**3GPP TSG-RAN WG2 Meeting #109 electronic R2-200xxxx**

**Elbonia, 24 Feb – 6 Mar 2020**

**Agenda item: 6.8.1**

**Source: Intel Corporation**

**Title: Report of [AT109e][601][POS] Harmonise posSIB numbering across CRs (Intel)**

**Document for: Discussion and Decision**

# Introduction

This is the email discussion report on below email discussion:

* [AT109e][601][POS] Harmonise posSIB numbering across CRs (Intel)

**Status:** Started

**Scope:** Align posSIB numbering between the following CRs:

* R2-2001333 (38.331 running CR)
* R2-2001216 (36.331 CR to introduce PPP-RTK)
* R2-2001255 (38.331 CR to introduce on-demand SI request in connected mode)
* R2-2001230 (37.355 CR to introduce PPP-RTK)
* R2-2001234 (TPs to 37.355 to introduce UE-based DL positioning)
* R2-2000006 (37.355 CR to introduce barometric pressure broadcast)
* R2-2000188 (36.331 CR to introduce barometric pressure broadcast)
* R2-2000396 (36.331 CR to introduce TBS AD broadcast)
* R2-2000426 (37.355 CR to introduce TBS AD broadcast)
* R2-2000153 (37.355 CR to introduce NavIC)
* R2-2000157 (36.331 CR to introduce NavIC)

**Intended Outcome:** Agreed document listing the posSIB numbers, for reference by individual CR authors

**Deadline: Thursday** 2020-02-27 1200 CET

# Discussion

The posSIB number is defined in section 7.2 in LPP specification TS36.355 or TS37.355 as below, and to be used in RRC specification.

The supported *posSibType*'s are specified in Table 7.2-1. The GNSS Common and Generic Assistance Data IEs are defined in sub-clause 6.5.2.2. The OTDOA Assistance Data IEs are defined in sub-clause 7.4.2.

Table 7.2-1: Mapping of posSibType to assistanceDataElement

|  |  |  |
| --- | --- | --- |
|  | *posSibType* [12] | *assistanceDataElement* |
| GNSS Common Assistance Data (clause 6.5.2.2) | *posSibType1-1* | *GNSS-ReferenceTime* |
| *posSibType1-2* | *GNSS-ReferenceLocation* |
| *posSibType1-3* | *GNSS-IonosphericModel* |
| *posSibType1-4* | *GNSS-EarthOrientationParameters* |
| *posSibType1-5* | *GNSS-RTK-ReferenceStationInfo* |
| *posSibType1-6* | *GNSS-RTK-CommonObservationInfo* |
| *posSibType1-7* | *GNSS-RTK-AuxiliaryStationData* |
| GNSS Generic Assistance Data (clause 6.5.2.2) | *posSibType2-1* | *GNSS-TimeModelList* |
| *posSibType2-2* | *GNSS-DifferentialCorrections* |
| *posSibType2-3* | *GNSS-NavigationModel* |
| *posSibType2-4* | *GNSS-RealTimeIntegrity* |
| *posSibType2-5* | *GNSS-DataBitAssistance* |
| *posSibType2-6* | *GNSS-AcquisitionAssistance* |
| *posSibType2-7* | *GNSS-Almanac* |
| *posSibType2-8* | *GNSS-UTC-Model* |
| *posSibType2-9* | *GNSS-AuxiliaryInformation* |
| *posSibType2-10* | *BDS-DifferentialCorrections* |
| *posSibType2-11* | *BDS-GridModelParameter* |
| *posSibType2-12* | *GNSS-RTK-Observations* |
| *posSibType2-13* | *GLO-RTK-BiasInformation* |
| *posSibType2-14* | *GNSS-RTK-MAC-CorrectionDifferences* |
| *posSibType2-15* | *GNSS-RTK-Residuals* |
| *posSibType2-16* | *GNSS-RTK-FKP-Gradients* |
| *posSibType2-17* | *GNSS-SSR-OrbitCorrections* |
| *posSibType2-18* | *GNSS-SSR-ClockCorrections* |
| *posSibType2-19* | *GNSS-SSR-CodeBias* |
| OTDOA Assistance Data (clause 7.4.2) | *posSibType3-1* | *OTDOA-UE-Assisted* |

The new posSIBs introduced in Rel-16 are:

LTE:

* Barometric pressure R2-2000006 [6]:

|  |  |  |
| --- | --- | --- |
| Barometric Assistance Data  (clause 6.5.5.8) | *posSibTypeX-Y* | *Sensor-AssistanceDataList* |

* TBS AD in R2-2000426 [9];

|  |  |  |
| --- | --- | --- |
| TBS Assistance Data  (clause 7.4.2) | *posSibTypeX-Y* | *TBS-AssistanceDataList* |

* NavIC R2-2000153 [10];

|  |  |  |
| --- | --- | --- |
| GNSS Generic Assistance Data (clause 6.5.2.2) | *posSibType2-xx* | *NavIC-DifferentialCorrections* |
| *posSibType2-yy* | *NavIC-GridModelParameter* |

NR/LTE:

* PPP-RTK R2-2001230 [4];

|  |  |  |
| --- | --- | --- |
|  | *posSibType* [12] | *assistanceDataElement* |
| GNSS Common Assistance Data (clause 6.5.2.2) | *posSibType1-8* | *GNSS-SSR-CorrectionPoints* |
| GNSS Generic Assistance Data (clause 6.5.2.2) | *posSibType2-20* | *GNSS-SSR-URA* |
| *posSibType2-21* | *GNSS-SSR-PhaseBias* |
| *posSibType2-22* | *GNSS-SSR-STEC-Correction* |
| *posSibType2-23* | *GNSS-SSR-GriddedCorrection* |

NR:

posSIB related agreements are

Agreements:

The mapping table 7.2-1 defined in TS36.355 is reused for A-GNSS, RTK, and LTE OTDOA

Introduce new posSibType(s) for PPP-RTK

Introduce new posSibType(s) for NR DL TDOA

* UE based DL positioning R2-2001234 [5], aligned with agreement “Split the position calculation assistance data into two separate posSIBs, one containing the TRP coordinates and one containing the RTDs.”;

'*posSibTypeX-y*' *NR-UEB-TRP-LocationData*

'*posSibTypeX-z*'. *NR-UEB-TRP-RTD-Info*

So far, the necessary posSIBs for PPP-RTK, NavIC, TBS aD and barometric pressure are quite stable. We should do the numbering for them first.

The example could be:

Table 7.2-1: Mapping of posSibType to assistanceDataElement

|  |  |  |
| --- | --- | --- |
|  | *posSibType* [12] | *assistanceDataElement* |
| GNSS Common Assistance Data (clause 6.5.2.2) | *posSibType1-1* | *GNSS-ReferenceTime* |
| *posSibType1-2* | *GNSS-ReferenceLocation* |
| *posSibType1-3* | *GNSS-IonosphericModel* |
| *posSibType1-4* | *GNSS-EarthOrientationParameters* |
| *posSibType1-5* | *GNSS-RTK-ReferenceStationInfo* |
| *posSibType1-6* | *GNSS-RTK-CommonObservationInfo* |
| *posSibType1-7* | *GNSS-RTK-AuxiliaryStationData* |
| *posSibType1-8* | *GNSS-SSR-CorrectionPoints* |
| GNSS Generic Assistance Data (clause 6.5.2.2) | *posSibType2-1* | *GNSS-TimeModelList* |
| *posSibType2-2* | *GNSS-DifferentialCorrections* |
| *posSibType2-3* | *GNSS-NavigationModel* |
| *posSibType2-4* | *GNSS-RealTimeIntegrity* |
| *posSibType2-5* | *GNSS-DataBitAssistance* |
| *posSibType2-6* | *GNSS-AcquisitionAssistance* |
| *posSibType2-7* | *GNSS-Almanac* |
| *posSibType2-8* | *GNSS-UTC-Model* |
| *posSibType2-9* | *GNSS-AuxiliaryInformation* |
| *posSibType2-10* | *BDS-DifferentialCorrections* |
| *posSibType2-11* | *BDS-GridModelParameter* |
| *posSibType2-12* | *GNSS-RTK-Observations* |
| *posSibType2-13* | *GLO-RTK-BiasInformation* |
| *posSibType2-14* | *GNSS-RTK-MAC-CorrectionDifferences* |
| *posSibType2-15* | *GNSS-RTK-Residuals* |
| *posSibType2-16* | *GNSS-RTK-FKP-Gradients* |
| *posSibType2-17* | *GNSS-SSR-OrbitCorrections* |
| *posSibType2-18* | *GNSS-SSR-ClockCorrections* |
| *posSibType2-19* | *GNSS-SSR-CodeBias* |
| *posSibType2-20* | *NavIC-DifferentialCorrections* |
| *posSibType2-21* | *NavIC-GridModelParameter* |
| *posSibType2-22* | *GNSS-SSR-URA* |
| *posSibType2-23* | *GNSS-SSR-PhaseBias* |
| *posSibType2-24* | *GNSS-SSR-STEC-Correction* |
| *posSibType2-25* | *GNSS-SSR-GriddedCorrection* |
| OTDOA Assistance Data (clause 7.4.2) | *posSibType3-1* | *OTDOA-UE-Assisted* |
| Barometric Assistance Data  (clause 6.5.5.8) | *posSibType4-1* | *Sensor-AssistanceDataList* |
| TBS Assistance Data  (clause 7.4.2) | *posSibType5-1* | *TBS-AssistanceDataList* |
|  |  |  |

**Question 1: Do companies agree the above number allocation for TBS AD, barometric pressure, NavIC and PPP-RTK?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Remark** |
| Huawei | Yes | the above number allocation is ok |
| Intel | Yes |  |
| Qualcomm | No | In Rel-16, the new SSR posSIBs are applicable to both, LTE and NR, but the NavIC posSIBs only to LTE. Therefore, it would be better to first add the SSR posSIB types, and then the NavIC.  This would keep the GNSS SSR posSIB numbering in Rel-16 continuous for both, LTE and NR.  The posSIB numbering should be:  posSibType2-20 GNSS-SSR-URA  posSibType2-21 GNSS-SSR-PhaseBias  posSibType2-22 GNSS-SSR-STEC-Correction  posSibType2-23 GNSS-SSR-GriddedCorrection  posSibType2-24 NavIC-DifferentialCorrections  posSibType2-25 NavIC-GridModelParameter  posSIBs -20 to -23 will go into both, LTE and NR RRC, but posSIBs -24/-25 only in LTE RRC in this Release.  With the current proposal, we would have a jump from 19 to 22 for NR RRC. It’s not really technical, but it would keep the SSR numbering continuous/together. With the current proposal, SSR is interleaved by NavIC. |
| Nokia | No | Allocating consecutive *posSibType* numbers for GNSS SSR generic assistance data is preferred since we have the opportunity to do so right now. |
| CATT | No | Agree with Qualcomm’s comments, the locations of SSR and NavIC should be exchanged. |

For NR posSIB, the agreement should be updated a bit to “Introduce new posSibType(s) for NR DL TDOA and DL AoD” since we have agreed that UE based positioning can be applied for DL-TDOA and DL AoD.

**Question 2: Do companies agree the new posSIB should be applied for both NR DL TDOA and DL AoD?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Remark** |
| Huawei | Yes | PosSIB(s) should be introduced for both NR DL TDOA and DL AoD according to the previous agreement. |
| Intel | Yes |  |
| Qualcomm | Yes |  |
| Nokia | Yes |  |
| CATT | Yes |  |

We assume same as OTDOA, a new posSIB is sufficient for NR DL TDOA and NR DL AoD since the assistance data for them are same, except referencing cell. Then it will be:

|  |  |  |
| --- | --- | --- |
| NR DL Assistance Data (clause 7.4.2) | *posSibType6-1* | *NR-DL-UE-Assisted* |

**Question 3: Do companies agree the new posSIB posSibType6-1 is introduced for both DL TDOA and DL AoD?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Remark** |
| Huawei | Yes | But, this could be named as like“NR-DL-Measurement-AD” because this posSIB includes PRS configuration and it could be used for both UE-assisted and UE-based DL positioning. |
| Intel | Yes | Agree with Huawei’s suggestion |
|  |  |  |
| Qualcomm | Yes | The name proposed by Huawei is fine with us as well. |
| Nokia | Yes | We prefer to see DL-TDOA and DL-AoD in the description in first column but would like to keep the *assistanceDataElement* name as *NR-DL-UE-Assisted* to align with LTE OTDOA. It also nicely contrasts with -UEB- in the assistance data element for UE-Based.  I suggest something like: “NR DL-TDOA/DL-AoD Assistance Data (clause 7.4.2)” in the first column |
| CATT | Yes | We have no strong opinion on the naming. Both are acceptable. |

The posSIB for UE based positioning can be introduced under NR DL Asssitance data, i.e.

|  |  |  |
| --- | --- | --- |
| NR DL Assistance Data (clause 7.4.2) | *posSibType6-1* | *NR-DL-UE-Assisted* |
| *posSibType6-2* | *NR-UEB-TRP-LocationData* |
| *posSibType6-3* | *NR-UEB-TRP-RTD-Info* |

**Question 4: Do companies agree posSibType6-2 and posSibType6-3 for NR-UEB-TRP-LocationData and NR-UEB-TRP-RTD-Info?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Remark** |
| Huawei | Yes, as baseline | The following agreement has been agreed.  *Split the position calculation assistance data into two separate posSIBs, one containing the TRP coordinates and one containing the RTDs”*  *Include spatial direction information of the DL-PRS Resources in the position calculation assistance data (e.g., azimuth, elevation)for UE-based for DL-AoD.*  So, based on these agreements, it is reasonable to organize the SIB as the current text. In addition, we would like to point out that there is ongoing email discussion on UE-based positioning,  [R2-2001234](file:///C:\\Users\\mtk16923\\Documents\\3GPP%20Meetings\\202002%20-%20RAN2_109e,%20Online\\Extracts\\R2-2001234_(Email%20discussion%20108-89NR-Pos%20Assistance%20Data%20for%20UE-based).docx" \o "C:Usersmtk16923Documents3GPP Meetings202002 - RAN2_109e, OnlineExtractsR2-2001234_(Email discussion 108-89NR-Pos Assistance Data for UE-based).docx) Summary of [108#89][NR/Pos] UE-based downlink positioning assistance data Qualcomm Incorportaed discussion NR\_pos-Core  Within this tdoc, the following has been proposed:  **Proposal:** RAN2 to discuss and decide  (a) whether beamwidth information can be provided in the assistance data in Rel-16 or should be deferred to e.g. Rel-17;  (b) whether to support LCS-to-GCS translation parameter for the spatial direction information;  (c) whether to include RTD drift rate in the assistance data;  (d) whether to include RTD per DL-PRS Resource.  If some progress has been made, the content of system information needs to be updated based on that. |
| Intel | Yes | The content of each posSIB should be discussed in separate topics. |
| Qualcomm | Yes |  |
| Nokia | Yes | See also our comment for Question 3. |
| CATT | Yes |  |

Since so far, the posSIB for LTE and NR are specified in the same table, it would be good to add columns to show whether a posSIB is applied for LTE and/or NR.

The example is shown as below:

Table 7.2-1: Mapping of posSibType to assistanceDataElement

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | *posSibType* [12] | *assistanceDataElement* | *LTE* | *NR* |
| GNSS Common Assistance Data (clause 6.5.2.2) | *posSibType1-1* | *GNSS-ReferenceTime* | *Yes* | *Yes* |
| *posSibType1-2* | *GNSS-ReferenceLocation* | *Yes* | *Yes* |
| *posSibType1-3* | *GNSS-IonosphericModel* | *Yes* | *Yes* |
| *posSibType1-4* | *GNSS-EarthOrientationParameters* | *Yes* | *Yes* |
| *posSibType1-5* | *GNSS-RTK-ReferenceStationInfo* | *Yes* | *Yes* |
| *posSibType1-6* | *GNSS-RTK-CommonObservationInfo* | *Yes* | *Yes* |
| *posSibType1-7* | *GNSS-RTK-AuxiliaryStationData* | *Yes* | *Yes* |
| *posSibType1-8* | *GNSS-SSR-CorrectionPoints* | *Yes* | *Yes* |
| GNSS Generic Assistance Data (clause 6.5.2.2) | *posSibType2-1* | *GNSS-TimeModelList* | *Yes* | *Yes* |
| *posSibType2-2* | *GNSS-DifferentialCorrections* | *Yes* | *Yes* |
| *posSibType2-3* | *GNSS-NavigationModel* | *Yes* | *Yes* |
| *posSibType2-4* | *GNSS-RealTimeIntegrity* | *Yes* | *Yes* |
| *posSibType2-5* | *GNSS-DataBitAssistance* | *Yes* | *Yes* |
| *posSibType2-6* | *GNSS-AcquisitionAssistance* | *Yes* | *Yes* |
| *posSibType2-7* | *GNSS-Almanac* | *Yes* | *Yes* |
| *posSibType2-8* | *GNSS-UTC-Model* | *Yes* | *Yes* |
| *posSibType2-9* | *GNSS-AuxiliaryInformation* | *Yes* | *Yes* |
| *posSibType2-10* | *BDS-DifferentialCorrections* | *Yes* | *Yes* |
| *posSibType2-11* | *BDS-GridModelParameter* | *Yes* | *Yes* |
| *posSibType2-12* | *GNSS-RTK-Observations* | *Yes* | *Yes* |
| *posSibType2-13* | *GLO-RTK-BiasInformation* | *Yes* | *Yes* |
| *posSibType2-14* | *GNSS-RTK-MAC-CorrectionDifferences* | *Yes* | *Yes* |
| *posSibType2-15* | *GNSS-RTK-Residuals* | *Yes* | *Yes* |
| *posSibType2-16* | *GNSS-RTK-FKP-Gradients* | *Yes* | *Yes* |
| *posSibType2-17* | *GNSS-SSR-OrbitCorrections* | *Yes* | *Yes* |
| *posSibType2-18* | *GNSS-SSR-ClockCorrections* | *Yes* | *Yes* |
| *posSibType2-19* | *GNSS-SSR-CodeBias* | *Yes* | *Yes* |
| *posSibType2-20* | *NavIC-DifferentialCorrections* | *Yes* | *No* |
| *posSibType2-21* | *NavIC-GridModelParameter* | *Yes* | *No* |
| *posSibType2-22* | *GNSS-SSR-URA* | *Yes* | *Yes* |
| *posSibType2-23* | *GNSS-SSR-PhaseBias* | *Yes* | *Yes* |
| *posSibType2-24* | *GNSS-SSR-STEC-Correction* | *Yes* | *Yes* |
| *posSibType2-25* | *GNSS-SSR-GriddedCorrection* | *Yes* | *Yes* |
| OTDOA Assistance Data (clause 7.4.2) | *posSibType3-1* | *OTDOA-UE-Assisted* | *Yes* | *No* |
| Barometric Assistance Data  (clause 6.5.5.8) | *posSibType4-1* | *Sensor-AssistanceDataList* | *Yes* | *No* |
| TBS Assistance Data  (clause 7.4.2) | *posSibType5-1* | *TBS-AssistanceDataList* | *Yes* | *No* |
| NR DL Assistance Data (clause 7.4.2) | *posSibType6-1* | *NR-DL-UE-Assisted* | *No* | *Yes* |
| *posSibType6-2* | *NR-UEB-TRP-LocationData* | *No* | *Yes* |
| *posSibType6-3* | *NR-UEB-TRP-RTD-Info* | *No* | *Yes* |

**Question 5: Do companies agree to introduce columns on whether the posSIBs are applied for LTE and/or NR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Remark** |
| Huawei | No | As our agreed positioning architecture shown, all positioning methods should be supported by NG-RAN, which includes both LTE (ng-eNB) and NR (gNB). It depends on LMF implementation to transmit which posSib to ng-eNB or gNB. RAN just provide a broadcast way to LMF to transmit AD. UE will decide to receive which posSib based on its positioning capacity and positioning requirements. Actually, this spec will be captured in 37.355, which itself is a multi-RAT spec. |
| Intel | Yes | It is related to whether LTE RRC or NR RRC can support the posSIB or not. For instance, NR RRC will not broadcast the posSIBs for NavIC, OTDOA, TBS and sensor. That’s NR node cannot broadcastposSIBs for NavIC, OTDOA, TBS and sensor even if the NR is considered as NG-RAN. Same limitation on ng-eNB. |
| Qualcomm | No | We don’t see a need for the new columns. This may be more appropriate for a Stage 2 specification, but for Stage 3, the applicability is clear from the RRC specifications. |
| Nokia | Yes | For some *assistanceDataElement* like *OTDOA-UE-Assisted* the IE description in 37.355 references 36.331 and for some other *assistanceDataElements* it is not (only the description under *AssistanceDataSIBelement* reference 36.331). While I expect 38.331 reference to be added to the appropriate places, it is still not explicit as to which *assistanceDataElement* applies to LTE or NR or both. We think the two new columns are informative and explicitly makes it clear whether the *assistanceDataElement* is applicable to LTE or NR or both. |
| CATT | No | The information is clear defined in RRC specification. |

**Question 6: If answer to 5 is yes, Do companies agree to the table shown as above on LTE/NR column?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Remark** |
| Intel | Yes |  |
| Nokia | Yes |  |
|  |  |  |

This is placeholder. Companies are invited to add if anything is missing in above discussion.

**Question 7: Is anything missing?**

|  |  |
| --- | --- |
| **Company** | **Remark** |
|  |  |
|  |  |
|  |  |

# Conclusion

The followings are proposed:

# References

[1] R2-2001333 (38.331 running CR)

[2] R2-2001216 (36.331 CR to introduce PPP-RTK)

[3] R2-2001255 (38.331 CR to introduce on-demand SI request in connected mode)

[4] R2-2001230 (37.355 CR to introduce PPP-RTK)

[5] R2-2001234 (TPs to 37.355 to introduce UE-based DL positioning)

[6] R2-2000006 (37.355 CR to introduce barometric pressure broadcast)

[7] R2-2000188 (36.331 CR to introduce barometric pressure broadcast)

[8] R2-2000396 (36.331 CR to introduce TBS AD broadcast)

[9] R2-2000426 (37.355 CR to introduce TBS AD broadcast)

[10] R2-2000153 (37.355 CR to introduce NavIC)

[11] R2-2000157 (36.331 CR to introduce NavIC)