**3GPP TSG RAN WG1 #109-e R1-2204852**

**e-Meeting, May 9th – 20th, 2022**

**Agenda Item: 8.16.5**

**Source: Moderator (AT&T)**

**Title: Summary of UE features for NR positioning enhancements**

**Document for:** **Discussion/Decision**

# Introduction

This document presents the summary of email discussion/approval [109-e-R17-UE-features-ePos-01] during RAN1 #109-e. According to the Chairman’s Notes:

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| [109-e-R17-UE-features-ePos-01] Email discussion UE on features for NR positioning enhancements – Ralf (AT&T)   * 1st check point for LS to RAN2: May 13 * Final check point for any remaining issues: May 20 |

The following was discussed and/or agreed during RAN1 #109-e within the scope of [109-e-R17-UE-features-ePos-01]. All proposals are based on the latest RAN1 UE features list for Rel-17 NR in [1].

# Summary of Contributions Submitted to RAN1 #109-e

The following is the moderator’s summary of contributions submitted to RAN1 #109-e in this agenda item.

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| 27. NR\_pos\_enh | 27-1-1 | UE-RxTEGs for UE-assisted DL TDOA and/or Multi-RTT positioning | 1. Support of UE-RxTEGs for UE-assisted DL TDOA and/or Multi-RTT positioning  2. The maximum number of UE-RxTEG, which is supported and reported by UE for UE assisted DL TDOA and/or Multi-RTT positioning | 13-1, one or more of {13-3, 13-4} | No |  | UE-RxTEG reporting is not supported and no assumption can be made on the UE Rx timing errors for the measurements | per band | n/a | n/a | n/a | Component 1 candidate values: {UE-assisted DL TDOA, Multi-RTT positioning, UE-assisted DL TDOA and Multi-RTT positioning}  Component 2 candidate values: {1, 2, 3, 4, 6, 8}  Note: a single value is reported when both multi-RTT and DL-TDOA are supported  Need for location server to know if the feature is supported  If the UE does not include RxTEG-ID associated with a measurement, no assumption can be made on the UE Rx timing errors for this measurement  Note: The “per band” reporting on this capability does not imply, that the RxTEG IDs in the measurement report are grouped per band; In the measurement report, the RxTEG ID can span from 0, up to 31 | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] |  |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] | * FG 27-1-1: UE-RxTEGs for UE-assisted DL TDOA and/or Multi-RTT positioning   + A consistent wording should be used as follows:     - “UE assisted DL TDOA” can be changed to “UE-assisted DL TDOA” |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-1-2 | Support of UE-TxTEGs for UL TDOA | The maximum number of UE-TxTEG for SRS resource for positioning, which is supported and reported by UE for UL TDOA | 13-8 | Yes |  | UE-TxTEGs for UL TDOA is not supported and no assumption can be made on the UE Tx timing error for the SRS resource for positioning | per band | n/a | n/a | n/a | The candidate values are {1,2,3,4,6,8}  Need for location server to know if the feature is supported  Note: It should support the serving gNB to request the UE to provide the association information of UL SRS resources for positioning with Tx TEGs to the serving gNB for UL TDOA  Note: If the UE does not include TxTEG-ID associated with a SRS resource for positioning, no assumption can be made on the UE Tx timing error for this SRS resource for positioning. | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] |  |
| CATT [3] |  |
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| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-1-2a | Support of UE-TxTEGs for Multi-RTT positioning | The maximum number of UE-TxTEG, which is supported and reported by UE for Multi-RTT positioning | 13-4, 13-8 | No |  | UE-TxTEGs for Multi-RTT positioning is not supported and no assumption can be made on the UE Tx timing error for the SRS resource for positioning | per band | n/a | n/a | n/a | The candidate values are {1,2,3,4,6,8}  Need for location server to know if the feature is supported  If the UE does not include TxTEG-ID associated with a measurement, no assumption can be made on the UE Tx timing errors for this SRS resource for positioning  Note: It should support the LMF to request the UE to provide the association information of UL SRS resources for positioning with Tx TEGs directly to the LMF for Multi-RTT if Multi-RTT is supported by UE | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] |  |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-1-3 | Support of UE-RxTxTEGs for Multi-RTT | The maximum number of UE-RxTxTEG, which is supported and reported by UE for Multi-RTT positioning | 13-4 and 13-8 | No |  | UE RxTx for Multi-RTT is not supported and no assumption can be made on the UE RxTx timing error for the measurement | per band | n/a | n/a | n/a | The candidate values are {1, 2, 4, 6, 8, 12, 16, 24, 32, 36, 48, 64}  Need for location server to know if the feature is supported  If the UE does not include RxTxTEG-ID associated with a measurement, no assumption can be made on the UE RxTx timing errors for this measurement  Note: The “per band” reporting on this capability does not imply, that the RxTxTEG IDs in the measurement report are grouped per band; In the measurement report, the RxTxTEG ID can span from 0, up to 255 | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] |  |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-1-4 | Support of UE Rx TEGs for measuring the same DL PRS resource | The maximum number of different UE-RxTEGs that a UE can support to measure the same DL PRS of a TRP | 27-1-1 | No |  | Up to 1 RxTEG is used to measure the same DL PRS resource of a TRP | per band | n/a | n/a | n/a | The candidate values are {2, 3, 4, 6, 8}  Need for location server to know if the feature is supported | Optional with capability signaling |

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| Huawei/HiSilicon [2] |  |
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| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-1-4a | Support of UE Rx TEGs for measuring the same DL PRS resource simultaneously | The maximum number of UE Rx TEGs for measuring the same DL PRS resource simultaneously | 27-1-4 | No |  | No assumption can be made regarding multiple Rx TEGs measuring the same DL PRS resource simultaneously | Per band | n/a | n/a | n/a | The candidate values are {1,2,34,6,8}  Need for location server to know if the feature is supported. | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-1-4a | Support of UE Rx TEGs for measuring the same DL PRS resource simultaneously | The maximum number of UE Rx TEGs for measuring the same DL PRS resource simultaneously | 27-1-4 | No |  | No assumption can be made regarding multiple Rx TEGs measuring the same DL PRS resource simultaneously | Per band | n/a | n/a | n/a | The candidate values are {1,2,3,4,6,8}  Need for location server to know if the feature is supported. | Optional with capability signaling | |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-2-1 | DL PRS RSRPP measurement report of the first path for UE-assisted DL-AoD | 1.) Support of measuring and reporting the PRS RSRPP of the first path for DL-AoD positioning method  2.) The maximum number of first path PRS RSRPP per TRP | 13-5 | No |  | DL PRS RSRPP measurement report of the first path for UE-assisted DL-AoD is not supported | per band | n/a | n/a | n/a | Component 2 candidate values: 1, 2,4,8,16,24  Need for location server to know if the feature is supported  The maximum number of first path PRS RSRP per TRP should be less than or equal to the maximum number of PRS RSRP (27-2-2)  [Note: Having FG 13-5 as the prerequisite FG does not imply that in a measurement report, reporting PRS-RSRP of a PRS resource should be the prerequisite of reporting PRS-RSRPP for the first path of the PRS resource] | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-2-1 | DL PRS RSRPP measurement report of the first path for UE-assisted DL-AoD | 1.) Support of measuring and reporting the PRS RSRPP of the first path for DL-AoD positioning method  2.) The maximum number of first path PRS RSRPP per TRP | 13-5 | No |  | DL PRS RSRPP measurement report of the first path for UE-assisted DL-AoD is not supported | per band | n/a | n/a | n/a | Component 2 candidate values: 1, 2,4,8,16,24  Need for location server to know if the feature is supported  The maximum number of first path PRS RSRP per TRP should be less than or equal to the maximum number of PRS RSRP (27-2-2) | Optional with capability signaling | |
| CATT [3] | For the FG, we think there is a need to keep the note of “Having FG 13-5 as the prerequisite FG does not imply that in a measurement report, reporting PRS-RSRP of a PRS resource should be the prerequisite of reporting PRS-RSRPP for the first path of the PRS resource”.  Based on the above discussions, our proposal on FG27-2-1 as follows,  *Proposal 2: Adopt the following modifications marked as red colour to FG 27-2-1 based on the agreement in RAN1#108-e:*   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-2-1 | DL PRS RSRPP measurement report of the first path for UE-assisted DL-AoD | 1.) Support of measuring and reporting the PRS RSRPP of the first path for DL-AoD positioning method  2.) The maximum number of first path PRS RSRPP per TRP | 13-5 | No |  |  | per band | n/a | n/a | n/a | Component 2 candidate values: 1, 2,4,8,16,24  Need for location server to know if the feature is supported  The maximum number of first path PRS RSRP per TRP should be less than or equal to the maximum number of PRS RSRP (27-2-2)  Note: Having FG 13-5 as the prerequisite FG does not imply that in a measurement report, reporting PRS-RSRP of a PRS resource should be the prerequisite of reporting PRS-RSRPP for the first path of the PRS resource | Optional with capability signalling | |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] | In our view, the [Note:] shall be kept in the FG. FG 13-5 is prerequisite for FG 27-2-1. But reporting PRS-RSRPP of the first path is independent from the reporting PRS-RSRP. The added note is good clarification.  Proposal 1: Keep the note in FG 27-2-1 |
| NTT DOCOMO, INC. [9] | * FG 27-2-1: DL PRS RSRPP measurement report of the first path for UE-assisted DL-AoD   + Support the current FG 27-2-1 (i.e. the brackets on the note can be removed) |
| Nokia/Nokia Shanghai Bell [10] | The yellow highlighted note is confusing, and in principle something to resolved in the main session, not in UE features session. Propose to remove it. |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-2-2 | DL PRS RSRP reporting for more than 8 measurements for UE-assisted DL-AoD positioning | Support reporting K> 8 DL PRS RSRP measurements per TRP.  Note: Multiple RSRPs corresponding to same or different Rx Beam index should be able to be reported for a given PRS resource for different timestamps. | 13-5 | No |  | UE report of more than 8 DL PRS-RSRP is not supported. | Per UE | n/a | Yes | n/a | The candidate values are {16, 24}  Need for location server to know if the feature is supported  The maximum number of reported DL PRS RSRP in the capability signaling should be no less than the maximum number of reported DL PRS RSRPP of the first path in the capability signaling | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-2-2 | DL PRS RSRP reporting for more than 8 measurements for UE-assisted DL-AoD positioning | Support reporting K> 8 DL PRS RSRP measurements per TRP.  Note: Multiple RSRPs corresponding to same or different Rx Beam index should be able to be reported for a given PRS resource for different timestamps. | 13-5 | No |  | UE report of more than 8 DL PRS-RSRP is not supported. | Per UE | No | Yes FR2 only | No | The candidate values are {16, 24}  Need for location server to know if the feature is supported  The maximum number of reported DL PRS RSRP in the capability signaling should be no less than the maximum number of reported DL PRS RSRPP of the first path in the capability signaling | Optional with capability signaling | |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-3-1 | M-sample measurements | The capability to support reporting a measurement based on measuring M=1 samples (instances) of a DL PRS resource set | 13-1 | No |  | If the UE does not provide the capability, the UE is assumed to support M=4 only | per band | n/a | n/a | n/a | The candidate values are {1 [FFS others]}  Need for location server to know if the feature is supported  Note: The sample number M=1 does not account for the potential AGC sample  Note: this feature is supported for both UE-assisted and UE based positioning | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-3-1 | M-sample measurements | The capability to support reporting a measurement based on measuring M=1 samples (instances) of a DL PRS resource set | 13-1 | No |  | If the UE does not provide the capability, the UE is assumed to support M=4 only | per band | n/a | n/a | n/a | The candidate values are {1 }  Need for location server to know if the feature is supported  Note: The sample number M=1 does not account for the potential AGC sample  Note: this feature is supported for both UE-assisted and UE based positioning | Optional with capability signaling | |
| CATT [3] |  |
| Vivo [4] | Regarding the candidate values, M=2 has been agreed for the AGC case based on the following agreement in R4-2206979 in the RAN 4 #102-e meeting.   |  | | --- | | **Agreements***:*   * Define low latency requirements the reduced number of samples:   + = 1 if the condition under which AGC is not required is met  * + = 2 if the condition under which AGC is not required is NOT met |   So, we propose   * ***For FG 27-3-1, add 2 as one of candidate values based on RAN4 conclusion.*** |
| ZTE [5] | In RAN4#102-e meeting, the following agreements were achieved where *Nsample* can be either 1 or 2 depending on whether the condition is met or not.   |  | | --- | | Agreements in RAN4#102-e*:*   * Additional samples for AGC for PRS measurements are not required in case the following conditions are met: * PRS bandwidth is within the active BWP and * Difference between the serving cell SS-RSRP and neighbor cell/TRP PRS-RSRP is within [6] dB   Agreements in RAN4#102-e*:*   * Define low latency requirements the reduced number of samples: * *Nsample* = 1 if the condition under which AGC is not required is met * *Nsample* = 2 if the condition under which AGC is not required is NOT met |   Hence, RAN1 defined FG 27-3-1 should be updated accordingly.  ***Proposal 1:*** *For FG 27-3-1, M=2 should be added.* |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] | * FG 27-3-1: M-sample measurements   + “[FFS others]” can be removed since only the value 1 is enough and is aligned with the motivation of this feature.   + A consistent wording should be used as follows:     - “UE based positioning” can be changed to “UE-based positioning” |
| Nokia/Nokia Shanghai Bell [10] | No need for extra component values. |
| Ericsson [11] | The agreed feature 27-3-1 indicates whether the UE supports measuring M=1 samples. However, in the UE feature table, there is some text regarding candidate values and FFS for other values. Given that this feature only indicates support for M=1, we propose to remove the text related to candidate values as follows:   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-3-1 | M-sample measurements | The capability to support reporting a measurement based on measuring M=1 samples (instances) of a DL PRS resource set | 13-1 | No |  | If the UE does not provide the capability, the UE is assumed to support M=4 only | per band | n/a | n/a | n/a | Need for location server to know if the feature is supported  Note: The sample number M=1 does not account for the potential AGC sample  Note: this feature is supported for both UE-assisted and UE based positioning | Optional with capability signaling | |
| Qualcomm Incorporated [12] | Do not include additional values beyond 1   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-3-1 | M-sample measurements | The capability to support reporting a measurement based on measuring M=1 samples (instances) of a DL PRS resource set | 13-1 | No |  | If the UE does not provide the capability, the UE is assumed to support M=4 only | per band | n/a | n/a | n/a | The candidate values are {1 }  Need for location server to know if the feature is supported  Note: The sample number M=1 does not account for the potential AGC sample  Note: this feature is supported for both UE-assisted and UE based positioning | Optional with capability signaling | |

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| 27. NR\_pos\_enh | 27-3-2 | DL PRS measurement outside MG and in a PRS processing window | 1. Supported PRS processing types subject to the UE determining that DL PRS to be higher priority for PRS measurement outside MG and in a PRS processing window  2. Support of priority handing options of PRS: Option1, Option2 or Option3   * 1. Option 1: UE may indicates support of two priority states.      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS      2. State 2: PRS is lower priority than all PDCCH/PDSCH/CSI-RS   2. Option 2: UE may indicate support of three priority states      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS      2. State 2: PRS is lower priority than PDCCH and URLLC PDSCH and higher priority than other PDSCH/CSI-RS         1. Note: The URLLC channel corresponds a dynamically scheduled PDSCH whose PUCCH resource for carrying ACK/NAK is marked as high-priority.      3. State 3: PRS is lower priority than all PDCCH/PDSCH/CSI-RS   3. Option 3: UE may indicate support of single priority state      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS | 13-1 | Yes |  | DL PRS measurement outside MG and in a PRS processing window is not supported | per band | n/a | n/a | n/a | Component 1 candidate values: One or more of {Type 1A, Type 1B, Type 2}  Component 2 candidate values: {option1, option2, option3}  Need for location server to know if the feature is supported  Note: Component 2 can be reported per supported band for each type supported by the UE, details left to RAN2  Note:   * Type 1A refers to the determination of prioritization between DL PRS and other DL signals/channels in all OFDM symbols within the PRS processing window. The DL signals/channels from all DL CCs (per UE) are affected across LTE and NR * Type 1B refers to the determination of prioritization between DL PRS and other DL signals/channels in all OFDM symbols within the PRS processing window. The DL signals/channels from a certain band are affected * Type 2 refers to the determination of prioritization between DL PRS and other DL signals/channels only in DL PRS symbols within the PRS processing window   Note: When the UE determines higher priority for other DL signals/channels over the PRS measurement/processing, the UE is not expected to measure/process DL PRS which is applicable to all of the above capability options  Note: Within a PRS processing window, UE measurement is inside the active DL BWP with PRS having the same numerology as the active DL BWP | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | FG 27-3-2 should be separated into the FG reported to gNB and the FG reported to the LMF.  For the split FG reported to LMF, FG 27-3-3 should be included as components.  A component without explicit signaling for the support of PPW configuration and activation should be added.  Type-1A, Type-1B, Type-2 should be further separated from the FG so that each Type can be associated with its individual capabilities, including priority options, buffering capabilities, etc.   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-3-2a | DL PRS measurement outside MG and in a type-1A PRS processing window - gNB | 1. Supported of PRS process outside the measurement gap in a type-1A PRS processing window  2. Support of priority handing options of PRS: Option1, Option2 or Option3   * 1. Option 1: UE may indicates support of two priority states.      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS      2. State 2: PRS is lower priority than all PDCCH/PDSCH/CSI-RS   2. Option 2: UE may indicate support of three priority states      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS      2. State 2: PRS is lower priority than PDCCH and URLLC PDSCH and higher priority than other PDSCH/CSI-RS         1. Note: The URLLC channel corresponds a dynamically scheduled PDSCH whose PUCCH resource for carrying ACK/NAK is marked as high-priority.      3. State 3: PRS is lower priority than all PDCCH/PDSCH/CSI-RS   3. Option 3: UE may indicate support of single priority state      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS   3. Support of pre-configuration of PRS processing window in RRC and activation/deactivation by a DL MAC CE  4. The detection time for the collision between a low priority PRS and a high priority DL signals/channels |  | Yes |  | DL PRS measurement outside MG and in a type-1A PRS processing window is not supported | per band | n/a | n/a | n/a | Component 2 candidate values: {option1, option2, option3}  Component 4 candidate values: {0.125, 0.25, 0.5, 1, 1.5, 2, 2.5, 3} ms  Note:   * Type 1A refers to the determination of prioritization between DL PRS and other DL signals/channels in all OFDM symbols within the PRS processing window. The DL signals/channels from all DL CCs (per UE) are affected across LTE and NR * Type 1B refers to the determination of prioritization between DL PRS and other DL signals/channels in all OFDM symbols within the PRS processing window. The DL signals/channels from a certain band are affected * Type 2 refers to the determination of prioritization between DL PRS and other DL signals/channels only in DL PRS symbols within the PRS processing window   Note: When the UE determines higher priority for other DL signals/channels over the PRS measurement/processing, the UE is not expected to measure/process DL PRS which is applicable to all of the above capability options  Note: Within a PRS processing window, UE measurement is inside the active DL BWP with PRS having the same numerology as the active DL BWP | Optional with capability signaling | | 27. NR\_pos\_enh | 27-3-2b | DL PRS measurement outside MG and in a type-1B PRS processing window - gNB | 1. Supported of PRS process outside the measurement gap in a type-1B PRS processing window  2. Support of priority handing options of PRS: Option1, Option2 or Option3   * 1. Option 1: UE may indicates support of two priority states.      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS      2. State 2: PRS is lower priority than all PDCCH/PDSCH/CSI-RS   2. Option 2: UE may indicate support of three priority states      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS      2. State 2: PRS is lower priority than PDCCH and URLLC PDSCH and higher priority than other PDSCH/CSI-RS         1. Note: The URLLC channel corresponds a dynamically scheduled PDSCH whose PUCCH resource for carrying ACK/NAK is marked as high-priority.      3. State 3: PRS is lower priority than all PDCCH/PDSCH/CSI-RS   3. Option 3: UE may indicate support of single priority state      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS   3. Support of pre-configuration of PRS processing window in RRC and activation/deactivation by a DL MAC CE  4. The detection time for the collision between a low priority PRS and a high priority DL signals/channels |  | Yes |  | DL PRS measurement outside MG and in a type-1B PRS processing window is not supported | per band | n/a | n/a | n/a | Component 2 candidate values: {option1, option2, option3}  Component 4 candidate values: {0.125, 0.25, 0.5, 1, 1.5, 2, 2.5, 3} ms  Note:   * Type 1A refers to the determination of prioritization between DL PRS and other DL signals/channels in all OFDM symbols within the PRS processing window. The DL signals/channels from all DL CCs (per UE) are affected across LTE and NR * Type 1B refers to the determination of prioritization between DL PRS and other DL signals/channels in all OFDM symbols within the PRS processing window. The DL signals/channels from a certain band are affected * Type 2 refers to the determination of prioritization between DL PRS and other DL signals/channels only in DL PRS symbols within the PRS processing window   Note: When the UE determines higher priority for other DL signals/channels over the PRS measurement/processing, the UE is not expected to measure/process DL PRS which is applicable to all of the above capability options  Note: Within a PRS processing window, UE measurement is inside the active DL BWP with PRS having the same numerology as the active DL BWP | Optional with capability signaling | | 27. NR\_pos\_enh | 27-3-2c | DL PRS measurement outside MG and in a type-2 PRS processing window - gNB | 1. Supported of PRS process outside the measurement gap in a type-2 PRS processing window  2. Support of priority handing options of PRS: Option1, Option2 or Option3   * 1. Option 1: UE may indicates support of two priority states.      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS      2. State 2: PRS is lower priority than all PDCCH/PDSCH/CSI-RS   2. Option 2: UE may indicate support of three priority states      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS      2. State 2: PRS is lower priority than PDCCH and URLLC PDSCH and higher priority than other PDSCH/CSI-RS         1. Note: The URLLC channel corresponds a dynamically scheduled PDSCH whose PUCCH resource for carrying ACK/NAK is marked as high-priority.      3. State 3: PRS is lower priority than all PDCCH/PDSCH/CSI-RS   3. Option 3: UE may indicate support of single priority state      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS   3. Support of pre-configuration of PRS processing window in RRC and activation/deactivation by a DL MAC CE  4. The detection time for the collision between a low priority PRS and a high priority DL signals/channels |  | Yes |  | DL PRS measurement outside MG and in a type-2 PRS processing window is not supported | per band | n/a | n/a | n/a | Component 2 candidate values: {option1, option2, option3}  Component 4 candidate values: {0.125, 0.25, 0.5, 1, 1.5, 2, 2.5, 3} ms  Note:   * Type 1A refers to the determination of prioritization between DL PRS and other DL signals/channels in all OFDM symbols within the PRS processing window. The DL signals/channels from all DL CCs (per UE) are affected across LTE and NR * Type 1B refers to the determination of prioritization between DL PRS and other DL signals/channels in all OFDM symbols within the PRS processing window. The DL signals/channels from a certain band are affected * Type 2 refers to the determination of prioritization between DL PRS and other DL signals/channels only in DL PRS symbols within the PRS processing window   Note: When the UE determines higher priority for other DL signals/channels over the PRS measurement/processing, the UE is not expected to measure/process DL PRS which is applicable to all of the above capability options  Note: Within a PRS processing window, UE measurement is inside the active DL BWP with PRS having the same numerology as the active DL BWP | Optional with capability signaling | | 27. NR\_pos\_enh | 27-3-4a | DL PRS measurement outside MG and in a type-1A PRS processing window - location sever | 1. Supported of PRS process outside the measurement gap in a type-1A PRS processing window  2. Support of priority handing options of PRS: Option1, Option2 or Option3   * 1. Option 1: UE may indicates support of two priority states.      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS      2. State 2: PRS is lower priority than all PDCCH/PDSCH/CSI-RS   2. Option 2: UE may indicate support of three priority states      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS      2. State 2: PRS is lower priority than PDCCH and URLLC PDSCH and higher priority than other PDSCH/CSI-RS         1. Note: The URLLC channel corresponds a dynamically scheduled PDSCH whose PUCCH resource for carrying ACK/NAK is marked as high-priority.      3. State 3: PRS is lower priority than all PDCCH/PDSCH/CSI-RS   3. Option 3: UE may indicate support of single priority state      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS   3. DL PRS buffering capability  a) Type 1 – sub-slot/symbol level buffering  b) Type 2 – slot level buffering  4. Duration of DL PRS symbols N in units of ms a UE can process every T ms assuming maximum DL PRS bandwidth in MHz, which is supported and reported by UE.  5. Max number of DL PRS resources that UE can process in a slot under it | 13-1 | No |  | DL PRS measurement outside MG and in a type-1A PRS processing window is not supported | per band | n/a | n/a | n/a | Component 2 candidate values: {option1, option2, option3}  Component 3 candidate values: {Type 1, Type 2}  Component 4 candidate values:  a) N: {0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50} ms  b) T: {1, 2, 4, 8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms  Component 5 candidate values:  FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz  Need for location server to know if the feature is supported  Note:   * Type 1A refers to the determination of prioritization between DL PRS and other DL signals/channels in all OFDM symbols within the PRS processing window. The DL signals/channels from all DL CCs (per UE) are affected across LTE and NR * Type 1B refers to the determination of prioritization between DL PRS and other DL signals/channels in all OFDM symbols within the PRS processing window. The DL signals/channels from a certain band are affected * Type 2 refers to the determination of prioritization between DL PRS and other DL signals/channels only in DL PRS symbols within the PRS processing window   Note: When the UE determines higher priority for other DL signals/channels over the PRS measurement/processing, the UE is not expected to measure/process DL PRS which is applicable to all of the above capability options  Note: Within a PRS processing window, UE measurement is inside the active DL BWP with PRS having the same numerology as the active DL BWP | Optional with capability signaling | |
| CATT [3] |  |
| Vivo [4] | |  | | --- | | **Agreement**  For capability 2 as per working assumption made in RAN1#106-e  For FR1, only the DL signals/channels from a certain CC inside the PRS processing window, which overlap with DL PRS symbols in time, are dropped if the DL PRS is determined to be higher priority  For FR2, only the DL signals/channels from a certain band inside the PRS processing window, which overlap with DL PRS symbols in time, are dropped if the DL PRS is determined to be higher priority |   Based on the above agreement in RAN1#108-e meeting, the note for Type 2 needs to be updated to per CC capability for FR1 and per band capability for FR2, that is, only the DL signalings/channels from a certain carrier in the PRS symbols inside the PRS processing window are dropped if the DL PRS is determined to be a higher priority for Type 2 in FR1, and only the DL signalings/channels from a certain band in the PRS symbols inside the PRS processing window are dropped if the DL PRS is configured to be a higher priority for Type 2 in FR2.  So, we propose   * ***The note for Type 2 in FG 27-3-2 can be modified as the following.*** * ***Type 2 refers to the determination of prioritization between DL PRS and other DL signals/channels only in DL PRS symbols within the PRS processing window,***   + ***The DL signals/channels from a certain CC, which overlap with DL PRS symbols in time are affected in FR1,***   + ***The DL signals/channels from a certain band, which overlap with DL PRS symbols in time are affected in FR2*** |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-3-3 | DL PRS Processing Capability outside MG - buffering capability | 1. DL PRS buffering capability  a) Type 1 – sub-slot/symbol level buffering  b) Type 2 – slot level buffering  [2. Maximum duration of DL PRS symbols N in units of ms a UE can process in the first part of a PRS processing window assuming maximum DL PRS bandwidth in MHz, such that the UE is capable of reporting the measurements T-N ms after the last PRS symbol]  3. Max number of DL PRS resources that UE can process in a slot under it | 27-3-2 | No |  | DL PRS measurement outside MG and in a PRS processing window is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {Type 1, Type 2}  [Candidate 2 component values:  a) N: {0.125, 0.25, 0.5, 1, 2, 3, 4, 5, 6, 8, 12} ms  b) T: {N+4, N+5, N+6, N+8} ms]  Component 3 candidate values:  FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz  Need for location server to know if the feature is supported  Note: A UE may declare PRS processing capabilities of each of the supported Type-1A, Type-1B, Type-2” capabilities in case it supports multiple types in a band | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |
| CATT [3] |  |
| Vivo [4] | For component 2, we don't think this is a great way that the value of T to be defined as N+5, when it is actually used, the processing time is T-N. In actual, the processing time is also {4,5,6,8}, so, why don't we just define the processing time directly? For us, we prefer reusing component 3 in FG 13-1 and discuss the candidate value in FG 27-3-3.  In addition, in the RAN4#102-e meeting, the following agreement has been achieved that **Tlast** was only needed to consider the MGL if all of the PRS resources to be measured are available in the same MG occasion so that the latency can be significantly reduced   |  | | --- | | **Agreements in RAN4#102-e***:*  Define Tlast as T+MGL when all of the PRS resources to be measured are available in the same MG occasion during Tavailabe.  *TS 38.133 h50*  is the measurement duration for the last PRS RSTD sample in positioning frequency layer *i*, including the sampling time and processing time. If all of the PRS resources to be measured are available in the same MG occasion during Tavailabe, = +MGL. Otherwise, = + |   In our view, we also can refer to the RAN4 agreement to define a similar **Tlast** for PRS processing outside MG to reduce latency. And then, there is no need to split PPW into two windows. For example, define **Tlast** as T+PPWL when UE is expected to measure up to the N ms PRS within a PRS processing window. So, we prefer reusing component 3 in FG 13-1 and adding a component for indicating the UE mode for PRS processing.   * ***The FG 27-3-3 can be modified as the following marked by blue.*** * ***Suggest modifying the candidate value of T as specific values*** * ***Reusing the description of FG 13-1 in component 2*** * ***Adding a component for indicating the UE mode for PRS processing*** * ***Mode 1: A UE is expected to measure all the PRS within the PRS processing window*** * ***Mode 2: A UE is expected to measure only up to the N ms PRS within a PRS processing window***  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-3-3 | DL PRS Processing Capability outside MG - buffering capability | 1. DL PRS buffering capability  a) Type 1 – sub-slot/symbol level buffering  b) Type 2 – slot level buffering  [2. Duration of DL PRS symbols N in units of ms a UE can process every T ms assuming maximum DL PRS bandwidth in MHz, which is supported and reported by UE.]  3. Max number of DL PRS resources that UE can process in a slot under it  4. DL PRS processing capability  a) mode 1 –all the PRS can be processed in a PPW cycle  b) mode 2 –up to PRS can be processed in a PPW cycle | 27-3-2 | No |  | DL PRS measurement outside MG and in a PRS processing window is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {Type 1, Type 2}  [Candidate 2 component values:  a) N: {0.125, 0.25, 0.5, 1, 2, 3, 4, 5, 6, 8, 12} ms  b) T: { 4, 5, 6, 8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms]  Component 3 candidate values:  FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz  Need for location server to know if the feature is supported  Note: A UE may declare PRS processing capabilities of each of the supported Type-1A, Type-1B, Type-2” capabilities in case it supports multiple types in a band | |
| ZTE [5] | In Rel-16, during the measurement window, the N ms of PRS symbols may be located in anywhere within the duration of T ms as shown in following figures.  Figure 1a Figure 1b Figure 1c  As defined in the formula of TS 38.133 for the measurement period, the component Tlast is the measurement duration for the last PRS sample, including the sampling time and processing time. The Tlast is to consider the cases that PRS resources from different sets are not concentrated on the same MG instance or PRS resources appear in the end of the processing window (e.g. Figure 1c shown above). This component leads to additional latency for the sampling and processing of the last PRS sample. As we are trying to reduce the latency as much as possible, it’s not acceptable to take additional time after the end of the PRS processing window.  In order to reduce the latency for DL PRS measurement in the PRS processing window outside MG, the location information report should be ready right after the end of the PRS processing window. That is, UE has to finish all the DL PRS receiving and computation in the PRS processing window to make full use of its hardware resources. Otherwise, there is no reason to drop other signals including PDSCH, PDCCH, CSI-RS etc. during the window in the case of PRS with higher priority for processing Type 1A and 1B. As discussed in RAN1#107e meeting, we propose the following UE PRS processing capability in PRS processing window outside MG.  **PRS processing capability** is shown in the Figure 2 below, a PRS processing window is divided into a PRS buffering window and a PRS computation window. UE is only expected to receive the DL PRS in the PRS buffering window. Then, based on the buffered DL PRS, UE can compute/process the DL PRS in the PRS computation window to get ready for a location information report by the end of PRS processing window. According to this understanding, UE has to report its capability with combinations of {N, T} under the following interpretations, where T is equal to N+X,   * A PRS processing window (with duration L) is divided into a PRS buffering window with duration L-(T-N) and a PRS computation window with duration T-N. The PRS computation window starts right after the end of the PRS buffering window. * UE shall take T-N ms of time to process up to N ms of symbols containing PRS resources received by UE in the PRS buffering window * UE is not expected to be configured a PRS processing window with duration smaller than T-N.   Figure 2 Type 1 PRS processing capability  In summary, we have the following proposal:  ***Proposal 2****: Define the component 2 of FG 27-3-3 as: Maximum duration of DL PRS symbols N in units of ms a UE can process in the first part of a PRS processing window assuming maximum DL PRS bandwidth in MHz, such that the UE is capable of reporting the measurements T-N ms after the last PRS symbol.*  Furthermore, for gapless PRS measurement, both FG 27-3-2 and 27-3-3 should be reported. Otherwise, the feature is not complete.  ***Proposal 3****: FG 27-3-2 and 27-3-3 should be reported together.* |
| China Telecom [6] |  |
| Samsung [7] | In R16 UE capability, the component 3 in 13-1 Common DL PRS Processing Capability is described as follows:   |  | | --- | | 1. Duration of DL PRS symbols N in units of ms a UE can process every T ms assuming maximum DL PRS bandwidth in MHz, which is supported and reported by UE. 2. T: {8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms 3. N: {0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50} ms |   In our view, for low latency positioning, the PRS processing time need to be smaller than the values in R16. Thus for the set of values of T in component 2, we suggest to include some smaller value in T, e.g., {1,2,4}ms. And we find it’s not necessary to build fixed dependence on N for T, e.g., the N+5 etc, as it is sufficient that UE can choose to report the suitable value from the value sets.  ***Proposal 1: Support smaller numbers for T in the existing UE PRS processing capability (N, T).***   1. T: {1, 2, 4, 8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 27-3-3 | DL PRS Processing Capability outside MG - buffering capability | ……  [2. Maximum duration of DL PRS symbols N in units of ms a UE can process in the first part of a PRS processing window assuming maximum DL PRS bandwidth in MHz, such that the UE is capable of reporting the measurements T-N ms after the last PRS symbol]  …… | 27-3-2 | DL PRS measurement outside MG and in a PRS processing window is not supported | Per band | ……  [Candidate 2 component values:  a) N: {0.125, 0.25, 0.5, 1, 2, 3, 4, 5, 6, 8, 12} ms  b) T: {1, 2, 4, 8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms]  …… | |
| OPPO [8] | In our view, component 2 in [] shall not be included here. The formulation of component 2 with “in the first part of PRS processing window…” is not aligned with previous RAN1 discussion and agreement. The feature of PRS processing window is to support processing PRS resource outside MG with a given processing priority. Defining “in the first part” would change the UE behavior and also specification, which is not preferred.  Proposal 3: FG 27-3-3 does not include the component 2. |
| NTT DOCOMO, INC. [9] | * FG 27-3-3: DL PRS Processing Capability outside MG - buffering capability   + Support the current FG 27-3-3 (i.e. the brackets on the component 2 can be removed) |
| Nokia/Nokia Shanghai Bell [10] | * + Original formulation of component 2 was more appropriated, and it had the benefit of being aligned with the Rel-16 PRS processing capability. |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] | * For Type-1A/1B agree with the current description and values of Component 2 * For Type-2, reuse the description and values of the legacy MG-based PRS processing * We support current description and values of component 2 at least for Type 1A/B. * We are OK to accept the legacy description and values for component 2 for Type 2.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-3-3 | DL PRS Processing Capability outside MG - buffering capability | 1. DL PRS buffering capability  a) Type 1 – sub-slot/symbol level buffering  b) Type 2 – slot level buffering  2. Description of component 2 for Type 1A/1B:   * Maximum duration of DL PRS symbols N in units of ms a UE can process in the first part of a PRS processing window assuming maximum DL PRS bandwidth in MHz, such that the UE is capable of reporting the measurements T-N ms after the last PRS symbol   Description of component 2 for Type 2:   * Duration of DL PRS symbols N in units of ms a UE can process every T ms assuming maximum DL PRS bandwidth in MHz, which is supported and reported by UE   3. Max number of DL PRS resources that UE can process in a slot | 27-3-2 | No |  | DL PRS measurement outside MG and in a PRS processing window is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {Type 1, Type 2}  Candidate 2 component values:  For Type 1A/1B:  a) N: {0.125, 0.25, 0.5, 1, 2, 3, 4, 5, 6, 8, 12} ms  b) T: {N+4, N+5, N+6, N+8} ms  For Type 2:  component values:   1. N: {0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50} ms 2. T: {8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms   Component 3 candidate values:  FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz  Need for location server to know if the feature is supported  Note: A UE may declare PRS processing capabilities of each of the supported Type-1A, Type-1B, Type-2” capabilities in case it supports multiple types in a band | Optional with capability signaling | |

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| 27. NR\_pos\_enh | 27-4-1 | LOS/NLOS Indicator for UE-assisted positioning | 1. Support reporting LoS/NLoS indicator type to LMF  2. LOS/NLOS indicator granularity | one of 13-5,13-6, or 13-11 | No |  | LOS/NLOS Indicator for UE-assisted positioning is not supported | Per UE | n/a | n/a | n/a | [Component 1 candidate values: {hard value, soft value[, both]}]  Component 2 candidate values: {trpSpecific, resourceSpecific[, both]}  [Note: a single value is reported when both multi-RTT and DL-TDOA are supported]  FFS: signalling per method  Need for location server to know if the feature is supported | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-4-1 | LOS/NLOS Indicator for UE-assisted positioning | 1. Support reporting LoS/NLoS indicator type to LMF  2. LOS/NLOS indicator granularity | one of 13-5,13-6, or 13-11 | No |  | LOS/NLOS Indicator for UE-assisted positioning is not supported | Per UE | No | No | No | [Component 1 candidate values: {hard value, soft value, both}]  Component 2 candidate values: {trpSpecific, resourceSpecific, both}  Note: a single value is reported when both multi-RTT and DL-TDOA are supported  Need for location server to know if the feature is supported | Optional with capability signaling | |
| CATT [3] |  |
| Vivo [4] | For LoS/NLoS indicators, it has been agreed in RAN1 #107 meeting that both soft values and hard values are supported for LoS/NLoS indicator reporting.   |  | | --- | | **Agreement**   * Support the following two options of values for LoS/NLoS indicator reporting from UE/TRP:   + Soft values: [0, 0.1, …, 0.9, 1] (in steps of 0.1)   + Hard values: [0, 1] * The values correspond to the likelihood of LoS, with a value of 1 corresponding to LoS and a value of 0 corresponding to NLoS |   It has been agreed to support reporting LoS/NLoS indicator type to LMF, but the candidate value for component 1 needs further discussion. As far as we are concerned, if a UE supports LOS/NLOS indicator of soft value type, it will of course support the hard value 0 and 1. That is, no matter a UE is supportive of hard value only or soft value, it can firstly identify whether a measurement is LoS or NLoS, then UE supportive of soft value type can further report the soft value to indicate the probability. Therefore, for component 1 candidate values, only supporting soft value LOS/NLOS indicator is not needed.   |  | | --- | | Agreement:   * For UE-based positioning, support the following options for LoS/NLoS indicators within positioning assistance data:   + Option 1 (Working assumption): LMF associates UE-based LoS/NloS indicators with each DL PRS resource for each TRP   + Option 2: LMF associates UE-based LoS/NloS indicators with each TRP * Note: For option 1, one LoS/NloS indicator is associated with one DL-PRS resource   **Agreement**  Confirm the working assumption on UE-based LoS/NloS indicators option 1 with the following revision:   * Option 1: LMF associates UE-based LoS/NloS indicators with each DL PRS resource for each TRP, provided the LMF can give different values for Los/NLos indicators of different DL PRS resource of one TRP. |   For component 2 candidate values, in RAN1 #106-bis and #107 e-meeting, we are okay to support one of two options for progress, but we also think “both” is reasonable since it is only for UE capability that indicates which granularity indicator can be supported for a UE and doesn’t mean the two levels indicator will be reported.   * ***For UE’s capability to support reporting LoS/NLoS indicator (FG27-4-1),***    + ***support component 1 candidate value {hard value, both hard value and soft value}***   + ***support component 2 candidate value {trpSpecific, resourceSpecific}*** |
| ZTE [5] |  |
| China Telecom [6] | In RAN1#107e, the following agreement has been reached.   |  | | --- | | **Agreement**   * Support the following two options of values for LoS/NLoS indicator reporting from UE/TRP:   + Soft values: [0, 0.1, …, 0.9, 1] (in steps of 0.1)   + Hard values: [0, 1] * The values correspond to the likelihood of LoS, with a value of 1 corresponding to LoS and a value of 0 corresponding to NLoS |   In RAN1 #108-e meeting, the majority agreed to wait for the discussion in AI 8.5.5 to finally decide whether the {both} should be added to the component 1 and 2 candidate value . However, no more agreement has been reached on this item in the last meeting [3]. For component 1, we think if the UE support the soft value of LoS/NLoS indicator, then the hard value can must be supported, since UE can only report one type of indicator at a time, so the candidate value {both} seems reduntant. But for making further progress on this item, according to the majority view during the discussion in both AI 8.5.5 and AI 8.16.5, we can live with that the {both} added as a candidate value for the LOS/NLOS indicator type, but at least the note that “*UE can not report both hard and soft values for the same association in the same time stamp*” should be added. As for the component 2, we also agree to add the candidate value {both} to the LOS/NLOS indicator granularity.  We don’t see the difference of the indicator reporting between the multi-RTT and DL-TDOA, we think the signaling or the two method can be the same and the “Note: a single value is reported when both multi-RTT and DL-TDOA are supported” can be be reserved here.  ***Proposal 1:***  ***For FG 27-4-1,***   * ***Support to add {both} as a candidate value for component 1 only if the following note be added: “Both does not imply that the UE can report both hard and soft values for the same association (e.g., PRS resource) in the same time stamp”.*** * ***Support to add {both} as a candidate value for component2.***   The FG 27-4-1 can be modified as follows,   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-4-1 | LOS/NLOS Indicator for UE-assisted positioning | 1. Support reporting LoS/NLoS indicator type to LMF  2. LOS/NLOS indicator granularity | one of 13-5,13-6, or 13-11 | No |  | LOS/NLOS Indicator for UE-assisted positioning is not supported | Per UE | n/a | n/a | n/a | ~~[~~Component 1 candidate values: {softValue, hardValue, both}~~]~~  Note: Both does not imply that the UE can report both hard and soft values for the same association (e.g., PRS resource) in the same time stamp  Component 2 candidate values: {trpSpecific, resourceSpecific~~[~~, both~~]~~}  ~~[~~Note: a single value is reported when both multi-RTT and DL-TDOA are supported~~]~~  ~~FFS: signalling per method~~  Need for location server to know if the feature is supported | Optional with capability signaling | |
| Samsung [7] |  |
| OPPO [8] | Regarding the candidate value for component 1, including ‘hard value’ and ‘soft value’ is sufficient. There is no use case to include candidate value ‘both’. Because candidate value ‘both’ would mean that the UE supports both softvalue and hardvalue. That is not practical. If a UE is capable of supporting softvalue, it is not technically feasible for the UE to report supporting hardvalue. Furthermore, if a UE reporting support ‘both’, indicating a value of 0 or 1 would cause ambiguity. The UE would not know if the indicated value 0 or 1 is from a softvalue or hardvalue set.  Regarding the LOS/NLOS indicator granularity of component 2, we also prefer not to include the candidate value “both”. There is no technical motivation to let one UE support both granularity and then switch them during NR positioning operation.  ***Proposal 5: On FG 27-4-1:***   * ***The candidate values for component 1 are: {soft value, hard value}.*** * ***The candidate value of component 2 does not include ‘both’*** |
| NTT DOCOMO, INC. [9] | * FG 27-4-1: LOS/NLOS Indicator for UE-assisted positioning   + Regarding component 1 candidate values, considering the common understanding of the AI 8.5.5 Note: “Both does not imply that the UE can report both hard and soft values for the same association (e.g., PRS resource) in the same time stamp.”, “both” can be reported.   + Regarding component 2 candidate values, we prefer to keep “both”.   + “[Note: a single value is reported when both multi-RTT and DL-TDOA are supported]” can be removed.   + “FFS: signalling per method” part can be removed. |
| Nokia/Nokia Shanghai Bell [10] | * + No need to signal candidate values, as UE should be able to support reports with either hard or soft values. |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] | * Support including hard, soft and both values for component 1 * Support including “both” as value in component 2 * Keep the Note * Support signaling per method  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-4-1 | LOS/NLOS Indicator for UE-assisted positioning | 1. Support reporting LoS/NLoS indicator type to LMF  2. LOS/NLOS indicator granularity | one of 13-5,13-6, or 13-11 | No |  | LOS/NLOS Indicator for UE-assisted positioning is not supported | Per UE | n/a | n/a | n/a | Component 1 candidate values: {hard value, soft value, both}  Component 2 candidate values: {trpSpecific, resourceSpecific, both}  Note: a single value is reported when both multi-RTT and DL-TDOA are supported  Signalling per method  Need for location server to know if the feature is supported | Optional with capability signaling | |

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| 27. NR\_pos\_enh | 27-6 | DL PRS processing capabilities in RRC inactive state | 1. DL PRS buffering capability  a) Type 1 – sub-slot/symbol level buffering  b) Type 2 – slot level buffering  2. Duration of DL PRS symbols N in units of ms a UE can process every T ms assuming maximum DL PRS bandwidth in MHz, which is supported and reported by UE  3. Max number of DL PRS resources that UE can process in a slot |  | No |  | DL PRS processing in RRC inactive state is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {Type 1, Type 2}  Component 2 candidate values:  T: {8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms  N: {0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50} ms  Component 3 candidate values:  FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz  Need for location server to know if the feature is supported  Note: Having the PRS processing capabilities in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] |  |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] | The following agreement was reached in RAN4:   |  | | --- | | *Agreements:*   * Support of the reduced number of samples in RRC\_INACTIVE state is UE capability   + The UE capability is under discussion in RAN1, and wait for RAN1 agreement. * PRS measurement requirements with reduced number of samples in RRC\_INACTIVE state are applicable only for UE which supports PRS measurements with reduced number of samples. * The requirements with reduced sample number are applicable when UE is requested by LMF to perform measurement with reduced sample number. * FFS: PRS measurement requirements with reduced number of samples in RRC\_INACTIVE are defined under the same side conditions as agreed for RRC CONNECTED state. |  * Based on the above agreement, we suggest adding a new component in the FG 27-6: “Support of single sample measurements in RRC Inactive state: The capability to support reporting a measurement based on measuring M=1 samples (instances) of a DL PRS resource set”.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-6 | DL PRS processing capabilities in RRC inactive state | 1. DL PRS buffering capability  a) Type 1 – sub-slot/symbol level buffering  b) Type 2 – slot level buffering  2. Duration of DL PRS symbols N in units of ms a UE can process every T ms assuming maximum DL PRS bandwidth in MHz, which is supported and reported by UE  3. Max number of DL PRS resources that UE can process in a slot  4. Support of single -sample measurements in RRC Inactive state: The capability to support reporting a measurement based on measuring M=1 samples (instances) of a DL PRS resource set |  | No |  | DL PRS processing in RRC inactive state is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {Type 1, Type 2}  Component 2 candidate values:  T: {8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms  N: {0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50} ms  Component 3 candidate values:  FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz  Need for location server to know if the feature is supported  Note: Having the PRS processing capabilities in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state  Note: The sample number M=1 does not account for the potential AGC sample | Optional with capability signaling | |

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| 27. NR\_pos\_enh | 27-7 | Multiple measurement instances which can be included in a single measurement report | Support of mutiple measurement instances which can be included in a single measurement report |  | No |  | Multiple measurement instances which can be included in a single measurement report are not supported | Per UE | No | No | No |  | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-7 | Multiple measurement instances which can be included in a single measurement report | Support of multiple measurement instances which can be included in a single measurement report |  | No |  | Multiple measurement instances which can be included in a single measurement report are not supported | Per UE | No | No | No |  | Optional with capability signaling | |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-8 | Support of PRS TEG association information for UE-based DL-TDOA | Support of reception of association between PRS and TRP Tx TEG for UE-based positioning | 13-1 | No |  | Positioning calculation assistance data containing association between PRS and TRP Tx TEG is not supported by UE | Per UE | n/a | n/a | n/a | Need for location server to know if the feature is supported. | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-8 | Support of PRS TEG association information for UE-based DL-TDOA | Support of reception of association between PRS and TRP Tx TEG for UE-based positioning | 13-1 | No |  | Positioning calculation assistance data containing association between PRS and TRP Tx TEG is not supported by UE | Per UE | No | No | No | Need for location server to know if the feature is supported. | Optional with capability signaling | |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-9 | Support of lower Rx beam sweeping factor | 1. Support of the lower Rx beam sweeping factor than 8 for FR2  2. Number of Rx beam sweeping factors |  | No |  | UE only supports 8 as the Rx beam sweeping factor defined by RAN4. | Per band | n/a | n/a  FR2 only | n/a | Component 2 candidate values: {1,2,4,6}  Need for location server to know if the feature is supported | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] |  |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-10 | Support of UL MAC CE based MG activation request for PRS measurements | 1. Support of using UL MAC CE to request measurement gap for PRS measurements: The information in the UL MAC CE for MG activation request by the UE can be one ID associated with the preconfiguration of the MG  2. Support of preconfiguration of MGs in RRC signaling for PRS measurements: Each MG in the preconfiguration is associated with an ID | 27-11 | Yes |  | Using UL MAC CE to indicate measurement gap for PRS measurements to the gNB is not supported. | Per UE | No | No | No |  | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-10 | Support of UL MAC CE based MG activation request for PRS measurements - gNB | 1. Support of using UL MAC CE to request measurement gap activation/deactivation for PRS measurements: The information in the UL MAC CE for MG activation request by the UE can be one ID associated with the preconfiguration of the MG  2. Support of preconfiguration of MGs in RRC signaling for PRS measurements: Each MG in the preconfiguration is associated with an ID | 27-11 | Yes |  | Using UL MAC CE to indicate measurement gap for PRS measurements to the gNB is not supported. | Per UE | No | No | No |  | Optional with capability signaling | |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-10a | Low latency MG activation request for PRS measurements | support of low latency MG activation request for PRS measurements | [27-10] | No |  | Low latency MG activation request for PRS measurements is not supported | Per UE | No | No | No | Need for location server to know if the feature is supported | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-10a | Low latency MG activation request for PRS measurements - location sever | support of low latency MG activation request for PRS measurements |  | No |  | Low latency MG activation request for PRS measurements is not supported | Per UE | No | No | No | Need for location server to know if the feature is supported | Optional with capability signaling | |
| CATT [3] |  |
| Vivo [4] | We prefer to keep the [27-10] as a prerequisite feature group considering FG 27-10 includes component 2 “Support of preconfiguration of MGs in RRC signaling for PRS measurements”. We believe in supporting of preconfiguration of MGs is a prerequisite for feature group 27-10a.   * ***For FG27-10a, keep the [27-10] as a prerequisite feature group.*** |
| ZTE [5] | For FG 27-10a, we think both 27-10 and 27-11 is needed as the prerequisite. First, 27-11 implies UE supports pre-configuration of MGs, and UE supporting 27-10a needs to support pre-configuration of MGs. Second, support of 27-10a must support 27-10 as well. If UE doesn’t support 27-10 reporting to gNB, it is not needed to report 27-10a.  ***Proposal 4****: For FG 27-10a, both 27-10 and 27-11 should be prerequisite.* |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] | * FG 27-10a: Low latency MG activation request for PRS measurements   + The prerequisite FG 27-10 can be removed. |
| Nokia/Nokia Shanghai Bell [10] | * + Confirm 27-10 as pre-requisite. |
| Ericsson [11] | FG 27-10a informs the LMF that the UE supports the use of low latency activation of MG configurations. Based on the information, the LMF can request the gNB to reconfigure the MG in UE. the UE should not have to report this capability if it is not capable to receive fast DL MAC CE reconfigurations. Therefore we think that 27-11 should be a prerequisite, instead of 27-10, which signals the UL MAC CE capability.  The following change is proposed:     |  |  |  |  |  | | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-10a | Low latency MG activation request for PRS measurements | support of low latency MG activation request for PRS measurements | [27-11] | |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-11 | Support of DL MAC CE based MG activation request for PRS measurements | 1. Support of preconfiguration of MGs in RRC signaling for PRS measurements: Each MG in the preconfiguration is associated with an ID  2. Support of using DL MAC CE to activate the MG for PRS measurements: The DL MAC CE for MG activation indicates the ID associated with the preconfigured MG |  | Yes |  | Using DL MAC CE to activate the preconfigured MG for PRS measurements is not supported | Per UE | No | No | No |  | Optional with capability signaling. |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-11 | Support of DL MAC CE based MG activation request for PRS measurements | 1. Support of preconfiguration of MGs in RRC signaling for PRS measurements: Each MG in the preconfiguration is associated with an ID  2. Support of using DL MAC CE to activate/deactivation the MG for PRS measurements: The DL MAC CE for MG activation indicates the ID associated with the preconfigured MG |  | Yes |  | Using DL MAC CE to activate the preconfigured MG for PRS measurements is not supported | Per UE | No | No | No |  | Optional with capability signaling. | |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-12 | LOS/NLOS indicator for UE-based positioning assistance data | Support reception of the assistance data containing the LOS/NLOS indicator.  1. LOS/NLOS indicator type  2. LOS/NLOS indicator granularity |  | No |  | LOS/NLOS indicator for UE-based positioning assistance data is not supported | Per UE | No | No | No | [Component 1 candidate values: {softValue, hardValue, both}]  Component 2 candidate values: {resourceSpecific, trpSpecific[, both]}  Need for location server to know if the feature is supported. | Optional with capability signaling. |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-12 | LOS/NLOS indicator for UE-based positioning assistance data | Support reception of the assistance data containing the LOS/NLOS indicator.  1. LOS/NLOS indicator type  2. LOS/NLOS indicator granularity |  | No |  | LOS/NLOS indicator for UE-based positioning assistance data is not supported | Per UE | No | No | No | Component 1 candidate values: {softValue, hardValue, both}  Component 2 candidate values: {resourceSpecific, trpSpecific, both}  Need for location server to know if the feature is supported. | Optional with capability signaling. | |
| CATT [3] |  |
| Vivo [4] | For FG 27-12, similar to FG27-4-1, we think the component 1 candidate value should be {hard value, both hard value and soft value}, and component 2 candidate value should be {trpSpecific, resourceSpecific}.   * ***For UE’s capability to support LOS/NLOS indicator for UE-based positioning assistance data (FG27-12), support the following:***   + ***support component 1 candidate value {hard value, both hard value and soft value};***   + ***support component 2 candidate value {trpSpecific, resourceSpecific}.*** |
| ZTE [5] |  |
| China Telecom [6] | Since the FG 27-12 and 27-4-1 have the same motivation, the candidate value for FG 27-12 should be the same as that of FG 27-4-1.  ***Proposal 2：***  ***The candidate value of FG 27-12 should keep the same as that of FG 27-4-1.***  The FG 27-12 can be modified as follows,   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-12 | LOS/NLOS indicator for UE-based positioning assistance data | Support reception of the assistance data containing the LOS/NLOS indicator.  1. LOS/NLOS indicator type  2. LOS/NLOS indicator granularity |  | No |  | LOS/NLOS indicator for UE-based positioning assistance data is not supported | Per UE | No | No | No | [Component 1 candidate values: {hard value, soft value~~[~~, both~~]~~}]  Note: Both does not imply that the UE can report both hard and soft values for the same association (e.g., PRS resource) in the same time stamp  Component 2 candidate values: {trpSpecific, resourceSpecific~~[~~, both~~]~~}  Need for location server to know if the feature is supported. | 27. NR\_pos\_enh | |
| Samsung [7] | According to the RAN1 #107 agreement, the LOS/NLOS indicators can be either soft values or hard values.   |  | | --- | | **Agreement**   * Support the following two options of values for LoS/NLoS indicator reporting from UE/TRP:   + Soft values: [0, 0.1, …, 0.9, 1] (in steps of 0.1)   + Hard values: [0, 1] * The values correspond to the likelihood of LoS, with a value of 1 corresponding to LoS and a value of 0 corresponding to NLoS |   A UE could support one of these options (either soft reporting or hard reporting). However, we did not find much motivation for supporting both (soft and hard reporting). For an advanced UE, if it’s capable of having soft values, it can choose to report hard or soft value, while the hard value is the only choice for a less advanced UE. But if “both” is indicated, which means UE gives the right to gNB to decide which type to be reported. While gNB or LMF did not have to choose since it’s the fact that soft value is more useful than hard value. Thus, we support including either hard or soft values for component 1.  For component 2, “both” is useful because the two types are not exclusive. Thus, “both” is supported.  ***Proposal 2：Support the following statements regarding LOS/NLOS indicators for feature 27-4-1:***   * ***Component 1 candidate values: {hard value, soft value}*** * ***Component 2 candidate values: {trpSpecific, resourceSpecific, both}***  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-12 | LOS/NLOS indicator for UE-based positioning assistance data | Support reception of the assistance data containing the LOS/NLOS indicator.  1.LOS/NLOS indicator type  2.LOS/NLOS indicator granularity |  |  |  | Component 1 candidate values:{softValue, hardValue}  Component 2 candidate values: {resourceSpecific, trpSpecific, both}  Need for location server to know if the feature is supported. | Optional with capability signaling. | |
| OPPO [8] | There is no need for support ‘both’ as candidate value for component 1 of LOS/NLOS indicator type. Similarly, there is no need to include ‘both’ as candidate value for component 2 of LOS/NLOS indicator granularity. If a UE can support resourceSpecific, it does not make sense for the LMF to provide trpSpecific configuration.  ***Proposal 4: For FG 27-12: do not include ‘both’ as candidate value for component 1 and do not include ‘both’ in candidate value for component 2.*** |
| NTT DOCOMO, INC. [9] | * FG 27-12: LOS/NLOS indicator for UE-based positioning assistance data   + Regarding component 1 candidate values, considering the common understanding of the AI 8.5.5 Note: “Both does not imply that the UE can report both hard and soft values for the same association (e.g., PRS resource) in the same time stamp.”, “both” can be reported.   + Regarding component 2 candidate values, we prefer to keep “both”. |
| Nokia/Nokia Shanghai Bell [10] | * + Component 1 definition should follow how 27-4-1 is going to be defined. |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] | * Support Component 1 * Support including “both” as value in component 2  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-12 | LOS/NLOS indicator for UE-based positioning assistance data | Support reception of the assistance data containing the LOS/NLOS indicator.  1. LOS/NLOS indicator type  2. LOS/NLOS indicator granularity |  | No |  | LOS/NLOS indicator for UE-based positioning assistance data is not supported | Per UE | No | No | No | Component 1 candidate values: {softValue, hardValue, both}  Component 2 candidate values: {resourceSpecific, trpSpecific, both}  Need for location server to know if the feature is supported. | Optional with capability signaling. | |

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| 27. NR\_pos\_enh | 27-13 | Additional path reporting for UE-assisted DL-TDOA | 1. Support of additional detected path timing reporting for K>2 additional paths for UE-assisted DL-TDOA  2. Support of RSRPP reporting for additional paths if UE supports FG 27-13a |  | No |  | Additional path reporting for UE-assisted DL-TDOA is not supported | Per UE | No | No | No | Component 1 candidate values: {4, 6, 8}  Need for location server to know if the feature is supported. | Optional with capability signaling. |

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| Company | Summary |
| Huawei/HiSilicon [2] |  |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-13a | First path RSRPP reporting for UE-assisted DL-TDOA | 1. Support of RSRPP reporting for first path | 13-1 | No |  | First path RSRPP reporting for UE-assisted 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. |

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| Company | Summary |
| Huawei/HiSilicon [2] |  |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-14 | Additional path reporting for Multi-RTT | 1. Support of additional detected path timing reporting for K>2 additional paths for Multi-RTT  2. Support of RSRPP reporting for additional paths if UE supports FG 27-14a |  | No |  | Additional path reporting for Multi-RTT is not supported | Per UE | No | No | No | Component 1 candidate values: {4, 6, 8}  Need for location server to know if the feature is supported. | Optional with capability signaling. |

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| Company | Summary |
| Huawei/HiSilicon [2] |  |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-14a | First path RSRPP reporting for Multi-RTT | 1. Support of RSRPP reporting for first path | 13-1 | No |  | First path RSRPP reporting 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. |

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| Company | Summary |
| Huawei/HiSilicon [2] |  |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-15 | Positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP | 1. Max number of SRS Resource Sets for positioning supported by UE  2. Max number of P/SPSRS Resources for positioning  3. Max number of P/SPSRS Resources for positioning per slot  4. Max number of periodic SRS Resources for positioning  5. Max number of periodic SRS Resources for positioning per slot |  | Yes |  | Positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {1, 2, 4, 8, 12, 16}  Component 2 candidate values: {1,2,4,8,16,32,64}  Component 3 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Component 4 candidate values: {1,2,4,8,16,32,64}  Component 5 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Note: OLPC for SRS for positioning based on SSB from the last serving cell (the cell that releases UE from connection) is part of this FG. No dedicated capability signaling is intended for this component  Need for location server to know if the feature is supported | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-15 | Positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP | 1. Max number of SRS Resource Sets for positioning supported by UE  2. Max number of SRS Resources for positioning  3. Max number of SRS Resources for positioning per slot  4. Max number of periodic SRS Resources for positioning  5. Max number of periodic SRS Resources for positioning per slot |  | Yes |  | Positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {1, 2, 4, 8, 12, 16}  Component 2 candidate values: {1,2,4,8,16,32,64}  Component 3 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Component 4 candidate values: {1,2,4,8,16,32,64}  Component 5 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Note: OLPC for SRS for positioning based on SSB from the last serving cell (the cell that releases UE from connection) is part of this FG. No dedicated capability signaling is intended for this component  Need for location server to know if the feature is supported | Optional with capability signaling | |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-15b | Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP | 1. Maximum SRS bandwidth supported for each SCS that UE supports within a single CC 2. Max number of SRS Resource Sets for positioning supported by UE 3. Max number of periodic SRS Resources for positioning 4. Max number of periodic SRS Resources for positioning per slot 5. [Different numerology between the SRS and the initial UL BWP is supported] 6. [SRS operation without restriction on the BW: BW of the SRS may not include BW of the CORESET#0 and SSB] 7. Max number of P/SP SRS Resources for positioning 8. Max number of P/SP SRS Resources for positioning per slot 9. FFS: center frequenecy | 27-15 | Yes |  | Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: FFS  Component 2 candidate values: {1, 2, 4, 8, 12, 16}  Component 3 candidate values: {1,2,4,8,16,32,64}  Component 4 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Component 5 candidate values: FFS  Component 6 candidate values: FFS  Component 7 candidate values: FFS  Note 1: The SRS should have a locationAndBandwidth, SCS, CP, defined the same way as a legacy BWP.  [Note 2: Based on other signalled UE capabilities, the UE supports at least one connected mode configuration where a hypothetical BWP defined by this SRS is the active BWP and switching between this active BWP and the initial BWP is supported.]  [Note 3: If component 5 is not signaled, the UE only supports same numerology between the SRS and the initial UL BWP]  [Note 4: If component 6 is not signaled, the UE supports only SRS BW that include the BW of the CORESET #0 and SSB.]  [Need for location server to know if the feature is supported] | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-15b | Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP | 1. Maximum SRS bandwidth supported for each SCS that UE supports within a single CC 2. Max number of SRS Resource Sets for positioning supported by UE 3. Max number of periodic SRS Resources for positioning 4. Max number of periodic SRS Resources for positioning per slot 5. Support of the same numerology between the SRS and the initial UL BWP 6. Support of operation with restriction on the BW: BW of the SRS includes BW of the CORESET#0 and SSB 7. Max number of SRS Resources for positioning 8. Max number of SRS Resources for positioning per slot 9. Support of the same centre frequency between the SRS for positioning and the initial UL BWP 10. SRS switching time | 27-15 | Yes |  | Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100} MHz for FR1 and {50, 100, 200, 400} MHz for FR2  Component 2 candidate values: {1, 2, 4, 8, 12, 16}  Component 3 candidate values: {1,2,4,8,16,32,64}  Component 4 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Component 7 candidate values: {1,2,4,8,16,32,64}  Component 8 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Component 10 candidate values: {0, 30, 100, 140, 200, 300, 500, 900} us for DL and UL respectively.  Note 1: The SRS should have a locationAndBandwidth, SCS, CP, defined the same way as a legacy BWP.  Note 2: Component 10 may correspond to the IE SRS-SwitchingTimeNR.  Need for location server to know if the feature is supported | Optional with capability signaling | | 27. NR\_pos\_enh | 27-15c | Support of different numerologies between SRS for positioning and initial UL BWP for SRS configured outside initial UL BWP in RRC\_INACTIVE state | Support of different numerologies between SRS for positioning and initial UL BWP | 27-15b | Yes |  | SRS for positioning should have the same numerology as the initial UL BWP | Per band | n/a | n/a | n/a |  | Optional with capability signaling | | 27. NR\_pos\_enh | 27-15d | Support of operation without BW restriction for SRS configured outside initial UL BWP in RRC\_INACTIVE state | Support of the bandwidth of SRS not including the bandwidth of the CORESET#0 and SSB. | 27-15b | Yes |  | SRS for positioning should include the bandwidth of the CORESET#0 and SSB | Per band | n/a | n/a | n/a |  | Optional with capability signaling | | 27. NR\_pos\_enh | 27-15e | Support of different centre frequency between the SRS for positioning and the initial UL BWP | Support of different centre frequencies between the SRS for positioning and the initial UL BWP | 27-15b | Yes |  | SRS for positioning should have the same centre frequency as the initial UL BWP | Per band | n/a | n/a | n/a |  | Optional with capability signaling | |
| CATT [3] |  |
| Vivo [4] | In addition, the following agreements were achieved related to option 2 of SRS for positioning configuration in inactive state.   |  | | --- | | Agreement  For Option 2 of SRS for positioning configuration,   * The feature is supported at least for NUL in Rel.17 * The SRS for positioning is configured in the same band and CC as the initial UL BWP   + Signaling details are up to RAN2 * The following is up to UE capability indication   + Support of different SCS, CP type from the initial UL BWP   + Support a different center frequency between the SRS for positioning and the initial UL BWP   + Whether bandwidth of SRS for positioning may not include bandwidth of the CORESET#0 and SSB   Working assumption  For Option 2 of SRS for positioning transmission in RRC\_INACTIVE, a UE capability for switching time between SRS Tx and other Tx in initial UL BWP or Rx in initial DL BWP is introduced   * The capability is reported per band   + The capability applies at least to TDD   + FFS: FDD * The switching time value(s) are left up to RAN4 discussion * If the transmission of SRS for positioning with the switching time overlaps/collides in time domain with other DL reception or UL transmission at least for TDD, the SRS for positioning transmission is dropped in the symbol(s) where the overlap/collision occurs   + Note: Transmission of SRS for positioning with the switching time covers the following example TDD cases:     1. “switching after SRS” (i.e., transmission of SRS + switching time)     2. “switching before SRS” (i.e., switching time + transmission of SRS) |   Based on the latest agreement, component 5 and 6 can be confirmed. For component 9, it should be changed to ‘different center frequency between the SRS for positioning and the initial UL BWP’. Then, considering ‘switching time’ was also agreed in the working assumption, a new component ‘switching time’ should be added in FG27-15b.  In addition, for the ‘Note’ column, the following issues are discussed.   * For Component 1 candidate values, the bandwidth should be limited to FG2-1‘Maximum channel bandwidth supported in each band for DL and UL separately and for each SCS that UE supports within a single CC’ as the following. Therefore, similarly, for SRS bandwidth outside initial UL BWP, Table 5.3.5-1 in TS38.101-1/TS38.101-2 can be referred.  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 2. UE RF | 2-1 | Maximum channel bandwidth supported in each band for DL and UL separately and for each SCS that UE supports within a single CC | 1) FR1 channel bandwidths in TS38.101-1 Table 5.3.5-1  2) FR2 channel bandwidths in TS38.101-2 Table 5.3.5-1 |  | *channelBWs-DL*  *channelBWs-UL* | *BandNR* | No | No | UE capability signalling shall follow RP-172832 (Per-band capability signalling, separately for DL and UL and for each SCS)  Whether a bandwidth newly introduced in future is mandatory for UE shall be discussed case by case. | For FR1, all the bandwidths listed in TS38.101-1 v15.0.0 Table 5.3.5-1 for each band shall be mandatory with a single CC. The bandwidths listed in the slide #3 of R4-1805985 are mandatory with a single CC. 90MHz is optional for n41, n77, n78.  For FR2, the set of mandatory CBW is 50, 100, 200 MHz. |  * For Component 5 candidate values, we think if Note 3 is supported, candidate values are no need. * For Component 6 candidate values, we think if Note 4 is supported, candidate values are no need. * For Component 7/8 candidate values, we can refer to the values of FG27-15. * For Note 2, we don't see the need to leave it. * For Note 3 and Note 4, we are OK to leave them. * We support the note ‘Need for location server to know if the feature is supported’   Therefore, we propose   * ***For FG27-15b, support the following marked by blue.***  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-15b | Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP | 1. Maximum SRS bandwidth supported for each SCS that UE supports within a single CC 2. Max number of SRS Resource Sets for positioning supported by UE 3. Max number of periodic SRS Resources for positioning 4. Max number of periodic SRS Resources for positioning per slot 5. ~~[~~Different numerology between the SRS and the initial UL BWP is supported~~]~~ 6. ~~[~~SRS operation without restriction on the BW: BW of the SRS may not include BW of the CORESET#0 and SSB~~]~~ 7. Max number of P/SP SRS Resources for positioning 8. Max number of P/SP SRS Resources for positioning per slot 9. ~~FFS:~~ different center frequency between the SRS for positioning and the initial UL BWP 10. Switching time between SRS Tx and other Tx in initial UL BWP or Rx in initial DL BWP | 27-15 | Yes |  | Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP is not supported | Per band |  |  |  | Component 1 candidate values: refer to Table 5.3.5-1 in TS38.101-1/TS38.101-2  Component 2 candidate values: {1, 2, 4, 8, 12, 16}  Component 3 candidate values: {1,2,4,8,16,32,64}  Component 4 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  ~~Component 5 candidate values: FFS~~  ~~Component 6 candidate values: FFS~~  Component 7 candidate values: {1,2,4,8,16,32,64}  Component 8 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Note 1: The SRS should have a locationAndBandwidth, SCS, CP, defined the same way as a legacy BWP.  ~~[Note 2: Based on other signalled UE capabilities, the UE supports at least one connected mode configuration where a hypothetical BWP defined by this SRS is the active BWP and switching between this active BWP and the initial BWP is supported.]~~  ~~[~~Note 3: If component 5 is not signaled, the UE only supports same numerology between the SRS and the initial UL BWP~~]~~  ~~[~~Note 4: If component 6 is not signalled, the UE supports only SRS BW that include the BW of the CORESET #0 and SSB.~~]~~  ~~[~~Need for location server to know if the feature is supported~~]~~ | Optional with capability signaling | |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] | If the center frequency of SSRS outside initial UL BWP is different from that of the initial UL BWP, the UE may need to retune its RF chains for the reception and it will impact hardware implementation.  Furthermore, the main motivation to support SRS out of initial UL BWP is to support larger SRS bandwidth for higher accuracy. In our understanding, the 1st figure is the most typical case. For this case, UE is naturally to support it. However, for the 2nd and 3rd figure, we think the cases are less popular compared to the 1st figure. Thus, a separate UE feature is suggested to differentiate the supporting of different cases.  In summary, we suggest to support Component 9.  Additionally, from the perspective of UE implementation, we also support to keep Component 5 and 6.  ***Proposal 6: Support the following modifications for UE FG 27-15b (RED part)***   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-15b | Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP | 1. Maximum SRS bandwidth supported for each SCS that UE supports within a single CC 2. Max number of SRS Resource Sets for positioning supported by UE 3. Max number of periodic SRS Resources for positioning 4. Max number of periodic SRS Resources for positioning per slot 5. ~~[~~Whether to support Different numerology between the SRS and the initial UL BWP is supported~~]~~ 6. ~~[~~Whether to support SRS operation without restriction on the BW: BW of the SRS may not include BW of the CORESET#0 and SSB~~]~~ 7. Max number of P/SP SRS Resources for positioning 8. Max number of P/SP SRS Resources for positioning per slot 9. ~~FFS:~~ Whether to support different center frequenecy as the initial UL BWP |  | Component 1 candidate values: ~~FFS~~{10, 20, 25, 50, 100, 200, 400} MHz  Component 2 candidate values: {1, 2, 4, 8, 12, 16}  Component 3 candidate values: {1,2,4,8,16,32,64}  Component 4 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Component 5 candidate values: ~~FFS~~{Support, Not support}  Component 6 candidate values: ~~FFS~~{Support, Not support}  Component 7 candidate values: ~~FFS~~ {1,2,4,8,16,32,64}  Component 8 candidate values:{1,2,3,4,5,6,8,10, 12, 14}  Component 9 candidate values: {Support, Not support}  Note 1: The SRS should have a locationAndBandwidth, SCS, CP, defined the same way as a legacy BWP.  ~~[Note 2: Based on other signalled UE capabilities, the UE supports at least one connected mode configuration where a hypothetical BWP defined by this SRS is the active BWP and switching between this active BWP and the initial BWP is supported.]~~  ~~[Note 3: If component 5 is not signaled, the UE only supports same numerology between the SRS and the initial UL BWP]~~  ~~[Note 4: If component 6 is not signaled, the UE supports only SRS BW that include the BW of the CORESET #0 and SSB.]~~  ~~[~~Need for location server to know if the feature is supported~~]~~ | |
| NTT DOCOMO, INC. [9] | * FG 27-15b: Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP   + We prefer to keep component 5.   + We prefer to keep component 6.   + “FFS: center frequency” can be removed.   + Regarding semi-persistent SRS transmission for outside initial UL BWP, we need to discuss whether FG 27-15a is necessary in prerequisite feature groups in addition to FG 27-15.   + Regarding component 1 candidate values, we need to consider *SupportedBandwidth* information elements, and we think all values can be included as candidate values for component 1.   + We think component 5 candidate value is not needed.   + We think component 6 candidate value is not needed.   + Regarding component 7, the following candidate values can be considered.     - Candidate values: {1, 2, 4, 8, 16, 32, 64}   + Regarding component 8, the following candidate values can be considered.     - Candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}   + “[Need for location server to know if the feature is supported]” can be removed. |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] | During RAN1#108e, two components were left in yellow for FG 27-15b. both component 5 and 6 may impact the required retuning time when the SRS needs to be transmitted outside of the initial BWP. if the numerology is the same and the SRS overlap with the initial BWP, retuning time could be smaller compared to when the UE needs to readjust numerology and move to the initial BWP. a separate FG for the case of different numerology and with SRS BW outside of coreset0 / SSB could thus be considered.   |  |  |  |  |  | | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-15b | Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP | 1. Maximum SRS bandwidth supported for each SCS that UE supports within a single CC 2. Max number of SRS Resource Sets for positioning supported by UE 3. Max number of periodic SRS Resources for positioning 4. Max number of periodic SRS Resources for positioning per slot 5. [Different numerology between the SRS and the initial UL BWP is supported] 6. [SRS operation without restriction on the BW: BW of the SRS may not include BW of the CORESET#0 and SSB] 7. Max number of P/SP SRS Resources for positioning 8. Max number of P/SP SRS Resources for positioning per slot 9. FFS: center frequenecy | 27-15 |  1. Component 5 and 6 of FG 27-15b can be moved to a new, separate FG with 27-15b as a prerequisite. |
| Qualcomm Incorporated [12] | * Add the new components as agreed in the main session in the previous meeting:  |  | | --- | | Working assumption  For Option 2 of SRS for positioning transmission in RRC\_INACTIVE, a UE capability for switching time between SRS Tx and other Tx in initial UL BWP or Rx in initial DL BWP is introduced   * The capability is reported per band   + The capability applies at least to TDD   + FFS: FDD * The switching time value(s) are left up to RAN4 discussion * If the transmission of SRS for positioning with the switching time overlaps/collides in time domain with other DL reception or UL transmission at least for TDD, the SRS for positioning transmission is dropped in the symbol(s) where the overlap/collision occurs   + Note: Transmission of SRS for positioning with the switching time covers the following example TDD cases:     1. “switching after SRS” (i.e., transmission of SRS + switching time)     2. “switching before SRS” (i.e., switching time + transmission of SRS)   Agreement  For Option 2 of SRS for positioning configuration,   * The feature is supported at least for NUL in Rel.17 * The SRS for positioning is configured in the same band and CC as the initial UL BWP   + Signaling details are up to RAN2 * The following is up to UE capability indication   + Support of different SCS, CP type from the initial UL BWP   + Support a different center frequency between the SRS for positioning and the initial UL BWP   + Whether bandwidth of SRS for positioning may not include bandwidth of the CORESET#0 and SSB |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-15b | Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP | 1. Maximum SRS bandwidth supported for each SCS that UE supports within a single CC 2. Max number of SRS Resource Sets for positioning supported by UE 3. Max number of periodic SRS Resources for positioning 4. Max number of periodic SRS Resources for positioning per slot 5. Support of Different numerology between the SRS and the initial UL BWP 6. Support SRS operation without restriction on the BW: BW of the SRS may not include BW of the CORESET#0 and SSB 7. Max number of P/SP SRS Resources for positioning 8. Max number of P/SP SRS Resources for positioning per slot 9. Support a different center frequency between the SRS for positioning and the initial UL BWP | 27-15 | Yes |  | Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values:  a) FR1 bands: {5, 10, 20, 40, 50, 80, 100}  b) FR2 bands: {50, 100, 200, 400}  Component 2 candidate values: {1, 2, 4, 8, 12, 16}  Component 3 candidate values: {1,2,4,8,16,32,64}  Component 4 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Component 5 candidate values: NA  Component 6 candidate values: NA  Component 7 candidate values: {1,2,4,8,16,32,64}  Component 8 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Component 9 candidate values: NA  Note 1: The SRS should have a locationAndBandwidth, SCS, CP, defined the same way as a legacy BWP.  Note 2: Based on other signalled UE capabilities, the UE supports at least one connected mode configuration where a hypothetical BWP defined by this SRS is the active BWP and switching between this active BWP and the initial BWP is supported.  Note 3: If component 5 is not signaled, the UE only supports same numerology between the SRS and the initial UL BWP  Note 4: If component 6 is not signaled, the UE supports only SRS BW that include the BW of the CORESET #0 and SSB.  Note 5: If component 9 is not signaled, the UE only supports same center frequency between the SRS for positioning and initial UL BWP  Need for location server to know if the feature is supported | Optional with capability signaling | |

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| 27. NR\_pos\_enh | 27-15a | Support of positioning SRS transmission in RRC\_INACTIVE state for initial BWP with semi-persistent SRS | 1. Max number of semi-persistent SRS Resources for positioning  2. Max number of semi-persistent SRS Resources for positioning per slot | 27-15 | Yes |  | Support of positioning SRS transmission in RRC\_INACTIVE state for initial BWP with semi-persistent SRS is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {1,2,4,8,16,32,64}  Component 2 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  [Need for location server to know if the feature is supported]  FFS: outside initial BWP | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-15a | Support of positioning SRS transmission in RRC\_INACTIVE state for initial BWP with semi-persistent SRS | 1. Max number of semi-persistent SRS Resources for positioning  2. Max number of semi-persistent SRS Resources for positioning per slot | 27-15 | Yes |  | Support of positioning SRS transmission in RRC\_INACTIVE state for initial BWP with semi-persistent SRS is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {1,2,4,8,16,32,64}  Component 2 candidate values: {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 | |
| CATT [3] |  |
| Vivo [4] | For this FG, we support the note ‘Need for location server to know if the feature is supported’. Then, we also support UE capability of semi-persistent SRS outside initial UL BWP.   * ***For FG27-15a, support the note ‘Need for location server to know if the feature is supported’.*** * ***Support UE capability of semi-persistent SRS outside initial UL BWP.*** |
| ZTE [5] |  |
| China Telecom [6] | For the SRS transmission in RRC\_INACTIVE state for initial BWP with semi-persistent, there is no difference for the LMF whether the feature is supported, so we don’t see the need for the location server to know the feature.  ***Proposal 3：***  ***For the FG 27-15a, no need for location server to know if the feature is supported.***  The FG 27-15a can be modified as follows,   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-15a | Support of positioning SRS transmission in RRC\_INACTIVE state for initial BWP with semi-persistent SRS | 1. Max number of semi-persistent SRS Resources for positioning  2. Max number of semi-persistent SRS Resources for positioning per slot | 27-15 | Yes |  | Support of positioning SRS transmission in RRC\_INACTIVE state for initial BWP with semi-persistent SRS is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {1,2,4,8,16,32,64}  Component 2 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  ~~[Need for location server to know if the feature is supported]~~  FFS: outside initial BWP | Optional with capability signaling | |
| Samsung [7] |  |
| OPPO [8] | There is a separate UE feature for the semi-persistent SRS on initial UL BWP in RRC\_INACTIVE. Thus, following the similar logic, it is beneficial to have a separate counterpart for the semi-persistent SRS outside the initial UL BWP in RRC\_INACTIVE. Thus, we have the following proposal  ***Proposal 7: Support the following modifications for UE FG 27-15a and add a new UE FG 27-15c (RED part)***   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-15a | Support of positioning SRS transmission in RRC\_INACTIVE state for initial BWP with semi-persistent SRS | 1. Max number of semi-persistent SRS Resources for positioning  2. Max number of semi-persistent SRS Resources for positioning per slot |  | Component 1 candidate values: {1,2,4,8,16,32,64}  Component 2 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  ~~[~~Need for location server to know if the feature is supported~~]~~  ~~FFS: outside initial BWP~~ | | 27. NR\_pos\_enh | 27-15c | Support of positioning SRS transmission in RRC\_INACTIVE state outside initial BWP with semi-persistent SRS | 1. Max number of semi-persistent SRS Resources for positioning  2. Max number of semi-persistent SRS Resources for positioning per slot | 27-15a 27-15b | Component 1 candidate values: {1,2,4,8,16,32,64}  Component 2 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Need for location server to know if the feature is supported | |
| NTT DOCOMO, INC. [9] | * FG 27-15a: Support of positioning SRS transmission in RRC\_INACTIVE state for initial BWP with semi-persistent SRS   + “[Need for location server to know if the feature is supported]” can be removed.   + We need a clarification on prerequisite feature groups of FG 27-15b. When it has been clarified, “FFS: outside initial BWP” can be removed. |
| Nokia/Nokia Shanghai Bell [10] | * + No need for LMF to know the RRC state of the UE. |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-15a | Support of positioning SRS transmission in RRC\_INACTIVE state for initial BWP with semi-persistent SRS | 1. Max number of semi-persistent SRS Resources for positioning  2. Max number of semi-persistent SRS Resources for positioning per slot | 27-15 | Yes |  | Support of positioning SRS transmission in RRC\_INACTIVE state for initial BWP with semi-persistent SRS is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {1,2,4,8,16,32,64}  Component 2 candidate values: {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 | | 27. NR\_pos\_enh | 27-15b | Support of positioning SRS transmission in RRC\_INACTIVE state outside initial BWP with semi-persistent SRS | 1. Max number of semi-persistent SRS Resources for positioning  2. Max number of semi-persistent SRS Resources for positioning per slot | 27-15 | Yes |  | Support of positioning SRS transmission in RRC\_INACTIVE state outside initial BWP with semi-persistent SRS is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {1,2,4,8,16,32,64}  Component 2 candidate values: {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 | |

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| 27. NR\_pos\_enh | 27-16 | OLPC for positioning SRS in RRC\_INACTIVE state - gNB | Same asRRC  OLPC-SRS-Pos-r16 |  | Yes |  | OLPC for positioning SRS in RRC\_INACTIVE state is not supported (gNB) | Per band | n/a | n/a | n/a |  | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-16 | OLPC for positioning SRS in RRC\_INACTIVE state - gNB | Same as RRC  OLPC-SRS-Pos-r16 except that the feature is applicable to the SRS in RRC\_INACTIVE state |  | Yes |  | OLPC for positioning SRS in RRC\_INACTIVE state is not supported (gNB) | Per band | n/a | n/a | n/a |  | Optional with capability signaling | |
| CATT [3] |  |
| Vivo [4] | Regarding UE feature, an LS [4] from RAN2 asks the following clarification related to FG 27-16 and 27-19.   |  | | --- | | B). R1 27-16 and 27-19  R1 27-16 and 27-19 have a component description of ‘Same as RRC OLPC-SRS-Pos-r16’ and ‘Same as RRC SpatialRelationsSRS-Pos-r16’ respectively. It is unclear to RAN2 whether the pre-requisite in R1 27-16/27-19 should be *srs-PosResources-r16* as in RRC *OLPC-SRS-Pos-r16/SpatialRelationsSRS-Pos-r16* or should be *“srs-PosResourcesRRC-Inactive-r17”* (i.e. R1 27-15)). RAN2 would like RAN1 to clarify the pre-requisite used in the R1 27-16 and 27-19. |   From our point of view, the description of ‘Same as RRC OLPC-SRS-Pos-r16’ in FG27-16 is to reuse the content of FG13-9 series for OLPC support, not the pre-requisite groups of FG13-9 series, which is also applied to FG27-19.  Therefore, for the pre-requisite groups for both FG 27-16 and FG 27-19, we think basic feature groups in inactive state can be considered, e.g. FG 27-15, FG 27-15b, and FG 27-6 (for PRS related capability, e.g., OLPC support based on PRS).   * ***The pre-requisite groups for both FG 27-16 and FG 27-19 can be FG 27-15, FG 27-15b, and FG 27-6 (only for PRS related capability, e.g.,*** ***OLPC support based on PRS).*** |
| ZTE [5] | FG 27-16 and 27-19 have a component description of ‘Same as RRC OLPC-SRS-Pos-r16’ and ‘Same as RRC SpatialRelationsSRS-Pos-r16’ respectively. Based on RAN2 pre-meeting email discussion, it is unclear to RAN2 whether the pre-requisite of FG 27-16/27-19 should be srs-PosResources-r16 as in RRC OLPC-SRS-Pos-r16/SpatialRelationsSRS-Pos-r16 or should be “srs-PosResourcesRRC-Inactive-r17” (i.e. FG 27-15)). RAN2 would like RAN1 to clarify the pre-requisite used in the FG 27-16 and 27-19.  Since the two FGs should be for SRS in RRC\_INACTIVE state, we believe that “srs-PosResourcesRRC-Inactive-r17” (i.e. FG 27-15)) should be the prerequisite.  ***Proposal 5****: For FG 27-16 and 27-19, FG 27-15 should be the prerequisite.* |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] | * FG 27-16: OLPC for positioning SRS in RRC\_INACTIVE state – gNB   + We need to discuss the prerequisite FG since RAN1 received an LS requiring a clarification on FG 27-16 and 27-19 from RAN2 (R2-2204360). Considering the prerequisite of OLPC in RRC\_CONNECTED, we think that FG 27-15 (i.e. Positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP) should be added to the prerequisite FG. |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-16a | OLPC for positioning SRS in RRC\_INACTIVE state – location server | Same as LPP  OLPC-SRS-Pos-r16 |  | No |  | OLPC for positioning SRS in RRC\_INACTIVE state is not supported (location server) | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported.  Support of OLPC in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-16a | OLPC for positioning SRS in RRC\_INACTIVE state – location server | Same as LPP  OLPC-SRS-Pos-r16 except that the feature is applicable to the SRS in RRC\_INACTIVE state |  | No |  | OLPC for positioning SRS in RRC\_INACTIVE state is not supported (location server) | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported.  Support of OLPC in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling | |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] | * FG 27-16a: OLPC for positioning SRS in RRC\_INACTIVE state – location server   + Considering the prerequisite of OLPC in RRC\_CONNECTED, we think that FG 27-15 (i.e. Positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP) should be added to the prerequisite FG. |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-17 | PRS processing in RRC\_INACTIVE | Support of PRS processing in RRC\_INACTIVE | [13-1, 13-2, 13-3, 13-4] | Yes |  | PRS processing in RRC\_INACTIVE is not supported | per band | n/a | n/a | n/a | Note: UE supporting this feature may support at least one from DL RSTD, DL PRS-RSRP, or UE Rx – Tx time difference measurement | Optional with capability signaling. |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-17 | PRS processing in RRC\_INACTIVE - gNB | Support of PRS processing in RRC\_INACTIVE |  | Yes |  | PRS processing in RRC\_INACTIVE is not supported | per band | n/a | n/a | n/a | Note: UE supporting this feature shall support at least one from DL RSTD, DL PRS-RSRP, or UE Rx – Tx time difference measurement | Optional with capability signaling. | |
| CATT [3] | For this FG, we think its prerequisite feature groups should be 13-1, 13-2, 13-3, 13-4.  Based on the above discussions, our proposal on FG27-17 as follows,  *Proposal 3: Adopt the following modifications marked as red colour to FG 27-17 based on the agreement in RAN1#108-e:*   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-17 | PRS processing in RRC\_INACTIVE | Support of PRS processing in RRC\_INACTIVE | 13-1, 13-2, 13-3, 13-4 | Yes |  | PRS processing in RRC\_INACTIVE is not supported | per band | n/a | n/a | n/a | Note: UE supporting this feature may support at least one from DL RSTD, DL PRS-RSRP, or UE Rx – Tx time difference measurement | Optional with capability signaling. | |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] | * FG 27-17: PRS processing in RRC\_INACTIVE   + The prerequisite FG 13-2, 13-3 and 13-4 can be removed since these prerequisites can be covered by the note, while FG13-1 can be kept as the prerequisite since it is not covered by the note. This is similar handling as for FG27-18a/b/c, and the consistent handling would be preferable. |
| Nokia/Nokia Shanghai Bell [10] | * + Add a component on SRS transmission in RRC\_INACTIVE:     - 2. Support of positioning SRS transmission in RRC\_INACTIVE state.   + Add 13-8 as pre-requisite (SRS resources). |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-18a | Support of PRS measurement in RRC\_INACTIVE state for DL-TDOA | Support of PRS measurement in RRC\_INACTIVE state for DL-TDOA |  | No |  | PRS measurement in RRC\_INACTIVE state 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.  Note: Applicable for both UE-assisted and UE-based DL-TDOA  Note: PRS capabilities for DL-TDOA measurement and reporting described in FGs in 13-3, 13-3a, 13-3b, 13-6, 13-13 are the same for RRC Inactive.  Support of PRS processing measurement in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling. |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-18a | Support of PRS measurement in RRC\_INACTIVE state for DL-TDOA - location server | Support of PRS measurement in RRC\_INACTIVE state for DL-TDOA | 13-3, 13-3a, 13-3b, 13-6, 27-6 | No |  | PRS measurement in RRC\_INACTIVE state 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.  Note: Applicable for both UE-assisted and UE-based DL-TDOA  Note: PRS capabilities for DL-TDOA measurement and reporting described in FGs in 13-3, 13-3a, 13-3b, 13-6, 13-13 are the same for RRC Inactive.  Support of PRS processing measurement in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling. | |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-18b | Support of PRS measurement in RRC\_INACTIVE state for DL-AoD | Support of PRS measurement in RRC\_INACTIVE state for DL-AoD |  | No |  | PRS measurement in RRC\_INACTIVE state for DL-AoD is not supported | per band | n/a | n/a | n/a | Need for location server to know if the feature is supported.  Note: Applicable for both UE-assisted and UE-based DL-AoD  Note: PRS capabilities for DL-AOD measurement and reporting described in FGs 13-2, 13-2a, 13-2b, 13-5, 13-13 are the same for RRC Inactive.  Support of PRS processing measurement in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling. |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-18b | Support of PRS measurement in RRC\_INACTIVE state for DL-AoD - location server | Support of PRS measurement in RRC\_INACTIVE state for DL-AoD | 13-2, 13-2a, 13-2b, 13-5, 27-6 | No |  | PRS measurement in RRC\_INACTIVE state for DL-AoD is not supported | per band | n/a | n/a | n/a | Need for location server to know if the feature is supported.  Note: Applicable for both UE-assisted and UE-based DL-AoD  Note: PRS capabilities for DL-AOD measurement and reporting described in FGs 13-2, 13-2a, 13-2b, 13-5, 13-13 are the same for RRC Inactive.  Support of PRS processing measurement in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling. | |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-18c | Support of PRS measurement in RRC\_INACTIVE state for Multi-RTT | 1. Support of PRS measurement in RRC\_INACTIVE state for Multi-RTT |  | No |  | PRS measurement in RRC\_INACTIVE state for 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.  Note: PRS capabilities for Multi-RTT measurement and reporting described in FGs in 13-4, 13-4a, 13-4b, 13-11, 13-11a, 13-14 are the same for RRC Inactive  Support of PRS processing measurement in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling. |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-18c | Support of PRS measurement in RRC\_INACTIVE state for Multi-RTT - location server | 1. Support of PRS measurement in RRC\_INACTIVE state for Multi-RTT | 13-4, 13-4a, 13-4b, 13-11, 27-6 | No |  | PRS measurement in RRC\_INACTIVE state for 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.  Note: PRS capabilities for Multi-RTT measurement and reporting described in FGs in 13-4, 13-4a, 13-4b, 13-11, 13-11a, 13-14 are the same for RRC Inactive  Support of PRS processing measurement in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling. | |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-19 | Spatial relation for positioning SRS in RRC\_INACTIVE state - gNB | Same as*RRC*  *SpatialRelationsSRS-Pos-r16* |  | Yes |  | Spatial relation for positioning SRS in RRC\_INACTIVE state is not supported (gNB) | Per band | n/a | n/a | n/a |  | Optional with capability signalling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-19 | Spatial relation for positioning SRS in RRC\_INACTIVE state - gNB | Same as*RRC*  *SpatialRelationsSRS-Pos-r16* except that the feature is applicable to the SRS in RRC\_INACTIVE state |  | Yes |  | Spatial relation for positioning SRS in RRC\_INACTIVE state is not supported (gNB) | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| CATT [3] |  |
| Vivo [4] | Regarding UE feature, an LS [4] from RAN2 asks the following clarification related to FG 27-16 and 27-19.   |  | | --- | | B). R1 27-16 and 27-19  R1 27-16 and 27-19 have a component description of ‘Same as RRC OLPC-SRS-Pos-r16’ and ‘Same as RRC SpatialRelationsSRS-Pos-r16’ respectively. It is unclear to RAN2 whether the pre-requisite in R1 27-16/27-19 should be *srs-PosResources-r16* as in RRC *OLPC-SRS-Pos-r16/SpatialRelationsSRS-Pos-r16* or should be *“srs-PosResourcesRRC-Inactive-r17”* (i.e. R1 27-15)). RAN2 would like RAN1 to clarify the pre-requisite used in the R1 27-16 and 27-19. |   From our point of view, the description of ‘Same as RRC OLPC-SRS-Pos-r16’ in FG27-16 is to reuse the content of FG13-9 series for OLPC support, not the pre-requisite groups of FG13-9 series, which is also applied to FG27-19.  Therefore, for the pre-requisite groups for both FG 27-16 and FG 27-19, we think basic feature groups in inactive state can be considered, e.g. FG 27-15, FG 27-15b, and FG 27-6 (for PRS related capability, e.g., OLPC support based on PRS).   * ***The pre-requisite groups for both FG 27-16 and FG 27-19 can be FG 27-15, FG 27-15b, and FG 27-6 (only for PRS related capability, e.g.,*** ***OLPC support based on PRS).*** |
| ZTE [5] | FG 27-16 and 27-19 have a component description of ‘Same as RRC OLPC-SRS-Pos-r16’ and ‘Same as RRC SpatialRelationsSRS-Pos-r16’ respectively. Based on RAN2 pre-meeting email discussion, it is unclear to RAN2 whether the pre-requisite of FG 27-16/27-19 should be srs-PosResources-r16 as in RRC OLPC-SRS-Pos-r16/SpatialRelationsSRS-Pos-r16 or should be “srs-PosResourcesRRC-Inactive-r17” (i.e. FG 27-15)). RAN2 would like RAN1 to clarify the pre-requisite used in the FG 27-16 and 27-19.  Since the two FGs should be for SRS in RRC\_INACTIVE state, we believe that “srs-PosResourcesRRC-Inactive-r17” (i.e. FG 27-15)) should be the prerequisite.  ***Proposal 5****: For FG 27-16 and 27-19, FG 27-15 should be the prerequisite.* |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] | * FG 27-19: Spatial relation for positioning SRS in RRC\_INACTIVE state - gNB   + We need to discuss the prerequisite FG since RAN1 received an LS requiring a clarification on FG 27-16 and 27-19 from RAN2 (R2-2204360). Considering the prerequisite of spatial relation in RRC\_CONNECTED, we think that FG 27-15 (i.e. Positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP) should be added to the prerequisite FG. |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-19a | Spatial relation for positioning SRS in RRC\_INACTIVE state – location server | Same as *LPP*  *SpatialRelationsSRS-Pos-r16* |  | No |  | Spatial relation for positioning SRS in RRC\_INACTIVE state is not supported (location server) | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported.  Support of spatial relation in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signalling |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-19a | Spatial relation for positioning SRS in RRC\_INACTIVE state – location server | Same as *LPP*  *SpatialRelationsSRS-Pos-r16* except that the feature is applicable to the SRS in RRC\_INACTIVE state |  | No |  | Spatial relation for positioning SRS in RRC\_INACTIVE state is not supported (location server) | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported.  Support of spatial relation in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signalling | |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] | * FG 27-19a: Spatial relation for positioning SRS in RRC\_INACTIVE state – location server   + Considering the prerequisite of spatial relation in RRC\_CONNECTED, we think that FG 27-15 (i.e. Positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP) should be added to the prerequisite FG. |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-20 | PRS subset association for UE assisted DL-AoD | 1. Support of assistance data enhancement to indicate a subset of PRS resources for each PRS resource for the purpose of prioritization of DL-AoD reporting.  2. Supported resource set relationship for the target PRS resource and the associated subset  [3. Support associated subset measurement reporting] |  | No |  | PRS subset association for DL-AoD is not supported by the UE. | Per UE | n/a | n/a | n/a | Component 2 candidate values: {sameSet, DifferentSet, sameOrDifferentSet}  [Component 3 candidate values: {associated subset only, the target PRS resource and the associated subset}]  Need for location server to know | Optional with capability signaling. |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-20 | PRS subset association for UE assisted DL-AoD | 1. Support of assistance data enhancement to indicate a subset of PRS resources for each PRS resource for the purpose of prioritization of DL-AoD reporting.  2. Supported resource set relationship for the target PRS resource and the associated subset  3. Support associated subset measurement reporting including both cases of reporting subset only and of reporting the target PRS and the associated subset. |  | No |  | PRS subset association for DL-AoD is not supported by the UE. | Per UE | No | No | No | Component 2 candidate values: {sameSet, DifferentSet, sameOrDifferentSet}  Need for location server to know | Optional with capability signaling. | |
| CATT [3] |  |
| Vivo [4] | Components 2 and 3 have been discussed in a couple of meetings and Components 2 has been supported, even though we are supportive of component 3, we can accept removing component 3 for the progress the above agreement was reached.   * ***For FG 27-20, Component 3 can be removed.*** |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] | In our view, the component 3 is not needed. As in previous RAN1 agreement, the UE may report the RSRP measurement of PRS resources in the associated subset if the UE reports the RSRP measurement of the target PRS resource. But when the UE does not report the RSRP measurement of the target PRS resource, the UE still can report the RSRP measurement of PRS resources in the subset, which is a normal DL AoD measurement reporting. Thus, such case shall not be included in this FG.  ***Proposal 2: Do not support component 3 in FG 27-20.*** |
| NTT DOCOMO, INC. [9] | * FG 27-20: PRS subset association for UE assisted DL-AoD   + Support the current FG 27-20 (i.e. the brackets on the component 3 can be removed)   + A consistent wording should be used as follows:     - “UE assisted DL-AoD” can be changed to “UE-assisted DL-AoD” |
| Nokia/Nokia Shanghai Bell [10] | * + Component 3 is not needed. |
| Ericsson [11] | The support of subset measurement reports is not a necessary component of the FG. The report of the subset is no different from reports from the main PRS. therefore we think the component #3 can be removed from 27-20.   1. Component 3 of FG 27-20 can be removed. |
| Qualcomm Incorporated [12] | * Remove component 3  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-20 | PRS subset association for UE assisted DL-AoD | 1. Support of assistance data enhancement to indicate a subset of PRS resources for each PRS resource for the purpose of prioritization of DL-AoD reporting.  2. Supported resource set relationship for the target PRS resource and the associated subset |  | No |  | PRS subset association for DL-AoD is not supported by the UE. | Per UE | n/a | n/a | n/a | Component 2 candidate values: {sameSet, DifferentSet, sameOrDifferentSet}  Need for location server to know | Optional with capability signaling. | |

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| 27. NR\_pos\_enh | 27-21 | PRS boresight direction for UE-assisted DL-AoD | Support of assistance data enhancement to indicate the boresight direction of a PRS resource for UE-assisted DL-AoD. |  | No |  | UE-assisted DL-AoD with boresight direction of each DL-PRS is not supported. | Per UE | n/a | n/a | n/a | Need for location server to know | Optional with capability signaling. |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-21 | PRS boresight direction for UE-assisted DL-AoD | Support of assistance data enhancement to indicate the boresight direction of a PRS resource for UE-assisted DL-AoD. |  | No |  | UE-assisted DL-AoD with boresight direction of each DL-PRS is not supported. | Per UE | No | No | No | Need for location server to know | Optional with capability signaling. | |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

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| 27. NR\_pos\_enh | 27-22 | PRS beam pattern for UE-based DL-AoD | Support of PRS beam pattern for DL-AoD |  | No |  | UE-based DL-AoD with PRS beam pattern is not supported. | Per UE | n/a | n/a | n/a | Need for location server to know | Optional with capability signaling. |

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| Company | Summary |
| Huawei/HiSilicon [2] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-22 | PRS antenna beam pattern for UE-based DL-AoD | Support of PRS antenna beam pattern for DL-AoD |  | No |  | UE-based DL-AoD with PRS antenna beam pattern is not supported. | Per UE | No | No | No | Need for location server to know | Optional with capability signaling. | |
| CATT [3] |  |
| Vivo [4] |  |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

**Others**

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| --- | --- |
| Company | Summary |
| Huawei/HiSilicon [2] | We think that additional FGs to support more than one activated PRS processing window is needed. FG 27-xx  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-xx | Support of more than one activated PRS processing windows | 1. Number of supported activated PRS processing windows | One of {27-3-2a, 27-3-2b, 27-3-2c} | Yes |  | Only one activated PRS processing window is supported. | Per UE | No | No | No | Candidate values:{2, 3, 4} | Optional with capability signaling |   We think that SP SRS capability may also be added for option 2 SRS transmission. FG 27-15f  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-15f | Support of positioning SRS transmission in RRC\_INACTIVE state outside initial BWP with semi-persistent SRS | 1. Max number of semi-persistent SRS Resources for positioning  2. Max number of semi-persistent SRS Resources for positioning per slot | 27-15b | Yes |  | Support of positioning SRS transmission in RRC\_INACTIVE state outside initial BWP with semi-persistent SRS is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {1,2,4,8,16,32,64}  Component 2 candidate values: {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 | |
| CATT [3] | In the LS from RAN4 [1], RAN4 has discussed the threshold applied to the Rx timing difference between the serving cell PRS and PRS from a non-serving cell/TRP to determine the applicability of PRS measurements outside MG.  RAN4 has agreed to introduce a UE capability to accommodate different UE implementations of PRS measurements outside MG.   * Introduce UE capability for the maximum Rx timing difference in MG-less PRS measurement   + Option 1: two values {CP length, 0.5 slot}   + Other options are not precluded   The threshold corresponds to the maximum Rx timing difference that the UE supports for PRS measurement outside MG.  The FG 27-3-2(PRS processing window) should be the prerequisite feature group of this new FG.  Based on the above discussions, we propose to introduce a new FG for the maximum Rx timing difference in MG-less PRS measurement as follows,  *Proposal 1: Introduce a new FG for the maximum Rx timing difference in MG-less PRS measurement FG 27-N based on RAN4’LS:*   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 27. NR\_pos\_enh | 27-N | Maximum Rx timing difference in MG-less PRS measurement | 1. Support of maximum Rx timing difference in MG-less PRS measurement  2. The maximum Rx timing difference in MG-less PRS measurement | 27-3-2 |  | No | The maximum Rx timing difference in MG-less PRS measurement is not supported and no assumption can be made on the maximum Rx timing difference in MG-less PRS measurement | per band | n/a | n/a | n/a | Component 2 candidate values: {CP length, 0.5 slot}  Need for location server to know if the feature is supported | Optional with capability signaling | |
| Vivo [4] | In RAN4 LS [3], the following agreement regarding TEG timing error margin was achieved.   |  | | --- | | * The framework of UE/TRP Rx TEG:   + Define multiple candidate timing error margin values {TE1, TE2, …, TEN} in the spec.     - The number of candidate values (i.e. N) and the exact values of {TE1, TE2, …, TEN} will be decided in Perf part.   + UE/TRP selects one value M from {TE1, TE2, …, TEN} based on its implementation and indicate to LMF.   + For UE that supports multiple Rx TEGs (TEG#1, TEG#2, …), the associated timing error margin value of each Rx TEG is M, which means the timing error difference between the measurements within the same Rx TEG is within the margin M.   + The applicability of reported UE Rx TEG is limited to the measurements contained within the measurement report in which the Rx TEG information is provided, and only to measurements that are tagged with the corresponding TEG ID.   + The RRM accuracy requirements corresponding to the candidate timing error margin values {TE1, TE2, …, TEN} will be defined in Perf part. * The framework of UE/TRP Rx TEG can be also applied for UE/TRP RxTx TEG   + Note: if additional issues are identified based on RAN1/2 progress, then this agreement can be revised. |   It should be noted that UE/TRP selects one value M from {TE1, TE2, …, TEN} based on its implementation and indicate to LMF. So, from RAN1 perspective, for a UE, how to indicate the selected time error margin value to LMF should be discussed.  From our point of view, UE can select Rx timing error margin before UE capability report. Based on the margin, The Rx timing errors can be grouped and the maximum number of Rx TEGs for each band can be determined. Then, UE can report supported number of Rx TEGs along with Rx timing error margin via UE capability signaling.  In addition, regarding the type of Rx timing error margin, ‘per UE’ type can be supported according to the following RAN4 agreement.   |  | | --- | | *Agreements:*   * The same timing margin is used for all Rx TEGs per UE/TRP |   Similarly, per UE type capability of RxTx timing error margin for RxTx TEG can be supported.  For timing error margin of Tx TEG, we can wait for further RAN4 conclusion.   * ***Support the UE capability of timing error margin for Rx TEG and RxTx TEG.*** * ***The capability type is per UE.*** |
| ZTE [5] |  |
| China Telecom [6] |  |
| Samsung [7] |  |
| OPPO [8] |  |
| NTT DOCOMO, INC. [9] |  |
| Nokia/Nokia Shanghai Bell [10] |  |
| Ericsson [11] |  |
| Qualcomm Incorporated [12] |  |

# Discussion/Approval Items during RAN1 #109-e — First Checkpoint

After review of contributions submitted to RAN1 #109-e in this agenda item, the following topics were identified by the moderator for discussion/approval during RAN1 #109-e.

**General comments**

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| Company | Comments/Questions/Suggestions |
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# Issue 1: FG 27-1-4a

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-1-4a | Support of UE Rx TEGs for measuring the same DL PRS resource simultaneously | The maximum number of UE Rx TEGs for measuring the same DL PRS resource simultaneously | 27-1-4 | No |  | No assumption can be made regarding multiple Rx TEGs measuring the same DL PRS resource simultaneously | Per band | n/a | n/a | n/a | The candidate values are {1,2,3,4,6,8}  Need for location server to know if the feature is supported. | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 2: FG 27-2-1

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-2-1 | DL PRS RSRPP measurement report of the first path for UE-assisted DL-AoD | 1.) Support of measuring and reporting the PRS RSRPP of the first path for DL-AoD positioning method  2.) The maximum number of first path PRS RSRPP per TRP | 13-5 | No |  | DL PRS RSRPP measurement report of the first path for UE-assisted DL-AoD is not supported | per band | n/a | n/a | n/a | Component 2 candidate values: 1, 2,4,8,16,24  Need for location server to know if the feature is supported  The maximum number of first path PRS RSRP per TRP should be less than or equal to the maximum number of PRS RSRP (27-2-2)  ~~[~~Note: Having FG 13-5 as the prerequisite FG does not imply that in a measurement report, reporting PRS-RSRP of a PRS resource should be the prerequisite of reporting PRS-RSRPP for the first path of the PRS resource~~]~~ | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 3: FG 27-2-2

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-2-2 | DL PRS RSRP reporting for more than 8 measurements for UE-assisted DL-AoD positioning | Support reporting K> 8 DL PRS RSRP measurements per TRP.  ~~Note: Multiple RSRPs corresponding to same or different Rx Beam index should be able to be reported for a given PRS resource for different timestamps.~~ | 13-5 | No |  | UE report of more than 8 DL PRS-RSRP is not supported. | Per UE | ~~n/a~~ No | Yes  FR2 only | ~~n/a~~ No | The candidate values are {16, 24}  Note: Multiple RSRPs corresponding to same or different Rx Beam index should be able to be reported for a given PRS resource for different timestamps.  Need for location server to know if the feature is supported  The maximum number of reported DL PRS RSRP in the capability signaling should be no less than the maximum number of reported DL PRS RSRPP of the first path in the capability signaling | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 4: FG 27-3-1

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-3-1 | M-sample measurements | The capability to support reporting a measurement based on measuring M=1 samples (instances) of a DL PRS resource set | 13-1 | No |  | If the UE does not provide the capability, the UE is assumed to support M=4 only | per band | n/a | n/a | n/a | ~~The candidate values are {1 [FFS others]}~~  Need for location server to know if the feature is supported  Note: The sample number M=1 does not account for the potential AGC sample  Note: this feature is supported for both UE-assisted and UE based positioning | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 5: FG 27-3-2

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-3-2 | DL PRS measurement outside MG and in a PRS processing window | 1. Supported PRS processing types subject to the UE determining that DL PRS to be higher priority for PRS measurement outside MG and in a PRS processing window  2. Support of priority handing options of PRS: Option1, Option2 or Option3   * 1. Option 1: UE may indicates support of two priority states.      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS      2. State 2: PRS is lower priority than all PDCCH/PDSCH/CSI-RS   2. Option 2: UE may indicate support of three priority states      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS      2. State 2: PRS is lower priority than PDCCH and URLLC PDSCH and higher priority than other PDSCH/CSI-RS         1. Note: The URLLC channel corresponds a dynamically scheduled PDSCH whose PUCCH resource for carrying ACK/NAK is marked as high-priority.      3. State 3: PRS is lower priority than all PDCCH/PDSCH/CSI-RS   3. Option 3: UE may indicate support of single priority state      1. State 1: PRS is higher priority than all PDCCH/PDSCH/CSI-RS | 13-1 | Yes |  | DL PRS measurement outside MG and in a PRS processing window is not supported | per band | n/a | n/a | n/a | Component 1 candidate values: One or more of {Type 1A, Type 1B, Type 2}  Component 2 candidate values: {option1, option2, option3}  Need for location server to know if the feature is supported  Note: Component 2 can be reported per supported band for each type supported by the UE, details left to RAN2  Note:   * Type 1A refers to the determination of prioritization between DL PRS and other DL signals/channels in all OFDM symbols within the PRS processing window. The DL signals/channels from all DL CCs (per UE) are affected across LTE and NR * Type 1B refers to the determination of prioritization between DL PRS and other DL signals/channels in all OFDM symbols within the PRS processing window. The DL signals/channels from a certain band are affected * Type 2 refers to the determination of prioritization between DL PRS and other DL signals/channels only in DL PRS symbols within the PRS processing window   + The DL signals/channels from a certain CC, which overlap with DL PRS symbols in time are affected in FR1,   + The DL signals/channels from a certain band, which overlap with DL PRS symbols in time are affected in FR2   Note: When the UE determines higher priority for other DL signals/channels over the PRS measurement/processing, the UE is not expected to measure/process DL PRS which is applicable to all of the above capability options  Note: Within a PRS processing window, UE measurement is inside the active DL BWP with PRS having the same numerology as the active DL BWP | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 6: FG 27-3-3

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-3-3 | DL PRS Processing Capability outside MG - buffering capability | 1. DL PRS buffering capability  a) Type 1 – sub-slot/symbol level buffering  b) Type 2 – slot level buffering  ~~[~~2. Type 1 – Maximum duration of DL PRS symbols N in units of ms a UE can process in the first part of a PRS processing window assuming maximum DL PRS bandwidth in MHz, such that the UE is capable of reporting the measurements T-N ms after the last PRS symbol~~]~~  3. Type 2 – Duration of DL PRS symbols N in units of ms a UE can process every T ms assuming maximum DL PRS bandwidth in MHz, which is supported and reported by UE  4. Max number of DL PRS resources that UE can process in a slot ~~under it~~ | 27-3-2 | No |  | DL PRS measurement outside MG and in a PRS processing window is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {Type 1, Type 2}  ~~[~~Candidate 2 component values:  a) N: {0.125, 0.25, 0.5, 1, 2, 3, 4, 5, 6, 8, 12} ms  b) T: {N+4, N+5, N+6, N+8} ms~~]~~  Component 3 candidate values:   1. N: {0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50} ms 2. T: {8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms   Component 4 candidate values:  FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz  Need for location server to know if the feature is supported  Note: A UE may declare PRS processing capabilities of each of the supported Type-1A, Type-1B, Type-2” capabilities in case it supports multiple types in a band | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 7: FG 27-4-1

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-4-1 | LOS/NLOS Indicator for UE-assisted positioning | 1. Support reporting LoS/NLoS indicator type to LMF  2. LOS/NLOS indicator granularity | one of 13-5,13-6, or 13-11 | No |  | LOS/NLOS Indicator for UE-assisted positioning is not supported | Per UE | ~~n/a~~ No | ~~n/a~~ No | ~~n/a~~ No | ~~[~~Component 1 candidate values: {hard value, soft value~~[~~, both~~]~~}~~]~~  Component 2 candidate values: {trpSpecific, resourceSpecific~~[~~, both~~]~~}  ~~[~~Note: a single value is reported when both multi-RTT and DL-TDOA are supported~~]~~  ~~FFS: signalling per method~~  Need for location server to know if the feature is supported | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 8: FG 27-6

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-6 | DL PRS processing capabilities in RRC inactive state | 1. DL PRS buffering capability  a) Type 1 – sub-slot/symbol level buffering  b) Type 2 – slot level buffering  2. Duration of DL PRS symbols N in units of ms a UE can process every T ms assuming maximum DL PRS bandwidth in MHz, which is supported and reported by UE  3. Max number of DL PRS resources that UE can process in a slot  4. Support of single -sample measurements in RRC Inactive state: The capability to support reporting a measurement based on measuring M=1 samples (instances) of a DL PRS resource set |  | No |  | DL PRS processing in RRC inactive state is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {Type 1, Type 2}  Component 2 candidate values:  T: {8, 16, 20, 30, 40, 80, 160, 320, 640, 1280} ms  N: {0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50} ms  Component 3 candidate values:  FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 15kHz, 30kHz, 60kHz  FR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64} for each SCS: 60kHz, 120kHz  Need for location server to know if the feature is supported  Note: Having the PRS processing capabilities in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state  Note: The sample number M=1 does not account for the potential AGC sample | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 9: FG 27-8

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-8 | Support of PRS TEG association information for UE-based DL-TDOA | Support of reception of association between PRS and TRP Tx TEG for UE-based positioning | 13-1 | No |  | Positioning calculation assistance data containing association between PRS and TRP Tx TEG is not supported by UE | Per UE | ~~n/a~~ No | ~~n/a~~ No | ~~n/a~~ No | Need for location server to know if the feature is supported. | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 10: FG 27-10

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-10 | Support of UL MAC CE based MG activation request for PRS measurements - gNB | 1. Support of using UL MAC CE to request measurement gap activation/deactivation for PRS measurements: The information in the UL MAC CE for MG activation request by the UE can be one ID associated with the preconfiguration of the MG  2. Support of preconfiguration of MGs in RRC signaling for PRS measurements: Each MG in the preconfiguration is associated with an ID | 27-11 | Yes |  | Using UL MAC CE to indicate measurement gap for PRS measurements to the gNB is not supported. | Per UE | No | No | No |  | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 11: FG 27-10a

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-10a | Low latency MG activation request for PRS measurements - location sever | support of low latency MG activation request for PRS measurements | ~~[27-10]~~ 27-11 | No |  | Low latency MG activation request for PRS measurements is not supported | Per UE | No | No | No | Need for location server to know if the feature is supported | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 12: FG 27-11

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-11 | Support of DL MAC CE based MG activation request for PRS measurements | 1. Support of preconfiguration of MGs in RRC signaling for PRS measurements: Each MG in the preconfiguration is associated with an ID  2. Support of using DL MAC CE to activate/deactivate the MG for PRS measurements: The DL MAC CE for MG activation indicates the ID associated with the preconfigured MG |  | Yes |  | Using DL MAC CE to activate the preconfigured MG for PRS measurements is not supported | Per UE | No | No | No |  | Optional with capability signaling. |

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| Company | Comments/Questions/Suggestions |
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# Issue 13: FG 27-12

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-12 | LOS/NLOS indicator for UE-based positioning assistance data | Support reception of the assistance data containing the LOS/NLOS indicator.  1. LOS/NLOS indicator type  2. LOS/NLOS indicator granularity |  | No |  | LOS/NLOS indicator for UE-based positioning assistance data is not supported | Per UE | No | No | No | ~~[~~Component 1 candidate values: {softValue, hardValue, both}~~]~~  Component 2 candidate values: {resourceSpecific, trpSpecific~~[~~, both~~]~~}  Need for location server to know if the feature is supported. | Optional with capability signaling. |

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| Company | Comments/Questions/Suggestions |
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# Issue 14: FG 27-15

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-15 | Positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP | 1. Max number of SRS Resource Sets for positioning supported by UE  2. Max number of ~~P/SP~~SRS Resources for positioning  3. Max number of ~~P/SP~~SRS Resources for positioning per slot  4. Max number of periodic SRS Resources for positioning  5. Max number of periodic SRS Resources for positioning per slot |  | Yes |  | Positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {1, 2, 4, 8, 12, 16}  Component 2 candidate values: {1,2,4,8,16,32,64}  Component 3 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Component 4 candidate values: {1,2,4,8,16,32,64}  Component 5 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Note: OLPC for SRS for positioning based on SSB from the last serving cell (the cell that releases UE from connection) is part of this FG. No dedicated capability signaling is intended for this component  Need for location server to know if the feature is supported | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 15: FG 27-15b

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-15b | Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP | 1. Maximum SRS bandwidth supported for each SCS that UE supports within a single CC 2. Max number of SRS Resource Sets for positioning supported by UE 3. Max number of periodic SRS Resources for positioning 4. Max number of periodic SRS Resources for positioning per slot 5. ~~[~~Support of Different numerology between the SRS and the initial UL BWP ~~is supported]~~ 6. ~~[~~Support of SRS operation without restriction on the BW: BW of the SRS may not include BW of the CORESET#0 and SSB~~]~~ 7. Max number of ~~P/SP~~ SRS Resources for positioning 8. Max number of ~~P/SP~~ SRS Resources for positioning per slot 9. ~~FFS:~~ Support a different center frequenecy between the SRS for positioning and the initial UL BWP 10. Switching time between SRS Tx and other Tx in initial UL BWP or Rx in initial DL BWP | 27-15 | Yes |  | Positioning SRS transmission in RRC\_INACTIVE state configured outside initial UL BWP is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: ~~FFS~~   1. FR1 bands: {5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100} 2. FR2 bands: {50, 100, 200, 400}   Component 2 candidate values: {1, 2, 4, 8, 12, 16}  Component 3 candidate values: {1,2,4,8,16,32,64}  Component 4 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  ~~Component 5 candidate values: FFS~~  ~~Component 6 candidate values: FFS~~  Component 7 candidate values: {1,2,4,8,16,32,64} ~~FFS~~  Component 8 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  Component 10 candidate values: {0, 30, 100, 140, 200, 300, 500, 900} us for DL and UL respectively  Note 1: The SRS should have a locationAndBandwidth, SCS, CP, defined the same way as a legacy BWP.  Note 2: If component 9 is not signaled, the UE only supports same center frequency between the SRS for positioning and initial UL BWP  ~~[Note 2: Based on other signalled UE capabilities, the UE supports at least one connected mode configuration where a hypothetical BWP defined by this SRS is the active BWP and switching between this active BWP and the initial BWP is supported.]~~  ~~[Note 3: If component 5 is not signaled, the UE only supports same numerology between the SRS and the initial UL BWP]~~  ~~[Note 4: If component 6 is not signaled, the UE supports only SRS BW that include the BW of the CORESET #0 and SSB.]~~  ~~[~~Need for location server to know if the feature is supported~~]~~ | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 16: FG 27-15a

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-15a | Support of positioning SRS transmission in RRC\_INACTIVE state for initial BWP with semi-persistent SRS | 1. Max number of semi-persistent SRS Resources for positioning  2. Max number of semi-persistent SRS Resources for positioning per slot | 27-15 | Yes |  | Support of positioning SRS transmission in RRC\_INACTIVE state for initial BWP with semi-persistent SRS is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {1,2,4,8,16,32,64}  Component 2 candidate values: {1, 2, 3, 4, 5, 6, 8, 10, 12, 14}  ~~[~~Need for location server to know if the feature is supported~~]~~  ~~FFS: outside initial BWP~~ | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-15b | Support of positioning SRS transmission in RRC\_INACTIVE state outside initial BWP with semi-persistent SRS | 1. Max number of semi-persistent SRS Resources for positioning  2. Max number of semi-persistent SRS Resources for positioning per slot | 27-15 | Yes |  | Support of positioning SRS transmission in RRC\_INACTIVE state outside initial BWP with semi-persistent SRS is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {1,2,4,8,16,32,64}  Component 2 candidate values: {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 |

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| Company | Comments/Questions/Suggestions |
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# Issue 17: FG 27-16

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

* **Note: additional proposals are being discussed in [109-e-R17-UE-features] “Email discussion on incoming LS (R1-2205090) on updated Rel-17 RAN1 UE features list for NR by May 13 – Ralf (AT&T)”**

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| 27. NR\_pos\_enh | 27-16 | OLPC for positioning SRS in RRC\_INACTIVE state - gNB | Same asRRC  OLPC-SRS-Pos-r16 except that the feature is applicable to the SRS in RRC\_INACTIVE state |  | Yes |  | OLPC for positioning SRS in RRC\_INACTIVE state is not supported (gNB) | Per band | n/a | n/a | n/a |  | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 18: FG 27-16a

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

* **Note: additional proposals are being discussed in [109-e-R17-UE-features] “Email discussion on incoming LS (R1-2205090) on updated Rel-17 RAN1 UE features list for NR by May 13 – Ralf (AT&T)”**

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| 27. NR\_pos\_enh | 27-16a | OLPC for positioning SRS in RRC\_INACTIVE state – location server | Same as LPP  OLPC-SRS-Pos-r16 except that the feature is applicable to the SRS in RRC\_INACTIVE state |  | No |  | OLPC for positioning SRS in RRC\_INACTIVE state is not supported (location server) | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported.  Support of OLPC in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Issue 19: FG 27-17

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-17 | PRS processing in RRC\_INACTIVE - gNB | 1. Support of PRS processing in RRC\_INACTIVE  2. Support of positioning SRS transmission in RRC\_INACTIVE state | ~~[~~13-1,13-8 ~~13-2, 13-3, 13-4]~~ | Yes |  | PRS processing in RRC\_INACTIVE is not supported | per band | n/a | n/a | n/a | Note: UE supporting this feature ~~may~~ shall support at least one from DL RSTD, DL PRS-RSRP, or UE Rx – Tx time difference measurement | Optional with capability signaling. |

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| Company | Comments/Questions/Suggestions |
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# Issue 20: FG 27-18a

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-18a | Support of PRS measurement in RRC\_INACTIVE state for DL-TDOA - location server | Support of PRS measurement in RRC\_INACTIVE state for DL-TDOA | 13-3, 13-3a, 13-3b, 13-6, 27-6 | No |  | PRS measurement in RRC\_INACTIVE state 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.  Note: Applicable for both UE-assisted and UE-based DL-TDOA  Note: PRS capabilities for DL-TDOA measurement and reporting described in FGs in 13-3, 13-3a, 13-3b, 13-6, 13-13 are the same for RRC Inactive.  Support of PRS processing measurement in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling. |

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| Company | Comments/Questions/Suggestions |
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# Issue 21: FG 27-18b

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-18b | Support of PRS measurement in RRC\_INACTIVE state for DL-AoD - location server | Support of PRS measurement in RRC\_INACTIVE state for DL-AoD | 13-2, 13-2a, 13-2b, 13-5, 27-6 | No |  | PRS measurement in RRC\_INACTIVE state for DL-AoD is not supported | per band | n/a | n/a | n/a | Need for location server to know if the feature is supported.  Note: Applicable for both UE-assisted and UE-based DL-AoD  Note: PRS capabilities for DL-AOD measurement and reporting described in FGs 13-2, 13-2a, 13-2b, 13-5, 13-13 are the same for RRC Inactive.  Support of PRS processing measurement in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling. |

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| Company | Comments/Questions/Suggestions |
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# Issue 22: FG 27-18c

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-18c | Support of PRS measurement in RRC\_INACTIVE state for Multi-RTT - location server | 1. Support of PRS measurement in RRC\_INACTIVE state for Multi-RTT | 13-4, 13-4a, 13-4b, 13-11, 27-6 | No |  | PRS measurement in RRC\_INACTIVE state for 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.  Note: PRS capabilities for Multi-RTT measurement and reporting described in FGs in 13-4, 13-4a, 13-4b, 13-11, 13-11a, 13-14 are the same for RRC Inactive  Support of PRS processing measurement in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signaling. |

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| Company | Comments/Questions/Suggestions |
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# Issue 23: FG 27-19

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

* **Note: additional proposals are being discussed in [109-e-R17-UE-features] “Email discussion on incoming LS (R1-2205090) on updated Rel-17 RAN1 UE features list for NR by May 13 – Ralf (AT&T)”**

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| 27. NR\_pos\_enh | 27-19 | Spatial relation for positioning SRS in RRC\_INACTIVE state - gNB | Same as*RRC*  *SpatialRelationsSRS-Pos-r16* except that the feature is applicable to the SRS in RRC\_INACTIVE state |  | Yes |  | Spatial relation for positioning SRS in RRC\_INACTIVE state is not supported (gNB) | Per band | n/a | n/a | n/a |  | Optional with capability signalling |

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| Company | Comments/Questions/Suggestions |
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# Issue 24: FG 27-19a

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

* **Note: additional proposals are being discussed in [109-e-R17-UE-features] “Email discussion on incoming LS (R1-2205090) on updated Rel-17 RAN1 UE features list for NR by May 13 – Ralf (AT&T)”**

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| 27. NR\_pos\_enh | 27-19a | Spatial relation for positioning SRS in RRC\_INACTIVE state – location server | Same as *LPP*  *SpatialRelationsSRS-Pos-r16* except that the feature is applicable to the SRS in RRC\_INACTIVE state |  | No |  | Spatial relation for positioning SRS in RRC\_INACTIVE state is not supported (location server) | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported.  Support of spatial relation in RRC\_INACTIVE state does not imply that LMF is aware of or controlling UE RRC state | Optional with capability signalling |

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| Company | Comments/Questions/Suggestions |
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# Issue 25: FG 27-20

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-20 | PRS subset association for UE assisted DL-AoD | 1. Support of assistance data enhancement to indicate a subset of PRS resources for each PRS resource for the purpose of prioritization of DL-AoD reporting.  2. Supported resource set relationship for the target PRS resource and the associated subset  ~~[3. Support associated subset measurement reporting]~~ |  | No |  | PRS subset association for DL-AoD is not supported by the UE. | Per UE | ~~n/a~~ No | ~~n/a~~ No | ~~n/a~~ No | Component 2 candidate values: {sameSet, DifferentSet, sameOrDifferentSet}  ~~[Component 3 candidate values: {associated subset only, the target PRS resource and the associated subset}]~~  Need for location server to know | Optional with capability signaling. |

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| Company | Comments/Questions/Suggestions |
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# Issue 26: FG 27-21

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-21 | PRS boresight direction for UE-assisted DL-AoD | Support of assistance data enhancement to indicate the boresight direction of a PRS resource for UE-assisted DL-AoD. |  | No |  | UE-assisted DL-AoD with boresight direction of each DL-PRS is not supported. | Per UE | ~~n/a~~ No | ~~n/a~~ No | ~~n/a~~ No | Need for location server to know | Optional with capability signaling. |

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| Company | Comments/Questions/Suggestions |
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# Issue 27: FG 27-22

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| 27. NR\_pos\_enh | 27-22 | PRS antenna beam pattern for UE-based DL-AoD | Support of PRS antenna beam pattern for DL-AoD |  | No |  | UE-based DL-AoD with PRS antenna beam pattern is not supported. | Per UE | ~~n/a~~ No | ~~n/a~~ No | ~~n/a~~ No | Need for location server to know | Optional with capability signaling. |

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| Company | Comments/Questions/Suggestions |
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# Issue 28: New FGs

After review of contributions submitted to RAN1 #109-e in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Introduce the following new FGs**

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| 27. NR\_pos\_enh | 27-23 | Support of more than one activated PRS processing windows | 1. Number of supported activated PRS processing windows | One of {27-3-2a, 27-3-2b, 27-3-2c} | Yes |  | Only one activated PRS processing window is supported. | Per UE | No | No | No | Candidate values:{2, 3, 4} | Optional with capability signaling |
| 27. NR\_pos\_enh | 27-24 | Maximum Rx timing difference in MG-less PRS measurement | 1. Support of maximum Rx timing difference in MG-less PRS measurement  2. The maximum Rx timing difference in MG-less PRS measurement | 27-3-2 |  | No | The maximum Rx timing difference in MG-less PRS measurement is not supported and no assumption can be made on the maximum Rx timing difference in MG-less PRS measurement | per band | n/a | n/a | n/a | Component 2 candidate values: {CP length, 0.5 slot}  Need for location server to know if the feature is supported | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
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# Discussion/Approval Items during RAN1 #109-e — Second Checkpoint

Based on the comments/questions/suggestions received by the first checkpoint, the following are the revised proposals and/or proposed agreements by the moderator. Companies submitted the following views on the moderator’s proposals.

***[Please submit all comments/questions/suggestions here, late comments/questions/suggestions submitted in Section 3 will not be considered]***

**General comments**

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| Company | Comments/Questions/Suggestions |
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# Issue 1: FG

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| Company | Comments/Questions/Suggestions |
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# Discussion/Approval Items during RAN1 #109-e — Third Checkpoint

Based on the comments/questions/suggestions received by the second checkpoint, the following are the revised proposals and/or proposed agreements by the moderator. Companies submitted the following views on the moderator’s proposals.

***[Please submit all comments/questions/suggestions here, late comments/questions/suggestions submitted in Section 4 will not be considered]***

**General comments**

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| Company | Comments/Questions/Suggestions |
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# Issue 1: FG

**Proposal: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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| Company | Comments/Questions/Suggestions |
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# Summary of Final Proposals for Agreements

This Section summarizes the final proposals for agreement in RAN1 #109-e by email. There are no tables for comments.

***[All comments must be directly made on the RAN1 email reflector]***

Companies can continue to update their comments in the previous Sections, however, these are no longer monitored by the moderator. Any such comments will be for archival purposes only and will not influence the outcome of this email discussion. Any objection to any of the proposals in this Section must be voiced directly on the RAN1 email reflector.

## Final Proposals for Agreement by the First Check Point

**Possible Agreement: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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## Final Proposals for Agreement by the Second Check Point

**Possible Agreement: Adopt the following changes highlighted in chromatic fonts, while keeping the yellow highlighting, if any, as shown**

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# Conclusion

In addition to the agreements in Section 6, that were reached by email during RAN1 #109-e, the following was agreed by GTW during RAN1 #109-e:

# References

1. R1-2202929, Updated RAN1 UE features list for Rel-17 NR after RAN1 #108-e including remaining RAN1 issues, Moderators (AT&T, NTT DOCOMO, INC.)
2. R1-2203100, Rel-17 UE features for NR positioning, Huawei/HiSilicon
3. R1-2203429, Remaining issues on Rel-17 UE features for NR Positioning enhancements, CATT
4. R1-2203533, Discussion on UE features for NR positioning enhancements, vivo
5. R1-2203621, Discussion on UE features for Rel-17 positioning, ZTE
6. R1-2203653, Remaining issues on UE features for Rel-17 NR positioning enhancements, China Telecom
7. R1-2203880, Discussion on UE features for NR positioning enhancements, Samsung
8. R1-2203962, UE features for NR positioning enhancements, OPPO
9. R1-2204360, Discussion on Rel-17 UE features for NR positioning enhancements, NTT DOCOMO, INC.
10. R1-2204590, On UE features for NR positioning enhancements, Nokia/Nokia Shanghai Bell
11. R1-2204944, Views on NR positioning enhancements UE features, Ericsson
12. R1-2205002, UE features for NR positioning enhancements, Qualcomm Incorporated