**3GPP TSG-RAN WG2 Meeting #124R2-231xxxx**

**Chicago, USA, Nov 13-17, 2023, 2023**

**Agenda item: 7.2.1**

**Source: Xiaomi**

**Title: [Post124][417][POS] Rel-18 positioning 37.355/38.355 capabilities (Xiaomi)**

**Document for: Discussion and Decision**

# Introduction

This is to kick off the following post meeting email discussion.

* [Post124][418][POS] Rel-18 positioning 37.355/38.355 capabilities (Xiaomi)

Scope: Finalise and check the LPP and SLPP portions of the Rel-18 positioning capabilities (including taking into account updates to the RAN1 feature list).

Intended outcome: Endorsed TPs for merge into LPP CR and SLPP TS

Deadline: Short (same deadline as for merge into mega CRs)

The UE capabilities on CPP for LPP are not provided yet since all RAN1 UE features on CPP are marked with FFS and/or yellow.

Companies comments are invited to provide in this document.

# Discussion on the TP for SLPP

**Question 1: Companies are invited to provide their comments on the TP for the SLPP**

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| **Company** | **Comments** |
| Intel | Common-SL-PRS-Methods-ProvideCapabilities => CommonSL-PRS-MethodsIEsProvideCapabilities  Rapp: Revised accordingly. |
| Intel | ten-ms-unit-ResponseTime => tenMsUnitResponseTime  Rapp: Revised accordingly. |
| Intel | maxBands needs to be defined.  Rapp: Revised accordingly. |
| Intel | ENUMATED=> ENUMERATED  Rapp: Revised accordingly. |
| Intel | For per band capability, e.g. SL-PRS-CapabilityPerBand, SL-AOA-CapabilityPerBand , band info, i.e. ARFCH needs to be added in the IE;  Rapp: Revised accordingly. |
| Intel1 | Based on RAN1 email discussion, following features were captured by mistake and shall be removed:   * + 41-1-19b   + 41-1-20   + 41-1-21   + 41-1-22   + 41-2-12   + 41-4-19   Rapp: Removed. |
| Lenovo | **V02\_Rapp:**  In clause 6.3.1 the ASN.1 tags for FreqBandIndicatorNR and PositioningModes are missing.  Rapp: Revised accordingly. |
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# Discussion on the TP for LPHAP

The UE features with the FFS are not implemented in the TP, therefore, only the following UE features are implemented in the TP:

RAN2 UE feature list:

* Preconfigured SRS in RRC\_INACTIVE state in validity area for initial UL BWP
* Preconfigured SRS in RRC\_INACTIVE state in validity area for configured outside UL BWP

**Question 2: Companies are invited to provide their comments on the TP for LPHAP**

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| **Company** | **Comments** |
| Nokia | preconfiguredposSRS-RRC-Inactive-InitialUL-BWP-r18 => preconfiguredPosSRS-RRC-Inactive-InitialUL-BWP-r18 OR preconfigured-posSRS-RRC-Inactive-InitialUL-BWP-r18  preconfiguredposSRS-RRC-Inactive-OutsideInitialUL-BWP-r18 => preconfiguredPosSRS-RRC-Inactive-OutsideInitialUL-BWP-r18 OR preconfigured-posSRS-RRC-Inactive-OutsideInitialUL-BWP-r18  Rapp: Revised as preconfiguredPosSRS-RRC-InactiveInitialUL-BWP-r18 and preconfiguredPosSRS-RRC-InactiveOutsideInitialUL-BWP-r18, it is aligned with ASN.1 |
| Nokia | Typo: ***preconfiguredposSRS-RRC-Inactive-OutsideitialUL-BWP. Name not aligned with ASN.1.***  Rapp: Revised as preconfiguredPosSRS-RRC-InactiveOutsideInitialUL-BWP-r18 |
| Nokia | Why still TP. Are we not going to have a CR? Also, why still have separate TP for each feature. Shouldn’t we be merging all into one running CR which will be used to merge into the mega CR?  Rapp: According to the chairman notes, the outcome is TP, but no strong view on TP or running CR. The separate TPs are easier for tracking UE capabilities for different UE features, and a single LPP TP will be provided for email approval. |
| Ericsson | preconfiguredposSRS-RRC-Inactive-InitialUL-BWP-r18 ENUMERATED {supported} OPTIONAL,  preconfiguredposSRS-RRC-Inactive-OutsideInitialUL-BWP-r18 ENUMERATED {supported} OPTIONAL  ]]  We do not need to say preconfigured; it is up to NW whether to configure pre or non-pre config.  So name can be:  srs-PosRRC-Inactive-InitialUL-BWP-r18 ENUMERATED {supported} OPTIONAL,  srs-PosRRC-Inactive-OutsideInitialUL-BWP-r18 ENUMERATED {supported} OPTIONAL  ]]  Rapp: Revised accordingly |
| Lenovo | **V03\_Rapp:**  In the description of posSRS-RRC-InactiveInitialUL-BWP and posSRS-RRC-InactiveOutsideInitialUL-BWP a typo in “RRC\_INACTUIVE” should be fixed, i.e. remove redundant letter “U”.  Rapp: Revised accordingly. |
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# Discussion on the TP for bandwidth aggregation

The UE features with FFS and/or marked with yellow are not implemented in the TP, therefore, the following UE features are implemented in the TP.

RAN1 UE feature list:

* FG 41-4-1
* FG 41-4-1a
* FG 41-4-1b
* FG 41-4-1c
* FG 41-4-3
* FG 41-4-3a
* FG 41-4-4
* FG 41-4-4a
* FG 41-4-5

**Question 3: Companies are invited to provide their comments on the TP for the bandwidth aggregation**

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| **Company** | **Comments** |
| Intel | last comma shall be deleted  },  }  Rapp: Revised accordingly. |
| Intel | Comma needs to be added  ...  [[  Rapp: Revised accordingly. |
| Nokia | PRS-BWA-TwoContiguoousIntrabandInMG-r18 => PRS-BWA-TwoContiguousIntrabandInMG-r18. There is similar typo in other instances too.  Rapp: Revised accordingly. |
| Nokia | In the field descriptions in LPP, a UE is referred to as target device. This should be consistent.  Rapp: Revised accordingly. |
| Lenovo | **V04\_Rapp:**   * In ASN.1 of IE NR-DL-PRS-ProcessingCapability the typos in the below names should be fixed, i.e. remove redundant letter “o”.   PRS-BWA-TwoContiguoousIntrabandInMG-r18 ::= SEQUENCE {  PRS-BWA-ThreeContiguoousIntrabandInMG-r18 ::= SEQUENCE {   * In ASN.1 of PRS-BWA-ThreeContiguoousIntrabandInMG-r18 a comma is missing, see below.   maxNumOfAggregatedDL-PRS-ResourcePerSlot-FR1-r18 SEQUENCE {  scs15-r18 ENUMERATED {n1, n2, n4, n6, n8, n12,  n16, n24, n32, n48, n64 }  OPTIONAL,  scs30-r18 ENUMERATED {n1, n2, n4, n6, n8, n12,  n16, n24, n32, n48, n64 }  OPTIONAL,  scs60-r18 ENUMERATED {n1, n2, n4, n6, n8, n12,  n16, n24, n32, n48, n64 }  OPTIONAL  },  maxNumOfAggregatedDL-PRS-ResourcePerSlot-FR2-r18 SEQUENCE {   * In ASN.1 of IE NR-DL-TDOA-MeasurementCapability the square brackets were added w/o change marks.   DL-TDOA-MeasCapabilityPerBand-r17 ::= SEQUENCE {  freqBandIndicatorNR-r17 FreqBandIndicatorNR-r16,  supportOfDL-PRS-FirstPathRSRP-r17 ENUMERATED { supported } OPTIONAL,  dl-PRS-MeasRRC-Inactive-r17 ENUMERATED { supported } OPTIONAL,  ...,  [[  supportOfDL-PRS-BWA-RRC-Connected-r18 ENUMERATED { supported } OPTIONAL,  supportOfDL-PRS-BWA-RRC-Inactive-r18 ENUMERATED { supported } OPTIONAL,  supportOfDL-PRS-BWA-RRC-Idle-r18 ENUMERATED { supported } OPTIONAL  ]]  }  Rapp: Revised accordingly |
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# Discussion on the TP for Redcap UE positioning

The UE features with the FFS are not implemented in the TP and FG 41-5-x is not implemented since it seems that both gNB and LMF don’t need to know the capability according to the feature list, the further update is needed from RAN1, therefore, only the following UE features are implemented in the TP.

RAN1 UE feature list:

* FG 41-5-1a
* FG 41-5-1b

**Question 4: Companies are invited to provide their comments on the TP for Redcap UE positioning**

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| **Company** | **Comments** |
| Nokia | In the field descriptions in LPP, a UE is referred to as target device. This should be consistent.  Rapp: the current description is aligned with other existing UE capabilities. |
| Nokia | Drop “supported” from the capability names of supportedDL-PRS-MeasurementWithRxFH-RRC-Inactive and supportedDL-PRS-MeasurementWithRxFH-RRC-Idle.  Rapp: Revised accordingly. It revised as *dl-PRS-MeasurementWithRxFH-RRC-Inactive and dl-PRS-MeasurementWithRxFH-RRC-Idle.* |
| CATT | These Components in 41-5-1 which apply to Redcap UE can be captured in LPP. Only [FFS: whether this FG is applicable to non-Redcap UE]. So it seems the components won’t be applied to non-Redcap UE so far. But I didn’t find any capabilities on 41-5-1 in TP.  Rapp: current TP don’t capture the 41-5-1 since the Prerequisite feature groups of FG 41-5-1 is marked with yellow, and if this FG is applicable to non-Recap UEs, the following description of the features should be updated accordingly, so the Rapp prefer not to capture it now.  PRS measurement with Rx frequency hopping within a MG and measurement reporting RRC\_CONNECTED for RedCap UEs |
| Ericsson | Below **a**nd can be **A**nd  reducedNumOfSampleForMeasurementWithFH-RRC\_IdleandInacitve-r18  reducedNumOfSampleForMeasurementWithFH-RRC\_IdleAndInacitve-r18  Rapp: Revised accordingly |
| Lenovo | **V03\_Rapp:**  In ASN.1 and field description of reducedNumOfSampleForMeasurementWithFH-RRC\_IdleAndInacitve-r18 there is a typo. The word “Inacitve” should say “Inactive”.  NR-DL-PRS-ProcessingCapability field descriptions:   * In the description of dl-PRS-MeasurementWithRxFH-RRC-Inactive and dl-PRS-MeasurementWithRxFH-RRC-Idle the word “in” is missing, see below.   “…and measurement reporting in RRC\_CONNECTED for RedCap UEs …”   * In the description of reducedNumOfSampleForMeasurementWithFH-RRC-Connected and reducedNumOfSampleForMeasurementWithFH-RRC\_IdleAndInacitve we suggest the highlighted changes below since only supportOfRedCap-r17 is defined in 38.331, and supportedDL-PRS-ProcessingSamples-RRC-CONNECTED-r17 is defined only in LPP.   “The UE can indicate TRUE only if the UE supports *supportOfRedCap-r17* defined in TS 38.331 [35], and *supportedDL-PRS-ProcessingSamples-RRC-CONNECTED-r17* ~~defined in TS 38.331 [35]~~. Otherwise, the UE indicates FALSE.”  Rapp: Revised accordingly |
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# Discussion on the TP for RAT-dependent positioning

The following UE capabilities are defined for RAT-dependent positioning integrity.

* Support of Dl-TDOA positioning integrity
* Support of DL-AoD positioning integrity

**Question 5: Companies are invited to provide their comments on the TP for RAT-dependent positioning integrity**

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| **Company** | **Comments** |
| Intel | nr-DL-TDOA-posIntegritySupport=> nr-DL-TDOA-PosIntegritySupport  nr-DL-AoD-posIntegritySupport-r18 => nr-DL-AoD-PosIntegritySupport-r18  Rapp: Revised accordingly |
| Nokia | In RAN2#124 we sent an LS to SA2 saying RAT-dependent integrity is supported for DL-AoD, DL-TDOA, Multi-RTT, UL-TDOA, UL-AoA. Shouldn’t we be adding UE capabilities for the other missing positioning methods also?  Rapp: For the Multi-RTT, UL-TDOA, UL-AoA, only LMF based RAT-dependent positioning integrity is supported, and it seems the UE capabilities are not needed since there is no enhancement for UE supporting LMF based RAT-dependent positioning integrity. We will capture it in the open issue list for the next meeting discussion. |
| Lenovo | **V02\_Rapp:**  NR-DL-TDOA-ProvideCapabilities field descriptions: in the capability name the lowercase letter “p” should be set to capital letter “P” to be aligned with ASN.1. Furthermore, in the description the word “filed”, shoud say “field”.  ***nr-DL-TDOA-posIntegritySupport***  This filed, if present, indicates that the target device supports the RAT-dependent positioning integrity for DL-TDOA.  NR-DL-AoD-ProvideCapabilities field descriptions: in the capability name the lowercase letter “p” should be set to capital letter “P” to be aligned with ASN.1. Furthermore, in the description the word “filed”, shoud say “field”.  ***nr-DL-AoD-posIntegritySupport***  This filed, if present, indicates that the target device supports the RAT-dependent positioning integrity for DL-AoD.  Rapp: Revised accordingly |
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# RAN2 UE feature list

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| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Field name in TS 38.355 [x] or 37.355 [9]** | **Parent IE in TS 38.355 [x] or 37.355 [9]** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Note** | **Mandatory/Optional** |
| NR\_pos\_enh2 | x-1 | Periodical Reporting | Indicates whether the UE supports periodical Reporting for SL-AoA, SL-RTT, SL-TDOA or SL-TOA. |  | *38.355*  *periodicalReporting* | *38.355*  *NR-Multi-RTT-ProvideCapabilities-r16 or*  *NR-DL-TDOA-ProvideCapabilities-r16 or*  *NR-ECID-ProvideCapabilities-r16 or*  *NR-DL-AoD-ProvideCapabilities-r16*  *LPP* | N/A | N/A |  | Optional with capability signalling |
| x-2 | 10 ms granularity for response time | Indicates whether the '*ten-milli-seconds*' response time unit is supported by the target device. |  | *38.355*  *tenMsUnitResponseTime* | 38.355  *SL-AOA-ProvideCapabilities, or SL-RTT-ProvideCapabilities, or SL-TDOA-ProvideCapabilities, or SL-TOA-ProvideCapabilities* | N/A | N/A |  | Optional with capability signalling |
| x-3 | Positioning Modes | Indicates what positoining mode the UE supports for SL-AoA, SL-RTT, SL-TDOA or SL-TOA. The positioning mode includes ue-based, and ue-assisted. |  | *38.355*  *positioningModes* | *38.355*  *SL-AOA-ProvideCapabilities, or SL-RTT-ProvideCapabilities, or SL-TDOA-ProvideCapabilities, or SL-TOA-ProvideCapabilities* | N/A | N/A |  | Optional with capability signalling |
|  | x-4 | Positioning integrity for DL-TDoA | Indicates that the target devices support the RAT-dependent positioning integrity for DL-TDOA. |  | *37.355*  *nr-DL-TDOA-posIntegritySupport* | *37.355*  *NR-DL-TDOA-ProvideCapabilities* | N/A | N/A |  | Optional with capability signalling |
|  | x-5 | Positioning integrity for DL-AoD | Indicates that the target devices support the RAT-dependent positioning integrity for DL-AoD. |  | *37..355*  *nr-DL-AoD-posIntegritySupport* | *37.355*  *NR-DL-AoD-ProvideCapabilities* | N/A | N/A |  | Optional with capability signalling |
|  | x-6 | Preconfigured SRS for initial BWP | Indicates the UE supports of preconfigured SRS with validity area in RRC\_INACTUIVE for initial BWP. |  | *37.355*  *preconfiguredposSRS-RRC-Inactive-InitialUL-BWP* | *37.355*  *SRS-CapabilityPerBand* | N/A | N/A |  | Optional with capability signalling |
|  | x-7 | Preconfigured SRS for outside initial BWP | Indicates the UE supports of preconfigured SRS with validity area in RRC\_INACTUIVE outside initial BWP. |  | *37.355*  *preconfiguredposSRS-RRC-Inactive-OutsideInitialUL-BWP* | *37.355*  *SRS-CapabilityPerBand* | N/A | N/A |  | Optional with capability signalling |

**Question 6: Companies are invited to provide their comments on the RAN2 UE feature list**

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| **Company** | **Comments** |
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# Summary

# Participants

|  |  |
| --- | --- |
| **Company Name** | **Participant name/contact** |
| Nokia | mani.thyagarajan@nokia.com |
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# Appendix (RAN1 UE feature list)

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| **Features** | **Index** | **Feature group** | **Components** | **Prerequisite feature groups** | **Need for the gNB to know if the feature is supported** | **Applicable to the capability signalling exchange between UEs (Sidelink WI only)”.** | **Consequence if the feature is not supported by the UE** | **Type**  **(the ‘type’ definition from UE features should be based on the granularity of 1) Per UE or 2) Per Band or 3) Per BC or 4) Per FS or 5) Per FSPC)** | **Need of FDD/TDD differentiation** | **Need of FR1/FR2 differentiation** | **Capability interpretation for mixture of FDD/TDD and/or FR1/FR2** | **Note** | **Mandatory/Optional** |
| 41. NR\_pos\_enh2 | 41-1-1 | Common SL PRS Processing Capability in a SL BWP | 1. Maximum SL PRS bandwidth in MHz in a resource pool for positioning, which is supported and reported by UE for SL-PRS measurement  2. Maximum number of active SL PRS resources across all configured RPs in a slot assuming maximum SL PRS bandwidth in MHz, which is supported and reported by UE  3. Maximum number of slots with active SL PRS resources across all configured RPsassuming maximum SL PRS bandwidth in MHz, which is supported and reported by UE  4. Minimum time after the end of a slot carrying the active SL-PRS resource(s) assuming maximum number of symbols and maximum bandwidth for a UE to finish the SL-PRS resource and the associated PSCCH processing which is supported and reported by UE |  | Yes | No | The UE does not support the reception and processing of SL PRS | [Per FS/Per Band/Per FCPC] | n/a | n/a | n/a | Component 1 candidate values:  FR1 bands: {5, 10, 20, 40, 50, 80, 100}  FR2 bands: {50, 100, 200, 400}  Component 2 candidate values:  FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24} for each SCS: 15kHz, 30kHz, 60kHz  FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64, 128} for each SCS: 60kHz, 120kHz  Component 3 candidate values:  FFS  Component 4 candidate values: {[30ms, 40ms, 50ms, 100ms]}  Note: a SL PRS resource is considered as active starting at the end of the last symbol of the PSCCH carrying the SCI trigger and the occupancy is released at the end of timeline indicated in component 4  Need for location server/ UE to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-2 | Receiving SL-PRS in a shared resource pool | 1. Support SL-PRS in shared resource pool  2. Support receiving SCI format 2D | [15-1, 15-4, 41-1-1] | Yes | No | Receiving SL-PRS in a shared resource pool is not supported | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported  [UE indicating support of FG 41-1-1 must indicate either this feature group or feature group 41-1-3 is supported or both are supported] | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-3 | Receiving SL-PRS in a dedicated resource pool | 1. Support SL-PRS in dedicated resource pool  2. Support receiving SCI format 1B | [15-1, 15-4 41-1-1] | Yes | No | Receiving SL-PRS in a dedicated resource pool is not supported | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported  [UE support of FG 41-1-1 must indicate either this feature group or feature group 41-1-2 is supported or both are supported] | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-4a | Transmitting SL-PRS in a shared resource pool | 1. Support of transmitting SL-PRS in a shared resource pool  2. Support transmitting SCI format 2D | [15-2, 41-1-2] | Yes | No | Transmitting SL-PRS in a shared resource pool is not supported | Per band | n/a | n/a | n/a | The supported resource allocation modes are the same as for communication and signaled in FGs [x-y] and [x-z]  Need for location server/UE to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-4b | Transmitting SL-PRS mode 1 in a dedicated SL PRS resource pool | 1. UE can transmit SL-PRS and PSCCH within a slot without PSSCH in dedicated SL PRS resource pool  2. UE can transmit SL-PRS according to the mapping rule between PSCCH and SL-PRS  3. Support transmitting SCI format 1B  4. Support receiving DCI format 3\_2  5. Support downlink pathloss based open loop power control of SL-PRS | [15-2, 41-1-3] | Yes | No | Transmitting SL-PRS mode 1 in a dedicated SL PRS resource pool is not supported | Per band | n/a | n/a | n/a | Need for location server/UE to know if the feature is supported  Note: component 5 is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1 | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-4c | Transmitting SL-PRS mode 2 in a dedicated resource pool | 1. UE can transmit SL-PRS and PSCCH within a slot without PSSCH in dedicated resource pool  2. UE can transmit SL-PRS according to the mapping rule between PSCCH and SL-PRS  3. Support transmitting SCI format 1B | [15-[x], 41-1-3], at least one of {41-1-8, 41-1-10} | Yes | No | Transmitting SL-PRS mode 2 in a dedicated resource pool is not supported | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-5 | SL-PRS congestion control in a dedicated resource pool | 1) UE can report SL PRS CBR measurement to gNB when operating in mode 1 and mode 2  2) UE can adjust its radio parameters based on SL PRS CBR measurement and SL PRS CRlimit  3) UE can process SL PRS CBR and SL PRS CR within the time it indicates | FFS | Yes | No | SL-PRS congestion control in a dedicated resource pool is not supported | Per band | n/a | n/a | n/a | Component-3 candidate value set  {Congestion process time 1, Congestion process time 2, Congestion process time 3} where  Congestion process time 1: 2, 2, 4, 8 slots for 15, 30, 60, 120 kHz subcarrier spacing.  Congestion process time 2: 2, 4, 8, 16 slots for 15, 30, 60, 120 kHz subcarrier spacing Congestion process time 3: 3, 6, 12, 24 slots for 15, 30, 60, 120 kHz subcarrier spacing  Note: component 1 is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1 | Optional with capability signaling. |
| 41. NR\_pos\_enh2 | 41-1-7a | SL PRS measurement for SL-RSTD | 1. Support SL RSTD measurement based on SL-PRS  2. Support SL RSTD measurement reporting  3. Maximum number of SL RSTD measurement reporting for different SL-PRS reception for the same pair of UEs | FFS | No | No | UE does not support SL PRS measurement for SL-RSTD | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported  Compoonent 3 candidate values: {1,2,3,4} | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-7b | SL PRS measurement for SL RTOA | 1. Support SL RTOA measurement based on SL-PRS  2. Support SL RTOA measurement reporting  3. Maximum number of SL RTOA measurementreporting for different SL-PRS reception for the same pair of UEs | FFS | No | No | UE does not support SL PRS measurement for SL RTOA | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported  Component 3 candidate values: {1,2,3,4} | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-7c | SL PRS measurement for UE Rx – Tx time difference without Tx time stamp | 1. Support UE Rx – Tx time difference measurement based on SL PRS  2. Support UE Rx – Tx time difference measurement reporting without Tx time stamp  3. Maximum number of Rx-Tx measurement reporting for different SL-PRS reception for the same pair of UEs] | FFS | No | No | UE does not support SL PRS measurement for Rx – Tx time difference without Tx time stamp | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported  Component 3 candidate values: {1,2,3,4} | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-7d | SL PRS measurement for UE Rx – Tx time difference with Tx time stamp | 1. Support UE Rx – Tx time difference measurement based on SL PRS  2. Support UE Rx – Tx time difference measurement reporting with Tx time stamp  3. Reporting M Rx-Tx measurements for the same SL-PRS transmission (or reception) and different SL-PRS reception (or transmission) for the same pair of UEs  4. Maximum number of Rx-Tx measurement reporting for different SL-PRS reception for the same pair of UEs] | FFS | No | No | UE does not support SL PRS measurement for UE Rx – Tx time difference with Tx time stamp | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported  Component 3 candidate values of M={1,2,3,4}  Component 4 candidate values: {1,2,3,4} | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-7e | SL PRS measurement for SL PRS-RSRP | 1. Support SL PRS-RSRP measurement based on SL-PRS  2. Support SL PRS-RSRP measurement reporting | FFS | No | No | SL PRS measurement for SL PRS-RSRP is not supported | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-7f | SL PRS measurement for SL PRS-RSRPP | 1. Support SL PRS-RSRPP measurement based on SL-PRS  2. Support SL PRS-RSRPP measurement reporting | FFS | No | No | SL PRS measurement for SL PRS-RSRPP is not supported | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-7g | SL PRS measurement for SL AoA | 1. Support SL AoA measurement based on SL-PRS  2. Support SL AoA measurement reporting types. Candidate values: bitmap {GCS, LCS with translation, LCS without translation}. | FFS | No | No | SL PRS measurement for SL AoA is not supported | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-8 | Support of random selection in a dedicated resource pool | 1. Support transmitting SL-PRS and associated PSCCH using random selection in a dedicated resource pool  2 Support DL pathloss based open loop power control when configured by NR Uu | FFS | Yes | No | UE cannot transmit SL-PRS using random selection in a dedicated resource pool | Per band | n/a | n/a | n/a | Note: Configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Note: Component 2 is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1 | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-10 | Support of full sensing in a dedicated resource pool | 1. UE can transmit SL-PRS and associated PSCCH using full sensing  2. Support DL pathloss based open loop power control when configured by NR Uu | FFS | Yes | No | UE cannot transmit SL-PRS using full sensing in a dedicated resource pool | [Per FS] | n/a | n/a | n/a | Note: Configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Note: Component 2 is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1 | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-11 | TDM-based multiplexing of SL-PRS reception from different UEs in the same slot in dedicated resource pool | Support of TDM-based multiplexing of SL-PRS reception from different UEs in the same slot in dedicated resource pool | FFS | No | No | TDM-based multiplexing of SL-PRS reception from different UEs in the same slot is not supported in dedicated resource pool | Per band | n/a | n/a | n/a | Need for location server/UE to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-12 | Comb-based multiplexing for SL-PRS reception from different UEs in the same slot in dedicated resource pool | Support of comb-based multiplexing for SL-PRS reception from different UEs in the same slot in dedicated resource pool | FFS | No | No | Comb-based multiplexing for SL-PRS reception from different UEs in the same slot is not supported in dedicated resource pool | Per band | n/a | n/a | n/a | Need for location server/UE to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-13 | Reporting the additional paths for SL positioning | 1. Maximum number of additional detected path timing reporting for K additional paths for SL positioning  2. Support of RSRPP reporting for additional paths | FFS | No | No | Reporting the additional paths for SL positioning is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {1, 2, 4, 6, 8}  Need for location server/UE to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-14 | LoS/NLoS indicator for SL positioning per measurement | Support of LoS/NLoS indicator for SL positioning per measurement | FFS | No | No | LoS/NLoS indicator for SL positioning per measurement is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {hard value, hard+soft value}  Need for location server/UE to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-17 | Open loop SL pathloss based power control for SL-PRS and associated PSCCH and SL RSRP report for dedicated resource pool | Support of open loop SL pathloss based power control for SL-PRS and associated PSCCH and SL RSRP report for dedicated resource pool for unicast transmissions | FFS | Yes | Yes | Open loop SL power control and SL RSRP report for dedicated resource pool is not supported for unicast transmissions | Per band | n/a | n/a | n/a |  | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-19 | ARP location provision for sidelink as assistance data | Support of ARP location provision for sidelink as assistance data |  | No | No | UE cannot provide ARP location for sidelink as assistance data | Per band | n/a | n/a | n/a | Need for location server/UE to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-19a | Report of Rx ARP-ID with SL positioning measurements | Support providing Rx ARP-ID with SL positioning measurements |  | No | No | UE cannot report Rx ARP-ID with SL positioning measurements | Per band | n/a | n/a | n/a | Need for location server/UE to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-19b | Report of Tx ARP-ID to LMF or another UE for location calculation measurements as assistance data | Support providing Rx ARP-ID with SL positioning measurements | At least one of: 41-1-4a, 41-1-4b, 41-1-4c | No | No | Report of Tx ARP-ID to LMF or another UE for location calculation measurements as assistance data is not supported | Per band | N.A. | N.A. | N.A. | Need for location server/UE to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-20 | SL-PRS transmission request in physical layer | 1. Support transmitting SL-PRS transmission request via SCI  2. Support receiving SL-PRS transmission request via SCI |  | No | Yes | SL-PRS transmission request in physical layer cannot be signalled | Per band | No | No | No |  | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-21 | Synchronization information of anchor UEs between a UE and LMF or another UE. | Provide synchronization information of anchor UE to LMF or another UE includes:  - The synchronization source type (GNSS, gNB/eNB, and UE) of anchor UEs  - The RTD between anchor UEs | FFS | No | No | UE cannot provide synchronization information to LMF or another UE. | Per band | N.A. | N.A. | N.A. | Need for location server/UE to know if the feature is supported. | Optional with capability signaling. |
| 41. NR\_pos\_enh2 | 41-1-22 | Provision of assistance information for SL AoA measurement to measuring UE | Expected SL-AoA value and uncertainty range | At least one of: 41-1-4a, 41-1-4b, 41-1-4c | No | No | UE cannot provide assistance information for SL AoA measurement to measuring UE | Per band | N.A. | N.A. | N.A. | Need for location server/UE to know if the feature is supported. | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-2-1 | DL RSCP reporting based on DL PRS in RRC\_CONNECTED | 1. Support of DL RSCP reporting based on DL PRS in RRC\_CONNECTED | FFS | No | n/a | DL RSCP reporting based on DL PRS in RRC\_CONNECTED is not supported | Per band | n/a | n/a | n/a | Note: DL RSCP is reported together with UE Rx-Tx time difference measurement  Need for location server to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-2-1a | DL RSCPD reporting based on DL PRS in RRC\_CONNECTED | 1. Support of DL RSCPD reporting based on DL PRS in RRC\_CONNECTED | FFS | No | n/a | DL RSCPD reporting based on DL PRS in RRC\_CONNECTED is not supported | Per band | n/a | n/a | n/a | Note: DL RSCPD is reported along with measurement report for DL-RSTD  Need for location server to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-2-2 | DL RSCP reporting based on DL PRS in RRC\_INACTIVE | Support of DL RSCP reporting based on DL PRS measurement in RRC\_INACTIVE | FFS | No | n/a | DL RSCP reporting based on DL PRS in RRC\_INACTIVE is not supported | Per band | n/a | n/a | n/a | Note: DL RSCP is reported together with UE Rx-Tx time difference measurement  Need for location server to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-2-2a | DL RSCPD reporting based on DL PRS in RRC\_INACTIVE | 1. Support of DL RSCPD reporting based on DL PRS measurement in RRC\_INACTIVE | FFS | No | n/a | DL RSCPD reporting based on DL PRS in RRC\_INACTIVE is not supported | Per band | n/a | n/a | n/a | Note: DL RSCPD is reported along with measurement report for DL-RSTD  Need for location server to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-2-3 | Measurement on indicated DL PRS resource sets within the indicated time window(s) for UE based and UE assisted | Support of Measurement on indicated DL PRS resource sets within the indicated time window(s) for UE based and UE assisted | 13-1, FFS more | No | N.A. | Measurement on indicated DL PRS resource sets within the indicated time window(s) for UE based and UE assisted is not supported | Per band | N.A. | N.A. | N.A. | Need for location server to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-2-4 | UE-based Carrier Phase Positioning | 1. Support of carrier phase measurement for UE-based positioning  2. Support of Assistance data for UE-based Carrier Phase Positioning | FFS | No | N.A. | UE-based Carrier Phase Positioning is not supported | Per band | N.A. | N.A. | N.A. | Need for location server to know if the feature is supported. | Optional with capability signaling. |
| 41. NR\_pos\_enh2 | 41-2-5 | Reporting timestamp with OFDM symbol index associated with RSCP measurement and RSCPD measurement | Support of Reporting timestamp with OFDM symbol index associated with RSCP measurement and RSCPD measurement | [41-2-1, 0r 41-2-1a, 41-2-2,41-2-2a] | No | N.A. | Reporting timestamp with OFDM symbol index associated with RSCP measurement and RSCPD measurement is not supported | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-2-6 | Support associating a single Rx-Tx or RSTD measurement with up to N\_sample RSCP/RSCPD measurement | Support associating a single Rx-Tx or RSTD measurement with up to N\_sample RSCP/RSCPD measurement | FFS | No | N.A. | The UE can only associate a single Rx-Tx or RSTD measurement with 1 RSCP/RSCPD measurement | Per band | N.A. | N.A. | N.A. | Need for location server to know if the feature is supported. | Optional with capability signaling. |
| 41. NR\_pos\_enh2 | 41-2-7 | DL RSCPD measurement based on DL PRS in RRC\_IDLE | Support of DL RSCPD measurement based on DL PRS measurement in RRC\_IDLE | FFS | No | n/a | DL RSCPD measurement based on DL PRS measurement in RRC\_IDLE is not supported | Per band | n/a | n/a | n/a | Note: DL RSCPD is reported along with measurement report for DL-RSTD    Need for location server to know if the feature is supported | Optional with capability signaling. |
| 41. NR\_pos\_enh2 | 41-2-8 | Support to perform legacy measurements inside the indicated time window only for DL TDoA | Support to perform legacy measurements inside the indicated time window only | FFS | No | N/A | The UE may use the indicated DL PRS resource set(s) occurring outside the indicated time window for legacy measurements in addition to the indicated DL PRS resource set(s) occurring inside the indicated time window | Per band | No | No | No | Need for location server to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-2-9 | Support to perform legacy measurements inside the indicated time window only for multi-RTT | Support to perform legacy measurements inside the indicated time window only | FFS | No | N/A | The UE may use the indicated DL PRS resource set(s) occurring outside the indicated time window for legacy measurements in addition to the indicated DL PRS resource set(s) occurring inside the indicated time window | Per band | No | No | No | Need for location server to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-2-10 | Support to perform legacy measurements inside the indicated time window only for DL AoD | Support to perform legacy measurements inside the indicated time window only | FFS | No | N/A | The UE may use the indicated DL PRS resource set(s) occurring outside the indicated time window for legacy measurements in addition to the indicated DL PRS resource set(s) occurring inside the indicated time window | Per band | No | No | No | Need for location server to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-2-11 | UE-based CPP | 1. Support of UE-based CPP and reception of assistance data for positioning calculation | 13-1, FFS more | No | N.A. | UE-based CPP is not supported | Per band | N.A. | N.A. | N.A. | Note: Need location server to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-2-12 | Reporting Granularity | Support of ReportingGranularityfactor k={-1, -2, -3, -4, -5, -6} | FFS | No | N.A. | Reporting Granularity cannot be signalled | Per band | N.A. | N.A. | N.A. | Need for location server to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-3-1 | SRS for positioning configuration in multiple cells for UEs in RRC\_INACTIVE state for initial UL BWP | 1. SRS for positioning configuration in multiple cells for UEs in RRC\_INACTIVE state for initial UL BWP | FFS | Yes | n/a | SRS for positioning configuration in multiple cells for UEs in RRC\_INACTIVE state for initial UL BWP is not supported | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported | Optional with capability signalling |
| 41. NR\_pos\_enh2 | 41-3-1a | UE autonomous TA adjustment | UE autonomously adjust the TA when cell-reselection happens | 41-3-1 | Yes | n/a | UE cannot autonomously adjust the TA when cell-reselection happens | Per band | n/a | n/a | n/a |  | Optional with capability signalling |
| 41. NR\_pos\_enh2 | 41-3-2 | SRS for positioning configuration in multiple cells for UEs in RRC\_INACTIVE state configured outside initial UL BWP | Support of SRS for positioning configuration in multiple cells for UEs in RRC\_INACTIVE state configured outside initial UL BWP | FFS | Yes | n/a | SRS for positioning configuration in multiple cells for UEs in RRC\_INACTIVE state configured outside initial UL BWP is not supported | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported | Optional with capability signalling |
| 41. NR\_pos\_enh2 | 41-3-3 | Support of PRS measurement in RRC\_IDLE | Support of DL PRS measurement in RRC\_IDLE for Rel. 17 methods the UE supports in RRC\_INACTIVE | FFS | No | n/a | PRS measurements in RRC\_IDLE not supported | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported | Optional with capability signaling. |
| 41. NR\_pos\_enh2 | 41-4-1 | DL PRS processing capabilities for aggregated PRS processing of 2 PFLs in intra-band contiguous within a MG for RRC\_CONNECTED | 1. Maximum aggregated DL PRS bandwidth in MHz, which is supported and reported by UE  2. Maximum DL PRS bandwidth in MHz, per PFL  3. DL PRS buffering capability  4. Duration of DL PRS symbols N in units of ms a UE can process every T ms assuming maximum aggregated DL PRS bandwidth in MHz, which is supported and reported by UE.  5. Maximum number of aggregated DL PRS resources across aggregated PFLs that UE can process in a slot | 13-1 | No | n/a | DL PRS processing capabilities for aggregated PRS processing of 2 PFLs in intra-band contiguous within a MG for RRC\_CONNECTEDis not supported | Per band | n/a | n/a | n/a | Component 1 candidate values:  a) FR1 bands: {10, 20, 40, 50, 80, 100, 160, 200}  b) FR2 bands: {100, 200, 400, 800}  Component 2 candidate values:  a) FR1 bands: {5, 10, 20, 40, 50, 80, 100}  b) FR2 bands: {50, 100, 200, 400}  Note: Component 3 in FG41-4-1 follows buffering capability type reported in FG13-1  Component 4 candidate values:  a) T: {8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms  b) N: {0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50} ms  Note: this value N should be equal or smaller than the value N reported by FG 13-1, or this value T should be equal or larger than the value T reported by FG 13-1  Component 5 candidate values:  a. FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  b. FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz  Note: each two linked PRS resources are counted as 1 resource  Note: this value should be equal or smaller than the value reported by FG 13-1  Note: The above parameters are reported assuming a configured measurement gap and a maximum ratio of measurement gap length (MGL)/measurement gap repetition period (MGRP) of no more than 30% | Optional with capability signaling. |
| 41. NR\_pos\_enh2 | 41-4-1a | DL PRS processing capabilities for aggregated PRS processing of 3 PFLs in intra-band contiguous within a MG for RRC\_CONNECTED | 1. Maximum aggregated DL PRS bandwidth in MHz, which is supported and reported by UE  2. Maximum DL PRS bandwidth in MHz, per PFL  3. DL PRS buffering capability  4. Duration of DL PRS symbols N in units of ms a UE can process every T ms assuming maximum aggregated DL PRS bandwidth in MHz, which is supported and reported by UE.  5. Maximum number of aggregated DL PRS resources across aggregated PFLs that UE can process in a slot | 41-4-1 | No | n/a | DL PRS processing capabilities for aggregated PRS processing of 3 PFLs in intra-band contiguous within a MG for RRC\_CONNECTED is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values:  a) FR1 bands: {15, 20, 30, 40, 50, 60, 80, 100, 120, 140, 150, 160, 180, 200, 240, 300}}  b) FR2 bands: {150, 200, 300, 400, 600, 800, 1000, 1200}  Component 2 candidate values:  a) FR1 bands: {5, 10, 20, 40, 50, 80, 100}  b) FR2 bands: {50, 100, 200, 400}  Note: Component 3 in FG41-4-1a follows buffering capability type reported in FG13-1  Component 4 candidate values:  a) T: {8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms  b) N: {0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50} ms  Note: this value N should be equal or smaller than the value N reported by FG 13-1 or this value T should be equal or larger than the value T reported by FG 13-1  Component 5 candidate values:  a. FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  b. FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz  Note: each three linked PRS resources are counted as 1 resource  Note: this value should be equal or smaller than the value reported by FG 13-1  Note: The above parameters are reported assuming a configured measurement gap and a maximum ratio of measurement gap length (MGL)/measurement gap repetition period (MGRP) of no more than 30% | Optional with capability signaling. |
| 41. NR\_pos\_enh2 | 41-4-1b | DL PRS processing capabilities for aggregated PRS processing of 2 PFLs in intra-band contiguous for RRC\_IDLE and RRC\_INACTIVE | 1. Maximum aggregated DL PRS bandwidth in MHz, which is supported and reported by UE  2. Maximum DL PRS bandwidth in MHz, per PFL  3. DL PRS buffering capability  4. Duration of DL PRS symbols N in units of ms a UE can process every T ms assuming maximum aggregated DL PRS bandwidth in MHz, which is supported and reported by UE.  5. Maximum number of aggregated DL PRS resources across aggregated PFLs that UE can process in a slot | 27-6 | No | n/a | DL PRS processing capabilities for aggregated PRS processing of 2 PFLs in intra-band contiguous for RRC\_IDLE and RRC\_INACTIVE is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values:  a) FR1 bands: {10, 20, 40, 50, 80, 100, 160, 200}  b) FR2 bands: {100, 200, 400, 800}  Component 2 candidate values:a) FR1 bands: {5, 10, 20, 40, 50, 80, 100}  b) FR2 bands: {50, 100, 200, 400}  Note: Component 3 in FG41-4-1b follows buffering capability type reported in FG13-1  Component 4 candidate values:  a) T: {8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms  b) N: {0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50} ms  Note: this value N should be equal or smaller than the value N reported by FG 27-6 or this value T should be equal or larger than the value T reported by FG 27-6  Component 5 candidate values:  a. FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  b. FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz  Note: each two linked PRS resources are counted as 1 resource  Note: this value should be equal or smaller than the value reported by FG 27-6 | Optional with capability signaling. |
| 41. NR\_pos\_enh2 | 41-4-1c | DL PRS processing capabilities for aggregated PRS processing of 3 PFLs in intra-band contiguous for RRC\_IDLE and RRC\_INACTIVE | 1. Maximum aggregated DL PRS bandwidth in MHz, which is supported and reported by UE  2. Maximum DL PRS bandwidth in MHz, per PFL  3. DL PRS buffering capability  4. Duration of DL PRS symbols N in units of ms a UE can process every T ms assuming maximum aggregated DL PRS bandwidth in MHz, which is supported and reported by UE.  5. Max number of aggregated DL PRS resources across aggregated PFLs that UE can process in a slot under it | 41-4-1b | No | n/a | DL PRS processing capabilities for aggregated PRS processing of 3 PFLs in intra-band contiguous for RRC\_IDLE and RRC\_INACTIVE is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values:  a) FR1 bands: {15, 20, 30, 40, 50, 60, 80, 100, 120, 140, 150, 160, 180, 200, 240, 300}  b) FR2 bands: {150, 200, 300, 400, 600, 800, 1000, 1200}  Component 2 candidate values:  a) FR1 bands: {5, 10, 20, 40, 50, 80, 100}  b) FR2 bands: {50, 100, 200, 400}  Note: Component 3 in FG41-4-1c follows buffering capability type reported in FG13-1  Component 4 candidate values:  a) T: {8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms  b) N: {0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50} ms  Note: this value N should be equal or smaller than the value N reported by FG 27-6 or this value T should be equal or larger than the value T reported by FG 27-6  Component 5 candidate values:  a. FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  b. FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz  Note: each three linked PRS resources are counted as 1 resource  Note: this value should be equal or smaller than the value reported by FG 27-6 | Optional with capability signaling. |
| 41. NR\_pos\_enh2 | 41-4-2 | PRS bandwidth aggregation with two PFL combinations | Support of PRS bandwidth aggregation with two PFL combinations | FFS | No | n/a | PRS bandwidth aggregation with two PFL combinations is not supported | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported.  Note: More than one combination are measured in TDMed manner | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-4-3 | PRS bandwidth aggregation in RRC\_CONNECTED — DL-TDOA | Support of PRS bandwidth aggregation in RRC\_CONNECTED for DL-TDOA | 13-3, 41-4-1 | No | n/a | PRS bandwidth aggregation in RRC\_CONNECTED for DL-TDOA is not supported | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported. | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-4-3a | PRS bandwidth aggregation in RRC\_CONNECTED —Multi-RTT | Support of PRS bandwidth aggregation in RRC\_CONNECTED FOR Multi-RTT | 13-4, 41-4-1 | No | n/a | PRS bandwidth aggregation in RRC\_CONNECTED FOR Multi-RTT is not supported | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported. | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-4-4 | PRS bandwidth aggregation in RRC\_ INACTIVE — DL-TDOA | Support of PRS bandwidth aggregation in RRC\_ INACTIVE for DL-TDOA | 27-18a, 41-4-1b | No | n/a | PRS bandwidth aggregation in RRC\_ INACTIVE for DL-TDOA is not supported | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported. | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-4-4a | PRS bandwidth aggregation in RRC\_ INACTIVE —Multi-RTT | Support of PRS bandwidth aggregation in RRC\_ INACTIVE for Multi-RTT | 27-18a, 41-4-1b | No | n/a | PRS bandwidth aggregation in RRC\_ INACTIVE for Multi-RTT is not supported | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported. | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-4-5 | PRS bandwidth aggregation in RRC\_IDLE — DL-TDOA | Support of PRS bandwidth aggregation in RRC\_IDLE for DL-TDOA | 41-3-3, 41-4-1b | No | n/a | PRS bandwidth aggregation in RRC\_IDLE for DL-TDOA is not supported | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported. | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-4-6 | Positioning SRS bandwidth aggregation in RRC\_CONNECTED | 1. The number of supported aggregated carriers in intra band contiguous carriers  2. Maximum aggregated UL SRS bandwidth in MHz, which is supported and reported by UE  5. Max number of aggregated SRS resource sets for positioning supported by UE for SRS bandwidth aggregation  6. Maximum number of aggregated SRS resources for bandwidth aggregation  7. Maximum number of aggregated SRS resources for bandwidth aggregation per slot  8. Support the same SRS power reduction across aggregated carriers | [13-8, 6-2] | Yes | n/a | Positioning SRS bandwidth aggregation in RRC\_CONNECTED is not supported | Per FS | n/a | n/a | n/a | Component 1 candidate values: {2,3,2and3}  Component 2 candidate values:  For 2 in Component 1:  FR1 bands: {80, 100, 160, 200M}  FR2 bands: {50, 100, 200, 400, 600, 800}  For 3 in Component 1:  FR1 bands: {80, 100, 160, 200, 300}  FR2 bands: {50, 100, 200, 400, 600, 800, 1000, 1200}  Component 5 candidate values: {1, 2, 4, 8, 12, 16}  Component 6 candidate values:  [Periodic: {1,2,4,8,16,32,64}  Aperiodic: {0,1,2,4,8,16,32,64}  Semi-persistent: {0,1,2,4,8,16,32,64}]  Component 7 candidate values:  [Periodic: {1,2,3,4,5,6,8,10,12,14}  Aperiodic: {0,1,2,3,4,5,6,8,10,12,14}  Semi-persistent: {0,1,2,3,4,5,6,8,10,12,14}]  Note: The UE supports the simultaneous transmission in a coherent manner of 2 or 3 SRS resources in 2 or 3 intra-band contiguous CCs.  Note: each two or three linked SRS resources are counted as 1 resource  Note: A UE that support FG [13-8a] must signal a non-zero value for components 6 and 7 for aperiodic  Need for location server to know if the feature is supported. UE only reports the number on bands for the current configured CA band combination. | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-4-6a | Joint triggering by single Rel. 17 DCI | Support a Rel-17 single DCI scheduling positioning SRS resource sets across the linked carriers for SRS bandwidth aggregation in RRC\_CONNECTED state | 41-4-6 | Yes | n/a | Joint triggering by single Rel. 17 DCI is not supported | Per band | n/a | n/a | n/a |  | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-4-7 | Positioning SRS bandwidth aggregation independent from UL communication CA in RRC\_CONNECTED | 1. The number of supported aggregated carriers in intra band contiguous carriers  2. Maximum aggregated UL SRS bandwidth in MHz, which is supported and reported by UE  5. Max number of aggregated SRS resource sets for positioning supported by UE for SRS bandwidth aggregation  6. Maximum number of aggregated SRS resources for bandwidth aggregation  7. Maximum number of aggregated SRS resources for bandwidth aggregation per slot  8. Support the same SRS power reduction across aggregated carriers  9. Guard period | FFS | Yes | n/a | Positioning SRS bandwidth aggregation independent from UL communication CA in RRC\_CONNECTED is not supported | Per FS | n/a | n/a | n/a | Component 1 candidate values: {2,3,2and3}  Component 2 candidate values:  For 2 in Component 1:  FR1 bands: {80, 100, 160, 200M}  FR2 bands: {50, 100, 200, 400, 600, 800}  For 3 in Component 1:  FR1 bands: {80, 100, 160, 200, 300}  FR2 bands: {50, 100, 200, 400, 600, 800, 1000, 1200}  Component 5 candidate values: {1, 2, 4, 8, 12, 16}  Component 6 candidate values:  [Periodic: {1,2,4,8,16,32,64}  Aperiodic: {0,1,2,4,8,16,32,64}  Semi-persistent: {0,1,2,4,8,16,32,64}]  Component 7 candidate values:  [Periodic: {1,2,3,4,5,6,8,10,12,14}  Aperiodic: {0,1,2,3,4,5,6,8,10,12,14}  Semi-persistent: {0,1,2,3,4,5,6,8,10,12,14}]  Note: The UE supports the simultaneous transmission in a coherent manner of 2 or 3 SRS resources in 2 or 3 intra-band contiguous CCs.  Note: each two or three linked SRS resources are counted as 1 resource  Need for location server to know if the feature is supported. UE only reports the number on bands for the current configured CA band combination.  Note: Guard period is needed before and after the aggregated SRS transmissions when SRS resource is configured within a CC without PUSCH/PUCCH is linked for aggregation with an SRS resource configured within an UL active BWP of a UL communication CC | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-4-8 | Positioning SRS bandwidth aggregation in RRC\_INACTIVE | 1. The number of supported aggregated carriers in intra band contiguous carriers  2. Maximum aggregated UL SRS bandwidth in MHz, which is supported and reported by UE  5. Max number of aggregated SRS resource sets for positioning supported by UE for SRS bandwidth aggregation  6. Maximum number of aggregated SRS resources for bandwidth aggregation  7. Maximum number of aggregated SRS resources for bandwidth aggregation per slot  8. Support the same SRS power reduction across aggregated carriers | [27-15b] | Yes | n/a | Positioning SRS bandwidth aggregation in RRC\_INACTIVE is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {2,3,2and3}  Component 2 candidate values:  For 2 in Component 1:  FR1 bands: {80, 100, 160, 200M}  FR2 bands: {50, 100, 200, 400, 600, 800}  For 3 in Component 1:  FR1 bands: {80, 100, 160, 200, 300}  FR2 bands: {50, 100, 200, 400, 600, 800, 1000, 1200}  Component 5 candidate values: {1, 2, 4, 8, 12, 16}  Component 6 candidate values:  [Periodic: {1,2,4,8,16,32,64}  Semi-persistent: {0,1,2,4,8,16,32,64}]  Component 7 candidate values:  [Periodic: {1,2,3,4,5,6,8,10,12,14}  Semi-persistent: {0,1,2,3,4,5,6,8,10,12,14}]  Need for location server to know if the feature is supported. | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-4-19 | Use of DCI format 0\_3 or 1\_3 for multi-cell PDSCH/PUSCH scheduling to trigger SRS resources for bandwidth aggregation | For triggering of aperiodic SRS for positioning in RRC\_CONNECTED, DCI formats 0\_3/1\_3 can be used to trigger aperiodic SRS for positioning across the scheduled multiple cells for bandwidth aggregation. | FFS | Yes | N.A. | DCI format 0\_3 or 1\_3 for multi-cell PDSCH/PUSCH scheduling cannot be used to trigger SRS resources for bandwidth aggregation in multiple CCs | Per FS | N.A. | N.A. | N.A. |  | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-5-1 | PRS measurement with Rx frequency hopping within a MG and measurement reporting RRC\_CONNECTED for RedCap UEs | 1. Maximum DL PRS bandwidth across all hops  3. Maximum number of hops  4. Duration of DL PRS symbols N3 in units of ms a UE can process every T3 ms  5. RF Rx retune times between consecutive hops  6. Overlapping PRB(s) between adjacent hops | 13-1, [28-1] | Yes | n/a | PRS measurement with Rx frequency hopping within a MG and measurement report in RRC\_CONNECTED for RedCap UEs is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values:  FR1: {40, 50, 80, 100}  FR2: {100, 200, 400}  Component 3 candidate values: {2,3,4,5,6}  Component 4 candidate values:  T3: {8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms  N3: {0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50} ms  Component 5 candidate values:  FR1: {70us, 140us, 210us}  FR2: {35us, 70us, 140us}  Component 6 candidate values: {0, 1, 2, 4}  Note 1: The maximum DL PRS bandwidth per hop follows component 1 of FG 13-1  Note 2: DL PRS buffering capability follows component 2 of FG 13-1  [FFS: whether this FG is applicable to non-Redcap UE]  Need for location server to know if the feature is supported. | Optional with capability signalling |
| 41. NR\_pos\_enh2 | 41-5-1a | PRS measurement with Rx frequency hopping in RRC\_INACTIVE for RedCap UEs | Support of PRS measurement with Rx frequency hopping in RRC\_INACTIVE for RedCap UEs | 41-5-1, 27-6 | Yes | n/a | PRS measurement with Rx frequency hopping in RRC\_INACTIVE for RedCap UEs is not supported | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported. | Optional with capability signalling |
| 41. NR\_pos\_enh2 | 41-5-1b | PRS measurement with Rx frequency hopping in RRC\_IDLE for RedCap UEs | Support of PRS measurement with Rx frequency hopping in RRC\_IDLE for RedCap UEs | 41-5-1 | Yes | n/a | PRS measurement with Rx frequency hopping in RRC\_IDLE for RedCap UEs is not supported | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported. | Optional with capability signalling |
| 41. NR\_pos\_enh2 | 41-5-2 | Support of positioning SRS with Tx frequency hopping in RRC\_CONNECTED for RedCap UEs | 1. Maximum SRS bandwidth across all hops  2. Maximum number of hops  3. RF Tx retuning time between consecutive hops  4. Switching time between active BWP and frequency hop  5. Overlapping PRB(s) between adjacent hops  6. Support of {0,1,2,4} overlapping PRB(s) between adjacent hops |  | Yes | n/a | Positioning SRS with Tx hopping in RRC\_CONNECTED is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values:  FR1: {40, 50, 80, 100}  FR2: {100, 200, 400}  Component 2 candidate values: {2,3,4,5,6,FFS}  Component 3 candidate values:  FR1: {70us, 140us, 210us}  FR2: {35us, 70us, 140us}  Component 4 candidate values:  {100us, 140us, 200us, 300us, 500us}  Note: No additional UE requirements shall be specified for the case of Tx hopping with non-overlapping hops compared to the case of Tx hopping with overlapping hops, e.g., a UE is not responsible for keeping phase continuity across the hops in either case of overlapping or non-overlapping hops  Need for location server to know if the feature is supported | Optional with capability signalling |
| 41. NR\_pos\_enh2 | 41-5-2a | Support of positioning SRS with Tx frequency hopping in RRC\_INACTIVE for RedCap UEs | 1. Maximum SRS bandwidth across all hops  2. Maximum number of hops  3. RF Tx retuning time between consecutive hops  4. Switching time between active BWP and frequency hop  5. Overlapping PRB(s) between adjacent hops  6. Support of {0,1,2,4} overlapping PRB(s) between adjacent hops | 27-15b | Yes | n/a | Positioning SRS with Tx hopping in RRC\_INACTIVE is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values:  FR1: {40, 50, 80, 100}  FR2: {100, 200, 400}  Component 2 candidate values: {2,3,4,5,6,FFS}  Component 3 candidate values:  FR1: {70us, 140us, 210us}  FR2: {35us, 70us, 140us}  Component 4 candidate values:  {100us, 140us, 200us, 300us, 500us}  Note: No additional UE requirements shall be specified for the case of Tx hopping with non-overlapping hops compared to the case of Tx hopping with overlapping hops, e.g., a UE is not responsible for keeping phase continuity across the hops in either case of overlapping or non-overlapping hops  Need for location server to know if the feature is supported | Optional with capability signalling |
| 41. NR\_pos\_enh2 | 41-5-X | UL Time Window and transmission of SRS for positioning with Tx Frequency hopping within the window | Support of UL Time Window and transmission of SRS for positioning with Tx Frequency hopping within the window | 41-5-2 | No | N.A. | UE does not support the UL time window for SRS for positioning with Tx frequency hopping | Per band | N.A. | N.A. | N.A. |  | Optional with capability signaling |