:*** *Add the margin in the TEG reporting signaling.*

FL Comments

There is a need for RAN1 to decide whether to introduce additional RRC parameters, or UE capability to support UE/TRP to provide the Rx/RxTx TEG margins to the LMF. Companies are invited to provide their opinions on which of the following options should be used for UE/TRP to provide the Rx/RxTx TEG margins to the LMF.

### Proposal 4-1

Support of one of the following options for UE to provide the Rx/RxTx TEG margins to the LMF:

* *Option 1: Support UE to provide Rx/RxTx TEG margins to LMF as UE capability*
	+ *Note: the details, e.g., per UE or per Band etc., will be further discussed in UE feature session, once more information are available from RAN4.*
* *Option 2: Support UE to provide UE Rx/RxTx TEG margins to LMF via LPP signaling*
	+ *Note: Details of UE Rx/RxTx TEG margins in LPP ignaling will be included in RRC parameter list once more information are available from RAN4.*
* *Option 3: Request RAN4 on whether UE Rx/RxTx TEG margins are provided to LMF as UE capability, or as LPP signaling parameters*

Comments

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| --- | --- | --- | --- |
| **Company** | **yes** | **NO** | **Additional comments** |
| Huawei, HiSilicon | Option 2 | Option 1 | Just to clarify UE capability is also LPP signaling, so I guess the LPP signaling in Option 2 means the LPP measurement report. |
| Nokia/NSB |  |  | Feels like RAN2/4 may already be working on this. Not sure RAN1 needs to do anything but we are okay with Option 2 in principle.  |
| ZTE | Option 3 |  | This proposal is also related to the question 1 of proposal 2-3. So we prefer Option 3 to send a single LS to RAN4. |
| OPPOI |  | Option1/2/3 | RAN4 defined the Rx/RxTx TEG framework, and they will complete the design of UE feature along with RAN2. Why does RAN1 think RAN4 will not finish their design?  |
| CATT | Option 2 or Option 3 |  |  |
| Qualcomm | 3 |  |  |
| vivo | Option 3 |  | This proposal is related to question 1 in proposal 2-3, and further clarifications from RAN4 are needed.On the one hand, it seems that the ‘margin’ can be reported via UE capability. ‘Maximum number of Rx TEGs per band’ has been supported via UE capability report. We believe that this capability is related to the ‘margin’ selected by the UE. When the margin is tight, the maximum number of TEGs that UE can support will be larger; otherwise, the maximum number of TEGs will be smaller. In addition, based on the following agreement, the same timing margin is used for all Rx TEGs per UE. If ‘all Rx TEGs’ here is regarded as all Rx TEGs across a positioning session, then it is reasonable to report a fixed ‘margin’ in UE capability. Further clarifications on ‘all Rx TEGs’ in the following agreement are needed.

|  |
| --- |
| *Agreements:** The same timing margin is used for all Rx TEGs per UE/TRP
 |

On the other hand, it seems that the applicability of the ‘margin’ can be limited to the measurements contained within the measurement report, which follows the same applicability of Rx TEG within measurement report. So how should the ‘maximum number of Rx TEGs’ in the UE capability be interpreted? Is the ‘margin’ when the UE determines the capability different from the margin when the UE determines Rx TEG within the measurement report? |

### Proposal 4-2

* *Support gNB to provide TRP Rx/RxTx TEG margins to LMF via NRPPa signaling.*
	+ *Note: Details of TRP Rx/RxTx TEG margins in NRPPa signaling will be included in RRC parameter list once more information are available from RAN4.*

Comments

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **yes** | **NO** | **Additional comments** |
| Huawei, HiSilicon | Yes |  |  |
| Nokia/NSB | Yes |  | Again we should wait for further RAN2/4 progress.  |
| ZTE |  | No | How can RAN1 define the margin values? In our understanding it is better to let RAN4 handle this issue. Perhaps we can ask RAN4 to define TRP TEG margin.FL: As indicated in the note, the margins will be defined by RAN4. |
| OPPO |  |  | It is RAN2/4 workFL: RAN1 may need to decide whether gNB needs to provide the information. RAN2 can work on the details on signaling. |
| CATT | Yes |  |  |
| Qualcomm | Yes |  |  |
| vivo | Yes |  |  |

# Maximum number of Tx TEG SRS Associations in a M-RTT measurement report

**Issue #1-13 in** [**R1-2205097**](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2205097.zip)**.**

Submitted Proposals

* ***(Qualcomm,*** [***R1-2204985***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2204985.zip) ***[8]) Proposal 2:*** *With regards to the Tx TEG SRS Association inside an M-RTT report, support a maximum of 1024 Tx TEG SRS associations (up to 8 Tx TEG per band \* Up to 4 bands \* Up to 32 timestamps).*

FL Comments

The maximum number of UE-TxTEG is currently defined as 8 per UE. Further discussion may be needed to change it “per band”. In addition, the maximum of Tx TEG is also related to the issue on whether the SRS associations is unchanged in different time instances within one measurement report.

### Proposal 5-1

* *In one UE M-RTT measurement report, support reporting the UE Rx-Tx time difference measurements related to*
	+ *A maximum 8 Tx TEG per band*
	+ *A maximum of 4 bands*
	+ *A maximum of 32 measurement time instances*
	+ *A maximum of 1024 Tx TEG SRS associations*

Comments

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **yes** | **NO** | **Additional comments** |
| Huawei, HiSilicon |  |  | Unclear why this proposal is related to submitted proposals.We already agreed that total number of UE TEGs is 8 per UE, then we should not have 8 TEGs per band x up to 8 bands.For the timestamp, we believe 8 is a reasonable value.So the total number of SRS-TEG association per multi-RTT reporting (or per RRC UE positioning assistance information) shall be 8x4 = 32.Adding more number of TEG IDs in a reporting, will only cause chaos at the network, because it may be very difficult to find two measurement/SRS that has the same TEG ID. |
| Nokia/NSB |  |  | Not needed/non-essential issue.  |
| ZTE |  |  | Support in principle. Whether 32 instance should be carefully considered. This is related to the proposal 6-1. If we assume SRS-TEG association is not changed within one measurement instance, then 32 in the above third sub-bullet should be assumed as the maximum number of measurement instances. However, 128 is suggested in proposal 7-1. |
| OPPO |  |  | It is not preferred to revert our previous agreement (The maximum number of UE-TxTEG is 8 per UE) |
| CATT |  |  | Share the similar view as Nokia. |
| Qualcomm |  |  | If the agreement is 8 TEGs per UE, we can drop this part of the proposal, but we still think we need to discuss what is the maximum time instances that can be ncluded in the report. We think it is essential issue for RAN2 to finish specification.  |
| Vivo  |  |  | Sorry, we would like to confirm whether “total number of UE TEGs is 8 per UE “ is right since per band TxTEG number can be “8” based on UE capability, and SRS for positioning can be configured in multiple CCs**Agreement*** If a UE is configured with SRS for positioning in multiple CCs, when the UE reports UE Tx TEG(s) for UL-TDOA or Multi-RTT, the frequency information of SRS for positioning resources should be included in the report;
* It is up to RAN2/RAN3 to decide how the frequency information of SRS for positioning resources is included in the report of the UE Tx TEG(s)
* Send LS to RAN2/RAN3 for the signaling design
 |

# Maximum number of measurement instances in a report

**Issue #1-16 in** [**R1-2205097**](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2205097.zip)**.**

Submitted Proposals

* ***(Qualcomm,*** [***R1-2204985***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2204985.zip) ***[8]) Proposal 7:*** *Support up to 128 measurement instances in a single measurement report.*

FL Comments

RAN1 needs to define the maximum number of measurement instances in a report, and include the maximum number in the RRC parameter list for RAN2/RAN3.

### Proposal 6-1

* *Support up to 128 measurement instances in a single measurement report.*

Comments

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| --- | --- | --- | --- |
| **Company** | **yes** | **NO** | **Additional comments** |
| Huawei, HiSilicon |  | No | Not sure if the LPP signaling can handle such a large volume data. We think 32 should be sufficient. |
| Nokia/NSB |  | No | We feel much less than 128 would be needed.  |
| ZTE |  | No | This can be discussed together with proposal 5-1. |
| CATT |  | No | 32 seems sufficient |
| Qualcomm |  |  | We are also OK with 32. We just need a value to finish the specification.  |
| vivo |  |  | We are OK with 32 if ‘the maximum number’ is not related to UE capability, since the following conclusion was achieved in UE feature list in RAN1#108e.Support of multiple measurement instances which can be included in a single measurement report |

# TPs

## TP for terminologies of “ueRxTEG” and “ueRxTEG

**Issue #1-9 in** [**R1-2205097**](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2205097.zip)**.**

Submitted Proposals

* ***(OPPO,*** [***R1-2203960***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203960.zip) ***([6]) Proposal 1:*** *Adopt the following TP1 for TS 38.214 to keep the consistency within the same specification.*

|  |
| --- |
| TP1 for TS 38.214 --------------------------------------------------------------------------------------------------------------------------------***Reason for change:*** The terminologies of “*ueRxTEG*” and “*ueRxTEG*” are defined in TS 38.214. However, they are not used in the specification. In contrast, the terminologies of “UE Rx TEG” and “UE RxTx TEG” are used in TS 38.214.***Summary of change:*** Change *ueRxTEG*” and “*ueRxTEG*” to “UE Rx TEG” and “UE RxTx TEG”, respectively ***Consequences if not approved:***  Inconsistent terminologies within the same specification.--------------------------------------------------------------------------------------------------------------------------------5.1.6.5 PRS reception procedure <Unchanged parts are omitted>The UE may be configured to report one or more measurement instances, each with its own timestamp, on DL RSTD, DL PRS-RSRP, and/or UE Rx-Tx time difference measurements, in a single measurement report. Timing Error Group(s) (TEG(s)) at UE side are defined:*-* UE Rx TEG is associated with one or more DL measurements, which have the Rx timing error difference within a certain margin.*-* UE RxTx TEG is associated with one or more UE Rx-Tx time difference measurements, which have the 'Rx timing errors+Tx timing errors' difference within a certain margin.* <Unchanged parts are omitted>
 |

* ***(OPPO,*** [***R1-2203960***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203960.zip) ***([6]) Proposal 2: Adopt the following TP1 for TS 38.214 to keep the consistency within the same specification.***

|  |
| --- |
| TP2 for TS 38.214 --------------------------------------------------------------------------------------------------------------------------------***Reason for change:*** The terminology “*ueTxTEG*” is defined in TS 38.214. However, it is not used in the specification. In contrast, the terminology “UE Tx TEG” is used in TS 38.214.***Summary of change:*** Change “*ueTxTEG*” to “UE Tx TEG”***Consequences if not approved:***  Inconsistent terminologies within the same specifiction.--------------------------------------------------------------------------------------------------------------------------------6.2.1.4 UE sounding procedure for positioning purposes<Unchanged parts are omitted>The UE may be configured, subject to UE capability, to report UE Tx TEGs (Timing Error Group), where:*-* UE Tx TEG is associated with the transmissions of one or more UL SRS resources for the positioning purpose, which have the Tx timing error difference within a certain margin.The UE may be configured to report, subject to UE capability, association information of SRS resource(s) configured by the higher layer parameter *SRS-PosResource* with UE Tx TEG(s) via higher layer parameter [*ueTxTEG*]. <Unchanged parts are omitted> |

FL Comments

The TP seems editorial, which can be discussed directly when updating the specs.

### Proposal 7-1

*Adopt the TPs in Proposal 1 and Proposal 2 in R1-2203960 ([6]) for TS 38.214.*

Comments

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **yes** | **NO** | **Additional comments** |
| Huawei, HiSilicon | P1, P2 |  |  |
| Nokia/NSB |  | X | Not needed. Non-essential.  |
| ZTE | Yes |  |  |
| OPPO | Yes |  | If not adopted, the terminologies defined will be different from the ones used within the same spec.  |
| CATT | Yes |  |  |
| vivo | Yes |  |  |

## TP for capturing RAN1’s agreement on UE Tx TEG reporting (TS 38.214)

**Issue #1-14 in** [**R1-2205097**](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2205097.zip)**.**

Submitted Proposals

* ***(Qualcomm,*** [***R1-2204985***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2204985.zip) ***[8]) Proposal 3:*** *Add in the TS 38.214, the following changes:*
	+ *The UE may be configured to report, for the SRS resources for positioning that have already been transmitted, subject to UE capability, association information of SRS resource(s) configured by the higher layer parameter SRS-PosResource with UE Tx TEG(s) via higher layer parameter [ueTxTEG].*
	+ *If the UE reports a UE Tx TEG ID with a UE Rx-Tx time difference measurement, as defined in clause 5.1.6.5, the UE shall report the association information of already transmitted SRS resources configured by the higher layer parameter SRS-PosResource with the UE Tx TEG ID.*

FL Comments

It seems the RAN1’s agreement is not fully captured into 38.214. Thus, suggest discuss how to capture the agreement in TS 38.214.

### Proposal 7-2

*Adopt the following text proposal to TS38.214*

*• Reason for change*

*RAN1’s the agreement “Based on a configured periodicity, a UE may report the UE Tx TEG association for the SRS resources for positioning that have already been transmitted during the configured period” is not fully captured in the TS 38.214.*

*• Summary of change*

*Add the missing part “have already been transmitted” into the specs.*

*• Consequences if not approved*

*The specification does not capture RAN1 agreement properly.*

 *-----------------------Start of text proposal to TS 38.214 -----------*

*< Unchanged parts are omitted >*

* + *The UE may be configured to report, for the SRS resources for positioning that have already been transmitted, subject to UE capability, association information of SRS resource(s) configured by the higher layer parameter SRS-PosResource with UE Tx TEG(s) via higher layer parameter [ueTxTEG].*
	+ *If the UE reports a UE Tx TEG ID with a UE Rx-Tx time difference measurement, as defined in clause 5.1.6.5, the UE shall report the association information of already transmitted SRS resources configured by the higher layer parameter SRS-PosResource with the UE Tx TEG ID.*

*< Unchanged parts are omitted >*

*------------------------End of Text proposal to TS 38.214----------*

Comments

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **yes** | **NO** | **Additional comments** |
| Huawei, HiSilicon | Yes |  | The change should be highlighted. |
| Nokia/NSB | Yes |  |  |
| ZTE | Yes |  |  |
| OPPO | Yes |  |  |
| CATT | Yes |  |  |
| Qualcomm | Yes |  |  |
| vivo | Yes |  |  |

## TP for capturing RAN1’s agreement on multiple measurement instances

**Issue #1-15 in** [**R1-2205097**](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2205097.zip)**.**

Submitted Proposals

* ***(Qualcomm,*** [***R1-2204985***](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2204985.zip) ***[8]) Proposal 6:*** *Add the following sentence in TS 38.214 Section 5.1.6.5*
	+ *The UE may be configured, subject to UE capability, to report, for each indicated positioning method in a measurement report, multiple measurement instances associated with the indicated positioning method.*

FL Comments

It seems the RAN1’s agreement is not fully captured into 38.214. Thus, suggest discuss how to capture the agreement in TS 38.214.

### Proposal 7-3

*Add the following TP in Section 5.1.6.5 of TS 38.214:*

* + *The UE may be configured, subject to UE capability, to report, for each indicated positioning method in a measurement report, multiple measurement instances associated with the indicated positioning method.*

Comments

|  |  |  |
| --- | --- | --- |
| **Company** | **yes/no** | **Additional comments**  |
| Huawei, HiSilicon |  | Prefer to leave it up to RAN2 specification. |
| Nokia/NSB |  | No need to add to RAN1 spec.  |
| ZTE |  | We share the similar views with Huawei and Nokia. |
| OPPO |  | In the current spec, there is the following description. It seems capture the similar information as the TP. The UE may be configured to report one or more measurement instances, each with its own timestamp, on DL RSTD, DL PRS-RSRP, and/or UE Rx-Tx time difference measurements, in a single measurement report.  |
| CATT |  | Similar view as OPPO.  |
| vivo |  | Based on previous agreement in RAN1#108e, it should be up to RAN2 on how to implement above proposal.**Agreement*** The association between measurement instances and UE measurements in the report to LMF should be defined as follows:
	+ For each indicated positioning method in a measurement report, multiple measurement instances are associated with the indicated positioning method.
		- E.g., a UE reports in a single NR-XXX-ProvideLocationInformation, multiple NR-XXX-SignalMeasurementInformation elements for UE assisted positioning, and NR-XXX-LocationInformation for UE-based positioning.
* It is up to RAN2 on how to implement above agreement
* It is up to RAN3 to implement the association between measurement instances and gNB measurements in the report to LMF

Send an LS to RAN2/RAN3, asking them to take above information into account in their signalling work. |

# References

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2. [R1-2203436](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203436.zip) Maintenance on enhancements of accuracy improvements for NR positioning CATT
3. [R1-2203515](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203515.zip) Maintenance on accuracy improvements for NR positioning enhancements vivo
4. [R1-2203619](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203619.zip) Remaining issues on accuracy improvement for Rel-17 positioning ZTE
5. [R1-2203864](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203864.zip) Maintenance on accuracy improvement related enhancement Samsung
6. [R1-2203960](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203960.zip) Maintenance of Rel-17 Positioning Accuracy Enhancement OPPO
7. [R1-2204127](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2204127.zip) Remaining issues for accuracy enhancements for NR positioning InterDigital, Inc.
8. [R1-2204985](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2204985.zip) Maintenance on Accuracy Improvements Qualcomm Incorporated
9. [R1-2203024](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203024.zip)(R4-2206998) LS on the UE/TRP TEG framework RAN(CATT)
10. [R1-2203408](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203408.zip) Discussion on the UE/TRP TEG framework CATT
11. [R1-2203409](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203409.zip) Draft reply LS on the UE/TRP TEG framework CATT
12. [R1-2204924](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2204924.zip) Discussion on UE/TRP TEG framework Huawei, HiSilicon
13. [R1-2203040](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203040.zip) (R3-222721), "Questions concerning the implementation of RAN1 agreements in NRPPa," RAN3 (Ericsson)
14. [R1-2203412](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203412.zip) Discussion on questions concerning the implementation of RAN1 agreements in NRPPa CATT
15. [R1-2203413](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203413.zip) Draft reply LS on questions concerning the implementation of RAN1 agreements in NRPPa CATT
16. [R1-2203491](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203491.zip) Draft Reply LS on questions concerning the implementation of RAN1 agreements in NRPPa vivo
17. [R1-2203615](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203615.zip) Draft reply LS on questions of RAN1 agreements in NRPPa ZTE
18. [R1-2203963](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2203963.zip) Discussion on “Questions concerning the implementation of RAN1 agreements in NRPPa” OPPO
19. [R1-2204929](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_109-e/Docs/R1-2204929.zip) Draft reply LS on Questions concerning the implementation of RAN1 agreements in NRPPa Huawei, HiSilicon