3GPP TSG-RAN WG2 Meeting #109bis-e***R2-20xxxxx***

Online, April 20 – 30, 2020

**Agenda item:** 6.8.2.4

**Source:** Ericsson

**Title:** Email discussion report: [AT109bis-e][610][POS] LPP proposals (Ericsson)

**Document for:**  Discussion and Decision

# 1. Introduction

This document summarizes the following email discussion:

* [AT109bis-e][610][POS] LPP proposals (Ericsson)

 Scope: Discuss proposals 2, 4, 5, 6, 7, 8 from R2-2003783

 Intended outcome: Summary of agreements in R2-2003997

 Deadline: Wednesday 2020-04-29 1000 UTC

2 Discussion

The following rappoorted proposals from [1] are discussed in the below subsections:

**Rapporteur’s Proposal 2:** RAN2 should discuss the interpretation of additional paths measurements (*nr‑AdditionalPathList*) in case of additional timing measurements are reported.

**Rapporteur’s Proposal 4:** RAN2 should discuss the use cases for a new *LocationInformationType* ‘locationEstimateAndMeasurementsRequired’ in IE *CommonIEsProvideLocationInformation* first, before introducing the feature in LPP.

 **Rapporteur’s Proposal 5:** RAN2 should discuss whether PSCell/Scell information should be provided by a target device in *CommonIEsRequestAssistanceData*.

**Rapporteur’s Proposal 6:** RAN2 should inform RAN1 of the RAN2 discussion and concerns related to the SMTC information in the SSB assistance data, and ask RAN1 for any status update of the working assumption in RAN1.

**Rapporteur’s Proposal 7:** RAN2 should inform RAN1 of the RAN2 discussion and ask whether PRS-PRS QCL Type D indication is still needed (this may be a combined LS to RAN1 incl. Rapporteur’s Proposal 6).

**Rapporteur’s Proposal 8:** RAN2 should discuss whether

 (a) to change the name of the IE *TRP-ID* (e.g., to distinguish from the RAN3 TRP-ID), or

(b) to remove IE *TRP-ID* from LPP and add the relevant *TRP-ID* fields to the individual parent IEs.

2.1 Interpretation of additional paths measurements

The current definition in LPP for the additional path reporting is ambiguous/unclear; in particular together with the additional measurement reporting capability. The figure below is provided in [2] which illustrates the different path timing possibilities (for different resources of two exemplary TRPs):

The black line illustrates the "main RSTD", *nr-RSTD* measurement.

Reference Path

Reference TRP

Path#1

Neighbouring TRP

Path#2

Path#2

Path#1

Path#1

Path#2

Path#2

Path#1

Path#1

Path#2

Path#2

Resource#0

Resource#1

Resource#2

Resource#0

Resource#1

Resource#2

RSTD

The blue line illustrates the *nr-RSTD-ResultDiff* (provided in IE *NR-DL-TDOA-AdditionalMeasurementElement*).

The red line illustrates the *nr-AdditionalPathList* for the "main RSTD" (outside the *NR-DL-TDOA-AdditionalMeasurementElement*).

The green and orange dashed curves are the candidates for the *nr-AdditionalPathList*for *NR-DL-TDOA-AdditionalMeasurementElement* according to [2].

The proposal in [2] is to clarify the definition of the time reference of the additional paths, with the following two options:

**Option 1.1.** The additional path time reference is the first path of the resource (the reference path) illustrated in “orange” in the figure

**Option 1.2.** The additional path time reference is the first path of the resource used to determine RSTD illustrated in “green” in the figure.

Companies are asked to provide comments and a preference of option in the table below

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| 1 Additional path time reference of the additional measurements (RSTD and UE RxTx) |
| Company | Comments |
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2.2 Use cases for reporting both both measurements and location

[3] argus that due to the introduction of UE-based DL-TDOA and DL-AoD positioning modes in Rel-16, "the concept of information type needs to be updated" [3] such that the UE reports both, a location estimate and location measurements.

With UE-assisted positioning, the operator obtains information via the reported measurements and quality from the devices as well as the UE-assisted positioning and estimated uncertainty that can be used to optimize configurations, procedures, deployments costs etc with respect to the performance of UE-asisted positioning.

With UE-based positioning the UE can benefit from regular measurements over time and can obtain a better position estimate compared to UE-assisted position estimated in the network based on reported UE measurements. The operator can currently request measurements as part of UE-assisted positioning or estimated UE-based positions but not both. Therefore, the operator cannot correlate the signal configurations and measurements on the one hand and the UE-based position estimates on the other hand, in order to to optimize configurations, procedures, deployments costs etc with respect to the performance of UE-based positioning.

The discussion can be summarized in two options:

**Option 2.1**. Introduce the location information type locationEstimateAndMeasurementsRequired, enabling the operator to request for both a UE-based location estimate and measurements to allow positioning configuration optimization.

**Option 2.2**. Do not introduce the location information type locationEstimateAndMeasurementsRequired, meaning that the operator has to rely on a network-based UE-assisted location estimate to represent the UE-based location estimate in the positioning configuration optimization.

Companies are asked to provide comments and a preference of option in the table below

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| 2 Introduction of a new location information type for compbined location estimate and measurements |
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2.3 PSCell/Scell location information provisioning

In a request for assistance data, according to [2], the UE should not only provide the UE current Pcell identity, but also PSCell/Scell information. It was commented in [2] that PSCell/Scell information could be helpful for the LMF e.g., in case a target device does not support inter-frequency DL RSTD.

According to Summary Rapporteur’s understanding, this issue was proposed in previous Releases. One of the arguments against this feature was that the activation/deactivation of Scell’s can be a rather dynamic process, and the information provided by a UE may be outdated/less useful by a location server.

**Option 3.1.** The UE only provides the Pcell identity in the request for assistance data

**Option 3.2.** The UE provides the identity of the PCell as well as of any PSCells/SCells in the request for assistance data.

Companies are asked to provide comments and a preference of option in the table below

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| 3 PSCell/Scell location information provisioning |
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2.4 SMTC window information as part of the SSB assistance data

It was argued in [2] that the use case for the SMTC included in the SSB assistance data is not quite clear. It was pointed out in that the SMTC information in the SSB assistance data is indeed still a working assumption in RAN1. It is proposed to remove the SMTC information in the SSB assistance data in [2].

Since the SMTC information is part of the RAN1 parameter list, it should not be removed without RAN1 consultation. The situation can be summarized in the following two options

**Option 4.1.** Leave the SSB configuration as is, including the SMTC window parametsr

**Option 4.2.** Send an LS to RAN1 informing that from a RAN2 perspective, SMTC parameters do not seem the be necessary in the SSB assistance data over LPP, and ask about RAN1s view concerning these parameters

Companies are asked to provide comments and a preference of option in the table below

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| 4 SMTC window information as part of the SSB assistance data |
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2.5 QCL information in the DL-PRS assistance data

Accoring to [2], QCL Type D information between two DL-PRS Resources was only introduced to support DL-AoD positioning ; i.e., to force a target device to use the same RX beam for receiving multiple DL-PRS Resources from the same TRP. Since the assistance data and/or location request can be customized for DL-AoD, there appears to be no need for QCL Type D information between two DL-PRS Resources according to [2].

**Option 5.1.** Leave the QCL Type D information as is in the assistance data

**Option 5.2.** Send an LS to RAN1 to inform about the RAN2 discussion and ask whether PRS-PRS QCL Type D indication is still needed

Companies are asked to provide comments and a preference of option in the table below

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| 5 QCL information in the DL-PRS assistance data |
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2.6 TRP ID

It is argued in [2] and [4] that the IE *TRP-ID* in RAN2 need to be better defined to avoid confusion with RAN3, its use needs to be clarified and in what IEs it is needed and how the identifiers associated to a TRP shall be represented.

According to [2], it is enough with the PRS ID to uniquely identify a TRP within an LPP session between LMF and a UE. Furthermore, [4] provides a summary of TRP-ID issues. Ultimately, the following Table of required TRP-ID elements for various IEs is derived in [4]:

|  |  |
| --- | --- |
| IE name | Required fields |
| *NR-Multi-RTT-MeasElement* | dl-PRS-ID |
| *NR-DL-AoD-MeasElement* | dl-PRS-ID |
| *NR-DL-TDOA-MeasElement* | dl-PRS-ID |
| *NR-MeasuredResultsElement* | pci, CGI and ARFCN |
| *NR-TimeStamp* | None |
| *DL-PRS-IdInfo* | dl-PRS-ID |
| *NR-DL-PRS-AssistanceDataPerTRP* | dl-PRS-ID and ARFCN |
| *NR-SSB-Config* | PCI and ARFCN |
| *ReferenceTRP-RTD-Info* | dl-PRS-ID |
| *RTD-InfoElement* | dl-PRS-ID |
| *NR-DL-PRS-BeamInfo* | dl-PRS-ID |
| *TRP-LocationInfoElement* | dl-PRS-ID |

The above Table summarizes the IEs which currently make use of the IE *TRP-ID,* and which fields of the IE *TRP-ID* is/are required for the functionality in the corresponding parent IE.

In addition, the summary Rapporteur’s comment [1] is that a Cell-ID may be required in *NR-TimeStamp* to indicate the cell/TRP from which the SFN has been derived.

Companies are asked to provide comments about what IEs and procedures that make use of the different TRP identifiers in the table below

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| 6.1 IEs and procedures that make use of different TRP identifiers within an LPP session |
| Company | Comments |
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Another set of issues raised are

* appropriate name for the TRP identifier that identifies one of the up to 256 TRPs that a UE can handle (currently the name PRS ID is used)
* if the identifiers associated to TRPs shall be gathered in an IE, or if they should be present as individual fields
* the appropriate name of an IE gathering the TRP identifiers if agreed (currently, the name TRP-ID is used)

Companies are asked to provide comments about how different TRP identifiers are represented and named within an LPP session, in the table below

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| 6.2 TRP identifier representation and naming within an LPP session |
| Company | Comments |
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# 4. Summary

# 5. References

1. R2-2003783, “Summary of LPP agenda item 6.8.2.3”, Qualcomm Incorporated (Summary Rapporteur)
2. R2-2003061, "Remaining issues with LPP", Huawei, HiSilicon.
3. R2-2003130, "Measurement Reporting for UE based positioning", Ericsson
4. R2-2003318, "Handling on TRP-ID", Intel Corporation