**3GPP TSG-RAN2 Meeting #116 electronic *Draft R2-2111627***

**Online, November 01 – November 12, 2021**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
|  |
|  | **38.331** | **CR** | **2857** | **rev** | **1** | **Current version:** | **16.6.0** |  |
|  |
| *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 | **X** | Core Network |  |

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| ***Title:***  | Correction on *supportNewDMRS-Port-r16* capability |
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| ***Source to WG:*** | Huawei, HiSilicon |
| ***Source to TSG:*** | RAN2 |
|  |  |
| ***Work item code:*** | NR\_eMIMO-Core |  | ***Date:*** | 2021-10-22 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-16 |
|  | *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 canbe 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-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | According to RAN1 FG 16-2b-1b and TS 38.306, the *supportNewDMRS-Port-r16* capability indicates whether UE supports of new DMRS port entry {0,2,3}. The DMRS port {0,2,3} together is a new kind of DMRS port combination, which should be reported as “supported” or not by UE.However, the current ASN.1 signalling doesn’t reflect the actual meaning of this feature, and it is not aligned with the description in TS 38.306. In current TS 38.331, the *supportNewDMRS-Port-r16* IE has the type of ENUMERATED with three candidate values {n0, n2, n3}, and the UE can only report one of these values. Thus, it is not clear for both the network and UE how to interpret this capability.To make the understanding aligned between the network and UE, it should be clarified that any value reported for *supportNewDMRS-Port-r16* indicates UE supports this feature. |
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| ***Summary of change:*** | Clarify that the presence of the field *supportNewDMRS-Port-r16* indicates that the UE supports the new DMRS port entry {0, 2, 3}, while the included value n0, n2 or n3 has no particular meaning.**Impact Analysis**Impacted 5G architecture options:SA, (NG)EN-DC, NE-DC, NR-DCImpacted functionality:DMRS**The CR is considered mandatory to support the new DMRS port entry {0, 2, 3}.**Inter-operability:1. If the UE is implemented according to the CR and the NW is not, it is not clear for the network how to understand the capability on new DMRS port, and the NW may misunderstand the capability is not supported by UE.
2. If the NW is implemented according to the CR and the UE is not, it is not clear for the UE how to report the capability on new DMRS port, but there is no inter-operability issue.
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| ***Consequences if not approved:*** | It is not clear for the network and UE how to interpret the capability of *supportNewDMRS-Port-r16*, and the understanding may be not aligned between the network and UE. |
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| ***Clauses affected:*** | 6.3.3 |
|  |  |
|  | **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*

6.3.3 UE capability information elements

– *MIMO-ParametersPerBand*

The IE *MIMO-ParametersPerBand* is used to convey MIMO related parameters specific for a certain band (not per feature set or band combination).

***MIMO-ParametersPerBand* information element**

-- ASN1START

-- TAG-MIMO-PARAMETERSPERBAND-START

MIMO-ParametersPerBand ::= SEQUENCE {

 tci-StatePDSCH SEQUENCE {

 maxNumberConfiguredTCIstatesPerCC ENUMERATED {n4, n8, n16, n32, n64, n128} OPTIONAL,

 maxNumberActiveTCI-PerBWP ENUMERATED {n1, n2, n4, n8} OPTIONAL

 } OPTIONAL,

 additionalActiveTCI-StatePDCCH ENUMERATED {supported} OPTIONAL,

 pusch-TransCoherence ENUMERATED {nonCoherent, partialCoherent, fullCoherent} OPTIONAL,

 beamCorrespondenceWithoutUL-BeamSweeping ENUMERATED {supported} OPTIONAL,

 periodicBeamReport ENUMERATED {supported} OPTIONAL,

 aperiodicBeamReport ENUMERATED {supported} OPTIONAL,

 sp-BeamReportPUCCH ENUMERATED {supported} OPTIONAL,

 sp-BeamReportPUSCH ENUMERATED {supported} OPTIONAL,

 dummy1 DummyG OPTIONAL,

 maxNumberRxBeam INTEGER (2..8) OPTIONAL,

 maxNumberRxTxBeamSwitchDL SEQUENCE {

 scs-15kHz ENUMERATED {n4, n7, n14} OPTIONAL,

 scs-30kHz ENUMERATED {n4, n7, n14} OPTIONAL,

 scs-60kHz ENUMERATED {n4, n7, n14} OPTIONAL,

 scs-120kHz ENUMERATED {n4, n7, n14} OPTIONAL,

 scs-240kHz ENUMERATED {n4, n7, n14} OPTIONAL

 } OPTIONAL,

 maxNumberNonGroupBeamReporting ENUMERATED {n1, n2, n4} OPTIONAL,

 groupBeamReporting ENUMERATED {supported} OPTIONAL,

 uplinkBeamManagement SEQUENCE {

 maxNumberSRS-ResourcePerSet-BM ENUMERATED {n2, n4, n8, n16},

 maxNumberSRS-ResourceSet INTEGER (1..8)

 } OPTIONAL,

 maxNumberCSI-RS-BFD INTEGER (1..64) OPTIONAL,

 maxNumberSSB-BFD INTEGER (1..64) OPTIONAL,

 maxNumberCSI-RS-SSB-CBD INTEGER (1..256) OPTIONAL,

 dummy2 ENUMERATED {supported} OPTIONAL,

 twoPortsPTRS-UL ENUMERATED {supported} OPTIONAL,

 dummy5 SRS-Resources OPTIONAL,

 dummy3 INTEGER (1..4) OPTIONAL,

 beamReportTiming SEQUENCE {

 scs-15kHz ENUMERATED {sym2, sym4, sym8} OPTIONAL,

 scs-30kHz ENUMERATED {sym4, sym8, sym14, sym28} OPTIONAL,

 scs-60kHz ENUMERATED {sym8, sym14, sym28} OPTIONAL,

 scs-120kHz ENUMERATED {sym14, sym28, sym56} OPTIONAL

 } OPTIONAL,

 ptrs-DensityRecommendationSetDL SEQUENCE {

 scs-15kHz PTRS-DensityRecommendationDL OPTIONAL,

 scs-30kHz PTRS-DensityRecommendationDL OPTIONAL,

 scs-60kHz PTRS-DensityRecommendationDL OPTIONAL,

 scs-120kHz PTRS-DensityRecommendationDL OPTIONAL

 } OPTIONAL,

 ptrs-DensityRecommendationSetUL SEQUENCE {

 scs-15kHz PTRS-DensityRecommendationUL OPTIONAL,

 scs-30kHz PTRS-DensityRecommendationUL OPTIONAL,

 scs-60kHz PTRS-DensityRecommendationUL OPTIONAL,

 scs-120kHz PTRS-DensityRecommendationUL OPTIONAL

 } OPTIONAL,

 dummy4 DummyH OPTIONAL,

 aperiodicTRS ENUMERATED {supported} OPTIONAL,

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 dummy6 ENUMERATED {true} OPTIONAL,

 beamManagementSSB-CSI-RS BeamManagementSSB-CSI-RS OPTIONAL,

 beamSwitchTiming SEQUENCE {

 scs-60kHz ENUMERATED {sym14, sym28, sym48, sym224, sym336} OPTIONAL,

 scs-120kHz ENUMERATED {sym14, sym28, sym48, sym224, sym336} OPTIONAL

 } OPTIONAL,

 codebookParameters CodebookParameters OPTIONAL,

 csi-RS-IM-ReceptionForFeedback CSI-RS-IM-ReceptionForFeedback OPTIONAL,

 csi-RS-ProcFrameworkForSRS CSI-RS-ProcFrameworkForSRS OPTIONAL,

 csi-ReportFramework CSI-ReportFramework OPTIONAL,

 csi-RS-ForTracking CSI-RS-ForTracking OPTIONAL,

 srs-AssocCSI-RS SEQUENCE (SIZE (1.. maxNrofCSI-RS-Resources)) OF SupportedCSI-RS-Resource OPTIONAL,

 spatialRelations SpatialRelations OPTIONAL

 ]],

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 -- R1 16-2b-0: Support of default QCL assumption with two TCI states

 defaultQCL-TwoTCI-r16 ENUMERATED {supported} OPTIONAL,

 codebookParametersPerBand-r16 CodebookParameters-v1610 OPTIONAL,

 -- R1 16-1b-3: Support of PUCCH resource groups per BWP for simultaneous spatial relation update

 simul-SpatialRelationUpdatePUCCHResGroup-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 16-1f: Maximum number of SCells configured for SCell beam failure recovery simultaneously

 maxNumberSCellBFR-r16 ENUMERATED {n1,n2,n4,n8} OPTIONAL,

 -- R1 16-2c: Supports simultaneous reception with different Type-D for FR2 only

 simultaneousReceptionDiffTypeD-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 16-1a-1: SSB/CSI-RS for L1-SINR measurement

 ssb-csirs-SINR-measurement-r16 SEQUENCE {

 maxNumberSSB-CSIRS-OneTx-CMR-r16 ENUMERATED {n8, n16, n32, n64},

 maxNumberCSI-IM-NZP-IMR-res-r16 ENUMERATED {n8, n16, n32, n64},

 maxNumberCSIRS-2Tx-res-r16 ENUMERATED {n0, n4, n8, n16, n32, n64},

 maxNumberSSB-CSIRS-res-r16 ENUMERATED {n8, n16, n32, n64, n128},

 maxNumberCSI-IM-NZP-IMR-res-mem-r16 ENUMERATED {n8, n16, n32, n64, n128},

 supportedCSI-RS-Density-CMR-r16 ENUMERATED {one, three, oneAndThree},

 maxNumberAperiodicCSI-RS-Res-r16 ENUMERATED {n2, n4, n8, n16, n32, n64},

 supportedSINR-meas-r16 ENUMERATED {ssbWithCSI-IM, ssbWithNZP-IMR, csirsWithNZP-IMR, csi-RSWithoutIMR} OPTIONAL

 } OPTIONAL,

 -- R1 16-1a-2: Non-group based L1-SINR reporting

 nonGroupSINR-reporting-r16 ENUMERATED {n1, n2, n4} OPTIONAL,

 -- R1 16-1a-3: Non-group based L1-SINR reporting

 groupSINR-reporting-r16 ENUMERATED {supported} OPTIONAL,

 multiDCI-multiTRP-Parameters-r16 SEQUENCE {

 -- R1 16-2a-0: Overlapping PDSCHs in time and fully overlapping in frequency and time

 overlapPDSCHsFullyFreqTime-r16 INTEGER (1..2) OPTIONAL,

 -- R1 16-2a-1: Overlapping PDSCHs in time and partially overlapping in frequency and time

 overlapPDSCHsInTimePartiallyFreq-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 16-2a-2: Out of order operation for DL

 outOfOrderOperationDL-r16 SEQUENCE {

 supportPDCCH-ToPDSCH-r16 ENUMERATED {supported} OPTIONAL,

 supportPDSCH-ToHARQ-ACK-r16 ENUMERATED {supported} OPTIONAL

 } OPTIONAL,

 -- R1 16-2a-3: Out of order operation for UL

 outOfOrderOperationUL-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 16-2a-5: Separate CRS rate matching

 separateCRS-RateMatching-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 16-2a-6: Default QCL enhancement for multi-DCI based multi-TRP

 defaultQCL-PerCORESETPoolIndex-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 16-2a-7: Maximum number of activated TCI states

 maxNumberActivatedTCI-States-r16 SEQUENCE {

 maxNumberPerCORESET-Pool-r16 ENUMERATED {n1, n2, n4, n8},

 maxTotalNumberAcrossCORESET-Pool-r16 ENUMERATED {n2, n4, n8, n16}

 } OPTIONAL

 } OPTIONAL,

 singleDCI-SDM-scheme-Parameters-r16 SEQUENCE {

 -- R1 16-2b-1b: Single-DCI based SDM scheme – Support of new DMRS port entry

 supportNewDMRS-Port-r16 ENUMERATED {n0, n2, n3} OPTIONAL,

 -- R1 16-2b-1a: Support of s-port DL PTRS

 supportTwoPortDL-PTRS-r16 ENUMERATED {supported} OPTIONAL

 } OPTIONAL,

 -- R1 16-2b-2: Support of single-DCI based FDMSchemeA

 supportFDM-SchemeA-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 16-2b-3a: Single-DCI based FDMSchemeB CW soft combining

 supportCodeWordSoftCombining-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 16-2b-4: Single-DCI based TDMSchemeA

 supportTDM-SchemeA-r16 ENUMERATED {kb3, kb5, kb10, kb20, noRestriction} OPTIONAL,

 -- R1 16-2b-5: Single-DCI based inter-slot TDM

 supportInter-slotTDM-r16 SEQUENCE {

 supportRepNumPDSCH-TDRA-r16 ENUMERATED {n2, n3, n4, n5, n6, n7, n8, n16},

 maxTBS-Size-r16 ENUMERATED {kb3, kb5, kb10, kb20, noRestriction},

 maxNumberTCI-states-r16 INTEGER (1..2)

 } OPTIONAL,

 -- R1 16-4: Low PAPR DMRS for PDSCH

 lowPAPR-DMRS-PDSCH-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 16-6a: Low PAPR DMRS for PUSCH without transform precoding

 lowPAPR-DMRS-PUSCHwithoutPrecoding-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 16-6b: Low PAPR DMRS for PUCCH

 lowPAPR-DMRS-PUCCH-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 16-6c: Low PAPR DMRS for PUSCH with transform precoding & pi/2 BPSK

 lowPAPR-DMRS-PUSCHwithPrecoding-r16 ENUMERATED {supported} OPTIONAL,

 -- R1 16-7: Extension of the maximum number of configured aperiodic CSI report settings

 csi-ReportFrameworkExt-r16 CSI-ReportFrameworkExt-r16 OPTIONAL,

 -- R1 16-3a, 16-3a-1, 16-3b, 16-3b-1, 16-8: Individual new codebook types

 codebookParametersAddition-r16 CodebookParametersAddition-r16 OPTIONAL,

 -- R1 16-8: Mixed codebook types

 codebookComboParametersAddition-r16 CodebookComboParametersAddition-r16 OPTIONAL,

 -- R4 8-2: SSB based beam correspondence

 beamCorrespondenceSSB-based-r16 ENUMERATED {supported} OPTIONAL,

 -- R4 8-3: CSI-RS based beam correspondence

 beamCorrespondenceCSI-RS-based-r16 ENUMERATED {supported} OPTIONAL,

 beamSwitchTiming-r16 SEQUENCE {

 scs-60kHz-r16 ENUMERATED {sym224, sym336} OPTIONAL,

 scs-120kHz-r16 ENUMERATED {sym224, sym336} OPTIONAL

 } OPTIONAL

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 -- R1 16-1a-4: Semi-persistent L1-SINR report on PUCCH

 semi-PersistentL1-SINR-Report-PUCCH-r16 SEQUENCE {

 supportReportFormat1-2OFDM-syms-r16 ENUMERATED {supported} OPTIONAL,

 supportReportFormat4-14OFDM-syms-r16 ENUMERATED {supported} OPTIONAL

 } OPTIONAL,

 -- R1 16-1a-5: Semi-persistent L1-SINR report on PUSCH

 semi-PersistentL1-SINR-Report-PUSCH-r16 ENUMERATED {supported} OPTIONAL

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 -- R1 16-1h: Support of 64 configured PUCCH spatial relations

 spatialRelations-v1640 SEQUENCE {

 maxNumberConfiguredSpatialRelations-v1640 ENUMERATED {n96, n128, n160, n192, n224, n256, n288, n320}

 } OPTIONAL,

 -- R1 16-1i: Support of 64 configured candidate beam RSs for BFR

 support64CandidateBeamRS-BFR-r16 ENUMERATED {supported} OPTIONAL

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 -- R1 16-2a-9: Interpretation of maxNumberMIMO-LayersPDSCH for multi-DCI based mTRP

 maxMIMO-LayersForMulti-DCI-mTRP-r16 ENUMERATED {supported} OPTIONAL

 ]]

}

DummyG ::= SEQUENCE {

 maxNumberSSB-CSI-RS-ResourceOneTx ENUMERATED {n8, n16, n32, n64},

 maxNumberSSB-CSI-RS-ResourceTwoTx ENUMERATED {n0, n4, n8, n16, n32, n64},

 supportedCSI-RS-Density ENUMERATED {one, three, oneAndThree}

}

BeamManagementSSB-CSI-RS ::= SEQUENCE {

 maxNumberSSB-CSI-RS-ResourceOneTx ENUMERATED {n0, n8, n16, n32, n64},

 maxNumberCSI-RS-Resource ENUMERATED {n0, n4, n8, n16, n32, n64},

 maxNumberCSI-RS-ResourceTwoTx ENUMERATED {n0, n4, n8, n16, n32, n64},

 supportedCSI-RS-Density ENUMERATED {one, three, oneAndThree} OPTIONAL,

 maxNumberAperiodicCSI-RS-Resource ENUMERATED {n0, n1, n4, n8, n16, n32, n64}

}

DummyH ::= SEQUENCE {

 burstLength INTEGER (1..2),

 maxSimultaneousResourceSetsPerCC INTEGER (1..8),

 maxConfiguredResourceSetsPerCC INTEGER (1..64),

 maxConfiguredResourceSetsAllCC INTEGER (1..128)

}

CSI-RS-ForTracking ::= SEQUENCE {

 maxBurstLength INTEGER (1..2),

 maxSimultaneousResourceSetsPerCC INTEGER (1..8),

 maxConfiguredResourceSetsPerCC INTEGER (1..64),

 maxConfiguredResourceSetsAllCC INTEGER (1..256)

}

CSI-RS-IM-ReceptionForFeedback ::= SEQUENCE {

 maxConfigNumberNZP-CSI-RS-PerCC INTEGER (1..64),

 maxConfigNumberPortsAcrossNZP-CSI-RS-PerCC INTEGER (2..256),

 maxConfigNumberCSI-IM-PerCC ENUMERATED {n1, n2, n4, n8, n16, n32},

 maxNumberSimultaneousNZP-CSI-RS-PerCC INTEGER (1..64),

 totalNumberPortsSimultaneousNZP-CSI-RS-PerCC INTEGER (2..256)

}

CSI-RS-ProcFrameworkForSRS ::= SEQUENCE {

 maxNumberPeriodicSRS-AssocCSI-RS-PerBWP INTEGER (1..4),

 maxNumberAperiodicSRS-AssocCSI-RS-PerBWP INTEGER (1..4),

 maxNumberSP-SRS-AssocCSI-RS-PerBWP INTEGER (0..4),

 simultaneousSRS-AssocCSI-RS-PerCC INTEGER (1..8)

}

CSI-ReportFramework ::= SEQUENCE {

 maxNumberPeriodicCSI-PerBWP-ForCSI-Report INTEGER (1..4),

 maxNumberAperiodicCSI-PerBWP-ForCSI-Report INTEGER (1..4),

 maxNumberSemiPersistentCSI-PerBWP-ForCSI-Report INTEGER (0..4),

 maxNumberPeriodicCSI-PerBWP-ForBeamReport INTEGER (1..4),

 maxNumberAperiodicCSI-PerBWP-ForBeamReport INTEGER (1..4),

 maxNumberAperiodicCSI-triggeringStatePerCC ENUMERATED {n3, n7, n15, n31, n63, n128},

 maxNumberSemiPersistentCSI-PerBWP-ForBeamReport INTEGER (0..4),

 simultaneousCSI-ReportsPerCC INTEGER (1..8)

}

CSI-ReportFrameworkExt-r16 ::= SEQUENCE {

 maxNumberAperiodicCSI-PerBWP-ForCSI-ReportExt-r16 INTEGER (5..8)

}

PTRS-DensityRecommendationDL ::= SEQUENCE {

 frequencyDensity1 INTEGER (1..276),

 frequencyDensity2 INTEGER (1..276),

 timeDensity1 INTEGER (0..29),

 timeDensity2 INTEGER (0..29),

 timeDensity3 INTEGER (0..29)

}

PTRS-DensityRecommendationUL ::= SEQUENCE {

 frequencyDensity1 INTEGER (1..276),

 frequencyDensity2 INTEGER (1..276),

 timeDensity1 INTEGER (0..29),

 timeDensity2 INTEGER (0..29),

 timeDensity3 INTEGER (0..29),

 sampleDensity1 INTEGER (1..276),

 sampleDensity2 INTEGER (1..276),

 sampleDensity3 INTEGER (1..276),

 sampleDensity4 INTEGER (1..276),

 sampleDensity5 INTEGER (1..276)

}

SpatialRelations ::= SEQUENCE {

 maxNumberConfiguredSpatialRelations ENUMERATED {n4, n8, n16, n32, n64, n96},

 maxNumberActiveSpatialRelations ENUMERATED {n1, n2, n4, n8, n14},

 additionalActiveSpatialRelationPUCCH ENUMERATED {supported} OPTIONAL,

 maxNumberDL-RS-QCL-TypeD ENUMERATED {n1, n2, n4, n8, n14}

}

DummyI ::= SEQUENCE {

 supportedSRS-TxPortSwitch ENUMERATED {t1r2, t1r4, t2r4, t1r4-t2r4, tr-equal},

 txSwitchImpactToRx ENUMERATED {true} OPTIONAL

}

-- TAG-MIMO-PARAMETERSPERBAND-STOP

-- ASN1STOP

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| ***MIMO-ParametersPerBand field description*** |
| ***codebookParametersPerBand***For a given frequency band, this field this field indicates the alternative list of *SupportedCSI-RS-Resource* supported for each codebook type. The supported CSI-RS resoureces indicated by this field are referred by *codebookParametersperBC* in *CA-ParametersNR* to indicate the supported CSI-RS resoruece per band combination. |
| ***csi-RS-IM-ReceptionForFeedback/ csi-RS-ProcFrameworkForSRS/ csi-ReportFramework***CSI related capabilities which the UE supports on each of the carriers operated on this band. If the network configures the UE with serving cells on both FR1 and FR2 bands these values may be further limited by the corresponding fields in *fr1-fr2-Add-UE-NR-Capabilities*. |
| ***supportNewDMRS-Port-r16***Presence of this field by reporting any value of n0,n2,n3 indicates that the UE supports the new DMRS port entry {0,2,3}. |

<End of modification>