3GPP TSG-RAN WG2 Meeting #110-e***R2-2006171***

Online, June 01 – 12, 2020

**Agenda item:** 6.8.2.3

**Source:** Qualcomm Incorporated

**Title:** LPP Clean-Up

**Document for:**  Discussion and Decision

# 1. Introduction

This contribution proposes several corrections to the LPP ASN.1 in the attached document.

**Document History:**

**v1 (R2-2003350):**

- Only "non-functional"/editorial ASN.1 corrections are included in \_v1, which comprise:

- ASN.1 formatting corrections;

- ASN.1 syntax corrections;

- multiplicity and type constraint definitions are collected in a new section 6.6.

NOTE 1: No corrections to the field description tables are included in \_v1. Emphasis is on finalizing the ASN.1 first.

NOTE 2: LPP ASN.1 generally follows the guidelines in TS 36.331.

NOTE 3: The fields in the field description tables in LPP are generally sorted in the order as they appear in the ASN.1.

NOTE 4: The attached version \_v1 passes ASN.1 syntax check if the "FFS" items are replaced by some temporary numbers.

**v2 (R2-2003981):**

- The Proposed Conclusions 1-22 from tdoc R2-2003982 are implemented, except Conclusion 2 (which will be implemented in the final version).

- The changes in the endorsed CR in R2-2003985 are implemented.

**v3 (R2-2005213):**

- The Proposed Conclusions 1-11 from tdoc R2-2006003 are implemented.

**v4 (R2-2005906):**

- The Proposed Conclusions 12-38 from tdoc R2-2005882 are implemented.

**v5 (R2-2006171):**

- The TP from R2-2005904 (Annex 1) is implemented ([AT110-e][612][POS] Report on TRP-ID continuation email discussion).

- The *nr-DL-PRS-RSRP-Result* and *nr-DL-PRS-RSRP-ResultDiff* in *NR‑DL‑AoD‑SignalMeasurementInformation* is changed to mandatory present.

- An *nr-NTA-Offset* field is added to IE *NR-Multi-RTT-SignalMeasurementInformation* according to RAN4 LS in R2-2006138.

- The TP from R2-2005907 (Annex 2) is implemented ([AT110-e][617][POS] Report on email discussion about structure of UE-based assistance data).

- The changes from R2-2005908 are implemented (Editorial and other minor updates).

**Proposal:** Agree the attached version \_v5.

# 2. Open Issues List

References:

[1] R2-2003982, "Email discussion report: [AT109bis-e][601][POS] LPP ASN.1 issue gathering and easy agreements", Qualcomm.

[2] R2-2006003, "Email discussion report: [Post109bis-e][948][POS] LPP ASN.1 review", Qualcomm.

[3] R2-2005882, "Report of offline discussion [AT110-e][606][POS] Open issues in LPP ASN.1 review", Qualcomm.

[4] R2-2005213, "LPP Clean-Up" (v3), Qualcomm.

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| --- | --- | --- | --- | --- | --- |
| Item | Reference | Issue #  (digits before -x refer to LPP section) | Brief Description / Headline | Proposed Conclusion Number in [2] | Proposed Conclusion Number in [3] |
| 1 | Sec. 2.2 in [1] | 6.4.1-2 | The definition of NR-PhysCellId-r16 may fit better in the new collapsed 6.4.3  The new IE RelativeLocation-r16 may fit better in the common section 6.4.1 | 1  No change needed. |  |
| 2 | Sec. 3.1 in [1] | 6.4.3-1 | Consider renaming the IE NR-TimingMeasQuality. | 2  Change IE name |  |
| 3 | Sec. 3.2.1 in [1] | 6.4.3-2 | Reference TRP Information. The current LPP is unclear about the definition/signalling of "assistance data reference TRP" and "RSTD reference TRP". |  | 12/13  nr-DL-PRS-ReferenceInfo in NR-DL-PRS-AssistanceData is changed to mandatory present |
|  | Includes also potential issues on nr-DL-PRS-ReferenceInfo and nr-DL-PRS-SFN0-Offset fields, as described. | 3  Move SFN0-Offset to PRS AD |  |
| 4 | Sec. 3.2.2a in [1] | 6.4.3-4 | Currently, the field *dl-PRS-ResourceRepetitionFactor* is mandatory within *DL-PRS-ResourceSet*. While should be possible that the field is not configured and there is no repetition. The same rationale also goes for *dl-PRS-ResourceTimeGap.*  Also, check if nr-DL-PRS-expectedRSTD-r16 and nr-DL-PRS-expectedRSTD-uncerainty-r16 need to be mandatory. | 4  Agree in principle. |  |
| 5 | Sec. 3.2.2b in [1] | 6.4.3-5 | For the indication of SSB as PRS QCL, currently the field PCI is mandatory, however, it is unnecessary when the SSB and PRS locate on the same frequency layer. |  | 14  No change needed. |
| 6 | Sec. 3.2.5 in [1] | 6.4.3-8 | Need codes are currently missing in IE TRP-ID and the existing condition is confusing/wrong.  Issue depends on the conclusion related to TRP-ID. |  | Per online agreements:  - The NR-SSB-Config IE includes NR physical cell identity and NR ARFCN but no (0..255) TRP ID.  - The included identifiers of the NR E-CID Signal Measurement Information per cell are the NR physical cell identity, NR cell global identity (shall be provided if the device was able to determine the NCGI of the measured cell at the time of measurement) and NRARFCN.  - Add NCGI, PCI and NR-ARFCN as optional cell identifiers of the IE associated to TRPs in the DL-PRS and UEB AD, as well as UEA measurements.    - Add NCGI, PCI and NR-ARFCN as optional cell identifiers of the NR-TimeStamp IE. |
| 7 | Sec. 3.2.6 in [1] | 6.4.3-9 | Conditional presence of trp-id field in IE NR-TimeStamp is confusing/wrong. |  | 15  No change needed; Need Codes can also be fixed after the freeze (if needed) |
| 8 | Sec. 3.3 in [1] | 6.4.3-10 | The IE NR-PositionCalculationAssistance may not be needed. It may be better moved to the IE definitions of NR-UEB-TRP-LocationData and NR-UEB-TRP-RTD-Info from 7.4.2 to 6.4.3. | 5  No change needed. |  |
| 9 | Sec. 3.3 in [1] | 6.4.3-11 | The description of ‘nr-DL-PRS-SFN0-Offset’ should be modified for UE-assisted positioning. | 6  Addopt solution analogous to LTE |  |
| 10 | Sec. 2.2 in [1] | 6.4.3-12 | Representation of beam directions: (a) 0.1 degrees resolution (current spec.) (b) 1 degree resolution with an optional refinement to 0.1 degrees. | 7  Adopt (b) |  |
| 11 | Sec. 4.1.2 in [1] | 6.5.9-2 | The TRP-ID in the IE NR-ECID-SignalMeasurementInformation is currently optional present. However, an identifier of the TRP/cell for which the measurements are applicable is always needed.  The systemFrameNumber can usually only be included if the NR-MeasuredResultsElement is provided for a serving cell. | 8  Agree in principle. |  |
| 12 | Sec. 5.1 in [1] | 6.5.10-1 | There is currently no complete description/explanation for the sharing of the assistance data provided in IE NR DL PRS AssistanceData and NR-SelectedDL-PRS-IndexList.  DL-PRS AssistanceData placement in the LPP message structure. |  | 16  No need to change the ASN.1. Handle the issue (if any) via proper field/IE description. |
| 13 | Sec. 5.3.1 in [1] | 6.5.10-3 | DL-PRS RSRP measurements can optionally be provided for DL-TDOA positioning. However, there is currently confusion, since RSTD is a measurement for a pair of TRPs, but the RSRP is a single TRP measurement only. |  | 17  (analogous to item #3) |
| 14 | Sec. 5.3.2 in [1] | 6.5.10-4 | The IE NR-TimingMeasQuality is used to provide the quality of the RSTD measurement. However, the quality of the reference TRP TOA used for RSTD cannot be provided. Further, the quality of the additional RSTD measurements per TRP pair (up to 3) can also not be provided. |  | 18  No need to change the ASN.1.  19  Add the Quality to the additional measurements |
| 15 | Sec. 5.3.5 in [1] | 6.5.10-7 | The IE NR-DL-TDOA-MeasElement provides the RSTD measurements for up to 256 TRPs. However, since the RSTD measurement is between a pair of TRPs, only up to 255 report elements for IE NR-DL-TDOA-MeasElement are possible. |  | 20  No need to change the ASN.1.  (related to conclusion of item#14) |
| 16 | Sec. 5.4.1 in [1] | 6.5.10-8 | The IE NR-DL-TDOA-RequestLocationInformation reserves a BIT STRING Size 1..8 for the requested RSRP measurement. However, a single bit would be sufficient. | 9  No change needed. |  |
| 17 | Sec. 5.5.1 in [1] | 6.5.10-10 | The capability for periodic reporting cannot be indicated separately for the positioning mode. | 10  Change to PositioningModes bit map |  |
| 18 | Sec. 5.5.2 in [1] | 6.5.10-11 | A BIT STRING Size 1..8 is used for indicating support for DL-PRS RSRP measurements for DL-TDOA positioning.  (related to Issue 6.5.10-8) | 11  No change needed. |  |
| 19 | Sec. 6.1 in [1] | 6.5.11-1 | Same as 6.5.10-1, but for DL-AoD |  | 16  No need to change the ASN.1. Handle the issue (if any) via proper field/IE description. |
| 20 | Sec. 6.4.1 in [1] | 6.5.11-6 | Same as 6.5.10-10, but for DL-AoD | 10  Change to PositioningModes bit map |  |
| 21 | Sec. 6.6 in [1] | 6.5.11-8 | nr-DL-PRS-RxBeamIndex-r16: a single bit of information, viz. Boolean may be enough. May be no need to report the ID of the RX beam used. |  | 21  nr-DL-PRS-RxBeamIndex is changed to OPTIONAL present |
| 22 | Sec. 7.1 in [1] | 6.5.12-1 | Same as 6.5.10-1, but for Multi-RTT |  | 16  No need to change the ASN.1. Handle the issue (if any) via proper field/IE description. |
| 23 | Sec. 7.3.1 in [1] | 6.5.12-4 | Same as 6.5.10-8, but for Multi-RTT | 9  No change needed. |  |
| 24 | Sec. 7.4.1 in [1] | 6.5.12-6 | Same as 6.5.10-11, but for Multi-RTT | 11  No change needed. |  |
| 25 | Sec. 4 in [2] | 6.5.10-12 | Add a request for posSIBs to LPP Request Assistance Data*.* |  | 22  No change needed. |
| 26 | Sec. 4 in [2] | 6.4.3-13 | The *DL-PRS-NumSymbols-r16* should be moved under *NR-DL-PRS-Resource-r16.* |  | 23  No change needed. |
| 27 | Sec. 4 in [2] | 6.5.12-7 | Add a *nr-DL-PRS-UE-Rx-Tx-MeasurementInfoRequest* to *NR-Multi-RTT-RequestLocationInformation*, analogous to *nr-DL-PRS-RstdMeasurementInfoRequest* for DL-TDOA. |  | 24  Missing field added. |
| 28 | Sec. 4 in [2] | 6.4.3-14 | *integerSubframeOffset-r16* in *nr-DL-PRS-SFN0-Offset-r16* is Need OP, but behaviour on absence is not defined |  | 25  Changed to mandatory present |
| 29 | Sec. 4 in [2] | 6.4.3-15 | Muting is considered to be optional in RAN1. |  | 26  No change needed. |
| 30 | Sec. 4 in [2] | 6.4.3-16 | Allow *nr-SSB-Config-r16* for up to 256 TRPs in IE NR-DL-PRS-AssistanceData-r16. |  | 27  Changed to (1..nrMaxTRPs-r16) |
| 31 | Sec. 4 in [2] | 6.5.10-13  6.5.11-9  6.5.12-8 | Define a priority of the assistance data for the UE (for DL-TDOA, DL-AoD, and Multi-RTT assistance data). |  | 28  No need to change the ASN.1. Handle the issue (if any) via proper field/IE description. |
| 32 | Sec. 4 in [2] | 6.5.12-9 | There is no quality indicator for the *nr-UE-RxTxTimeDiffAdditional-r16* in the IE *NR-Multi-RTT-AdditionalMeasurementElement-r16* |  | 29  nr-TimingQuality added |
| 33 | Sec. 4 in [2] | 6.5.10-14 | Missing value ranges for *nr-rstd* in IE *NR-DL-TDOA-MeasElement* can now be defined based on RAN4 LS R2-2004377/R2-2004383.  Missing value ranges for *timingReportingGranularityFactor* in IE *NR-DL-TDOA-ReportConfig* can now be defined based on RAN4 LS R2-2004377/R2-2004383. |  | 30  Values added |
| 34 | Sec. 4 in [2] | 6.5.10-15 | Missing value ranges for *nr-RSTD-ResultDiff* in IE *NR-DL-TDOA-AdditionalMeasurementElement* can now be defined based on RAN4 LS R2-2004383. |  | 31  Values added |
| 35 | Sec. 4 in [2] | 6.4.3-17 | Missing value ranges for *nr-relativeTimeDifference* in IE *NR-AdditionalPath* can now be defined based on RAN4 LS R2-2004383. |  | 32  Values added |
| 36 | Sec. 4 in [2] | 6.5.12-10 | Missing value ranges for *nr-UE-RxTxTimeDiff* in IE *NR-Multi-RTT-MeasElement* can now be defined based on RAN4 LS R2-2004383.  Missing value ranges for *nr-UE-RxTxTimeDiffAdditional* in IE *NR-Multi-RTT-AdditionalMeasurementElement* can now be defined based on RAN4 LS R2-2004383. |  | 33  Values added  NOTE: The UE TxTx measurement has been changed to mandatory present. |
| 37 | Sec. 4 in [2] | 6.5.10-16  6.5.11-10  6.5.12-11 | Missing value ranges for *nr-PRS-RSRP-Result* in IE *NR-DL-AoD-MeasElement*, *NR-DL-TDOA-MeasElement* and *NR-Multi-RTT-MeasElement* can now be defined based on RAN4 LS R2-2004383. |  | 34  Values added |
| 38 | Sec. 4 in [2] | 6.5.11-11 | Missing value ranges for *nr-PRS-RSRP-ResultDiff* in IE *NR-DL-AoD-AdditionalMeasurementElement* can now be defined based on RAN4 LS R2-2004383. |  | 35  Values added |
| 39 | Sec. 4 in [2] | 6.5.12-12  6.5.10-17 | Missing value ranges for *nr-PRS-RSRP-ResultDiff* in IE *NR-Multi-RTT-AdditionalMeasurementElement* can now be defined based on RAN4 LS R2-2004383.  Missing value ranges for *dl-PRS-RSRP-ResultDiff* in IE *NR-DL-TDOA-AdditionalMeasurementElement* can now be defined based on RAN4 LS R2-2004383. |  | 36  Values added |
| 40 | Sec. 4 in [2] | 6.4.2-1 | Add PSCell ID information in *CommonIEsRequestAssistanceData* |  | 37  No change needed. |
| 41 | Sec. 4 in [2] | 6.4.3-18 | Remove the *smtc-r16* field from IE *NR-SSB-Config-r16* |  | 38  SMTC removed from IE. |
| 42 | Sec. 4 in [2] | 6.4.3-19 | Change the field *ssbSubcarrierSpacing-r16* in IE *NR-SSB-Config* to optional present.  The field name should be *ssb-SubcarrierSpacing* with a “-“ |  | Proposal:  No change needed. |
| 43 | Sec. 4 in [2] | 6.4.3-20 | Add field description for the following fields  *trp-ID-r16*  The field description can be determined after the email discussion on trp-id  *nr-DL-PRS-ResourceID-List-r16*  List of resource Ids for the DL PRS resources on the RSTD reference TRP  *nr-DL-PRS-ResourceSetId-r16*)  resource set id for the DL PRS resource set on the RSTD reference TRP |  | Proposal:  Missing field descriptions can be added as corrections after the freeze. |
| 44 | Sec. 4 in [2] | 6.4.3-21 | Add field description for the following fields:  ***NR-DL-PRS-ReferenceInfo***  Note that the description is also related to the discussion in Issue 3 above on "assistance data reference TRP" and "RSTD reference TRP". Now, this field description can be FFS.  ***NR-TimeStamp***  Time stamp associated with the DL-TDOA/RSRP/UE rx-tx time difference measurement for DL-TDOA, DL-AOD and multi-RTT  ***NR-SelectedDL-PRS-PerFreq***  DL PRS resource configuerd for a specific frequency layer. |  | Proposal:  Missing field descriptions can be added as corrections after the freeze. |
| 45 | Sec. 4 in [2] | 6.4.3-22 | The current definition for *dl-PRS-Periodicity-and-ResourceSetSlotOffset* includes the *scs* of the PRS which is also provided in IE *NR-DL-PRS-PositioningFrequencyLayer.*  Remove the scs from *NR-DL-PRS-Periodicity-and-ResourceSetSlotOffset*. |  | Proposal:  No change needed. |
| 46 | Sec. 4 in [2] |  | Field description Tables do not follow LPP style and/or are missing. |  | Proposal:  Missing field descriptions can be added as corrections after the freeze. |
| 47 | Sec. 4 in [2] | 6.4.3-23 | Revise the field description for *dl-PRS-ResourceSlot Offset*  ***dl-PRS-ResourceSlotOffset***  This parameters indicates points to starting slot of DL PRS Resource with respect to corresponding *DL-PRS-ResourceSetSlotOffset* in number of slots***.*** |  | Proposal:  Missing field descriptions can be added as corrections after the freeze. |
| 48 | Sec. 4 in [2] | 6.4.3-24 | The field description of *nrARFCNRef-r16* in IE *TRP-ID* is not correct; description depends on the usage of the field. |  | Proposal:  Missing field descriptions can be added as corrections after the freeze. |
| 49 | Sec. 4 in [2] | 6.4.3-25 | *NR-SSB-Config* field description:  *ssb-periodicityServingCell* should be changed to *ssb-periodicity*  *ssb-Index* field description: Index of ssb serves as the source reference signal for the QCL relationship for DL PRS. |  | Proposal:  Missing field descriptions can be added as corrections after the freeze. |
| 50 | Sec. 4 in [2] |  | In the description for *NR-SelectedDL-PRS-IndexList*: In case of multiple methods, the *NR-DL-PRS-ProvideAssistanceData-r16* may only be present in one of the method (in IE *NR-SelectedDL-PRS-PerFreq-r16*) 🡺 Should be “*NR-DL-PRS-AssistanceData-r16*”.  The IE *DL-PRS-IdInfo* provides IDs provides the IDs of the reference and neighbour TRPs DL-PRS Resources. (in IE *DL-PRS-IdInfo*)  Suggest to change the naming of “*NR-UL-SRS-MeasCapability*” since UE only transmits SRS, for example, can be revised as “*NR-UL-SRS-TransCapability*”. |  | Proposal:  Missing field descriptions can be added as corrections after the freeze. |