**3GPP TSG- WG2 Meeting #126 *R2-240xxxx***

**Fukuoka, Japan , th – 24th, 2024**

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| *CR-Form-v12.3* | | | | | | | | |
| **CHANGE REQUEST** | | | | | | | | |
|  | | | | | | | | |
|  |  | **CR** |  | **rev** | **2** | **Current version:** |  |  |
|  | | | | | | | | |
| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* | | | | | | | | |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network |  | Core Network | **X** |

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|  | | | | | | | | | | |
| ***Title:*** | Miscellaneous corrections on LPP for Rel-18 positioning UE capabilities | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | Xiaomi | | | | | | | | | |
| ***Source to TSG:*** | R2 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** |  | | | | |  | ***Date:*** | | | 2024-04-22 |
|  |  | | | |  | |  | | |  |
| ***Category:*** |  |  | | | | | ***Release:*** | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | To capture following agreements made in RAN2#125bis:  Move the two fields posSRS-BWA-RRC-Connected-r18 and posSRS-BWA-IndependentCA-RRC-Connected-r18 from IE SRS-CapabilityPerBand-r16 to SRS-PosResourcesPerBand-r16.  To update FG 41-4-6, FG 41-4-7 and FG41-4-8 according to R1-2403703 updated RAN1 UE feature list for Rel-18 NR after RAN1 116bis.  The featue ‘symbolTimeStampSupport-r18’ is not in the RAN1 UE feature list.  To capture the following agreements made in RAN2#126:   * Replace the field name supportOfLegacyMeasurementInTimeWindow by supportOfMeasurementInTimeWindowForDL-TDOA and similarly for other methods. * Delete nr-DL-AoD-OnDemandPRS-ForBWA-Support-r18 IE from NR-DL-AoD-ProvideCapabilities. * Delete the words “within a MG” from the field descriptions for the IEs prs-BWA-TwoContiguousIntrabandInMG-RRC-IdleAndInactive and prs-BWA-ThreeContiguousIntrabandInMG-RRC-IdleAndInactive. * In LPP CR revise the field descriptions of reducedNumOfSampleInMeasurementWithPRS-BWA-RRC-Connected and reducedNumOfSampleInMeasurementWithPRS-BWA-RRC-IdleAndInactive to make it condition to the support of component 1 of R1 FG 41-4-1. * In LPP CR fix the editorial issues in the field descriptions of posSRS-Preconfigured-RRC-InactiveInitialUL-BWP, posSRS-Preconfigured-RRC-InactiveOutsideInitialUL-BWP, posSRS-ValidityAreaRRC-InactiveInitialUL-BWP, posSRS-ValidityAreaRRC-InactiveOutsideInitialUL-BWP and posSRS-TxFH-RRC-Inactive.   To update the prerequisite feature groups of RAN4 UE features according to RAN4 UE feature list R4-2410712.  To update the UE capabilities according to RAN1-2405566 LS on Rel-18 RAN1 UE features list for NR after RAN1#117. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | 1 Move the two fields posSRS-BWA-RRC-Connected-r18 and posSRS-BWA-IndependentCA-RRC-Connected-r18 from IE SRS-CapabilityPerBand-r16 to SRS-PosResourcesPerBand-r16.  2 Update component 2 and notes of FG41-4-6.  3 Update component 2, component 9 and notes of FG 41-4-7.  4 Update component 2, component 9 and notes of FG 41-4-8.  5.Remove the symbolTimeStampSupport-r18.  6 Update supportOfLegacyMeasurementInTimeWindow.  7 Delete nr-DL-AoD-OnDemandPRS-ForBWA-Support-r18 IE from NR-DL-AoD-ProvideCapabilities.  8 Update the name of prs-BWA-TwoContiguousIntrabandInMG-RRC-IdleAndInactive and prs-BWA-ThreeContiguousIntrabandInMG-RRC-IdleAndInactive, and update the corrosponding field description.  9 Update the prerequisite feature groups of reducedNumOfSampleInMeasurementWithPRS-BWA-RRC-Connected-r18, reducedNumOfSampleInMeasurementWithPRS-BWA-RRC-IdleAndInactive-r18, reducedNumOfSampleForMeasurementWithFH-RRC-Connected-r18 and reducedNumOfSampleForMeasurementWithFH-RRC-IdleAndInactive-r18.  10 Fix the editorial issues in the field descriptions of posSRS-Preconfigured-RRC-InactiveInitialUL-BWP, posSRS-Preconfigured-RRC-InactiveOutsideInitialUL-BWP, posSRS-ValidityAreaRRC-InactiveInitialUL-BWP, posSRS-ValidityAreaRRC-InactiveOutsideInitialUL-BWP and posSRS-TxFH-RRC-Inactive.  11 Move the supportOfPRS-MeasurementRRC-Idle-r18 from NR-DL-PRS-ProcessingCapability to NR-DL-TDOA-MeasurementCapability and NR-DL-AoD-MeasurementCapability.  12 Update the ASN.1 and corresponding field description of PosSRS-BWA-RRC-Connected-r18, PosSRS-BWA-IndependentCA-RRC-Connected-r18 and PosSRS-BWA-RRC-Inactive. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | The UE capabilities for Rel-18 positioning are not captured correctly. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 6.4.3, 6.5.10.6, 6.5.10.6a, 6.5.11.6, 6.5.11.6a, 6.5.12.6, 6.5.12.6a | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

START OF CHANGE

### 6.4.3 Common NR Positioning Information Elements

#### *– NR-DL-PRS-ProcessingCapability*

The IE *NR-DL-PRS-ProcessingCapability* defines the common DL-PRS Processing capability. In the case of capabilities for multiple NR positioning methods are provided, the IE *NR-DL-PRS-ProcessingCapability* applies across the NR positioning methods and the target device shall indicate the same values for the capabilities in IEs *NR-DL-TDOA-ProvideCapabilities*, *NR-DL-AoD-ProvideCapabilities*, and *NR-Multi-RTT-ProvideCapabilities*.

The *PRS-ProcessingCapabilityPerBand* is defined for a single positioning frequency layer on a certain band (i.e., a target device supporting multiple positioning frequency layers is expected to process one frequency layer at a time).

-- ASN1START

NR-DL-PRS-ProcessingCapability-r16 ::= SEQUENCE {

prs-ProcessingCapabilityBandList-r16 SEQUENCE (SIZE (1..nrMaxBands-r16)) OF

PRS-ProcessingCapabilityPerBand-r16,

maxSupportedFreqLayers-r16 INTEGER (1..4),

simulLTE-NR-PRS-r16 ENUMERATED { supported } OPTIONAL,

...,

[[

dummy ENUMERATED { m1, m2, ... } OPTIONAL

]]

}

PRS-ProcessingCapabilityPerBand-r16 ::= SEQUENCE {

freqBandIndicatorNR-r16 FreqBandIndicatorNR-r16,

supportedBandwidthPRS-r16 CHOICE {

fr1 ENUMERATED {mhz5, mhz10, mhz20, mhz40,

mhz50, mhz80, mhz100},

fr2 ENUMERATED {mhz50, mhz100, mhz200, mhz400},

...

},

dl-PRS-BufferType-r16 ENUMERATED {type1, type2, ...},

durationOfPRS-Processing-r16 SEQUENCE {

durationOfPRS-ProcessingSymbols-r16 ENUMERATED {nDot125, nDot25, nDot5, n1,

n2, n4, n6, n8, n12, n16, n20, n25,

n30, n32, n35, n40, n45, n50},

durationOfPRS-ProcessingSymbolsInEveryTms-r16

ENUMERATED {n8, n16, n20, n30, n40, n80,

n160,n320, n640, n1280},

...

},

maxNumOfDL-PRS-ResProcessedPerSlot-r16 SEQUENCE {

scs15-r16 ENUMERATED {n1, n2, n4, n8, n16, n24, n32,

n48, n64} OPTIONAL,

scs30-r16 ENUMERATED {n1, n2, n4, n8, n16, n24, n32,

n48, n64} OPTIONAL,

scs60-r16 ENUMERATED {n1, n2, n4, n8, n16, n24, n32,

n48, n64} OPTIONAL,

scs120-r16 ENUMERATED {n1, n2, n4, n8, n16, n24, n32,

n48, n64} OPTIONAL,

...,

[[

scs15-v1690 ENUMERATED {n6, n12} OPTIONAL,

scs30-v1690 ENUMERATED {n6, n12} OPTIONAL,

scs60-v1690 ENUMERATED {n6, n12} OPTIONAL,

scs120-v1690 ENUMERATED {n6, n12} OPTIONAL

]]

},

...,

[[

supportedDL-PRS-ProcessingSamples-RRC-CONNECTED-r17 ENUMERATED { supported } OPTIONAL,

prs-ProcessingWindowType1A-r17 ENUMERATED { option1, option2, option3} OPTIONAL,

prs-ProcessingWindowType1B-r17 ENUMERATED { option1, option2, option3} OPTIONAL,

prs-ProcessingWindowType2-r17 ENUMERATED { option1, option2, option3} OPTIONAL,

prs-ProcessingCapabilityOutsideMGinPPW-r17

SEQUENCE (SIZE(1..3)) OF

PRS-ProcessingCapabilityOutsideMGinPPWperType-r17

OPTIONAL,

dl-PRS-BufferType-RRC-Inactive-r17 ENUMERATED { type1, type2, ... } OPTIONAL,

durationOfPRS-Processing-RRC-Inactive-r17 SEQUENCE {

durationOfPRS-ProcessingSymbols-r17 ENUMERATED {nDot125, nDot25, nDot5, n1,

n2, n4, n6, n8, n12, n16, n20, n25,

n30, n32, n35, n40, n45, n50},

durationOfPRS-ProcessingSymbolsInEveryTms-r17

ENUMERATED {n8, n16, n20, n30, n40, n80,

n160,n320, n640, n1280},

...

} OPTIONAL,

maxNumOfDL-PRS-ResProcessedPerSlot-RRC-Inactive-r17 SEQUENCE {

scs15-r17 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

scs30-r17 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

scs60-r17 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

scs120-r17 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

...

} OPTIONAL,

supportedLowerRxBeamSweepingFactor-FR2-r17 ENUMERATED { n1, n2, n4, n6 } OPTIONAL

]],

[[

supportedDL-PRS-ProcessingSamples-RRC-Inactive-r17 ENUMERATED { supported } OPTIONAL

]],

[[

prs-MeasurementWithoutMG-r17 ENUMERATED {cp, symbolDot25, symbolDot5,

slotDot5} OPTIONAL

]],

[[

maxNumOfOneSymbolPRS-ResProcessedPerSlot-RRC-Inactive-r18 SEQUENCE {

scs15-r18 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

scs30-r18 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

scs60-r18 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

scs120-r18 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

...

} OPTIONAL,

maxNumOfOneSymbolPRS-ResProcessedPerSlot-RRC-Connected-r18 SEQUENCE {

scs15-r18 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

scs30-r18 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

scs60-r18 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

scs120-r18 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

...

} OPTIONAL,

ppw-maxNumOfOneSymbolPRS-ResProcessedPerSlot-r18 SEQUENCE {

scs15-r18 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

scs30-r18 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

scs60-r18 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

scs120-r18 ENUMERATED {n1, n2, n4, n6, n8, n12, n16, n24,

n32, n48, n64} OPTIONAL,

...

} OPTIONAL,

prs-BWA-TwoContiguousIntrabandInMG-RRC-Connected-r18

PRS-BWA-TwoContiguousIntrabandInMG-r18 OPTIONAL,

prs-BWA-ThreeContiguousIntrabandInMG-RRC-Connected-r18

PRS-BWA-ThreeContiguousIntrabandInMG-r18 OPTIONAL,

prs-BWA-TwoContiguousIntraband-RRC-IdleAndInactive-r18

PRS-BWA-TwoContiguousIntrabandInMG-r18 OPTIONAL,

prs-BWA-ThreeContiguousIntraband-RRC-IdleAndInactive-r18

PRS-BWA-ThreeContiguousIntrabandInMG-r18 OPTIONAL,

reducedNumOfSampleInMeasurementWithPRS-BWA-RRC-Connected-r18 ENUMERATED { supported }

OPTIONAL,

reducedNumOfSampleInMeasurementWithPRS-BWA-RRC-IdleAndInactive-r18

ENUMERATED { supported } OPTIONAL,

dl-PRS-MeasurementWithRxFH-RRC-Inactive-r18 ENUMERATED { supported } OPTIONAL,

dl-PRS-MeasurementWithRxFH-RRC-Idle-r18 ENUMERATED { supported } OPTIONAL,

reducedNumOfSampleForMeasurementWithFH-RRC-Connected-r18 ENUMERATED { supported }

OPTIONAL,

reducedNumOfSampleForMeasurementWithFH-RRC-IdleAndInactive-r18 ENUMERATED { supported }

OPTIONAL,

supportOfPRS-BWA-WithTwoPFL-Combination-r18 ENUMERATED { supported } OPTIONAL,

dl-PRS-MeasurementWithRxFH-RRC-Connected-r18 DL-PRS-MeasurementWithRxFH-RRC-Connected-r18 OPTIONAL

]]

}

PRS-ProcessingCapabilityOutsideMGinPPWperType-r17 ::= SEQUENCE {

prsProcessingType-r17 ENUMERATED { type1A, type1B, type2 },

ppw-dl-PRS-BufferType-r17 ENUMERATED { type1, type2, ... },

ppw-durationOfPRS-Processing1-r17 SEQUENCE {

ppw-durationOfPRS-ProcessingSymbolsN-r17

ENUMERATED { msDot125, msDot25, msDot5, ms1, ms2, ms4,

ms6, ms8, ms12, ms16, ms20, ms25, ms30, ms32, ms35,

ms40, ms45, ms50 },

ppw-durationOfPRS-ProcessingSymbolsT-r17

ENUMERATED { ms1, ms2, ms4, ms8, ms16, ms20, ms30, ms40, ms80,

ms160, ms320, ms640, ms1280 }

} OPTIONAL,

ppw-durationOfPRS-Processing2-r17 SEQUENCE {

ppw-durationOfPRS-ProcessingSymbolsN2-r17

ENUMERATED { msDot125, msDot25, msDot5, ms1, ms2, ms3, ms4, ms5,

ms6, ms8, ms12 },

ppw-durationOfPRS-ProcessingSymbolsT2-r17

ENUMERATED { ms4, ms5, ms6, ms8 }

} OPTIONAL,

ppw-maxNumOfDL-PRS-ResProcessedPerSlot-r17 SEQUENCE {

scs15-r17 ENUMERATED {n1, n2, n4, n6, n8, n12,

n16, n24, n32, n48, n64 }

OPTIONAL,

scs30-r17 ENUMERATED {n1, n2, n4, n6, n8, n12,

n16, n24, n32, n48, n64 }

OPTIONAL,

scs60-r17 ENUMERATED {n1, n2, n4, n6, n8, n12,

n16, n24, n32, n48, n64 }

OPTIONAL,

scs120-r17 ENUMERATED {n1, n2, n4, n6, n8, n12,

n16, n24, n32, n48, n64 }

OPTIONAL,

...

},

...,

[[

ppw-maxNumOfDL-Bandwidth-r17 CHOICE {

fr1 ENUMERATED {mhz5, mhz10, mhz20, mhz40,

mhz50, mhz80, mhz100},

fr2 ENUMERATED {mhz50, mhz100, mhz200, mhz400}

} OPTIONAL

]]

}

PRS-BWA-TwoContiguousIntrabandInMG-r18 ::= SEQUENCE {

maximumOfTwoAggregatedDL-PRS-Bandwidth-FR1-r18 ENUMERATED {mhz10, mhz20, mhz40, mhz50,

mhz80, mhz100, mhz160, mhz200}

OPTIONAL,

maximumOfTwoAggregatedDL-PRS-Bandwidth-FR2-r18 ENUMERATED {mhz100, mhz200, mhz400, mhz800}

OPTIONAL,

maximumOfDL-PRS-BandwidthPerPFL-FR1-r18 ENUMERATED {mhz5, mhz10, mhz20, mhz40,

mhz50, mhz80, mhz100} OPTIONAL,

maximumOfDL-PRS-BandwidthPerPFL-FR2-r18 ENUMERATED {mhz50, mhz100, mhz200, mhz400}

OPTIONAL,

dl-PRS-BufferTypeOfBWA-r18 ENUMERATED {type1, type2},

prs-durationOfTwoPRS-BWA-Processing-r18 SEQUENCE {

prs-durationOfTwoPRS-BWA-ProcessingSymbolsN-r18

ENUMERATED {msDot125, msDot25, msDot5, ms1, ms2, ms4, ms6, ms8, ms12,

ms16, ms20, ms25, ms30, ms32, ms35, ms40, ms45, ms50},

prs-durationOfTwoPRS-BWA-ProcessingSymbolsT-r18

ENUMERATED {ms8, ms16, ms20, ms30, ms40, ms80, ms160, ms320, ms640, ms1280}

} OPTIONAL,

maxNumOfAggregatedDL-PRS-ResourcePerSlot-FR1-r18 SEQUENCE {

scs15-r18 ENUMERATED {n1, n2, n4, n6, n8, n12,

n16, n24, n32, n48, n64 } OPTIONAL,

scs30-r18 ENUMERATED {n1, n2, n4, n6, n8, n12,

n16, n24, n32, n48, n64 } OPTIONAL,

scs60-r18 ENUMERATED {n1, n2, n4, n6, n8, n12,

n16, n24, n32, n48, n64 } OPTIONAL

},

maxNumOfAggregatedDL-PRS-ResourcePerSlot-FR2-r18 SEQUENCE {

scs60-r18 ENUMERATED {n1, n2, n4, n6, n8, n12,

n16, n24, n32, n48, n64 } OPTIONAL,

scs120-r18 ENUMERATED {n1, n2, n4, n6, n8, n12,

n16, n24, n32, n48, n64 } OPTIONAL

}

}

PRS-BWA-ThreeContiguousIntrabandInMG-r18 ::= SEQUENCE {

maximumOfThreeAggregatedDL-PRS-Bandwidth-FR1-r18

ENUMERATED {mhz15, mhz20, mhz30, mhz40, mhz50, mhz60, mhz80, mhz100, mhz120,

mhz140, mhz150, mhz180, mhz200, mhz240, mhz300} OPTIONAL,

maximumOfThreeAggregatedDL-PRS-Bandwidth-FR2-r18

ENUMERATED {mhz150, mhz200, mhz300, mhz400, mhz600, mhz800, mhz1000,

mhz1200} OPTIONAL,

maximumOfDL-PRS-BandwidthPerPFL-FR1-r18

ENUMERATED {mhz5, mhz10, mhz20, mhz40, mhz50, mhz80, mhz100} OPTIONAL,

maximumOfDL-PRS-BandwidthPerPFL-FR2-r18

ENUMERATED {mhz50, mhz100, mhz200, mhz400} OPTIONAL,

dl-PRS-BufferTypeOfBWA-r18 ENUMERATED {type1, type2},

prs-durationOfThreePRS-BWA-Processing-r18 SEQUENCE {

prs-durationOfThreePRS-BWA-ProcessingSymbolsN-r18

ENUMERATED {msDot125, msDot25, msDot5, ms1, ms2, ms4, ms6, ms8, ms12,

ms16, ms20, ms25, ms30, ms32, ms35, ms40, ms45, ms50},

prs-durationOfThreePRS-BWA-ProcessingSymbolsT-r18

ENUMERATED {ms8, ms16, ms20, ms30, ms40, ms80, ms160,

ms320, ms640, ms1280}

} OPTIONAL,

maxNumOfAggregatedDL-PRS-ResourcePerSlot-FR1-r18 SEQUENCE {

scs15-r18 ENUMERATED {n1, n2, n4, n6, n8, n12,

n16, n24, n32, n48, n64 } OPTIONAL,

scs30-r18 ENUMERATED {n1, n2, n4, n6, n8, n12,

n16, n24, n32, n48, n64 } OPTIONAL,

scs60-r18 ENUMERATED {n1, n2, n4, n6, n8, n12,

n16, n24, n32, n48, n64 } OPTIONAL

},

maxNumOfAggregatedDL-PRS-ResourcePerSlot-FR2-r18 SEQUENCE {

scs60-r18 ENUMERATED {n1, n2, n4, n6, n8, n12,

n16, n24, n32, n48, n64 } OPTIONAL,

scs120-r18 ENUMERATED {n1, n2, n4, n6, n8, n12,

n16, n24, n32, n48, n64 } OPTIONAL

}

}

DL-PRS-MeasurementWithRxFH-RRC-Connected-r18 ::=SEQUENCE {

maximumPRS-BandwidthAcrossAllHopsFR1-r18 ENUMERATED {mhz40, mhz50, mhz80, mhz100}

OPTIONAL,

maximumPRS-BandwidthAcrossAllHopsFR2-r18 ENUMERATED {mhz100, mhz200, mhz400} OPTIONAL,

maximumFH-Hops-r18 ENUMERATED {n2, n3, n4, n5, n6} OPTIONAL,

processingDuration-r18 SEQUENCE {

processingPRS-SymbolsDurationN3-r18 ENUMERATED {msDot125, msDot25, msDot5, ms1, ms2,

ms4, ms6, ms8, ms12,ms16, ms20, ms25,

ms30, ms32, ms35, ms40, ms45, ms50},

processingDurationT3-r18 ENUMERATED {ms8, ms16, ms20, ms30, ms40, ms80,

ms160, ms320, ms640, ms1280}

} OPTIONAL,

rf-RxRetunTimeFR1-r18 ENUMERATED {n70,n140,n210} OPTIONAL,

rf-RxRetunTimeFR2-r18 ENUMERATED {n35,n70,n140} OPTIONAL,

numOfOverlappingPRB-r18 ENUMERATED {n0,n1,n2,n4} OPTIONAL,

...

}

-- ASN1STOP

| *NR-DL-PRS-ProcessingCapability* field descriptions |
| --- |
| ***maxSupportedFreqLayers***  Indicates the maximum number of positioning frequency layers supported by UE. |
| ***simulLTE-NR-PRS***  Indicates whether the UE supports parallel processing of LTE PRS and NR DL-PRS. |
| ***dummy***  This field is not used in the specification. If received it shall be ignored by the receiver. |
| ***supportedBandwidthPRS***  Indicates the maximum number of DL-PRS bandwidth in MHz, which is supported and reported by UE. |
| ***dl-PRS-BufferType***  IndicatesDL-PRS buffering capability. Value *type1* indicates sub-slot/symbol level buffering and value *type2* indicates slot level buffering. |
| ***durationOfPRS-Processing***  Indicates the duration *N* of DL-PRS symbols in units of ms a UE can process every T ms assuming maximum DL-PRS bandwidth provided in *supportedBandwidthPRS* and comprises the following subfields:  - ***durationOfPRS-ProcessingSymbols***: This field specifies the values for *N*. Enumerated values indicate 0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50 ms.  - ***durationOfPRS-ProcessingSymbolsInEveryTms***: This field specifies the values for *T*. Enumerated values indicate 8, 16, 20, 30, 40, 80, 160, 320, 640, 1280 ms.  See NOTE 9. |
| ***maxNumOfDL-PRS-ResProcessedPerSlot***  Indicates the maximum number of DL-PRS Resources that UE can process in a slot. SCS: 15 kHz, 30 kHz, 60 kHz are applicable for FR1 bands. SCS: 60 kHz, 120 kHz are applicable for FR2 bands. |
| ***supportedDL-PRS-ProcessingSamples-RRC-CONNECTED***  Indicates the UE capability for support of measurements based on measuring M=1 or M=2 (instances) of a DL-PRS Resource Set. The UE can include this field only if the UE supports *prs-ProcessingCapabilityBandList*. Otherwise, the UE does not include this field.  NOTE 1: This feature is supported for both UE-assisted and UE based positioning. |
| ***prs-ProcessingWindowType1A***  Indicates the supported DL-PRS processing types subject to the UE determining that DL-PRS to be higher priority for DL-PRS measurement outside MG and in a DL-PRS Processing Window.  Type 1A refers to the determination of prioritization between DL-PRS and other DL signals/channels in all OFDM symbols within the DL-PRS Processing Window. The DL signals/channels from all DL CCs (per UE) are affected across LTE and NR. Enumerated value indicates supported priority handing options of DL-PRS:  - *option1*: Support of "st1" and "st3" defined in clause 5.1.6.5 of TS 38.214 [45].  - *option2*: Support of "st1", "st2", and "st3" defined in clause 5.1.6.5 of TS 38.214 [45].  - *option3*: Support of "st1" only defined in clause 5.1.6.5 of TS 38.214 [45].  The UE can include this field only if the UE supports *prs-ProcessingCapabilityBandList*. Otherwise, the UE does not include this field.  NOTE 2: Within a DL-PRS processing window, UE measurement is inside the active DL BWP with DL-PRS having the same numerology as the active DL BWP.  NOTE 2a: When the UE determines higher priority for other DL signals/channels over the DL-PRS measurement/processing, the UE is not expected to measure/process DL-PRS. |
| ***prs-ProcessingWindowType1B***  Indicates the supported DL-PRS processing types subject to the UE determining that DL-PRS to be higher priority for DL-PRS measurement outside MG and in a DL-PRS Processing Window.  Type 1B refers to the determination of prioritization between DL-PRS and other DL signals/channels in all OFDM symbols within the DL-PRS processing window. The DL signals/channels from a certain band are affected. Enumerated value indicates supported priority handing options of DL-PRS (see *prs-ProcessingWindowType1A*).  The UE can include this field only if the UE supports prs-ProcessingCapabilityBandList. Otherwise, the UE does not include this field.  NOTE 3: Within a DL-PRS processing window, UE measurement is inside the active DL BWP with DL-PRS having the same numerology as the active DL BWP.  NOTE 3a: When the UE determines higher priority for other DL signals/channels over the DL-PRS measurement/processing, the UE is not expected to measure/process DL-PRS. |
| ***prs-ProcessingWindowType2***  Indicates the supported DL-PRS processing types subject to the UE determining that DL-PRS to be higher priority for DL-PRS measurement outside MG and in a DL-PRS Processing Window.  Type 2 refers to the determination of prioritization between DL-PRS and other DL signals/channels only in DL-PRS symbols within the DL-PRS processing window. Enumerated value indicates supported priority handing options of DL-PRS (see *prs-ProcessingWindowType1A*).  The UE can include this field only if the UE supports *prs-ProcessingCapabilityBandList*. Otherwise, the UE does not include this field.  NOTE 4: Within a DL-PRS processing window, UE measurement is inside the active DL BWP with DL-PRS having the same numerology as the active DL BWP.  NOTE 4a: When the UE determines higher priority for other DL signals/channels over the DL-PRS measurement/processing, the UE is not expected to measure/process DL-PRS. |
| ***prs-ProcessingCapabilityOutsideMGinPPW***  Indicates the DL-PRS Processing Capability outside MG of each of the supported PPW Type in the case the UE supports multiple PPW Types in a band and comprises the following subfields:  - ***prsProcessingType***: Indicates the DL-PRS Processing Window Type for which the *prs-ProcessingCapabilityOutsideMGinPPW* are provided.  - ***ppw-dl-PRS-BufferType***: Indicates DL-PRS buffering capability. Value '*type1'* indicates sub-slot/symbol level buffering and value '*type2'* indicates slot level buffering.  - ***ppw-durationOfPRS-Processing1***: Indicates the duration of DL-PRS symbols N in units of ms a UE can process every T ms assuming maximum DL-PRS bandwidth provided in *ppw-maxNumOfDL-Bandwidth* and comprises the following subfields:  - ***ppw-durationOfPRS-ProcessingSymbolsN***: This field specifies the values for *N*. Enumerated values indicate 0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50 ms.  - ***ppw-durationOfPRS-ProcessingSymbolsT***: This field specifies the values for *T*. Enumerated values indicate 1, 2, 4, 8, 16, 20, 30, 40, 80, 160, 320, 640, 1280 ms.  - ***ppw-durationOfPRS-Processing2***: Indicates the duration of DL-PRS symbols N2 in units of ms a UE can process inT2 ms assuming maximum DL-PRS bandwidth provided in *ppw-maxNumOfDL-Bandwidth* and comprises the following subfields:  - ***ppw-durationOfPRS-ProcessingSymbolsN2***: This field specifies the values for *N2*. Enumerated values indicate 0.125, 0.25, 0.5, 1, 2, 3, 4, 5, 6, 8, 12 ms.  - ***ppw-durationOfPRS-ProcessingSymbolsT2***: This field specifies the values for *T2*. Enumerated values indicate 4, 5, 6, 8 ms.  - ***ppw-maxNumOfDL-PRS-ResProcessedPerSlot:*** Indicates the maximum number of DL-PRS resources that UE can process in a slot. SCS: 15 kHz, 30 kHz, 60 kHz are applicable for FR1 bands. SCS: 60 kHz, 120 kHz are applicable for FR2 bands.  - ***ppw-maxNumOfDL-Bandwidth:*** Indicates the maximum number of DL-PRS bandwidth in MHz, which is supported and reported by UE for DL-PRS measurement outside MG within the PPW.  The UE can include this field only if the UE supports one of *prs-ProcessingWindowType1A*, *prs-ProcessingWindowType1B* and *prs-ProcessingWindowType2*. Otherwise, the UE does not include this field.  NOTE 5: A UE that supports one of *prs-ProcessingWindowType1A*, *prs-ProcessingWindowType1B* or *prs-ProcessingWindowType2* shall always include the *prs-ProcessingCapabilityOutsideMGinPPW*.  NOTE 6: The (N, T) UE capability in *ppw-durationOfPRS-Processing1* is interpreted as in NOTE 9, and the UE is expected to receive the DL-PRS within the DL-PRS processing window but the processing of the received DL-PRS may be outside a DL-PRS processing window.  NOTE 7: The (N2, T2) UE capability in *ppw-durationOfPRS-Processing2* is interpreted such that the UE is capable of measuring up to N2 ms DL-PRS within a PPW and is capable of completing the DL-PRS processing within the PPW, e.g., if the time duration from the last symbol of the measured DL-PRS Resource(s) inside the PPW to the end of PPW is not smaller than T2 ms.  NOTE 8: A UE which supports *prs-ProcessingCapabilityOutsideMGinPPW* shall support either *ppw-durationOfPRS-Processing1* or *ppw-durationOfPRS-Processing2*, but not both for each supported type in a band. |
| ***dl-PRS-BufferType-RRC-Inactive***  IndicatesDL-PRS buffering capability in RRC\_INACTIVE state. Value '*type1'* indicates sub-slot/symbol level buffering and value '*type2'* indicates slot level buffering. |
| ***durationOfPRS-Processing-RRC-Inactive***  Indicates the duration *N* of DL-PRS symbols in units of ms a UE can process every *T* ms in RRC\_INACTIVE state assuming maximum DL-PRS bandwidth provided in *supportedBandwidthPRS* and comprises the following subfields:  - ***durationOfPRS-ProcessingSymbols***: This field specifies the values for *N*. Enumerated values indicate 0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50 ms.  - ***durationOfPRS-ProcessingSymbolsInEveryTms***: This field specifies the values for *T*. Enumerated values indicate 8, 16, 20, 30, 40, 80, 160, 320, 640, 1280 ms.  See NOTE 9. |
| ***maxNumOfDL-PRS-ResProcessedPerSlot-RRC-Inactive***  Indicates the maximum number of DL-PRS Resources a UE can process in a slot in RRC\_INACTIVE state. SCS: 15 kHz, 30 kHz, 60 kHz are applicable for FR1 bands. SCS: 60 kHz, 120 kHz are applicable for FR2 bands. |
| ***supportedLowerRxBeamSweepingFactor-FR2***  Indicates support of the lower Rx beam sweeping factor than 8 for FR2. Enumerated value indicates the number of Rx beam sweeping factors supported. |
| ***supportedDL-PRS-ProcessingSamples-RRC-Inactive***  Indicates the UE capability for support of reduced number of samples for DL-PRS measurement in RRC\_INACTIVE state. The UE can include this field only if the UE supports *prs-ProcessingRRC-Inactive* defined in TS 38.331 [35]. Otherwise, the UE does not include this field. |
| ***maxNumOfOneSymbolPRS-ResProcessedPerSlot-RRC-Inactive***  Indicates the maximum number of single-symbol DL-PRS Resources that UE can process in a slot in RRC\_INACTIVE. SCS: 15 kHz, 30 kHz, 60 kHz are applicable for FR1 bands. SCS: 60 kHz, 120 kHz are applicable for FR2 bands. A UE which supports *maxNumOfOneSymbolPRS-ResProcessedPerSlot-RRC-Inactive-r18* shall support single-symbol DL-PRS with the comb sizes from {2,4,6,12}.  The UE can include this field only if the UE supports one of *dl-PRS-BufferType-RRC-Inactive*, *durationOfPRS-Processing-RRC-Inactive*, and *maxNumOfDL-PRS-ResProcessedPerSlot-RRC-Inactive*. Otherwise, the UE does not include this field. |
| ***maxNumOfOneSymbolPRS-ResProcessedPerSlot-RRC-Connected***  Indicates the maximum number of single-symbol DL-PRS Resources that UE can process in a slot inside a measurement gap in RRC\_CONNECTED. SCS: 15 kHz, 30 kHz, 60 kHz are applicable for FR1 bands. SCS: 60 kHz, 120 kHz are applicable for FR2 bands. A UE which supports *maxNumOfOneSymbolPRS-ResProcessedPerSlot-RRC-Connected-r18* shall support single-symbol DL-PRS with the comb sizes from {2,4,6,12}.  The UE can include this field only if the UE supports *prs-ProcessingCapabilityBandList*. Otherwise, the UE does not include this field. |
| ***ppw-maxNumOfOneSymbolPRS-ResProcessedPerSlot***  Indicates the maximum number of single-symbol DL-PRS Resources that UE can process in a slot outside a measurement gap in RRC\_CONNECTED. SCS: 15 kHz, 30 kHz, 60 kHz are applicable for FR1 bands. SCS: 60 kHz, 120 kHz are applicable for FR2 bands. A UE which supports *ppw-maxNumOfOneSymbolPRS-ResProcessedPerSlot-r18* shall support single-symbol DL-PRS with the comb sizes from {2,4,6,12}.  The UE can include this field only if the UE supports *prs-ProcessingCapabilityOutsideMGinPPW*. Otherwise, the UE does not include this field. |
| ***prs-MeasurementWithoutMG***  Indicates the UE capability for support of Rx timing difference between the serving cell and non-serving cell for DL-PRS measurement within a PPW. Value '*cp*' indicates one CP length, value '*symbolDot25*' indicates 0.25 symbol length, value '*symbolDot5*' indicates 0.5 symbol length and value '*slotDot5*' indicates 0.5 slot length. The UE can include this field only if the UE supports one of *prs-ProcessingWindowType1A*, *prs-ProcessingWindowType1B* and *prs-ProcessingWindowType2*. Otherwise, the UE does not include this field. |
| ***prs-BWA-TwoContiguousIntrabandInMG-RRC-Connected***  Indicates the UE capability for support of DL-PRS processing capabilities for aggregated DL-PRS processing of 2 PFLs in intra-band contiguous within a MG for RRC\_CONNECTED state and and comprises the following subfields:  - ***maximumOfTwoAggregatedDL-PRS-Bandwidth-FR1***: Indicates the maximum aggregated DL-PRS bandwidth in MHz for FR1, which is supported and reported by UE.  - ***maximumOfTwoAggregatedDL-PRS-Bandwidth-FR2***: Indicates the maximum aggregated DL-PRS bandwidth in MHz for FR2, which is supported and reported by UE.  - ***maximumOfDL-PRS-BandwidthPerPFL-FR1***: Indicates the maximum DL-PRS bandwidth in MHz for FR1, per PFL.  - ***maximumOfDL-PRS-BandwidthPerPFL-FR2***: Indicates the maximum DL-PRS bandwidth in MHz for FR2, per PFL.  - ***dl-PRS-BufferTypeOfBWA***: Indicates the DL-PRS buffering capability.  - ***prs-durationOfTwoPRS-BWA-Processing***: Indicates the duration of DL-PRS symbols N in units of ms a UE can process every T ms assuming maximum aggregated DL-PRS bandwidth in MHz, which is supported and reported by UE.  - ***prs-durationOfTwoPRS-BWA-ProcessingSymbolsN***: This field specifies the values for N. Enumerated values indicate 0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50 ms.  - ***prs-durationOfTwoPRS-BWA-ProcessingSymbolsT***: This field specifies the values for T. Enumerated values indicate 8, 16, 20, 30, 40, 80, 160, 320, 640, 1280, 2560 ms.  - ***maxNumOfAggregatedDL-PRS-ResourcePerSlot-FR1***: Indicates the Maximum number of aggregated DL-PRS Resources across aggregated PFLs that UE can process in a slot for FR1.  - ***maxNumOfAggregatedDL-PRS-ResourcePerSlot-FR2***: Indicates the Maximum number of aggregated DL-PRS Resources across aggregated PFLs that UE can process in a slot for FR2.  The UE can include this field only if the UE supports *supportedBandwidthPRS, dl-PRS-BufferType, durationOfPRS-Processing* and *maxNumOfDL-PRS-ResProcessedPerSlot*. Otherwise, the UE does not include this field.  NOTE 10: *dl-PRS-BufferTypeOfBWA* follows buffering capability type reported in *dl-PRS-BufferType.*  NOTE 11: The value N should be equal or smaller than the value N reported by *durationOfPRS-ProcessingSymbols*, or this value T should be equal or larger than the value T reported by *durationOfPRS-ProcessingSymbolsInEveryTms.*  NOTE 12: Each two linked DL-PRS Resources are counted as 1 resource.  NOTE 13: *maxNumOfAggregatedDL-PRS-ResourcePerSlot* should be equal or smaller than the value reported by *maxNumOfDL-PRS-ResProcessedPerSlot.*  NOTE 14: The above parameters are reported assuming a configured measurement gap and a maximum ratio of measurement gap length (MGL)/measurement gap repetition period (MGRP) of no more than 30%. |
| ***prs-BWA-ThreeContiguousIntrabandInMG-RRC-Connected***  Indicates the UE capability for support of DL-PRS processing capabilities for aggregated DL-PRS processing of 3 PFLs in intra-band contiguous within a MG for RRC\_CONNECTED state and comprises the following subfields:  **- *maximumOfThreeAggregatedDL-PRS-Bandwidth-FR1***: Indicates the maximum aggregated DL-PRS bandwidth in MHz of for FR1, which is supported and reported by UE.  **- *maximumOfThreeAggregatedDL-PRS-Bandwidth-FR2***: Indicates the maximum aggregated DL-PRS bandwidth in MHz for FR2, which is supported and reported by UE.  **- *maximumOfDL-PRS-BandwidthPerPFL-FR1***: Indicates the maximum DL-PRS bandwidth in MHz for FR1, per PFL  **- *maximumOfDL-PRS-BandwidthPerPFL-FR2***: Indicates the maximum DL-PRS bandwidth in MHz for FR2, per PFL  **- *dl-PRS-BufferTypeOfBWA***: Indicates the DL-PRS buffering capability.  **- *prs-durationOfThreePRS-BWA-Processing***: Indicates the duration of DL-PRS symbols N in units of ms a UE can process every T ms assuming maximum aggregated DL-PRS bandwidth in MHz, which is supported and reported by UE.  **- *prs-durationOfThreePRS-BWA-ProcessingSymbolsN***: This field specifies the values for N. Enumerated values indicate 0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50 ms.  **- *prs-durationOfThreePRS-BWA-ProcessingSymbolsT***: This field specifies the values for T. Enumerated values indicate 8, 16, 20, 30, 40, 80, 160, 320, 640, 1280, 3840 ms.  **- *maxNumOfAggregatedDL-PRS-ResourcePerSlot-FR1***: Indicates the Maximum number of aggregated DL-PRS Resources across aggregated PFLs that UE can process in a slot for FR1.  **- *maxNumOfAggregatedDL-PRS-ResourcePerSlot-FR2***: Indicates the Maximum number of aggregated DL-PRS Resources across aggregated PFLs that UE can process in a slot for FR2.  The UE can include this field only if the UE supports *prs-BWA-TwoContiguousIntrabandInMG-RRC-Connected****.*** Otherwise, the UE does not include this field.  NOTE15: *dl-PRS-BufferTypeOfBWA* follows buffering capability type reported in *dl-PRS-BufferType.*  NOTE16: The value N should be equal or smaller than the value N reported by *durationOfPRS-ProcessingSymbols*, or this value T should be equal or larger than the value T reported by *durationOfPRS-ProcessingSymbolsInEveryTms.*  NOTE17: Each three linked DL-PRS Resources are counted as 1 resource.  NOTE18: *maxNumOfAggregatedDL-PRS-ResourcePerSlot* should be equal or smaller than the value reported by *maxNumOfDL-PRS-ResProcessedPerSlot*.  NOTE19: The above parameters are reported assuming a configured measurement gap and a maximum ratio of measurement gap length (MGL)/measurement gap repetition period (MGRP) of no more than 30%. |
| ***prs-BWA-TwoContiguousIntraband-RRC-IdleAndInactive***  Indicates the UE capability for support of DL-PRS processing capabilities for aggregated DL-PRS processing of 2 PFLs in intra-band contiguous for RRC\_INACTIVE and RRC\_IDLE state.  The UE can include this field only if the UE supports *dl-PRS-BufferType-RRC-Inactive, durationOfPRS-Processing-RRC-Inactive and maxNumOfDL-PRS-ResProcessedPerSlot-RRC-Inactive*. Otherwise, the UE does not include this field. The capability signalling comprises the following parameters:  - ***maximumOfTwoAggregatedDL-PRS-Bandwidth-FR1***: Indicates the maximum aggregated DL-PRS bandwidth in MHz for FR1, which is supported and reported by UE.  - ***maximumOfTwoAggregatedDL-PRS-Bandwidth-FR2***: Indicates the maximum aggregated DL-PRS bandwidth in MHz for FR2, which is supported and reported by UE.  - ***maximumOfDL-PRS-BandwidthPerPFL-FR1***: Indicates the maximum DL-PRS bandwidth in MHz for FR1, per PFL.  - ***maximumOfDL-PRS-BandwidthPerPFL-FR2***: Indicates the maximum DL-PRS bandwidth in MHz for FR2, per PFL.  - ***dl-PRS-BufferTypeOfBWA***: Indicates the DL PRS buffering capability.  - ***prs-durationOfTwoPRS-BWA-Processing***: Indicates the duration of DL-PRS symbols N in units of ms a UE can process every T ms assuming maximum aggregated DL PRS bandwidth in MHz, which is supported and reported by UE.  - ***prs-durationOfTwoPRS-BWA-ProcessingSymbolsN***: This field specifies the values for N. Enumerated values indicate 0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50 ms.  - ***prs-durationOfTwoPRS-BWA-ProcessingSymbolsT***: This field specifies the values for T. Enumerated values indicate 8, 16, 20, 30, 40, 80, 160, 320, 640, 1280, 2560 ms.  - ***maxNumOfAggregatedDL-PRS-ResourcePerSlot-FR1***: Indicates the Maximum number of aggregated DL-PRS Resources across aggregated PFLs that UE can process in a slot for FR1.  - ***maxNumOfAggregatedDL-PRS-ResourcePerSlot-FR2***: Indicates the Maximum number of aggregated DL-PRS Resources across aggregated PFLs that UE can process in a slot for FR2.  NOTE 20: *dl-PRS-BufferTypeOfBWA* follows buffering capability type reported in *dl-PRS-BufferType.*  NOTE 21: The value N should be equal or smaller than the value N reported by *durationOfPRS-ProcessingSymbols*, or this value T should be equal or larger than the value T reported by *durationOfPRS-ProcessingSymbolsInEveryTms.*  NOTE 22: Each two linked PRS resources are counted as 1 resource  NOTE 23: *maxNumOfAggregatedDL-PRS-ResourcePerSlot* should be equal or smaller than the value reported by *maxNumOfDL-PRS-ResProcessedPerSlot-RRC-Inactive.* |
| ***prs-BWA-ThreeContiguousIntraband-RRC-IdleAndInactive***  Indicates the UE capability for support of DL-PRS processing capabilities for aggregated DL-PRS processing of 3 PFLs in intra-band contiguous for RRC\_INACTIVE and RRC\_IDLE state. The UE can include this field only if the UE supports *prs-BWA-TwoContiguousIntraband-RRC-IdleAndInactive*. Otherwise, the UE does not include this field. The capability signalling comprises the following parameters:  **- *maximumOfThreeAggregatedDL-PRS-Bandwidth-FR1***: Indicates the maximum aggregated DL-PRS bandwidth in MHz of for FR1, which is supported and reported by UE.  **- *maximumOfThreeAggregatedDL-PRS-Bandwidth-FR2***: Indicates the maximum aggregated DL-PRS bandwidth in MHz for FR2, which is supported and reported by UE.  **- *maximumOfDL-PRS-BandwidthPerPFL-FR1***: Indicates the maximum DL-PRS bandwidth in MHz for FR1, per PFL  **- *maximumOfDL-PRS-BandwidthPerPFL-FR2***: Indicates the maximum DL-PRS bandwidth in MHz for FR2, per PFL  **- *dl-PRS-BufferTypeOfBWA***: Indicates the DL-PRS buffering capability.  **- *prs-durationOfThreePRS-BWA-Processing***: Indicates the duration of DL-PRS symbols N in units of ms a UE can process every T ms assuming maximum aggregated DL PRS bandwidth in MHz, which is supported and reported by UE.  **- *prs-durationOfThreePRS-BWA-ProcessingSymbolsN***: This field specifies the values for N. Enumerated values indicate 0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50 ms.  **- *prs-durationOfThreePRS-BWA-ProcessingSymbolsT***: This field specifies the values for T. Enumerated values indicate 8, 16, 20, 30, 40, 80, 160, 320, 640, 1280, 3840 ms.  **- *maxNumOfAggregatedDL-PRS-ResourcePerSlot-FR1***: Indicates the Maximum number of aggregated DL-PRS Resources across aggregated PFLs that UE can process in a slot for FR1.  **- *maxNumOfAggregatedDL-PRS-ResourcePerSlot-FR2***: Indicates the Maximum number of aggregated DL-PRS Resources across aggregated PFLs that UE can process in a slot for FR2.  NOTE 24: *dl-PRS-BufferTypeOfBWA* follows buffering capability type reported in *dl-PRS-BufferType.*  NOTE 25: The value N should be equal or smaller than the value N reported by *durationOfPRS-ProcessingSymbols*, or this value T should be equal or larger than the value T reported by *durationOfPRS-ProcessingSymbolsInEveryTms.*  NOTE 26: Each two linked PRS resources are counted as 1 resource  NOTE 27: *maxNumOfAggregatedDL-PRS-ResourcePerSlot* should be equal or smaller than the value reported by *maxNumOfDL-PRS-ResProcessedPerSlot-RRC-Inactive.* |
| ***reducedNumOfSampleInMeasurementWithPRS-BWA-RRC-Connected***  Indicates whether the UE supports reduced number of samples in positioning measurements with DL-PRS bandwidth aggregation for RRC\_CONNECTED. The UE can include this field only if the UE indicates the capability of maximum aggregated DL PRS bandwidth for the supported FR1 or FR2 bands by using *maximumOfTwoAggregatedDL-PRS-Bandwidth-FR1* or *maximumOfTwoAggregatedDL-PRS-Bandwidth-FR2* of *prs-BWA-TwoContiguousIntrabandInMG-RRC-Connected****.*** Otherwise, the UE does not include this field. |
| ***reducedNumOfSampleInMeasurementWithPRS-BWA-RRC-IdleAndInactive***  Indicates whether the UE supports reduced number of samples in positioning measurements with DL-PRS bandwidth aggregation for RRC\_IDLE and RRC\_INACTIVE. The UE can include this field only if the UE indicates the capability of maximum aggregated DL PRS bandwidth for the supported FR1 or FR2 bands by using *maximumOfTwoAggregatedDL-PRS-Bandwidth-FR1* or *maximumOfTwoAggregatedDL-PRS-Bandwidth-FR2* of *prs-BWA-TwoContiguousIntrabandInMG-RRC-Connected*. Otherwise, the UE does not include this field. |
| ***dl-PRS-MeasurementWithRxFH-RRC-Inactive***  Indicates the UE capability for support of DL-PRS measurement with Rx frequency hopping in RRC\_INACTIVE for RedCap UEs. The UE can include this field only if the UE supports *dl-PRS-MeasurementWithRxFH-RRC-Connected* and *prs-ProcessingRRC-Inactive* defined in TS 38.331 [35]. Otherwise, the UE does not include this field. |
| ***dl-PRS-MeasurementWithRxFH-RRC-Idle***  Indicates the UE capability for support of DL-PRS measurement with Rx frequency hopping in RRC\_IDLE for RedCap UEs. The UE can include this field only if the UE supports *dl-PRS-MeasurementWithRxFH-RRC-Connected*. Otherwise, the UE does not include this field. |
| ***reducedNumOfSampleForMeasurementWithFH-RRC-Connected***  Indicates whether the UE supports reduced number of samples for DL-PRS based positioning measurements with frequency hopping for RRC\_CONNECTED. The UE can include this field only if the UE supports *supportOfRedCap* or *supportOfERedCap* defined in TS 38.331 [35]*,* *supportedDL-PRS-ProcessingSamples-RRC-CONNECTED* and *dl-PRS-MeasurementWithRxFH-RRC-Connected*. Otherwise, the UE does not include this field. |
| ***reducedNumOfSampleForMeasurementWithFH-RRC-IdleAndInactive***  Indicates whether the UE supports reduced number of samples for DL-PRS based positioning measurements with frequency hopping for RRC\_IDLE and RRC\_INACTIVE. The UE can include this field only if the UE supports *supportOfRedCap* or *supportOfERedCap* defined in TS 38.331 [35], *supportedDL-PRS-ProcessingSamples-RRC-CONNECTED* and *dl-PRS-MeasurementWithRxFH-RRC-Connected*. Otherwise, the UE does not include this field. |
| ***supportOfPRS-BWA-WithTwoPFL-Combination***  Indicates whether the UE supports DL-PRS bandwidth aggregation with two PFL combinations. The UE can include this field only if the UE supports *prs-BWA-TwoContiguousIntrabandInMG-RRC-Connected*. Otherwise, the UE does not include this field. |
| ***dl-PRS-MeasurementWithRxFH-RRC-Connected***  Indicates the UE capability for DL-PRS measurement with Rx frequency hopping within a MG and measurement reporting in RRC\_CONNECTED for RedCap UEs. The UE can include this field only if the UE supports *supportedBandwidthPRS*, *dl-PRS-BufferType*, *durationOfPRS-Processing*, *maxNumOfDL-PRS-ResProcessedPerSlot* and one of *supportOfRedCap* and *supportOfERedCap* defined in TS 38.331 [35]. Otherwise, the UE does not include this field. The capability signalling comprises the following parameters:  - ***maximumPRS-BandwidthAcrossAllHopsFR1:*** Indicates the maximum DL-PRS bandwidth across all hops in MHz for FR1, which is supported and reported by UE.  - ***maximumPRS-BandwidthAcrossAllHopsFR2***: Indicates the maximum DL-PRS bandwidth across all hops in MHz for FR2, which is supported and reported by UE.  - ***maximumFH-Hops***: Indicates the maximum number of hops, which is supported and reported by UE.  - ***processingDuration***: Indicates the duration of DL-PRS symbols N3 in units of ms a UE can process every T3 ms.  - ***processingPRS-SymbolsDurationN3***: This field specifies the values for N3. Enumerated values indicate 0.125, 0.25, 0.5, 1, 2, 4, 6, 8, 12, 16, 20, 25, 30, 32, 35, 40, 45, 50 ms.  - ***processingDurationT3***: This field specifies the values for T3. Enumerated values indicate 8, 16, 20, 30, 40, 80, 160, 320, 640, 1280ms.  - ***rf-RxRetunTimeFR1***: Indicates the RF Rx retune times between consecutive hops for FR1. Enumerated values indicate 70, 140, 210us.  - ***rf-RxRetunTimeFR2***: Indicates the RF Rx retune times between consecutive hops for FR2. Enumerated values indicate 35, 70, 140us.  - ***numOfOverlappingPRB***: Indicates the overlapping PRB(s) between adjacent hops. Enumerated values indicate 0,1,2,4 PRBs.  NOTE 28: The maximum DL-PRS bandwidth per hop follows *supportedBandwidthPRS*.  NOTE 29: DL-PRS buffering capability follows *dl-PRS-BufferType*. |
| NOTE 9: When the target device provides the *durationOfPRS-Processing* capability (*N*, *T*) for any time window defined in TS 38.214 [45] clause 5.1.6.5, the target device should be capable of processing all DL-PRS Resources within , if  - where K is defined in the TS 38.214 [45] clause 5.1.6.5, and  - the number of DL-PRS Resources in each slot does not exceed the *maxNumOfDL-PRS-ResProcessedPerSlot*, and  - the configured measurement gap and a maximum ratio of measurement gap length (MGL) / measurement gap repetition period (MGRP) is as specified in TS 38.133 [46]. |

#### *– NR-UL-SRS-Capability*

The IE *NR-UL-SRS-Capability* defines the UE uplink SRS capability.

-- ASN1START

NR-UL-SRS-Capability-r16 ::= SEQUENCE {

srs-CapabilityBandList-r16 SEQUENCE (SIZE (1..nrMaxBands-r16)) OF

SRS-CapabilityPerBand-r16,

srs-PosResourceConfigCA-BandList-r16 SEQUENCE (SIZE (1..nrMaxConfiguredBands-r16)) OF

SRS-PosResourcesPerBand-r16 OPTIONAL,

maxNumberSRS-PosPathLossEstimateAllServingCells-r16

ENUMERATED {n1, n4, n8, n16} OPTIONAL,

maxNumberSRS-PosSpatialRelationsAllServingCells-r16

ENUMERATED {n0, n1, n2, n4, n8, n16} OPTIONAL,

...

}

SRS-CapabilityPerBand-r16 ::= SEQUENCE {

freqBandIndicatorNR-r16 FreqBandIndicatorNR-r16,

olpc-SRS-Pos-r16 OLPC-SRS-Pos-r16 OPTIONAL,

spatialRelationsSRS-Pos-r16 SpatialRelationsSRS-Pos-r16 OPTIONAL,

...,

[[

posSRS-RRC-Inactive-InInitialUL-BWP-r17 PosSRS-RRC-Inactive-InInitialUL-BWP-r17 OPTIONAL,

posSRS-RRC-Inactive-OutsideInitialUL-BWP-r17

PosSRS-RRC-Inactive-OutsideInitialUL-BWP-r17

OPTIONAL,

olpc-SRS-PosRRC-Inactive-r17 OLPC-SRS-Pos-r16 OPTIONAL,

spatialRelationsSRS-PosRRC-Inactive-r17 SpatialRelationsSRS-Pos-r16 OPTIONAL

]],

[[

posSRS-SP-RRC-Inactive-InInitialUL-BWP-r17 PosSRS-SP-RRC-Inactive-InInitialUL-BWP-r17

OPTIONAL

]],

[[

posSRS-Preconfigured-RRC-InactiveInitialUL-BWP-r18 ENUMERATED {supported} OPTIONAL,

posSRS-Preconfigured-RRC-InactiveOutsideInitialUL-BWP-r18 ENUMERATED {supported} OPTIONAL,

posSRS-ValidityAreaRRC-InactiveInitialUL-BWP-r18 ENUMERATED {supported} OPTIONAL,

posSRS-ValidityAreaRRC-InactiveOutsideInitialUL-BWP-r18 ENUMERATED {supported} OPTIONAL,

posSRS-TxFH-RRC-Connected-r18 PosSRS-TxFrequencyHoppingRRC-Connected-r18 OPTIONAL,

posSRS-TxFH-RRC-Inactive-r18 PosSRS-TxFrequencyHoppingRRC-Inactive-r18 OPTIONAL,

posSRS-TxFH-WithTimeWindow-r18 ENUMERATED {supported} OPTIONAL,

posSRS-BWA-RRC-Inactive-r18 PosSRS-BWA-RRC-Inactive-r18 OPTIONAL

]]

}

OLPC-SRS-Pos-r16 ::= SEQUENCE {

olpc-SRS-PosBasedOnPRS-Serving-r16 ENUMERATED {supported} OPTIONAL,

olpc-SRS-PosBasedOnSSB-Neigh-r16 ENUMERATED {supported} OPTIONAL,

olpc-SRS-PosBasedOnPRS-Neigh-r16 ENUMERATED {supported} OPTIONAL,

maxNumberPathLossEstimatePerServing-r16 ENUMERATED {n1, n4, n8, n16} OPTIONAL,

...

}

SpatialRelationsSRS-Pos-r16 ::= SEQUENCE {

spatialRelation-SRS-PosBasedOnSSB-Serving-r16 ENUMERATED {supported} OPTIONAL,

spatialRelation-SRS-PosBasedOnCSI-RS-Serving-r16 ENUMERATED {supported} OPTIONAL,

spatialRelation-SRS-PosBasedOnPRS-Serving-r16 ENUMERATED {supported} OPTIONAL,

spatialRelation-SRS-PosBasedOnSRS-r16 ENUMERATED {supported} OPTIONAL,

spatialRelation-SRS-PosBasedOnSSB-Neigh-r16 ENUMERATED {supported} OPTIONAL,

spatialRelation-SRS-PosBasedOnPRS-Neigh-r16 ENUMERATED {supported} OPTIONAL,

...

}

SRS-PosResourcesPerBand-r16 ::= SEQUENCE {

freqBandIndicatorNR-r16 FreqBandIndicatorNR-r16,

maxNumberSRS-PosResourceSetsPerBWP-r16 ENUMERATED {n1, n2, n4, n8, n12, n16},

maxNumberSRS-PosResourcesPerBWP-r16 ENUMERATED {n1, n2, n4, n8, n16, n32, n64},

maxNumberPeriodicSRS-PosResourcesPerBWP-r16 ENUMERATED {n1, n2, n4, n8, n16, n32, n64},

maxNumberAP-SRS-PosResourcesPerBWP-r16 ENUMERATED {n1, n2, n4, n8, n16, n32, n64}

OPTIONAL,

maxNumberSP-SRS-PosResourcesPerBWP-r16 ENUMERATED {n1, n2, n4, n8, n16, n32, n64}

OPTIONAL,

...,

[[

posSRS-BWA-RRC-Connected-r18 PosSRS-BWA-RRC-Connected-r18 OPTIONAL,

posSRS-BWA-IndependentCA-RRC-Connected-r18 PosSRS-BWA-IndependentCA-RRC-Connected-r18

OPTIONAL

]]

}

PosSRS-RRC-Inactive-InInitialUL-BWP-r17 ::= SEQUENCE {

maxNumOfSRSposResourceSets-r17 ENUMERATED {n1, n2, n4, n8, n12, n16 } OPTIONAL,

maxNumOfPeriodicAndSemiPersistentSRSposResources-r17

ENUMERATED {n1, n2, n4, n8, n16, n32, n64 }

OPTIONAL,

maxNumOfPeriodicAndSemiPersistentSRSposResourcesPerSlot-r17

ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}

OPTIONAL,

maxNumOfPeriodicSRSposResources-r17

ENUMERATED {n1, n2, n4, n8, n16, n32, n64 }

OPTIONAL,

maxNumOfPeriodicSRSposResourcesPerSlot-r17

ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}

OPTIONAL,

dummy1 ENUMERATED {n1, n2, n4, n8, n16, n32, n64} OPTIONAL,

dummy2 ENUMERATED { n1, n2, n3, n4, n5, n6, n8, n10, n12, n14 }

OPTIONAL,

...

}

PosSRS-RRC-Inactive-OutsideInitialUL-BWP-r17 ::= SEQUENCE {

maxSRSposBandwidthForEachSCS-withinCC-FR1-r17

ENUMERATED { mhz5, mhz10, mhz15, mhz20, mhz25, mhz30,  
 mhz35, mhz40, mhz45, mhz50, mhz60, mhz70,

mhz80, mhz90, mhz100 } OPTIONAL,

maxSRSposBandwidthForEachSCS-withinCC-FR2-r17

ENUMERATED {mhz50, mhz100, mhz200, mhz400} OPTIONAL,

maxNumOfSRSposResourceSets-r17 ENUMERATED { n1, n2, n4, n8, n12, n16 } OPTIONAL,

maxNumOfPeriodicSRSposResources-r17 ENUMERATED { n1, n2, n4, n8, n16, n32, n64 }

OPTIONAL,

maxNumOfPeriodicSRSposResourcesPerSlot-r17

ENUMERATED { n1, n2, n3, n4, n5, n6, n8, n10, n12, n14 }

OPTIONAL,

differentNumerologyBetweenSRSposAndInitialBWP-r17

ENUMERATED { supported } OPTIONAL,

srsPosWithoutRestrictionOnBWP-r17

ENUMERATED { supported } OPTIONAL,

maxNumOfPeriodicAndSemiPersistentSRSposResources-r17

ENUMERATED {n1, n2, n4, n8, n16, n32, n64} OPTIONAL,

maxNumOfPeriodicAndSemiPersistentSRSposResourcesPerSlot-r17

ENUMERATED { n1, n2, n3, n4, n5, n6, n8, n10,

n12, n14 } OPTIONAL,

differentCenterFreqBetweenSRSposAndInitialBWP-r17

ENUMERATED { supported } OPTIONAL,

maxNumOfSemiPersistentSRSposResources-r17

ENUMERATED { n1, n2, n4, n8, n16, n32, n64 }

OPTIONAL,

maxNumOfSemiPersistentSRSposResourcesPerSlot-r17

ENUMERATED { n1, n2, n3, n4, n5, n6, n8, n10,

n12, n14 } OPTIONAL,

switchingTimeSRS-TX-OtherTX-r17 ENUMERATED { us100, us140, us200, us300, us500 }

OPTIONAL,

...

}

PosSRS-SP-RRC-Inactive-InInitialUL-BWP-r17 ::= SEQUENCE {

maxNumOfSemiPersistentSRSposResources-r17

ENUMERATED {n1, n2, n4, n8, n16, n32, n64} OPTIONAL,

maxNumOfSemiPersistentSRSposResourcesPerSlot-r17

ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}

OPTIONAL,

...

}

PosSRS-TxFrequencyHoppingRRC-Connected-r18 ::=SEQUENCE {

maximumSRS-BandwidthAcrossAllHopsFR1-r18 ENUMERATED {mhz40, mhz50, mhz80, mhz100}

OPTIONAL,

maximumSRS-BandwidthAcrossAllHopsFR2-r18 ENUMERATED {mhz100, mhz200, mhz400} OPTIONAL,

maximumTxFH-Hops-r18 ENUMERATED {n2, n3, n4, n5, n6} OPTIONAL,

rf-TxRetunTimeFR1-r18 ENUMERATED {n70, n140, n210} OPTIONAL,

rf-TxRetunTimeFR2-r18 ENUMERATED {n35, n70, n140} OPTIONAL,

switchTimeBetweenActiveBWP-FrequencyHop-r18 ENUMERATED {n100, n140,n200,n300,n500} OPTIONAL,

numOfOverlappingPRB-r18 ENUMERATED {n0, n1, n2, n4} OPTIONAL,

maximumSRS-ResourcePeriodic-r18 ENUMERATED {n1, n2, n4, n8, n16, n32, n64} OPTIONAL,

maximumSRS-ResourceAperiodic-r18 ENUMERATED {n0,n1, n2, n4, n8, n16, n32, n64} OPTIONAL,

maximumSRS-ResourceSemipersistent-r18 ENUMERATED {n0,n1, n2, n4, n8, n16, n32, n64}

OPTIONAL,

...

}

PosSRS-TxFrequencyHoppingRRC-Inactive-r18 ::=SEQUENCE {

maximumSRS-BandwidthAcrossAllHopsFR1-r18 ENUMERATED {mhz40, mhz50, mhz80, mhz100}

OPTIONAL,

maximumSRS-BandwidthAcrossAllHopsFR2-r18 ENUMERATED {mhz100, mhz200, mhz400} OPTIONAL,

maximumTxFH-Hops-r18 ENUMERATED {n2, n3, n4, n5, n6} OPTIONAL,

rf-TxRetunTimeFR1-r18 ENUMERATED {n70, n140, n210} OPTIONAL,

rf-TxRetunTimeFR2-r18 ENUMERATED {n35, n70, n140} OPTIONAL,

switchTimeBetweenActiveBWP-FrequencyHop-r18 ENUMERATED {n100, n140,n200,n300,n500} OPTIONAL,

numOfOverlappingPRB-r18 ENUMERATED {n0, n1, n2, n4} OPTIONAL,

maximumSRS-ResourcePeriodic-r18 ENUMERATED {n1, n2, n4, n8, n16, n32, n64} OPTIONAL,

maximumSRS-ResourceSemipersistent-r18 ENUMERATED {n0,n1, n2, n4, n8, n16, n32, n64}

OPTIONAL,

...

}

PosSRS-BWA-RRC-Connected-r18 ::=SEQUENCE {

numOfCarriersIntraBandContiguous-r18 ENUMERATED {two, three, twoandthree},

maximumAggregatedBW-TwoCarriersFR1-r18 ENUMERATED {mhz20, mhz40, mhz50, mhz80, mhz100, mhz160, mhz180, mhz190, mhz200} OPTIONAL,

maximumAggregatedBW-TwoCarriersFR2-r18 ENUMERATED {mhz50, mhz100, mhz200, mhz400, mhz600, mhz800} OPTIONAL,

maximumAggregatedBW-ThreeCarriersFR1-r18 ENUMERATED {mhz80, mhz100, mhz160, mhz200, mhz240, mhz300} OPTIONAL,

maximumAggregatedBW-ThreeCarriersFR2-r18 ENUMERATED {mhz50, mhz100, mhz200, mhz300, mhz400, mhz600, mhz800, mhz1000, mhz1200} OPTIONAL,

maximumAggregatedResourceSet-r18 ENUMERATED {n1, n2, n4, n8, n12, n16},

maximumAggregatedResourcePeriodic-r18 ENUMERATED {n1, n2, n4, n8, n16, n32, n64},

maximumAggregatedResourceAperiodic-r18 ENUMERATED {n0, n1, n2, n4, n8, n16, n32, n64},

maximumAggregatedResourceSemi-r18 ENUMERATED {n0, n1, n2, n4, n8, n16, n32, n64},

maximumAggregatedResourcePeriodicPerSlot-r18 ENUMERATED {n1, n2, n3, n4, n5, n6,

n8, n10, n12, n14},

maximumAggregatedResourceAperiodicPerSlot-r18 ENUMERATED {n0, n1, n2, n3, n4,

n5, n6, n8, n10, n12, n14}, maximumAggregatedResourceSemiPerSlot-r18 ENUMERATED {n0, n1, n2, n3, n4,

n5, n6, n8, n10, n12, n14},

...

}

PosSRS-BWA-IndependentCA-RRC-Connected-r18 ::=SEQUENCE {

numOfCarriersIntraBandContiguous-r18 ENUMERATED {two, three, twoandthree},

maximumAggregatedBW-TwoCarriersFR1-r18 ENUMERATED {mhz20, mhz40, mhz50, mhz80, mhz100, mhz160, mhz180, mhz190, mhz200} OPTIONAL,

maximumAggregatedBW-TwoCarriersFR2-r18 ENUMERATED {mhz50, mhz100, mhz200, mhz400, mhz600, mhz800} OPTIONAL,

maximumAggregatedBW-ThreeCarriersFR1-r18 ENUMERATED {mhz80, mhz100, mhz160, mhz200, mhz240, mhz300} OPTIONAL,

maximumAggregatedBW-ThreeCarriersFR2-r18 ENUMERATED {mhz50, mhz100, mhz200, mhz300, mhz400, mhz600, mhz800, mhz1000, mhz1200} OPTIONAL,

maximumAggregatedResourceSet-r18 ENUMERATED {n1, n2, n4, n8, n12, n16},

maximumAggregatedResourcePeriodic-r18 ENUMERATED {n1, n2, n4, n8, n16, n32, n64},

maximumAggregatedResourceAperiodic-r18 ENUMERATED {n0, n1, n2, n4, n8, n16, n32, n64},

maximumAggregatedResourceSemi-r18 ENUMERATED {n0, n1, n2, n4, n8, n16, n32, n64},

maximumAggregatedResourcePeriodicPerSlot-r18 ENUMERATED {n1, n2, n3, n4, n5,

n6, n8, n10, n12, n14},

maximumAggregatedResourceAperiodicPerSlot-r18 ENUMERATED {n0, n1, n2, n3, n4,

n5, n6, n8, n10, n12, n14},

maximumAggregatedResourceSemiPerSlot-r18 ENUMERATED {n0, n1, n2, n3, n4,

n5, n6, n8, n10, n12, n14} ,

guardPeriod-r18 ENUMERATED {n0, n30, n100, n140, n200},

powerClassForTwoAggregatedCarriers-r18 ENUMERATED {pc2, pc3} OPTIONAL,

powerClassForThreeAggregatedCarriers-r18 ENUMERATED {pc2, pc3} OPTIONAL,

...

}

PosSRS-BWA-RRC-Inactive-r18 ::=SEQUENCE {

numOfCarriersIntraBandContiguous-r18 ENUMERATED {two, three, twoandthree},

maximumAggregatedBW-TwoCarriersFR1-r18 ENUMERATED {mhz20, mhz40, mhz50, mhz80, mhz100, mhz160, mhz180, mhz190, mhz200} OPTIONAL,

maximumAggregatedBW-TwoCarriersFR2-r18 ENUMERATED {mhz50, mhz100, mhz200, mhz400, mhz600, mhz800} OPTIONAL,

maximumAggregatedBW-ThreeCarriersFR1-r18 ENUMERATED {mhz80, mhz100, mhz160, mhz200, mhz240, mhz300} OPTIONAL,

maximumAggregatedBW-ThreeCarriersFR2-r18 ENUMERATED {mhz50, mhz100, mhz200, mhz300, mhz400, mhz600, mhz800, mhz1000, mhz1200} OPTIONAL,

maximumAggregatedResourceSet-r18 ENUMERATED {n1, n2, n4, n8, n12, n16},

maximumAggregatedResourcePeriodic-r18 ENUMERATED {n1, n2, n4, n8, n16, n32, n64},

maximumAggregatedResourceSemi-r18 ENUMERATED {n0, n1, n2, n4, n8, n16, n32, n64},

maximumAggregatedResourcePeriodicPerSlot-r18 ENUMERATED {n1, n2, n3, n4,

n5, n6, n8, n10, n12, n14},

maximumAggregatedResourceSemiPerSlot-r18 ENUMERATED {n0, n1, n2, n3, n4,

n5, n6, n8, n10, n12, n14},

guardPeriod-r18 ENUMERATED {n0, n30, n100, n140, n200},

powerClassForTwoAggregatedCarriers-r18 ENUMERATED {pc2, pc3} OPTIONAL,

powerClassForThreeAggregatedCarriers-r18 ENUMERATED {pc2, pc3} OPTIONAL,

...

}

-- ASN1STOP

|  |
| --- |
| *NR-UL-SRS-Capability* field descriptions |
| ***srs-PosResourceConfigCA-BandList***  This field indicates the number of SRS for positioning resources supported by the target device. The target device includes this field for each band which belongs to the *srs-CapabilityBandList* for the current configured CA band combination. The capability signalling comprises the following parameters:  - ***freqBandIndicatorNR***indicates the current configured NR band of the target device.  - ***maxNumberSRS-PosResourceSetsPerBWP***indicates the maximum number of SRS Resource Sets for positioning supported by the target device per BWP. Enumerated values *n1*, *n2*, *n4*, *n8*, *n12*, *n16* correspond to 1, 2, 4, 8, 12, 16 SRS Resource Sets for positioning, respectively.  - ***maxNumberSRS-PosResourcesPerBWP***indicates the maximum number of periodic, semi-persistent, and aperiodic SRS Resources for positioning supported by the target device per BWP. Enumerated values *n1, n2, n4, n8, n16, n32, n64* correspond to 1, 2, 4, 8, 16, 32, 64 SRS Resources for positioning, respectively.  - ***maxNumberPeriodicSRS-PosResourcesPerBWP***indicates the maximum number of periodic SRS Resources for positioning supported by the target device per BWP. Enumerated values *n1, n2, n4, n8, n16, n32, n64* correspond to 1, 2, 4, 8, 16, 32, 64 periodic SRS Resources for positioning, respectively.  - ***maxNumberAP-SRS-PosResourcesPerBWP***indicates the maximum number of aperiodic SRS Resources for positioning supported by the target device per BWP. Enumerated values *n1, n2, n4, n8, n16, n32, n64* correspond to 1, 2, 4, 8, 16, 32, 64 aperiodic SRS Resources for positioning, respectively.  - ***maxNumberSP-SRS-PosResourcesPerBWP***indicates the maximum number of semi-persistent SRS Resources for positioning supported by the target device per BWP. Enumerated values *n1, n2, n4, n8, n16, n32, n64* correspond to 1, 2, 4, 8, 16, 32, 64 semi-persistent SRS Resources for positioning, respectively. |
| ***maxNumberSRS-PosPathLossEstimateAllServingCells***  Indicates the maximum number of pathloss estimates that the UE can simultaneously maintain for all the SRS resource sets for positioning across all cells in addition to the up to four pathloss estimates that the UE maintains per serving cell for the PUSCH/PUCCH/SRS transmissions. The UE shall include this field if the UE supports any of *olpc-SRS-PosBasedOnPRS-Serving, olpc-SRS-PosBasedOnSSB-Neigh* and *olpc-SRS-PosBasedOnPRS-Neigh.* Otherwise, the UE does not include this field. |
| ***maxNumberSRS-PosSpatialRelationsAllServingCells***  indicates the maximum number of maintained spatial relations for all the SRS resource sets for positioning across all serving cells in addition to the spatial relations maintained spatial relations per serving cell for the PUSCH/PUCCH/SRS transmissions. It is only applied for FR2. The UE can include this field only if the UE supports any of *spatialRelation-SRS-PosBasedOnSSB-Serving*, *spatialRelation-SRS-PosBasedOnCSI-RS-Serving*, *spatialRelation-SRS-PosBasedOnPRS-Serving*, *spatialRelation-SRS-PosBasedOnSSB-Neigh* or *spatialRelation-SRS-PosBasedOnPRS-Neigh*. Otherwise, the UE does not include this field. |
| ***olpc-SRS-Pos***  Indicates whether the UE supports open-loop power control for SRS for positioning. The capability signalling comprises the following parameters:  - ***olpc-SRS-PosBasedOnPRS-Serving***indicates whether the UE supports OLPC for SRS for positioning based on DL-PRS from the serving cell in the same band. The UE can include this field only if the UE supports NR-DL-*PRS-ProcessingCapability* and *srs-PosResources* TS38.331 [35] Otherwise, the UE does not include this field.  - ***olpc-SRS-PosBasedOnSSB-Neigh***indicates whether the UE supports OLPC for SRS for positioning based on SSB from the neighbouring cell in the same band. The UE can include this field only if the UE supports *srs-PosResources* TS 38.331 [35]. Otherwise, the UE does not include this field.  - ***olpc-SRS-PosBasedOnPRS-Neigh***indicates whether the UE supports OLPC for SRS for positioning based on DL-PRS from the neighbouring cell in the same band. The UE can include this field only if the UE supports *olpc-SRS-PosBasedOnPRS-Serving*. Otherwise, the UE does not include this field.  Note: A DL-PRS from a PRS-only TP is treated as DL-PRS from a non-serving cell.  - ***maxNumberPathLossEstimatePerServing***indicates the maximum number of pathloss estimates that the UE can simultaneously maintain for all the SRS resource sets for positioning per serving cell in addition to the up to four pathloss estimates that the UE maintains per serving cell for the PUSCH/PUCCH/SRS transmissions. The UE shall include this field if the UE supports any of *olpc-SRS-PosBasedOnPRS-Serving, olpc-SRS-PosBasedOnSSB-Neigh* and *olpc-SRS-PosBasedOnPRS-Neigh.* Otherwise, the UE does not include this field. |
| ***spatialRelationsSRS-Pos***  Indicates whether the UE supports spatial relations for SRS for positioning. It is only applicable for FR2. The capability signalling comprises the following parameters:  - ***spatialRelation-SRS-PosBasedOnSSB-Serving*** indicates whether the UE supports spatial relation for SRS for positioning based on SSB from the serving cell in the same band. The UE can include this field only if the UE supports *srs-PosResources* TS 38.331 [35]. Otherwise, the UE does not include this field.  - ***spatialRelation-SRS-PosBasedOnCSI-RS-Serving*** indicates whether the UE supports spatial relation for SRS for positioning based on CSI-RS from the serving cell in the same band. The UE can include this field only if the UE supports *spatialRelation-SRS-PosBasedOnSSB-Serving*. Otherwise, the UE does not include this field.  - ***spatialRelation-SRS-PosBasedOnPRS-Serving***indicates whether the UE supports spatial relation for SRS for positioning based on DL-PRS from the serving cell in the same band. The UE can include this field only if the UE supports any of DL-PRS Resources for DL-AoD, DL-PRS Resources for DL-TDOA or DL-PRS Resources for Multi-RTT, or *srs-PosResources* TS 38.331 [35]. Otherwise, the UE does not include this field.  - ***spatialRelation-SRS-PosBasedOnSRS***indicates whether the UE supports spatial relation for SRS for positioning based on SRS in the same band. The UE can include this field only if the UE supports *srs-PosResources* TS 38.331 [35]. Otherwise, the UE does not include this field.  - ***spatialRelation-SRS-PosBasedOnSSB-Neig****h* indicates whether the UE supports spatial relation for SRS for positioning based on SSB from the neighbouring cell in the same band. The UE can include this field only if the UE supports *spatialRelation-SRS-PosBasedOnSSB-Serving*. Otherwise, the UE does not include this field.  - ***spatialRelation-SRS-PosBasedOnPRS-Neigh***indicates whether the UE supports spatial relation for SRS for positioning based on DL-PRS from the neighbouring cell in the same band. The UE can include this field only if the UE supports *spatialRelation-SRS-PosBasedOnPRS-Serving*. Otherwise, the UE does not include this field.  Note: A DL-PRS from a PRS-only TP is treated as DL-PRS from a non-serving cell. |
| ***posSRS-RRC-Inactive-InInitialUL-BWP***  Indicates whether the UE supports positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP. The capability signalling comprises the following parameters:  - ***maxNumOfSRSposResourceSets*** indicates the maximum number of SRS Resource Sets for positioning supported by the UE.  - ***maxNumOfPeriodicAndSemiPersistentSRSposResources*** indicates the maximum number of periodic and semi-persistent SRS Resources for positioning supported by the UE.  - ***maxNumOfPeriodicAndSemiPersistentSRSposResourcesPerSlot***indicates the maximum number of periodic and semi-persistent SRS Resources for positioning per slot supported by the UE.  - ***maxNumOfPeriodicSRSposResources***indicates the maximum number of periodic SRS Resources for positioning supported by the UE.  - ***maxNumOfPeriodicSRSposResourcesPerSlot***indicates the maximum number of periodic SRS Resources for positioning per slot supported by the UE.  - ***dummy1, dummy2***are not used in the specification. If received they shall be ignored by the receiver. |
| ***posSRS-RRC-Inactive-OutsideInitialUL-BWP***  Indicates whether the UE supports positioning SRS transmission in RRC\_INACTIVE state outside initial UL BWP. The UE can include this field only if the UE supports *posSRS-RRC-Inactive-InInitialUL-BWP*. Otherwise, the UE does not include this field. The capability signalling comprises the following parameters:  - ***maxSRSposBandwidthForEachSCS-withinCC-FR1*** indicates the maximum SRS bandwidth in MHz supported for each SCS that UE supports within a single CC for FR1.  - ***maxSRSposBandwidthForEachSCS-withinCC-FR2*** indicates the maximum SRS bandwidth in MHz supported for each SCS that UE supports within a single CC for FR2.  - ***maxNumOfSRSposResourceSets*** indicates the maximum number of SRS Resource Sets for positioning supported by the UE.  - ***maxNumOfPeriodicSRSposResources***indicates the maximum number of periodic SRS Resources for positioning supported by the UE.  - ***maxNumOfPeriodicSRSposResourcesPerSlot***indicates the maximum number of periodic SRS Resources for positioning per slot supported by the UE.  - ***differentNumerologyBetweenSRSposAndInitialBWP***indicates whether different numerology between the SRS and the initial UL BWP is supported by the UE. If the field is absent, the UE only supports same numerology between the SRS and the initial UL BWP.  - ***srsPosWithoutRestrictionOnBWP*** indicates whether SRS operation without restriction on the BW is supported by the UE; BW of the SRS may not include BW of the CORESET#0 and SSB. If the field is absent, the UE supports only SRS BW that includes the BW of the CORESET #0 and SSB.  - ***maxNumOfPeriodicAndSemiPersistentSRSposResources*** indicates the maximum number of periodic and semi-persistent SRS Resources for positioning supported by the UE.  - ***maxNumOfPeriodicAndSemiPersistentSRSposResourcesPerSlot*** indicates the maximum number of periodic and semi-persistent SRS Resources for positioning per slot supported by the UE.  - ***differentCenterFreqBetweenSRSposAndInitialBWP*** indicates whether different center frequency between the SRS for positioning and the initial UL BWP is supported by the UE. If the field is absent, the UE only supports same center frequency between the SRS for positioning and initial UL BWP.  - ***maxNumOfSemiPersistentSRSposResources***indicates the maximum number of semi-persistent SRS Resources for positioning supported by the UE. The UE can include this field only if the UE supports *posSRS-RRC-Inactive-InInitialUL-BWP*. Otherwise, the UE does not include this field.  - ***maxNumOfSemiPersistentSRSposResourcesPerSlot***indicates the maximum number of semi-persistent SRS Resources for positioning per slot supported by the UE. The UE can include this field only if the UE supports *posSRS-RRC-Inactive-InInitialUL-BWP*. Otherwise, the UE does not include this field.  - ***switchingTimeSRS-TX-OtherTX*** indicates the switching time between SRS Tx and other Tx in initial UL BWP or Rx in initial DL BWP. |
| ***olpc-SRS-PosRRC-Inactive***  Indicates whether the UE supports open-loop power control for SRS for positioning in RRC\_INACTIVE state. The UE can include this field only if the UE supports *posSRS-RRC-Inactive-InInitialUL-BWP*. Otherwise, the UE does not include this field. |
| ***spatialRelationsSRS-PosRRC-Inactive***  Indicates whether the UE supports spatial relations for SRS for positioning in RRC\_INACTIVE state on FR2. The UE can include this field only if the UE supports *posSRS-RRC-Inactive-InInitialUL-BWP*. Otherwise, the UE does not include this field. |
| ***posSRS-SP-RRC-Inactive-InInitialUL-BWP***  Indicates whether the UE supports positioning SRS transmission in RRC\_INACTIVE state for initial UL BWP with semi-persistent SRS. The UE can include this field only if the UE supports *posSRS-RRC-Inactive-InInitialUL-BWP*. Otherwise, the UE does not include this field. The capability signalling comprises the following parameters:  - ***maxNumOfSemiPersistentSRSposResources*** indicates the maximum number of semi-persistent SRS Resources for positioning supported by the UE.  - ***maxNumOfSemiPersistentSRSposResourcesPerSlot*** indicates the maximum number of semi-persistent SRS Resources for positioning per slot supported by the UE. |
| ***posSRS-Preconfigured-RRC-InactiveInitialUL-BWP***  Indicates whether the UE supports pre-configured SRS with validity area in RRC\_INACTIVE for initial UL BWP. The UE can include this field only if the UE supports *posSRS-ValidityAreaRRC-InactiveInitialUL-BWP*. Otherwise, the UE does not include this field. |
| ***posSRS-Preconfigured-RRC-InactiveOutsideInitialUL-BWP***  Indicates whether the UE supports pre-configured SRS with validity area in RRC\_INACTIVE outside initial UL BWP. The UE can include this field only if the UE supports *posSRS-ValidityAreaRRC-InactiveOutsideInitialUL-BWP*. Otherwise, the UE does not include this field. |
| ***posSRS-ValidityAreaRRC-InactiveInitialUL-BWP***  Indicates whether the UE supports SRS for positioning configuration in multi cells in RRC\_INACTIVE for initial UL BWP. The UE can include this field only if the UE support *posSRS-RRC-Inactive-InInitialUL-BWP*. Otherwise, the UE does not include this field. |
| ***posSRS-ValidityAreaRRC-InactiveOutsideInitialUL-BWP***  Indicates whether the UE supports SRS for positioning configuration in multi cells in RRC\_INACTIVE outside initial UL BWP. The UE can include this field only if the UE supports *posSRS-RRC-Inactive-OutsideInitialUL-BWP* and *posSRS-ValidityAreaRRC-InactiveInitialUL-BWP****.*** Otherwise, the UE does not include this field. |
| ***posSRS-TxFH-RRC-Connected***  Indicates the UE capability for support of positioning SRS with Tx frequency hopping in RRC\_CONNECTED for RedCap UEs. The UE can include this field only if the UE supports *SRS-AllPosResources* and one of *supportOfRedCap* and *supportOfERedCap* defined in TS 38.331 [35]. Otherwise, the UE does not include this field. The capability signalling comprises the following parameters:  - ***maximumSRS-BandwidthAcrossAllHopsFR1***: Indicates the maximum positioning SRS bandwidth across all hops in MHz for FR1, which is supported and reported by UE.  - ***maximumSRS-BandwidthAcrossAllHopsFR2***: Indicates the maximum positioning SRS bandwidth across all hops in MHz for FR2, which is supported and reported by UE.  - ***maximumTxFH-Hops***: Indicates the maximum number of transmission hops, which is supported and reported by UE.  - ***rf-TxRetunTimeFR1***: Indicates the RF Tx retune times between consecutive hops for FR1. Enumerated values indicate 70, 140, 210us.  - ***rf-TxRetunTimeFR2***: Indicates the RF Tx retune times between consecutive hops for FR2. Enumerated values indicate 35, 70, 140us.  - ***switchTimeBetweenActiveBWP-FrequencyHop***: Indicates the switching time between active BWP and frequency hop. Enumerated values indicate 100, 140, 200, 300, 500µs.  - ***numOverlappingPRB***: Indicates the overlapping PRB(s) between adjacent hops. Enumerated values indicate 0,1,2,4 PRBs.  - ***maximumSRS-ResourcePeriodic***: Indicates the maximum number of periodic positioning SRS resources with Tx frequency hopping.  - ***maximumSRS-ResourceAperiodic***: Indicates the maximum number of aperiodic positioning SRS resources with Tx frequency hopping.  - ***maximumSRS-ResourceSemipersistent***: Indicates the maximum number of Semi-persistent positioning SRS resources with Tx frequency hopping.  NOTE 1: No additional UE requirements shall be specified for the case of Tx hopping with non-overlapping hops compared to the case of Tx hopping with overlapping hops, e.g., a UE is not responsible for keeping phase continuity across the hops in either case of overlapping or non-overlapping hops. |
| ***posSRS-TxFH-RRC-Inactive***  Indicates the UE capability for support of positioning SRS with Tx frequency hopping in RRC\_INACTIVE for RedCap UEs. The UE can include this field only if the UE supports *posSRS-RRC-Inactive-OutsideInitialUL-BWP* and one of *supportOfRedCap* and *supportOfERedCap* defined in TS 38.331 [35]. Otherwise, the UE does not include this field. The capability signalling comprises the following parameters:  - ***maximumSRS-BandwidthAcrossAllHopsFR1***: Indicates the maximum positioning SRS bandwidth across all hops in MHz for FR1, which is supported and reported by UE.  - ***maximumSRS-BandwidthAcrossAllHopsFR2***: Indicates the maximum positioning SRS bandwidth across all hops in MHz for FR2, which is supported and reported by UE.  - ***maximumTxFH-Hops***: Indicates the maximum number of transmission hops, which is supported and reported by UE.  - ***rf-TxRetunTimeFR1***: Indicates the RF Tx retune times between consecutive hops for FR1. Enumerated values indicate 70, 140, 210µs.  - ***rf-TxRetunTimeFR2***: Indicates the RF Tx retune times between consecutive hops for FR2. Enumerated values indicate 35, 70, 140µs.  - ***switchTimeBetweenActiveBWP-FrequencyHop***: Indicates the switching time between active BWP and frequency hop. Enumerated values indicate 100, 140, 200, 300, 500µs.  - ***numOfOverlappingPRB***: Indicates the overlapping PRB(s) between adjacent hops. Enumerated values indicate 0,1,2,4 PRBs.  - ***maximumSRS-ResourcePeriodic*** indicates the maximum number of periodic positioning SRS resources with Tx frequency hopping.  - ***maximumSRS-ResourceSemipersistent*** indicates the maximum number of Semi-persistent positioning SRS resources with Tx frequency hopping.  NOTE 2: No additional UE requirements shall be specified for the case of Tx hopping with non-overlapping hops compared to the case of Tx hopping with overlapping hops, e.g., a UE is not responsible for keeping phase continuity across the hops in either case of overlapping or non-overlapping hops. |
| ***posSRS-TxFH-WithTimeWindow***  Indicates the UE capability for support of UL time window and transmission of SRS for positioning with Tx Frequency hopping within the window. The UE can include this field only if the UE supports *posSRS-TxFH-RRC-Connected*. Otherwise, the UE does not include this field. |
| ***posSRS-BWA-RRC-Connected***  Indicates the UE capability for support of positioning SRS bandwidth aggregation in RRC\_CONNECTED and comprises the support of the same SRS power reduction across aggregated carriers. The UE can include this field only if the UE supports *SRS-AllPosResources and supportedBandCombinationList* defined in TS 38.331 [35]. Otherwise, the UE does not include this field. The capability signalling comprises the following parameters:  - ***numOfCarriersIntraBandContiguous***: Indicates the number of supported aggregated carriers in intra band contiguous carriers, which is supported and reported by UE.  - ***maximumAggregatedBW-TwoCarriersFR1***: Indicates the maximum aggregated SRS bandwidth in MHz for two aggregated carriers for FR1, which is supported and reported by UE.  - ***maximumAggregatedBW-TwoCarriersFR2***: Indicates the maximum aggregated SRS bandwidth in MHz for two aggregated carriers for FR2, which is supported and reported by UE.  - ***maximumAggregatedBW-ThreeCarriersFR1***: Indicates the maximum aggregated SRS bandwidth in MHz for three aggregated carriers for FR1, which is supported and reported by UE.  - ***maximumAggregatedBW-ThreeCarriersFR2***: Indicates the maximum aggregated SRS bandwidth in MHz for three aggregated carriers for FR2, which is supported and reported by UE.  - ***maximumAggregatedResourceSet***: Indicates the max number of aggregated SRS resource sets for positioning supported by UE for SRS bandwidth aggregation, which is supported and reported by UE.  - ***maximumAggregatedResourcePeriodic***: Indicates the maximum number of aggregated periodic SRS resources for bandwidth aggregation, which is supported and reported by UE.  - ***maximumAggregatedResourceAperiodic***: Indicates the maximum number of aggregated aperiodic SRS resources for bandwidth aggregation, which is supported and reported by UE.  - ***maximumAggregatedResourceSemi***: Indicates the maximum number of aggregated semi-persistent SRS resources for bandwidth aggregation, which is supported and reported by UE.  - ***maximumAggregatedResourcePeriodicPerSlot***: Indicates the maximum number of aggregated periodic SRS resources for bandwidth aggregation per slot, which is supported and reported by UE.  - ***maximumAggregatedResourceAperiodicPerSlot***: Indicates the maximum number of aggregated aperiodic SRS resources for bandwidth aggregation per slot, which is supported and reported by UE.  - ***maximumAggregatedResourceSemiPerSlot***: Indicates the maximum number of aggregated semi-persistent SRS resources for bandwidth aggregation per slot, which is supported and reported by UE.  NOTE 3: The UE supports the simultaneous transmission in a coherent manner of 2 or 3 SRS resources in 2 or 3 intra-band contiguous CCs.  NOTE 4: Each two or three linked SRS resources are counted as 1 resource  NOTE 5: A UE that support *SRS-PosResourceAP* defined in TS 38.331 [35] must signal a non-zero value for *maximumAggregatedResourceAperiodic* and *maximumAggregatedResourceAperiodicPerSlot*;  NOTE 6: UE only reports the number on bands for the current configured CA band combination.  NOTE 7: For *numOfCarriersIntraBandContiguous*, it shall be less than or equal to the maximum number of the component carrier associated with *ca-BandwidthClassUL-NR* in TS 38.331 [35].  NOTE 8: For maximum aggregated UL SRS bandwidth, it shall be less than or equal to the maximum aggregated transmission bandwidth associated with *ca-BandwidthClassUL-NR* in TS 38.331 [35]. Additionally, it shall be less than or equal to the maximum aggregated bandwidth for the supported CA configuration in Table 5.5A.1-1 in TS 38.101-1 [37] for FR1 bands or Table 5.5A.1-1 in TS 38.101-2 [34] for FR2 bands for the band where aggregated SRS CCs is configured. |
| ***posSRS-BWA-IndependentCA-RRC-Connected***  Indicates the UE capability for support of positioning SRS bandwidth aggregation independent from UL communication CA in RRC\_CONNECTED and comprises the support of the same SRS power reduction across aggregated carriers. The UE can include this field only if the UE supports *SRS-AllPosResources* defined in TS 38.331 [35]. Otherwise, the UE does not include this field. The capability signalling comprises the following parameters:  - ***numOfCarriersIntraBandContiguous***: Indicates the number of supported aggregated carriers in intra band contiguous carriers, which is supported and reported by UE.  - ***maximumAggregatedBW-TwoCarriersFR1***: Indicates the maximum aggregated SRS bandwidth in MHz for two aggregated carriers for FR1, which is supported and reported by UE.  - ***maximumAggregatedBW-TwoCarriersFR2***: Indicates the maximum aggregated SRS bandwidth in MHz for two aggregated carriers for FR2, which is supported and reported by UE.  - ***maximumAggregatedBW-ThreeCarriersFR1***: Indicates the maximum aggregated SRS bandwidth in MHz for three aggregated carriers for FR1, which is supported and reported by UE.  - ***maximumAggregatedBW-ThreeCarriersFR2***: Indicates the maximum aggregated SRS bandwidth in MHz for three aggregated carriers for FR2, which is supported and reported by UE.  - ***maximumAggregatedResourceSet***: Indicates the max number of aggregated SRS resource sets for positioning supported by UE for SRS bandwidth aggregation, which is supported and reported by UE.  - ***maximumAggregatedResourcePeriodic***: Indicates the maximum number of aggregated periodic SRS resources for bandwidth aggregation, which is supported and reported by UE.  - ***maximumAggregatedResourceAperiodic***: Indicates the maximum number of aggregated aperiodic SRS resources for bandwidth aggregation, which is supported and reported by UE.  - ***maximumAggregatedResourceSemi***: Indicates the maximum number of aggregated semi-persistent SRS resources for bandwidth aggregation, which is supported and reported by UE.  - ***maximumAggregatedResourcePeriodicPerSlot***: Indicates the maximum number of aggregated periodic SRS resources for bandwidth aggregation per slot, which is supported and reported by UE.  - ***maximumAggregatedResourceAperiodicPerSlot***: Indicates the maximum number of aggregated aperiodic SRS resources for bandwidth aggregation per slot, which is supported and reported by UE.  - ***maximumAggregatedResourceSemiPerSlot***: Indicates the maximum number of aggregated semi-persistent SRS resources for bandwidth aggregation per slot, which is supported and reported by UE.  - ***guardPeriod***: Indicates the guard period in microseconds before and after aggregated SRS transmission.  - ***powerClassForTwoAggregatedCarriers***: Indicates the power class of supported two aggregated carriers in intra band contiguous carries.  - ***powerClassForThreeAggregatedCarriers***: Indicates the power class of supported three aggregated carriers in intra band contiguous carries.  NOTE 9: The UE supports the simultaneous transmission in a coherent manner of 2 or 3 SRS resources in 2 or 3 intra-band contiguous CCs.  NOTE 10: Each two or three linked SRS resources are counted as 1 resource  NOTE 11: UE only reports the number on bands for the current configured CA band combination.  NOTE 12: Guard period is needed before and after the aggregated SRS transmissions when SRS resource is configured within a CC without PUSCH/PUCCH is linked for aggregation with an SRS resource configured within an UL active BWP of a UL communication CC.  NOTE 13: For a given band, independent of the band combination, the UE must signal the same guard period.  NOTE 14: The power class is only applicable for FR1 bands. |
| ***posSRS-BWA-RRC-Inactive***  Indicates the UE capability for support of positioning SRS bandwidth aggregation in RRC\_INACTIVE and comprises the support of the same SRS power reduction across aggregated carriers. The UE can include this field only if the UE supports *posSRS-RRC-Inactive-OutsideInitialUL-BWP*. Otherwise, the UE does not include this field. The capability signalling comprises the following parameters:  - ***numOfCarriersIntraBandContiguous***: Indicates the number of supported aggregated carriers in intra band contiguous carriers, which is supported and reported by UE.  - ***maximumAggregatedBW-TwoCarriersFR1***: Indicates the maximum aggregated SRS bandwidth in MHz for two aggregated carriers for FR1, which is supported and reported by UE.  - ***maximumAggregatedBW-TwoCarriersFR2***: Indicates the maximum aggregated SRS bandwidth in MHz for two aggregated carriers for FR2, which is supported and reported by UE.  - ***maximumAggregatedBW-ThreeCarriersFR1***: Indicates the maximum aggregated SRS bandwidth in MHz for three aggregated carriers for FR1, which is supported and reported by UE.  - ***maximumAggregatedBW-ThreeCarriersFR2***: Indicates the maximum aggregated SRS bandwidth in MHz for three aggregated carriers for FR2, which is supported and reported by UE.  - ***maximumAggregatedResourceSet***: Indicates the max number of aggregated SRS resource sets for positioning supported by UE for SRS bandwidth aggregation, which is supported and reported by UE.  - ***maximumAggregatedResourcePeriodic***: Indicates the maximum number of aggregated periodic SRS resources for bandwidth aggregation, which is supported and reported by UE.  - ***maximumAggregatedResourceSemi***: Indicates the maximum number of aggregated semi-persistent SRS resources for bandwidth aggregation, which is supported and reported by UE.  - ***maximumAggregatedResourcePeriodicPerSlot***: Indicates the maximum number of aggregated periodic SRS resources for bandwidth aggregation per slot, which is supported and reported by UE.  - ***maximumAggregatedResourceSemiPerSlot***: Indicates the maximum number of aggregated semi-persistent SRS resources for bandwidth aggregation per slot, which is supported and reported by UE.  - ***guardPeriod*:** Indicates the guard period in microseconds before and after aggregated SRS transmission.  - ***powerClassForTwoAggregatedCarriers***: Indicates the power class of supported two aggregated carriers in intra band contiguous carries.  - ***powerClassForThreeAggregatedCarriers***: Indicates the power class of supported three aggregated carriers in intra band contiguous carries.  NOTE 15: The power class is only applicable for FR1 bands. |

#### 6.5.10.6 NR DL-TDOA Capability Information

#### – *NR-DL-TDOA-ProvideCapabilities*

The IE *NR-DL-TDOA-ProvideCapabilities* is used by the target device to indicate its capability to support NR DL-TDOA and to provide its NR DL-TDOA positioning capabilities to the location server.

-- ASN1START

NR-DL-TDOA-ProvideCapabilities-r16 ::= SEQUENCE {

nr-DL-TDOA-Mode-r16 PositioningModes,

nr-DL-TDOA-PRS-Capability-r16 NR-DL-PRS-ResourcesCapability-r16,

nr-DL-TDOA-MeasurementCapability-r16 NR-DL-TDOA-MeasurementCapability-r16,

nr-DL-PRS-QCL-ProcessingCapability-r16 NR-DL-PRS-QCL-ProcessingCapability-r16,

nr-DL-PRS-ProcessingCapability-r16 NR-DL-PRS-ProcessingCapability-r16,

additionalPathsReport-r16 ENUMERATED { supported } OPTIONAL,

periodicalReporting-r16 PositioningModes OPTIONAL,

...,

[[

ten-ms-unit-ResponseTime-r17 PositioningModes OPTIONAL,

nr-PosCalcAssistanceSupport-r17 BIT STRING { trpLocSup (0),

beamInfoSup (1),

rtdInfoSup (2),

trpTEG-InfoSup (3),

nr-IntegritySup-r18 (4),

pruInfoSup-r18 (5)

} (SIZE (1..8)) OPTIONAL,

nr-los-nlos-AssistanceDataSupport-r17 SEQUENCE {

type-r17 LOS-NLOS-IndicatorType2-r17,

granularity-r17 LOS-NLOS-IndicatorGranularity2-r17,

...

} OPTIONAL,

nr-DL-PRS-ExpectedAoD-or-AoA-Sup-r17 BIT STRING { eAoD (0),

eAoA (1)

} (SIZE (1..8)) OPTIONAL,

nr-DL-TDOA-On-Demand-DL-PRS-Support-r17 NR-On-Demand-DL-PRS-Support-r17 OPTIONAL,

nr-los-nlos-IndicatorSupport-r17 SEQUENCE {

type-r17 LOS-NLOS-IndicatorType2-r17,

granularity-r17 LOS-NLOS-IndicatorGranularity2-r17,

...

} OPTIONAL,

additionalPathsExtSupport-r17 ENUMERATED { n4, n6, n8 } OPTIONAL,

scheduledLocationRequestSupported-r17 ScheduledLocationTimeSupportPerMode-r17 OPTIONAL,

nr-dl-prs-AssistanceDataValidity-r17 SEQUENCE {

area-validity-r17 INTEGER (1..maxNrOfAreas-r17) OPTIONAL, ...

} OPTIONAL,

multiMeasInSameMeasReport-r17 ENUMERATED { supported } OPTIONAL,

mg-ActivationRequest-r17 ENUMERATED { supported } OPTIONAL

]],

[[

posMeasGapSupport-r17 ENUMERATED { supported } OPTIONAL

]],

[[

multiLocationEstimateInSameMeasReport-r17 ENUMERATED { supported } OPTIONAL

]],

[[

locationCoordinateTypes-r18 LocationCoordinateTypes OPTIONAL,

periodicAssistanceData-r18 BIT STRING { solicited (0),

unsolicited (1)} (SIZE (1..8)) OPTIONAL,

nr-IntegrityAssistanceSupport-r18 BIT STRING {

serviceParametersSup (0),

serviceAlertSup (1),

riskParametersSup (2),

integrityParaTRP-LocSup (3),

integrityParaBeamInfoSup (4),

integrityParaRTD-InfoSup (5)

} (SIZE (1..8)) OPTIONAL,

nr-DL-TDOA-OnDemandPRS-ForBWA-Support-r18

ENUMERATED { supported } OPTIONAL

]]

}

-- ASN1STOP

|  |
| --- |
| *NR-DL-TDOA-ProvideCapabilities* field descriptions |
| ***nr-DL-TDOA-Mode***  This field specifies the NR DL-TDOA mode(s) supported by the target device. |
| ***periodicalReporting***  This field, if present, specifies the positioning modes for which the target device supports *periodicalReporting.* This is represented by a bit string, with a one‑value at the bit position means *periodicalReporting* for the positioning mode is supported; a zero‑value means not supported. If this field is absent, the target device does not support *periodicalReporting* in *CommonIEsRequestLocationInformation*. |
| ***ten-ms-unit-ResponseTime***  This field, if present, specifies the positioning modes for which the target device supports the enumerated value '*ten-milli-seconds*' in the IE *ResponseTime* in IE *CommonIEsRequestLocationInformation*. This is represented by a bit string, with a one‑value at the bit position means '*ten-milli-seconds'* response time unit for the positioning mode is supported; a zero‑value means not supported. If this field is absent, the target device does not support '*ten-milli-seconds'* response time unitin *CommonIEsRequestLocationInformation*. |
| ***nr-PosCalcAssistanceSupport***  This field indicates the Position Calculation Assistance Data supported by the target device for UE-based DL-TDOA. This is represented by a bit string, with a one‑value at the bit position means the particular assistance data is supported; a zero‑value means not supported.  - bit 0 indicates whether the field *nr-TRP-LocationInfo* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 1 indicates whether the field *nr-DL-PRS-BeamInfo* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 2 indicates whether the field *nr-RTD-Info* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 3 indicates whether the field *nr-DL-PRS-TRP-TEG-Info* in IE *NR-PositionCalculationAssistance* is supported or not. The UE can indicate this bit only if the UE supports *prs-ProcessingCapabilityBandList* and any of *maxNrOfDL-PRS-ResourceSetPerTrpPerFrequencyLayer*, *maxNrOfTRP-AcrossFreqs*, *maxNrOfPosLayer*, *maxNrOfDL-PRS-ResourcesPerResourceSet* and *maxNrOfDL-PRS-ResourcesPerPositioningFrequencylayer*. Otherwise, the UE does not include this field;  - bit 4 together with bit 0 indicates whether the fields *nr-IntegrityTRP-LocationBounds*, *nr-IntegrityDL-PRS-ResourceSetARP-LocationBounds*, *nr-IntegrityDL-PRS-ResourceARP-LocationBounds* in IE *NR-TRP-LocationInfo* are supported or not; bit 4 together with bit 1 indicates whether the field *nr-IntegrityBeamInfoBounds* in IE *NR-DL-PRS-BeamInfo* is supported or not; bit 4 together with the bit 2 indicates whether the field *nr-IntegrityRTD-InfoBounds* in IE *NR-RTD-Info* is supported or not;  - bit 5 indicates whether the field *nr-PRU-DL-Info* in IE *NR-PositionCalculationAssistance* is supported or not. |
| ***nr-los-nlos-AssistanceDataSupport***  This field, if present, indicates that the target device supports the *NR-DL-PRS-ExpectedLOS-NLOS-Assistance* in IE *NR-PositionCalculationAssistance*:  - *type* indicates whether the target device supports '*hard*' value or '*hard*' and '*soft*' value in *LOS-NLOS-Indicator* in IE *NR-DL-PRS-ExpectedLOS-NLOS-Assistance*.  - *granularity* indicates whether the target device supports *nr-los-nlos-indicator* in IE *NR-DL-PRS-ExpectedLOS-NLOS-Assistance* '*per-trp*', '*per-resource*', or both.  The UE can include this field only if the UE supports one of *maxDL-PRS-RSRP-MeasurementFR1*, *maxDL-PRS-RSRP-MeasurementFR2*, *dl-RSTD-MeasurementPerPairOfTRP-FR1*, *dl-RSTD-MeasurementPerPairOfTRP-FR*2, *maxNrOfRx-TX-MeasFR1*, *maxNrOfRx-TX-MeasFR2*, *supportOfRSRP-MeasFR1* and *supportOfRSRP-MeasFR2*. Otherwise, the UE does not include this field. |
| ***nr-DL-PRS-ExpectedAoD-or-AoA-Sup***  This field, if present, indicates that the target device supports the *NR-DL-PRS-ExpectedAoD-or-AoA* in *NR-DL-PRS-AssistanceData.* |
| ***nr-DL-TDOA-On-Demand-DL-PRS-Support***  This field, if present, indicates that the target device supports on-demand DL-PRS requests. |
| ***nr-los-nlos-IndicatorSupport***  This field, if present, indicates that the target device supports *nr-los-nlos-Indicator* reporting in IE *NR-DL-TDOA-SignalMeasurementInformation*.  - *type* indicates whether the target device supports '*hard*' value or '*hard*' and '*soft*' value in IE *LOS-NLOS-Indicator.*  - *granularity* indicates whether the target device supports *LOS-NLOS-Indicator* reporting per TRP, per DL-PRS Resource, or both.  NOTE: A single value is reported when both Multi-RTT and DL-TDOA are supported. |
| ***additionalPathsExtSupport***  This field, if present, indicates that the target device supports the *nr-AdditionalPathListExt* reporting in IE *NR-DL-TDOA-SignalMeasurementInformation*. The enumerated value indicates the number of additional paths supported by the target device.  NOTE: The *supportOfDL-PRS-FirstPathRSRP* in IE *NR-DL-TDOA-MeasurementCapability* also applies to the additional paths. |
| ***scheduledLocationRequestSupported***  This field, if present, specifies the positioning modes for which the target device supports scheduled location requests – i.e., supports the IE *ScheduledLocationTime* in IE *CommonIEsRequestLocationInformation* – and the time base(s) supported for the scheduled location time for each positioning mode. If this field is absent, the target device does not support scheduled location requests. |
| ***nr-dl-prs-AssistanceDataValidity***  This field, if present, indicates that the target device supports validity conditions for pre-configured assistance data and comprises the following subfields:  - ***area-validity*** indicates that the target device supports pre-configured assistance data with area validity. The integer number indicates the maximum number of areas the target device supports*.* |
| ***multiMeasInSameMeasReport***  This field, if present, indicates that the target device supports multiple measurement instances in a single measurement report. |
| ***mg-ActivationRequest***  This field, if present, indicates that the target device supports UL MAC CE for positioning measurement gap activation/deactivation request for DL-PRS measurements. The UE can include this field only if the UE supports *mg-ActivationRequestPRS-Meas* and *mg-ActivationCommPRS-Meas* defined in TS 38.331 [35]. |
| ***posMeasGapSupport***  This field, if present, indicates that the target device supports pre-configured positioning measurement gap for DL-PRS measurements. The UE can include this field only if the UE supports *mg-ActivationCommPRS-Meas* defined in TS 38.331 [35]. |
| ***multiLocationEstimateInSameMeasReport***  This field, if present, indicates that the target device supports multiple location estimate instances in a single measurement report. |
| ***locationCoordinateTypes***  This field indicates the geographical location coordinate types that a target device supports for UE-based DL-TDOA. TRUE indicates that a location coordinate type is supported and FALSE that it is not. |
| ***periodicAssistanceData***  This field identifies the periodic NR assistance data delivery procedures supported by the target device. This is represented by a bit string, with a one value at the bit position means the periodic NR assistance data delivery procedure is supported; a zero value means not supported. Bit 0 (solicited) represents the procedure according to clause 5.2.1a; bit (1) (unsolicited) represents the procedure according to clause 5.2.2a. |
| ***nr-IntegrityAssistanceSupport***  This field indicates the Integrity Assistance Data supported. This is represented by a bit string, with a one‑value at the bit position means the particular assistance data is supported; a zero‑value means not supported.  - bit 0 indicates whether the field *nr-IntegrityServiceParameters* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 1 indicates whether the field *nr-IntegrityServiceAlert* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 2 indicates whether the field *nr-IntegrityRiskParameters* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 3 indicates whether the field *nr-IntegrityParametersTRP-LocationInfo* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 4 indicates whether the field *nr-IntegrityParametersDL-PRS-BeamInfo* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 5 indicates whether the field *nr-IntegrityParametersRTD-Info* in IE *NR-PositionCalculationAssistance* is supported or not. |
| ***nr-DL-TDOA-OnDemandPRS-ForBWA-Support***  This field, if present, indicates that the target device supports on-demand DL-PRS request for bandwidth aggregation. |

#### 6.5.10.6a NR DL-TDOA Capability Information Elements

#### *– NR-DL-TDOA-MeasurementCapability*

The IE *NR-DL-TDOA-MeasurementCapability* defines the DL-TDOA measurement capability. The UE can include this IE only if the UE supports *NR-DL-PRS-ResourcesCapability* for DL-TDOA. Otherwise, the UE does not include this IE.

-- ASN1START

NR-DL-TDOA-MeasurementCapability-r16 ::= SEQUENCE {

dl-RSTD-MeasurementPerPairOfTRP-FR1-r16 INTEGER (1..4),

dl-RSTD-MeasurementPerPairOfTRP-FR2-r16 INTEGER (1..4),

supportOfDL-PRS-RSRP-MeasFR1-r16 ENUMERATED { supported} OPTIONAL,

supportOfDL-PRS-RSRP-MeasFR2-r16 ENUMERATED { supported} OPTIONAL,

...,

[[

nr-UE-TEG-Capability-r17 NR-UE-TEG-Capability-r17 OPTIONAL,

dl-tdoa-MeasCapabilityBandList-r17 SEQUENCE (SIZE (1..nrMaxBands-r16)) OF

DL-TDOA-MeasCapabilityPerBand-r17 OPTIONAL

]]

}

DL-TDOA-MeasCapabilityPerBand-r17 ::= SEQUENCE {

freqBandIndicatorNR-r17 FreqBandIndicatorNR-r16,

supportOfDL-PRS-FirstPathRSRP-r17 ENUMERATED { supported } OPTIONAL,

dl-PRS-MeasRRC-Inactive-r17 ENUMERATED { supported } OPTIONAL,

...,

[[

supportOfDL-PRS-BWA-RRC-Connected-r18 ENUMERATED { supported } OPTIONAL,

supportOfDL-PRS-BWA-RRC-Inactive-r18 ENUMERATED { supported } OPTIONAL,

supportOfDL-PRS-BWA-RRC-Idle-r18 ENUMERATED { supported } OPTIONAL,

nr-DL-PRS-RSCPD-ReportingRRC-Connected-r18 ENUMERATED { supported } OPTIONAL,

assocSingleRSTD-WithUpToNsampleRSCPD-r18 ENUMERATED { supported } OPTIONAL,

nr-DL-PRS-RSCPD-MeasurementRRC-Idle-r18 ENUMERATED { supported } OPTIONAL,

supportOfRSCPD-MeasurementInTimeWindow-r18 ENUMERATED { supported } OPTIONAL,

supportOfUE-basedCarrierPhasePositioning-r18 ENUMERATED { supported } OPTIONAL,

supportOfSymbolTimeStampForRSCPD-r18 ENUMERATED { supported } OPTIONAL,

supportOfFinerTimingReportGranularityForPRS-Meas-r18 ENUMERATED { minus1, minus2,

minus3, minus4, minus5, minus6}

OPTIONAL,

supportOfMeasurementsInTimeWindowForDL-TDOA-r18 BIT STRING { rstd (0),

rsrp (1),

rsrpp (2)

} (SIZE (1..8)) OPTIOANL,

supportOfPRS-MeasurementRRC-IdleForDL-TDOA-r18 ENUMERATED { supported } OPTIONAL

]]

}

-- ASN1STOP

|  |
| --- |
| *NR-DL-TDOA-MeasurementCapability* field descriptions |
| ***dl-RSTD-MeasurementPerPairOfTRP-FR1***  Indicates number of DL RSTD measurements per pair of TRPs on FR1. |
| ***dl-RSTD-MeasurementPerPairOfTRP-FR2***  Indicates number of DL RSTD measurements per pair of TRPs on FR2. |
| ***supportOfDL-PRS-RSRP-MeasFR1***  Indicates whether the UE supports DL-PRS RSRP measurement for DL-TDOA on FR1. |
| ***supportOfDL-PRS-RSRP-MeasFR2***  Indicates whether the UE supports DL-PRS RSRP measurement for DL-TDOA on FR2. |
| ***nr-UE-TEG-Capability***  Indicates the UE TEG capability. |
| ***supportOfDL-PRS-FirstPathRSRP***  Indicates whether the target device supports DL-PRS RSRPP of first path measurement for DL-TDOA. The UE can include this field only if the UE supports *prs-ProcessingCapabilityBandList*. Otherwise, the UE does not include this field. The UE supporting *additionalPathsReport* and *supportOfDL-PRS-FirstPathRSRP* shall support RSRPP reporting for K=1 or 2 additional paths. |
| ***dl-PRS-MeasRRC-Inactive***  This field, if present, indicates that the target device supports DL-PRS measurement in RRC\_INACTIVE state. The UE can include this field only if the UE supports *maxNrOfDL-PRS-ResourceSetPerTrpPerFrequencyLayer, maxNrOfTRP-AcrossFreqs, maxNrOfPosLayer* and *dl-PRS-BufferType-RRC-Inactive*. Otherwise, the UE does not include this field.  NOTE 1: This capability is applicable to both, UE-assisted and UE-based DL-TDOA.  NOTE 2: The capabilities *NR-DL-PRS-ResourcesCapability, dl-RSTD-MeasurementPerPairOfTRP-FR1, dl-RSTD-MeasurementPerPairOfTRP-FR2, supportOfDL-PRS-RSRP-MeasFR1, supportOfDL-PRS-RSRP-MeasFR2, simul-NR-DL-AoD-DL-TDOA* are the same in RRC\_INACTIVE state. |
| ***supportOfDL-PRS-BWA-RRC-Connected***  Indicates whether the target device supports DL-PRS bandwidth aggregation in RRC\_CONNECTED for DL-TDOA.  The UE can include this field only if the UE supports *maxNrOfDL-PRS-ResourceSetPerTrpPerFrequencyLayer, maxNrOfTRP-AcrossFreqs, maxNrOfPosLayer* and *prs-BWA-TwoContiguousIntrabandInMG-RRC-Connected*. Otherwise, the UE does not include this field. |
| ***supportOfDL-PRS-BWA-RRC-Inactive***  Indicates whether the target device supports DL-PRS bandwidth aggregation in RRC\_INACTIVE for DL-TDOA.  The UE can include this field only if the UE supports *dl-PRS-MeasRRC-Inactive* and *prs-BWA-TwoContiguousIntraband-RRC-IdleAndInactive*. Otherwise, the UE does not include this field. |
| ***supportOfDL-PRS-BWA-RRC-Idle***  Indicates whether the target device supports DL-PRS bandwidth aggregation in RRC\_IDLE for DL-TDOA.  The UE can include this field only if the UE supports *supportOfPRS-MeasurementRRC-Idle* and *prs-BWA-TwoContiguousIntraband-RRC-IdleAndInactive*. Otherwise, the UE does not include this field. |
| ***nr-DL-PRS-RSCPD-ReportingRRC-Connected***  This field, if present, indicates that the target device supports reporting RSCPD in RRC CONNECTED.  The UE can include this field only if the UE supports *dl-RSTD-MeasurementPerPairOfTRP-FR1* and *dl-RSTD-MeasurementPerPairOfTRP-FR2*. Otherwise, the UE does not include this field.  NOTE 3: RSCPD is reported together with RSTD measurement. |
| ***nr-DL-PRS-RSCPD-ReportingRRC-Inactive***  This field, if present, indicates that the target device supports reporting RSCPD in RRC INACTIVE. The UE can include this field only if the UE supports *dl-PRS-MeasRRC-Inactive*. Otherwise, the UE does not include this field.  NOTE 4: RSCPD is reported together with RSTD measurement. |
| ***assocSingleRSTD-WithUpToNsampleRSCPD***  This field, if present, indicates that the target device supports associating a single RSTD measurement with up to N\_sample RSCPD measurement. The UE can include this field only if the UE supports one of *nr-DL-PRS-RSCPD-ReportingRRC-Connected* and *nr-DL-PRS-RSCPD-ReportingRRC-Inactive*. Otherwise, the UE does not include this field. |
| ***nr-DL-PRS-RSCPD-MeasurementRRC-Idle***  This field, if present, indicates that the target device supports DL RSCPD measurement based on DL-PRS measurement in RRC\_IDLE. The UE can include this field only if the UE supports *supportOfPRS-MeasurementRRC-Idle*. Otherwise, the UE does not include this field.  NOTE 5: DL RSCPD is reported along with measurement report for DL-RSTD |
| ***supportOfRSCPD-MeasurementInTimeWindow***  This field, if present, indicates that the target device supports RSCPD measurement on indicated DL-PRS resource sets within the indicated time window(s) for UE based and UE assisted positioning. The UE can include this field only if the UE supports of *supportedBandwidthPRS*, *dl-PRS-BufferType*, *durationOfPRS-Processing*, *maxNumOfDL-PRS-ResProcessedPerSlot*. Otherwise, the UE does not include this field. |
| ***supportOfUE-basedCarrierPhasePositioning***  This field, if present, indicates that the target device supports carrier phase measurement for UE-based positioning and support of assistance data for UE-based carrier phase positioning. |
| ***supportOfSymbolTimeStampForRSCPD***  This field, if present, indicates that the target device supports reporting timestamp with OFDM symbol index associated with RSCPD measurement. The UE can include this field only if the UE supports one of *nr-DL-PRS-RSCPD-ReportingRRC-Connected* and *nr-DL-PRS-RSCPD-ReportingRRC-Inactive*. Otherwise, the UE does not include this field. |
| ***supportOfFinerTimingReportGranularityForPRS-Meas***  This field, if present, indicates that the target device supports of finer timing reporting granularity for DL-PRS measurement. |
| ***supportOfMeasurementsInTimeWindowForDL-TDOA***  This field, if present, indicates that the target device supports performing measurements inside the indicated time window only for DL TDOA. This is represented by a bit string, with a one‑value at the bit position means the particular measurement is supported; a zero‑value means not supported.  - bit 0 indicates whether performing DL RSTD is supported or not;  - bit 1 indicates whether peforming DL PRS-RSRP is supported or not;  - bit 2 indicates whether performing DL PRS-RSRPP is supported or not;  The UE can include this field only if the UE supports *maxNrOfDL-PRS-ResourcesPerResourceSet* and *maxNrOfDL-PRS-ResourcesPerPositioningFrequencylayer*. Otherwise, the UE does not include this field. |
| ***supportOfPRS-MeasurementRRC-IdleForDL-TDOA***  Indicates whether the UE supports DL-PRS measurement in RRC\_IDLE for DL-TDOA. The UE can include this field only if the UE supports *supportedBandwidthPRS, dl-PRS-BufferType, durationOfPRS-Processing, maxNumOfDL-PRS-ResProcessedPerSlot,* *dl-PRS-BufferType-RRC-Inactive, durationOfPRS-Processing-RRC-Inactive, maxNumOfDL-PRS-ResProcessedPerSlot-RRC-Inactive* and *dl-PRS-MeasRRC-Inactive*. Otherwise, the UE does not include this field. |

#### 6.5.11.6 NR DL-AoD Capability Information

#### – *NR-DL-AoD-ProvideCapabilities*

The IE *NR-DL-AoD-ProvideCapabilities* is used by the target device to indicate its capability to support NR DL-AoD and to provide its NR DL-AoD positioning capabilities to the location server.

-- ASN1START

NR-DL-AoD-ProvideCapabilities-r16 ::= SEQUENCE {

nr-DL-AoD-Mode-r16 PositioningModes,

nr-DL-AoD-PRS-Capability-r16 NR-DL-PRS-ResourcesCapability-r16,

nr-DL-AoD-MeasurementCapability-r16 NR-DL-AoD-MeasurementCapability-r16,

nr-DL-PRS-QCL-ProcessingCapability-r16 NR-DL-PRS-QCL-ProcessingCapability-r16,

nr-DL-PRS-ProcessingCapability-r16 NR-DL-PRS-ProcessingCapability-r16,

periodicalReporting-r16 PositioningModes OPTIONAL,

...,

[[

ten-ms-unit-ResponseTime-r17 PositioningModes OPTIONAL,

nr-PosCalcAssistanceSupport-r17 BIT STRING { trpLocSup (0),

beamInfoSup (1),

rtdInfoSup (2),

beamAntInfoSup (3),

nr-IntegrityBoundsSup-r18 (4)

} (SIZE (1..8)) OPTIONAL,

nr-los-nlos-AssistanceDataSupport-r17 SEQUENCE {

type-r17 LOS-NLOS-IndicatorType2-r17,

granularity-r17 LOS-NLOS-IndicatorGranularity2-r17,

...

} OPTIONAL,

nr-DL-PRS-ExpectedAoD-or-AoA-Sup-r17 BIT STRING { eAoD (0),

eAoA (1)

} (SIZE (1..8)) OPTIONAL,

dl-PRS-ResourcePrioritySubset-Sup-r17 ENUMERATED { sameSet, differentSet, sameOrDifferentSet }

OPTIONAL,

nr-DL-PRS-BeamInfoSup-r17 ENUMERATED { supported } OPTIONAL,

nr-DL-AoD-On-Demand-DL-PRS-Support-r17 NR-On-Demand-DL-PRS-Support-r17 OPTIONAL,

nr-los-nlos-IndicatorSupport-r17 SEQUENCE {

type-r17 LOS-NLOS-IndicatorType2-r17,

granularity-r17 LOS-NLOS-IndicatorGranularity2-r17,

...

} OPTIONAL,

scheduledLocationRequestSupported-r17 ScheduledLocationTimeSupportPerMode-r17

OPTIONAL,

nr-dl-prs-AssistanceDataValidity-r17 SEQUENCE {

area-validity-r17 INTEGER (1..maxNrOfAreas-r17) OPTIONAL,

...

} OPTIONAL,

multiMeasInSameMeasReport-r17 ENUMERATED { supported } OPTIONAL,

mg-ActivationRequest-r17 ENUMERATED { supported } OPTIONAL

]],

[[

posMeasGapSupport-r17 ENUMERATED { supported } OPTIONAL

]],

[[

multiLocationEstimateInSameMeasReport-r17 ENUMERATED { supported } OPTIONAL

]],

[[

locationCoordinateTypes-r18 LocationCoordinateTypes OPTIONAL,

nr-IntegrityAssistanceSupport-r18 BIT STRING {

serviceParametersSup (0),

serviceAlertSup (1),

riskParametersSup (2),

integrityParaTRP-LocSup (3),

integrityParaBeamInfoSup (4),

integrityParaRTD-InfoSup (5),

integrityBeamAntInfoSup (6)

} (SIZE (1..8)) OPTIONAL

]]

}

-- ASN1STOP

|  |
| --- |
| *NR-DL-AoD-ProvideCapabilities* field descriptions |
| ***nr-DL-AoD-Mode***  This field specifies the NR DL-AoD mode(s) supported by the target device. |
| ***periodicalReporting***  This field, if present, specifies the positioning modes for which the target device supports *periodicalReporting.* This is represented by a bit string, with a one‑value at the bit position means *periodicalReporting* for the positioning mode is supported; a zero‑value means not supported. If this field is absent, the target device does not support *periodicalReporting* in *CommonIEsRequestLocationInformation*. |
| ***ten-ms-unit-ResponseTime***  This field, if present, specifies the positioning modes for which the target device supports the enumerated value '*ten-milli-seconds*' in the IE *ResponseTime* in IE *CommonIEsRequestLocationInformation*. This is represented by a bit string, with a one‑value at the bit position means '*ten-milli-seconds'* response time unit for the positioning mode is supported; a zero‑value means not supported. If this field is absent, the target device does not support '*ten-milli-seconds'* response time unitin *CommonIEsRequestLocationInformation*. |
| ***nr-PosCalcAssistanceSupport***  This field indicates the Position Calculation Assistance Data supported by the target device for UE-based DL-AoD. This is represented by a bit string, with a one‑value at the bit position means the particular assistance data is supported; a zero‑value means not supported.  - bit 0 indicates whether the field *nr-TRP-LocationInfo* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 1 indicates whether the field *nr-DL-PRS-BeamInfo* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 2 indicates whether the field *nr-RTD-Info* in IE *NR-PositionCalculationAssistance* is supported or not. The UE can indicate this bit only if the UE supports *prs-ProcessingCapabilityBandList* and any of *maxNrOfDL-PRS-ResourceSetPerTrpPerFrequencyLayer*, *maxNrOfTRP-AcrossFreqs*, *maxNrOfPosLayer*, *maxNrOfDL-PRS-ResourcesPerResourceSet* and *maxNrOfDL-PRS-ResourcesPerPositioningFrequencylayer*. Otherwise, the UE does not include this field;  - bit 3 indicates whether the field *nr-TRP-BeamAntennaInfo* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 4 indicates whether the target service supports the range of integrity risk (IR) for which the integrity assistance data are valid;  - bit 5 together with bit 0 indicates whether the fields *nr-IntegrityTRP-LocationBounds, nr-IntegrityDL-PRS-ResourceSetARP-LocationBounds, nr-IntegrityDL-PRS-ResourceARP-LocationBounds* in IE *NR-TRP-LocationInfo* are supported or not; bit 5 together with bit 1 indicates whether the field *nr-IntegrityBeamInfoBounds* in IE *NR-DL-PRS-BeamInfo* is supported or not; bit 5 together with bit 2 indicates whether the field *nr-IntegrityRTD-InfoBounds* in IE *NR-RTD-Info* is supported or not; bit 5 together with bit 3 indicates whether the field *nr-integrityBeamPowerBounds* in IE *NR-TRP-BeamAntennaInfo* is supported or not. |
| ***nr-los-nlos-AssistanceDataSupport***  This field, if present, indicates that the target device supports the *NR-DL-PRS-ExpectedLOS-NLOS-Assistance* in IE *NR-PositionCalculationAssistance*:  - *type* indicates whether the target device supports '*hard*' value or '*hard*' and '*soft*' value in *LOS-NLOS-Indicator* in IE *NR-DL-PRS-ExpectedLOS-NLOS-Assistance*.  - *granularity* indicates whether the target device supports *nr-los-nlos-indicator* in IE *NR-DL-PRS-ExpectedLOS-NLOS-Assistanc*e 'per-trp', '*per-resource*', or both.  The UE can include this field only if the UE supports one of *maxDL-PRS-RSRP-MeasurementFR1*, *maxDL-PRS-RSRP-MeasurementFR2,dl-RSTD-MeasurementPerPairOfTRP-FR1, dl-RSTD-MeasurementPerPairOfTRP-FR2, maxNrOfRx-TX-MeasFR1, maxNrOfRx-TX-MeasFR2, supportOfRSRP-MeasFR1* and *supportOfRSRP-MeasFR2* . Otherwise, the UE does not include this field. |
| ***nr-DL-PRS-ExpectedAoD-or-AoA-Sup***  This field, if present, indicates that the target device supports the *NR-DL-PRS-ExpectedAoD-or-AoA* in *NR-DL-PRS-AssistanceData.* |
| ***dl-PRS-ResourcePrioritySubset-Sup***  This field, if present, indicates that the target device supports the *DL-PRS-ResourcePrioritySubset* in IE *NR-DL-PRS-Info.* Enumerated value indicates the supported resource set relationship for the target DL-PRS Resource and the associated subset. | |
| ***nr-DL-PRS-BeamInfoSup***  This field, if present, indicates that the target device supports the *NR-DL-PRS-BeamInfo* in IE *NR-DL-AoD-ProvideAssistanceData.* |
| ***nr-DL-AoD-On-Demand-DL-PRS-Support***  This field, if present, indicates that the target device supports on-demand DL-PRS requests. |
| ***nr-los-nlos-IndicatorSupport***  This field, if present, indicates that the target device supports *nr-los-nlos-Indicator* reporting in IE *NR-DL-AoD-SignalMeasurementInformation*.  - *type* indicates whether the target device supports '*hard*' value or '*hard*' and '*soft*' value in IE *LOS-NLOS-Indicator.*  - *granularit*y indicates whether the target device supports *LOS-NLOS-Indicator* reporting per TRP, per DL-PRS Resource, or both. |
| ***scheduledLocationRequestSupported***  This field, if present, specifies the positioning modes for which the target device supports scheduled location requests – i.e., supports the IE *ScheduledLocationTime* in IE *CommonIEsRequestLocationInformation* – and the time base(s) supported for the scheduled location time for each positioning mode. If this field is absent, the target device does not support scheduled location requests. |
| ***nr-dl-prs-AssistanceDataValidity***  This field, if present, indicates that the target device supports validity conditions for pre-configured assistance data and comprises the following subfields:  - ***area-validity*** indicates that the target device supports pre-configured assistance data with area validity. The integer number indicates the maximum number of areas the target device supports. |
| ***multiMeasInSameMeasReport***  This field, if present, indicates that the target device supports multiple measurement instances in a single measurement report. |
| ***mg-ActivationRequest***  This field, if present, indicates that the target device supports UL MAC CE for positioning measurement gap activation/deactivation request for DL-PRS measurements. The UE can include this field only if the UE supports *mg-ActivationRequestPRS-Meas* and *mg-ActivationCommPRS-Meas* defined in TS 38.331 [35]. |
| ***posMeasGapSupport***  This field, if present, indicates that the target device supports pre-configured positioning measurement gap for DL-PRS measurements. The UE can include this field only if the UE supports *mg-ActivationCommPRS-Meas* defined in TS 38.331 [35]. |
| ***multiLocationEstimateInSameMeasReport***  This field, if present, indicates that the target device supports multiple location estimate instances in a single measurement report. |
| ***locationCoordinateTypes***  This field indicates the geographical location coordinate types that a target device supports for UE-based DL-AoD. TRUE indicates that a location coordinate type is supported and FALSE that it is not. |
| ***nr-IntegrityAssistanceSupport***  This field indicates the Integrity Assistance Data supported. This is represented by a bit string, with a one‑value at the bit position means the particular assistance data is supported; a zero‑value means not supported.  - bit 0 indicates whether the field *nr-IntegrityServiceParameters* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 1 indicates whether the field *nr-IntegrityServiceAlert* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 2 indicates whether the field *nr-IntegrityRiskParameters* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 3 indicates whether the field *nr-IntegrityParametersTRP-LocationInfo* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 4 indicates whether the field *nr-IntegrityParametersDL-PRS-BeamInfo* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 5 indicates whether the field *nr-IntegrityParametersRTD-Info* in IE *NR-PositionCalculationAssistance* is supported or not;  - bit 6 indicates whether the field *nr-IntegrityParametersTRP-BeamAntennaInfo* in IE *NR-PositionCalculationAssistance* is supported or not. |

#### 6.5.11.6a NR DL-AoD Capability Information Elements

#### *– NR-DL-AoD-MeasurementCapability*

The IE *NR-DL-AoD-MeasurementCapability* defines the DL-AoD measurement capability. The UE can include this IE only if the UE supports *NR-DL-PRS-ResourcesCapability* for DL-AoD. Otherwise, the UE does not include this IE;

-- ASN1START

NR-DL-AoD-MeasurementCapability-r16 ::= SEQUENCE {

maxDL-PRS-RSRP-MeasurementFR1-r16 INTEGER (1..8),

maxDL-PRS-RSRP-MeasurementFR2-r16 INTEGER (1..8),

dl-AoD-MeasCapabilityBandList-r16 SEQUENCE (SIZE (1..nrMaxBands-r16)) OF

DL-AoD-MeasCapabilityPerBand-r16,

...,

[[

maxDL-PRS-RSRP-MeasurementFR1-v1730 ENUMERATED { n16, n24 } OPTIONAL,

maxDL-PRS-RSRP-MeasurementFR2-v1730 ENUMERATED { n16, n24 } OPTIONAL

]]

}

DL-AoD-MeasCapabilityPerBand-r16 ::= SEQUENCE {

freqBandIndicatorNR-r16 FreqBandIndicatorNR-r16,

simul-NR-DL-AoD-DL-TDOA-r16 ENUMERATED { supported} OPTIONAL,

simul-NR-DL-AoD-Multi-RTT-r16 ENUMERATED { supported} OPTIONAL,

...,

[[

maxDL-PRS-FirstPathRSRP-MeasPerTRP-r17 ENUMERATED { n1, n2, n4, n8, n16, n24 } OPTIONAL,

dl-PRS-MeasRRC-Inactive-r17 ENUMERATED { supported } OPTIONAL

]],

[[

supportOfMeasurementsInTimeWindowForDL-AoD-r18 BIT STRING {

rsrp (0),

rsrpp (1)

} (SIZE (1..8)) OPTIOANL,

supportOfPRS-MeasurementRRC-IdleForDL-AoD-r18 ENUMERATED { supported } OPTIONAL

]]

}

-- ASN1STOP

|  |
| --- |
| *NR-DL-AoD-MeasurementCapability* field descriptions |
| ***maxDL-PRS-RSRP-MeasurementFR1***  Indicates the maximum number of DL-PRS RSRP measurements on different DL-PRS Resources from the same TRP supported by the UE on FR1. If this field with suffix -v1730 is present, the target device should set the field with suffix -r16 to value '8'. |
| ***maxDL-PRS-RSRP-MeasurementFR2***  Indicates the maximum number of DL-PRS RSRP measurements on different DL-PRS Resources from the same TRP supported by the UE on FR2. If this field with suffix -v1730 is present, the target device should set the field with suffix -r16 to value '8'. |
| ***simul-NR-DL-AoD-DL-TDOA***  Indicates whether the UE supports simultaneous processing for DL-AoD and DL-TDOA measurements. The UE can include this field only if the UE supports DL-TDOA and DL-AoD. Otherwise, the UE does not include this field. |
| ***simul-NR-DL-AoD-Multi-RTT***  Indicates whether the UE supports simultaneous processing for DL-AoD and UE Multi-RTT measurements. The UE can include this field only if the UE supports Multi-RTT and DL-AoD. Otherwise, the UE does not include this field. |
| ***maxDL-PRS-FirstPathRSRP-MeasPerTRP***  This field, if present, indicates that the target device supports measuring and reporting the DL-PRS RSRPP of the first path. The enumerated value indicates the maximum number of RSRPP of first path per TRP supported. The UE can include this field only if the UE supports one of *maxDL-PRS-RSRP-MeasurementFR1* and *maxDL-PRS-RSRP-MeasurementFR2*. Otherwise, the UE does not include this field.  NOTE 1: The maximum number of first path DL-PRS RSRP per TRP should be less than or equal to the maximum number of DL-PRS RSRP defined in *maxDL-PRS-RSRP-MeasurementFR1* and *maxDL-PRS-RSRP-MeasurementFR2*. |
| ***dl-PRS-MeasRRC-Inactive***  This field, if present, indicates that the target device supports DL-PRS measurement in RRC\_INACTIVE state. The UE can include this field only if the UE supports *maxNrOfDL-PRS-ResourceSetPerTrpPerFrequencyLayer, maxNrOfTRP-AcrossFreqs, maxNrOfPosLayer* and *dl-PRS-BufferType-RRC-Inactive*. Otherwise, the UE does not include this field.  NOTE 1: This capability is applicable to both, UE-assisted and UE-based DL-AoD.  NOTE 2: The capabilities *NR-DL-PRS-ResourcesCapability, simul-NR-DL-AoD-DL-TDOA* are the same in RRC\_INACTIVE state. |
| ***supportOfMeasurementsInTimeWindowForDL-AoD***  This field, if present, indicates that the target device supports performing measurements inside the indicated time window only for DL AoD. This is represented by a bit string, with a one‑value at the bit position means the particular measurement is supported; a zero‑value means not supported.  - bit 0 indicates whether peforming DL PRS-RSRP is supported or not;  - bit 1 indicates whether performing DL PRS-RSRPP is supported or not;  The UE can include this field only if the UE supports *maxNrOfDL-PRS-ResourcesPerResourceSet* and *maxNrOfDL-PRS-ResourcesPerPositioningFrequencylayer*. Otherwise, the UE does not include this field. |
| ***supportOfPRS-MeasurementRRC-IdleForDL-AoD***  Indicates whether the UE supports DL-PRS measurement in RRC\_IDLE for DL-AoD. The UE can include this field only if the UE supports *supportedBandwidthPRS, dl-PRS-BufferType, durationOfPRS-Processing, maxNumOfDL-PRS-ResProcessedPerSlot,* *dl-PRS-BufferType-RRC-Inactive, durationOfPRS-Processing-RRC-Inactive, maxNumOfDL-PRS-ResProcessedPerSlot-RRC-Inactive* and *dl-PRS-MeasRRC-Inactive*. Otherwise, the UE does not include this field. |

#### 6.5.12.6 NR Multi-RTT Capability Information

#### – *NR-Multi-RTT-ProvideCapabilities*

The IE *NR-Multi-RTT-ProvideCapabilities* is used by the target device to indicate its capability to support NR Multi-RTT and to provide its NR Multi-RTT positioning capabilities to the location server.

-- ASN1START

NR-Multi-RTT-ProvideCapabilities-r16 ::= SEQUENCE {

nr-Multi-RTT-PRS-Capability-r16 NR-DL-PRS-ResourcesCapability-r16,

nr-Multi-RTT-MeasurementCapability-r16 NR-Multi-RTT-MeasurementCapability-r16,

nr-DL-PRS-QCL-ProcessingCapability-r16 NR-DL-PRS-QCL-ProcessingCapability-r16,

nr-DL-PRS-ProcessingCapability-r16 NR-DL-PRS-ProcessingCapability-r16,

nr-UL-SRS-Capability-r16 NR-UL-SRS-Capability-r16,

additionalPathsReport-r16 ENUMERATED { supported } OPTIONAL,

periodicalReporting-r16 ENUMERATED { supported } OPTIONAL,

...,

[[

ten-ms-unit-ResponseTime-r17 ENUMERATED { supported } OPTIONAL,

nr-DL-PRS-ExpectedAoD-or-AoA-Sup-r17 BIT STRING { eAoD (0),

eAoA (1)

} (SIZE (1..8)) OPTIONAL, nr-Multi-RTT-On-Demand-DL-PRS-Support-r17

NR-On-Demand-DL-PRS-Support-r17 OPTIONAL,

nr-UE-RxTx-TEG-ID-ReportingSupport-r17 BIT STRING { case1 (0),

case2 (1),

case3 (2)

} (SIZE (1..8)) OPTIONAL,

nr-los-nlos-IndicatorSupport-r17 SEQUENCE {

type-r17 LOS-NLOS-IndicatorType2-r17,

granularity-r17 LOS-NLOS-IndicatorGranularity2-r17,

...

} OPTIONAL,

additionalPathsExtSupport-r17 ENUMERATED { n4, n6, n8 } OPTIONAL,

scheduledLocationRequestSupported-r17 ScheduledLocationTimeSupport-r17 OPTIONAL,

nr-dl-prs-AssistanceDataValidity-r17 SEQUENCE {

area-validity-r17 INTEGER (1..maxNrOfAreas-r17) OPTIONAL,

...

} OPTIONAL,

multiMeasInSameMeasReport-r17 ENUMERATED { supported } OPTIONAL,

mg-ActivationRequest-r17 ENUMERATED { supported } OPTIONAL

]],

[[

posMeasGapSupport-r17 ENUMERATED { supported } OPTIONAL

]],

[[

nr-MultiRTT-OnDemandPRS-ForBWA-Support-r18 ENUMERATED { supported } OPTIONAL

]]

}

-- ASN1STOP

| *NR-Multi-RTT-ProvideCapabilities* field descriptions |
| --- |
| ***ten-ms-unit-ResponseTime***  This field, if present, indicates that the target device supports the enumerated value '*ten-milli-seconds*' in the IE *ResponseTime* in IE *CommonIEsRequestLocationInformation*. |
| ***nr-DL-PRS-ExpectedAoD-or-AoA-Sup***  This field, if present, indicates that the target device supports the *NR-DL-PRS-ExpectedAoD-or-AoA* in *NR-DL-PRS-AssistanceData.* |
| ***nr-Multi-RTT-On-Demand-DL-PRS-Support***  This field, if present, indicates that the target device supports on-demand DL-PRS requests. |
| ***nr-UE-RxTx-TEG-ID-ReportingSupport***  This field, if present, indicates that the target device supports *nr-UE-RxTx-TEG-Info* reporting in IE *NR-Multi-RTT-SignalMeasurementInformation.* This is represented by a bit string, with a one‑value at the bit position means the particular case is supported; a zero‑value means not supported:  - bit 0indicates that the target device supports the '*case1*' choice in *NR-UE-RxTx-TEG-Info*.  - bit 1 indicates that the target device supports the '*case2*' choice in *NR-UE-RxTx-TEG-Info*.  - bit 2 indicates that the target device supports the '*case3*' choice in *NR-UE-RxTx-TEG-Info*. |
| ***nr-los-nlos-IndicatorSupport***  This field, if present, indicates that the target device supports *nr-los-nlos-Indicator* reporting in IE *NR-Multi-RTT-SignalMeasurementInformation*.  - *type* indicates whether the target device supports '*hard*' value or '*hard*' and '*soft*' value in IE *LOS-NLOS-Indicator.*  - *granularity* indicates whether the target device supports *LOS-NLOS-Indicator* reporting per TRP, per DL-PRS Resource, or both.  NOTE: A single value is reported when both Multi-RTT and DL-TDOA are supported. |
| ***additionalPathsExtSupport***  This field, if present, indicates that the target device supports the *nr-AdditionalPathListExt* reporting in IE *NR-Multi-RTT-SignalMeasurementInformation*. The enumerated value indicates the number of additional paths supported by the target device.  NOTE: The *supportOfDL-PRS-FirstPathRSRP* in IE *NR-Multi-RTT-MeasurementCapability* also applies to the additional paths. |
| ***scheduledLocationRequestSupported***  This field, if present, indicates that the target device supports scheduled location requests – i.e., supports the IE *ScheduledLocationTime* in IE *CommonIEsRequestLocationInformation* – and the time base(s) supported for the scheduled location time. |
| ***nr-dl-prs-AssistanceDataValidity***  This field, if present, indicates that the target device supports validity conditions for pre-configured assistance data and comprises the following subfields:  - ***area-validity*** indicates that the target device supports pre-configured assistance data with area validity. The integer number indicates the maximum number of areas the target device supports*.* |
| ***multiMeasInSameMeasReport***  This field, if present, indicates that the target device supports multiple measurement instances in a single measurement report. |
| ***mg-ActivationRequest***  This field, if present, indicates that the target device supports UL MAC CE for positioning measurement gap activation/deactivation request for DL-PRS measurements. The UE can include this field only if the UE supports *mg-ActivationRequestPRS-Meas* and *mg-ActivationCommPRS-Meas* defined in TS 38.331 [35]. |
| ***posMeasGapSupport***  This field, if present, indicates that the target device supports pre-configured positioning measurement gap for DL-PRS measurements. The UE can include this field only if the UE supports *mg-ActivationCommPRS-Meas* defined in TS 38.331 [35]. |
| ***nr-MultiRTT-OnDemandPRS-ForBWA-Support***  This field, if present, indicates that the target device supports on-demand DL-PRS request for bandwidth aggregation. |

#### 6.5.12.6a NR Multi-RTT Capability Information Elements

#### *– NR-Multi-RTT-MeasurementCapability*

The IE *NR-Multi-RTT-MeasurementCapability* defines the Multi-RTT measurement capability. The UE can include this IE only if the UE supports *NR-DL-PRS-ResourcesCapability* for Multi-RTT. Otherwise, the UE does not include this IE;

-- ASN1START

NR-Multi-RTT-MeasurementCapability-r16 ::= SEQUENCE {

maxNrOfRx-TX-MeasFR1-r16 INTEGER (1..4) OPTIONAL,

maxNrOfRx-TX-MeasFR2-r16 INTEGER (1..4) OPTIONAL,

supportOfRSRP-MeasFR1-r16 ENUMERATED { supported } OPTIONAL,

supportOfRSRP-MeasFR2-r16 ENUMERATED { supported } OPTIONAL,

srs-AssocPRS-MultiLayersFR1-r16 ENUMERATED { supported } OPTIONAL,

srs-AssocPRS-MultiLayersFR2-r16 ENUMERATED { supported } OPTIONAL,

...,

[[

nr-UE-TEG-Capability-r17 NR-UE-TEG-Capability-r17 OPTIONAL,

multi-RTT-MeasCapabilityBandList-r17 SEQUENCE (SIZE (1..nrMaxBands-r16)) OF

Multi-RTT-MeasCapabilityPerBand-r17

OPTIONAL

]]

}

Multi-RTT-MeasCapabilityPerBand-r17 ::= SEQUENCE {

freqBandIndicatorNR-r17 FreqBandIndicatorNR-r16,

supportOfDL-PRS-FirstPathRSRP-r17 ENUMERATED { supported } OPTIONAL,

dl-PRS-MeasRRC-Inactive-r17 ENUMERATED { supported } OPTIONAL,

...,

[[

supportOfDL-PRS-BWA-RRC-Connected-r18 ENUMERATED { supported } OPTIONAL,

supportOfDL-PRS-BWA-RRC-Inactive-r18 ENUMERATED { supported } OPTIONAL,

nr-NTN-MeasAndReport-r18 ENUMERATED { supported } OPTIONAL,

nr-DL-PRS-RSCP-ReportingRRC-Connected-r18 ENUMERATED { supported } OPTIONAL,

nr-DL-PRS-RSCP-ReportingRRC-Inactive-r18 ENUMERATED { supported } OPTIONAL,

assocSingleRx-Tx-WithUpToNsampleRSCP-r18 ENUMERATED { supported } OPTIONAL,

supportOfRSCP-MeasurementInTimeWindow-r18 ENUMERATED { supported } OPTIONAL,

supportOfSymbolTimeStampForRSCP-r18 ENUMERATED { supported } OPTIONAL,

supportOfFinerTimingReportGranularityForPRS-Meas-r18 ENUMERATED { minus1, minus2,

minus3, minus4, minus5, minus6} OPTIONAL,

supportOfMeasurementsInTimeWindowForMulti-RTT-r18 BIT STRING { Rx-Tx (0),

rsrp (1),

rsrpp (2)

} (SIZE (1..8)) OPTIOANL

]]

}

-- ASN1STOP

|  |
| --- |
| *NR-Multi-RTT-MeasurementCapability* field descriptions |
| ***maxNrOfRx-TX-MeasFR1***  Indicates the maximum number of UE Rx–Tx time difference measurements corresponding to a single SRS resource/resource set for positioning with each measurement corresponding to a single DL-PRS Resource/Resource Set on FR1. |
| ***maxNrOfRx-TX-MeasFR2***  Indicates the maximum number of UE Rx–Tx time difference measurements corresponding to a single SRS resource/resource set for positioning with each measurement corresponding to a single DL-PRS Resource/Resource Set on FR2. |
| ***srs-AssocPRS-MultiLayersFR1***  Indicates whether the UE supports measurements derived on one or more DL-PRS Resource/Resource Sets which may be in different positioning frequency layers for SRS transmitted in a single CC. DL-PRS and SRS may be on different bands. This is for FR1 only. |
| ***srs-AssocPRS-MultiLayersFR2***  Indicates whether the UE supports measurements derived on one or more DL-PRS Resource/Resource Sets which may be in different positioning frequency layers for SRS transmitted in a single CC. DL-PRS and SRS may be on different bands. This is for FR2 only. |
| ***supportOfRSRP-MeasFR1***  Indicates whether the UE supports RSRP measurement for Multi-RTT on FR1. |
| ***supportOfRSRP-MeasFR2***  Indicates whether the UE supports RSRP measurement for Multi-RTT on FR2. |
| ***nr-UE-TEG-Capability***  Indicates the UE TEG capability. |
| ***supportOfDL-PRS-FirstPathRSRP***  Indicates whether the target device supports DL-PRS RSRPP of first path measurement for Multi-RTT. The UE can include this field only if the UE supports *prs-ProcessingCapabilityBandList*. Otherwise, the UE does not include this field. The UE supporting *additionalPathsReport* and *supportOfDL-PRS-FirstPathRSRP* shall support RSRPP reporting for K=1 or 2 additional paths. |
| ***dl-PRS-MeasRRC-Inactive***  This field, if present, indicates that the target device supports DL-PRS measurement in RRC\_INACTIVE state. The UE can include this field only if the UE supports *maxNrOfDL-PRS-ResourceSetPerTrpPerFrequencyLayer, maxNrOfTRP-AcrossFreqs, maxNrOfPosLayer* and *dl-PRS-BufferType-RRC-Inactive*. Otherwise, the UE does not include this field.  NOTE 1: The capabilities *NR-DL-PRS-ResourcesCapability, maxNrOfRx-TX-MeasFR1, maxNrOfRx-TX-MeasFR2, supportOfRSRP-MeasFR1, supportOfRSRP-MeasFR2, srs-AssocPRS-MultiLayersFR1, srs-AssocPRS-MultiLayersFR2, simul-NR-DL-AoD-Multi-RTT* are the same in RRC\_INACTIVE state. |
| ***supportOfDL-PRS-BWA-RRC-Connected***  Indicates whether the target device supports DL-PRS bandwidth aggregation in RRC\_CONNECTED for Multi-RTT. The target device can include this field only if the target device supports *maxNrOfDL-PRS-ResourceSetPerTrpPerFrequencyLayer*, *maxNrOfTRP-AcrossFreqs*, *maxNrOfPosLayer* and *prs-BWA-TwoContiguousIntrabandInMG-RRC-Connected*. Otherwise, the UE does not include this field. |
| ***supportOfDL-PRS-BWA-RRC-Inactive***  Indicates whether the target device supports DL-PRS bandwidth aggregation in RRC\_INACTIVE for Multi-RTT. The target device can include this field only if the target device supports *dl-PRS-MeasRRC-Inactive* and *prs-BWA-TwoContiguousIntraband-RRC-IdleandInactive*. Otherwise, the target device does not include this field. |
| ***nr-NTN-MeasAndReport***  This field, if present, indicates that the UE supports UE Rx-Tx Measurement and Report for Multi-RTT with single satellite in NTN with the following capabilities:  - UE Rx-Tx time difference and UE Rx-Tx time difference offset measurement and report for Multi-RTT positioning;  - Reporting DL timing drift due to Doppler over the service link associated with the UE Rx-Tx time difference measurement period.  NOTE 2: This field is only present, if *freqBandIndicatorNR* indicates the bands in Table 5.2.2-1 in TS 38.101-5 [54]. |
| ***nr-DL-PRS-RSCP-ReportingRRC-Connected***  This field, if present, indicates that the target device supports reporting RSCP in RRC CONNECTED. The UE can include this field only if the UE supports *maxNrOfRx-TX-MeasFR1, maxNrOfRx-TX-MeasFR2, supportOfRSRP-MeasFR1* and *supportOfRSRP-MeasFR2*. Otherwise, the UE does not include this field.  NOTE 3: RSCP is reported together with UE Rx-Tx time difference measurement. |
| ***nr-DL-PRS-RSCP-ReportingRRC-Inactive***  This field, if present, indicates that the target device supports reporting RSCP in RRC INACTIVE. The UE can include this field only if the UE supports *dl-PRS-MeasRRC-Inactive*. Otherwise, the UE does not include this field.  NOTE 4: RSCP is reported together with UE Rx-Tx time difference measurement. |
| ***supportOfLegacyMeasurementInTimeWindow***  This field, if present, indicates that the target device supports performing legacy measurements inside the indicated time window only for Multi-RTT. The UE can include this field only if the UE supports *maxNrOfDL-PRS-ResourcesPerResourceSet and maxNrOfDL-PRS-ResourcesPerPositioningFrequencylayer*. Otherwise, the UE does not include this field. |
| ***assocSingleRx-Tx-WithUpToNsampleRSCP***  This field, if present, indicates that the target device supports associating a single Rx-Tx measurement with up to N\_sample RSCP measurement. The UE can include this field only if the UE supports one of *nr-DL-PRS-RSCP-ReportingRRC-Connected* and *nr-DL-PRS-RSCP-ReportingRRC-Inactive*. Otherwise, the UE does not include this field. |
| ***supportOfSymbolTimeStampForRSCP***  This field, if present, indicates that the target device supports reporting timestamp with OFDM symbol index associated with RSCP measurement. The UE can include this field only if the UE supports one of *nr-DL-PRS-RSCP-ReportingRRC-Connected* and *nr-DL-PRS-RSCP-ReportingRRC-Inactive*. Otherwise, the UE does not include this field. |
| ***supportOfFinerTimingReportGranularityForPRS-Meas***  This field, if present, indicates that the target device supports finer timing reporting granularity for DL-PRS measurement. |
| ***supportOfMeasurementsInTimeWindowForMulti-RTT***  This field, if present, indicates that the target device supports performing measurements inside the indicated time window only for Multi RTT. This is represented by a bit string, with a one‑value at the bit position means the particular measurement is supported; a zero‑value means not supported.  - bit 0 indicates whether performing UE Rx-Tx time difference is supported or not;  - bit 1 indicates whether peforming DL PRS-RSRP is supported or not;  - bit 2 indicates whether performing DL PRS-RSRPP is supported or not;  The UE can include this field only if the UE supports *maxNrOfDL-PRS-ResourcesPerResourceSet* and *maxNrOfDL-PRS-ResourcesPerPositioningFrequencylayer*. Otherwise, the UE does not include this field. |

End of the change