**3GPP TSG RAN WG1 #116 R1-24nnnnn**

**Fukuoka City, Fukuoka, Japan, May 20th—24th, 2024**

**Source: Ad-Hoc Chair (AT&T)**

**Title: Session Notes of AI 8.2.2**

**Agenda Item:** **8.2.2**

**Document for:** **Endorsement**

### 8.2.2 UE features for other Rel-18 work items (Topics B)

*Including UE features for NR MIMO, expanded and improved NR positioning, NES, mobility enhancement, NCR, IoT-NTN, NR-NTN, and BWP without restriction.*

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

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| 53. NR\_BWP\_wor | 53-3 | Support RLM/BM/BFD measurements based on NCD-SSB within active BWP | 1. UE performs RLM/BM/BFD and gapless L3 intra-frequency measurements based on NCD-SSB, where the NCD-SSB is within the active DL BWP.  2. Bandwidth of UE-specific RRC configured BWP may not include bandwidth of the CORESET#0 (if CORESET#0 is present) and CD-SSB for PCell/PSCell (if configured) and bandwidth of the UE-specific RRC configured BWP may not include CD-SSB for Scell  3. NCD-SSB within the active DL BWP can be used as the QCL source for other reference signal.  4. UE performs L3 intra-frequency measurements without gaps based on NCD-SSB, where the NCD-SSB is within the active DL BWP. |  | Yes | n/a | UE cannot support RLM/BM/BFD and gapless L3 intra-frequency measurements based on NCD-SSB within active BWP | Per band | No | No | n/a | Note: This FG applies only to PCell and PSCell (if configured)  This FG is not applicable to RedCap or eRedCap UEs. | Optional with capability signalling |

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| 41. NR\_pos\_enh2 | 41-1-7a | SL PRS measurement for SL-RSTD | 1. Support SL RSTD measurement based on SL-PRS  2. Support SL RSTD measurement reporting  3. Maximum number of SL RSTD measurement reporting for different SL-PRS reception for the same pair of UEs | 41-1-1 | No | No | UE does not support SL PRS measurement for SL-RSTD | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported  Comp~~o~~onent 3 candidate values: {1,2,3,4} | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-7c | SL PRS measurement for UE Rx – Tx time difference without Tx time stamp | 1. Support UE Rx – Tx time difference measurement based on SL PRS  2. Support UE Rx – Tx time difference measurement reporting without Tx time stamp  3. Maximum number of Rx-Tx measurement reporting for different SL-PRS reception for the same pair of UEs~~]~~ | 41-1-1, at least one of 41-1-4a/b/c | No | No | UE does not support SL PRS measurement for Rx – Tx time difference without Tx time stamp | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported  Component 3 candidate values: {1,2,3,4} | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-7d | SL PRS measurement for UE Rx – Tx time difference with Tx time stamp | 1. Support UE Rx – Tx time difference measurement based on SL PRS  2. Support UE Rx – Tx time difference measurement reporting with Tx time stamp  3. Reporting M Rx-Tx measurements for the same SL-PRS transmission (or reception) and different SL-PRS reception (or transmission) for the same pair of UEs  4. Maximum number of Rx-Tx measurement reporting for different SL-PRS reception for the same pair of UEs~~]~~ | 41-1-1, at least one of 41-1-4a/b/c | No | No | UE does not support SL PRS measurement for UE Rx – Tx time difference with Tx time stamp | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported  Component 3 candidate values of M={1,2,3,4}  Component 4 candidate values: {1,2,3,4} | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-2-11 | Finer timing reporting granularity for PRS measurement | Supported ReportingGranularityfactors ~~-1 >=~~ X |  | No | N.A. | Reporting Granularity cannot be signalled | Per band | N.A. | N.A. | N.A. | Component 1 candidate values for X: {-6, -5, -4, -3, -2, -1}  Need for location server to know if the feature is supported | Optional with capability signaling |

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| 41. NR\_pos\_enh2 | 41-1-3 | Receiving SL-PRS in a dedicated resource pool | 1. Support SL-PRS in dedicated resource pool  2. Support receiving SCI format 1B  3. UE can receive X PSCCH in a slot  4. Supported CP type for 60 kHz SCS | 41-1-1 | Yes | No | Receiving SL-PRS in a dedicated resource pool is not supported | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported  Component 3 candidate values: {~~[~~floor (NRB /10 RBs), 2\*floor (NRB /10 RBs)~~]~~}  Component 4 candidate values: ~~CP length:~~ {NCP,NCP and ECP}  Note: NRB is the number of RBs defined per channel bandwidth by RAN4 in 38.101-1 Table 5.3.2-1 for FR1 and 38.101-2 Table 5.3.2-1 for FR2 | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-10 | Support of full sensing in a dedicated resource pool | 1. UE can transmit SL-PRS and associated PSCCH using full sensing  2. Support DL pathloss based open loop power control when configured by NR Uu  3. UE can receive X PSCCH in a slot |  | Yes | No | UE cannot transmit SL-PRS using full sensing in a dedicated resource pool | Per band | n/a | n/a | n/a | Component 3 candidate values: {floor (NRB /10 RBs), 2\*floor (NRB /10 RBs)}  Note: NRB is the number of RBs defined per channel bandwidth by RAN4 in 38.101-1 Table 5.3.2-1 for FR1 and 38.101-2 Table 5.3.2-1 for FR2  Note: Configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Note: Component 2 is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1  Note: UE supporting this FG also support receiving SCI format 1B | Optional with capability signaling |

**Agreement: Introduce the following new rows/FGs**

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| 41. NR\_pos\_enh2 | 41-1-xx | Supports SL PRS Rx for a band configured with SL CA | 1. Support of SL PRS reception in a single carrier for a shared SL PRS resource pool and/or a dedicated SL PRS resource pool for a band configured with SL CA | One of {41-1-2 or 41-1-3}  47-v1 | Yes | No | UE does not support SL PRS reception for a shared SL PRS resource pool and/or a dedicated SL PRS resource pool for a band configured with SL CA | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported  Note: In a shared SL PRS resource pool in a single SL carrier: Tx power control follows the rule defined for SL CA in NR Rel-18.  Note: In a dedicated SL PRS resource pool in a single SL carrier when the slots (pre)configured for the dedicated SL PRS resource pool do not collide with the slots (pre)configured for any other resource pool or S-SSB resource(s) in other carriers. | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-xx | Supports SL PRS Tx for a band configured with SL CA | 1. Support of SL PRS transmission in a single carrier for a shared SL PRS resource pool and/or a dedicated SL PRS resource pool for a band configured with SL CA | One of {41-1-4a, 41-1-4b or 41-1-4c}  47-v1 | Yes | No | UE does not support SL PRS transmission for a shared SL PRS resource pool and/or a dedicated SL PRS resource pool for a band configured with SL CA | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported  Note: In a shared SL PRS resource pool in a single SL carrier: Tx power control follows the rule defined for SL CA in NR Rel-18.  Note: In a dedicated SL PRS resource pool in a single SL carrier when the slots (pre)configured for the dedicated SL PRS resource pool do not collide with the slots (pre)configured for any other resource pool or S-SSB resource(s) in other carriers. | Optional with capability signaling |

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| 41. NR\_pos\_enh2 | 41-2-8 | Support to perform ~~legacy~~ DL PRS-RSRP, DL PRS-RSRPP, DL RSTD measurements inside the indicated time window only for DL TDoA | Support to perform ~~legacy~~ measurements inside the indicated time window only for DL TDoA | 13-3a | No | N/A | The UE may use the indicated DL PRS resource set(s) occurring outside the indicated time window for ~~legacy~~ PRS measurements for DL TDoA in addition to the indicated DL PRS resource set(s) occurring inside the indicated time window | Per band | No | No | No | Need for location server to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-2-9 | Support to perform ~~legacy~~ DL PRS-RSRP, DL PRS-RSRPP, UE Rx-Tx measurements inside the indicated time window only for multi-RTT | Support to perform ~~legacy~~ measurements inside the indicated time window only for multi-RTT | 13-4a | No | N/A | The UE may use the indicated DL PRS resource set(s) occurring outside the indicated time window for ~~legacy~~ PRS measurements for multi-RTT in addition to the indicated DL PRS resource set(s) occurring inside the indicated time window | Per band | No | No | No | Need for location server to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-2-10 | Support to perform ~~legacy~~ DL PRS-RSRP, DL PRS-RSRPP measurements inside the indicated time window only for DL AoD | Support to perform ~~legacy~~ measurements inside the indicated time window only for DL AoD | 13-2a | No | N/A | The UE may use the indicated DL PRS resource set(s) occurring outside the indicated time window for ~~legacy~~ PRS measurements for DL AoD in addition to the indicated DL PRS resource set(s) occurring inside the indicated time window | Per band | No | No | No | Need for location server to know if the feature is supported | Optional with capability signaling |

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| 41. NR\_pos\_enh2 | 41-3-3 | Support of PRS measurement in RRC\_IDLE | Support of DL PRS measurement in RRC\_IDLE for DL-TDOA and/or DL-AoD ~~Rel. 17 methods~~ the UE supports in RRC\_INACTIVE | 13-1, at least one of {27-18a, 27-18b}, 27-6~~}~~ | No | n/a | PRS measurements in RRC\_IDLE not supported | Per band | n/a | n/a | n/a | Need for location server to know if the feature is supported | Optional with capability signaling. |

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| 41. NR\_pos\_enh2 | 41-1-4a | Transmitting SL-PRS in a shared resource pool | 1. Support of transmitting SL-PRS in a shared resource pool  2. Support transmitting SCI format 2D | 15-2 or 15-3, 41-1-2 | Yes | No | Transmitting SL-PRS in a shared resource pool is not supported | Per band | n/a | n/a | n/a | The supported resource allocation modes are the same as for communication and signaled in FGs 15-2 and 15-3  Need for location server/UE to know if the feature is supported  Note: If UE indicates support of *p0-OLPC-Sidelink-r17*, the range of P0 values associated with p0-OLPC-Sidelink-r17 is used for SL PRS transmission | Optional with capability signaling |

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| 44. NR\_NTN\_enh | 44-1 | PUCCH repetition on common PUCCH resource | 1. Support repetition transmission of PUCCH for Msg4 HARQ-ACK on common PUCCH resource (i.e., PUCCH resource before dedicated configuration is provided)  2. Support receiving repetition factor in system information  3. Support receiving repetition factor in DCI format 1\_0 with CRC scrambled by TC-RNTI scheduling Msg4 PDSCH  4. Support Msg3 to report capability for PUCCH Msg4 HARQ-ACK repetition  5. Extension of the repetition transmission of PUCCH before dedicated PUCCH resource configuration  6. Support of RSRP threshold for Msg4 HARQ-ACK repetition on common PUCCH resources |  | Yes | No | UE does not support PUCCH repetition for common PUCCH resources | Per Band | N/A | N/A | N/A | A UE that includes LCID codepoint = one of {2, 3, 4, 5, 6, 7} for UL CCCH when the LX field is set to 1 must support FG 44-1  ~~[~~Note: This UE feature group is applicable only for bands in Tables 5.2.2-1 and 5.2.3-1 ~~[TBD for FR2-NTN bands]~~  in TS 38.101-5 ~~[~~and HAPS operation bands in Clause 5.2 of TS 38.104~~]~~ | Optional without capability signaling |

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| 44. NR\_NTN\_enh | 44-3 | UE Rx-Tx Measurement and Report for Multi-RTT with single satellite in NTN | 1. Support UE Rx-Tx time difference based on single sample and UE Rx-Tx time difference offset measurement and report for Multi-RTT positioning with single satellite in NTN  2. Support of reporting DL timing drift due to Doppler over the service link associated with the UE Rx-Tx time difference measurement period | 13-4, 13-8 | No | No | UE does not support Multi-RTT positioning with single satellite in NTN | Per Band | N/A | N/A | N/A | Note: This UE feature group is applicable only for bands in Tables 5.2.2-1 and 5.2.3-1 ~~[TBD for FR2-NTN bands]~~ in TS 38.101-5  Need for location server to know if the feature is supported | Optional with capability signaling |

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| 2. IoT\_NTN\_enh | 2-1g-2 | Dynamic HARQ feedback disabling by DCI-based overridden indication for NB-IoT in multi TB case | 1. UE receives DCI indication to override RRC configuration for disabling HARQ feedback  2. For ~~single~~ multi TB ~~scheduled~~ scheduling a single transport block by single DCI, UE follows NPDCCH monitoring behavior for a HARQ process configured as HARQ feedback disabled by per-HARQ process bitmap signaling and further reversed to HARQ feedback enabled by DCI | At least one of {Rel-16 2-6, 2-7},  Rel. 17 2-1b,  Rel-18 2-1e-2, 2-1f-2 | Yes | N/A | Release 18 NB-IoT UE cannot disable HARQ feedback in multi TB case | Per UE | No | No | Note: this applies to multi-TB case | Optional with capability signalling |

**Agreement: Include the following into the LS to RAN2 including an action for RAN2 to please review the proposed changes for alignment between RAN1 agreements and RAN2 implementations according to RAN1’s understanding**

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| 6.3.3 UE capability information elements First change – *FeatureSetUplink* The IE *FeatureSetUplink* is used to indicate the features that the UE supports on the carriers corresponding to one band entry in a band combination.  *FeatureSetUplink* information element  -- ASN1START  -- TAG-FEATURESETUPLINK-START  FeatureSetUplink ::= SEQUENCE {  featureSetListPerUplinkCC SEQUENCE (SIZE (1.. maxNrofServingCells)) OF FeatureSetUplinkPerCC-Id,  scalingFactor ENUMERATED {f0p4, f0p75, f0p8} OPTIONAL,  dummy3 ENUMERATED {supported} OPTIONAL,  intraBandFreqSeparationUL FreqSeparationClass OPTIONAL,  searchSpaceSharingCA-UL ENUMERATED {supported} OPTIONAL,  dummy1 DummyI OPTIONAL,  supportedSRS-Resources SRS-Resources OPTIONAL,  twoPUCCH-Group ENUMERATED {supported} OPTIONAL,  dynamicSwitchSUL ENUMERATED {supported} OPTIONAL,  simultaneousTxSUL-NonSUL ENUMERATED {supported} OPTIONAL,  pusch-ProcessingType1-DifferentTB-PerSlot SEQUENCE {  scs-15kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL,  scs-30kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL,  scs-60kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL,  scs-120kHz ENUMERATED {upto2, upto4, upto7} OPTIONAL  } OPTIONAL,  dummy2 DummyF OPTIONAL  }  FeatureSetUplink-v1540 ::= SEQUENCE {  zeroSlotOffsetAperiodicSRS ENUMERATED {supported} OPTIONAL,  pa-PhaseDiscontinuityImpacts ENUMERATED {supported} OPTIONAL,  pusch-SeparationWithGap ENUMERATED {supported} OPTIONAL,  pusch-ProcessingType2 SEQUENCE {  scs-15kHz ProcessingParameters OPTIONAL,  scs-30kHz ProcessingParameters OPTIONAL,  scs-60kHz ProcessingParameters OPTIONAL  } OPTIONAL,  ul-MCS-TableAlt-DynamicIndication ENUMERATED {supported} OPTIONAL  }  FeatureSetUplink-v1610 ::= SEQUENCE {  -- R1 11-5: PUsCH repetition Type B  pusch-RepetitionTypeB-r16 SEQUENCE {  maxNumberPUSCH-Tx-r16 ENUMERATED {n2, n3, n4, n7, n8, n12},  hoppingScheme-r16 ENUMERATED {interSlotHopping, interRepetitionHopping, both}  } OPTIONAL,  -- R1 11-7: UL cancelation scheme for self-carrier  ul-CancellationSelfCarrier-r16 ENUMERATED {supported} OPTIONAL,  -- R1 11-7a: UL cancelation scheme for cross-carrier  ul-CancellationCrossCarrier-r16 ENUMERATED {supported} OPTIONAL,  -- R1 16-5c: The maximum number of SRS resources in one SRS resource set with usage set to 'codebook' for Mode 2  ul-FullPwrMode2-MaxSRS-ResInSet-r16 ENUMERATED {n1, n2, n4} OPTIONAL,  -- R1 22-4a/4b/4c/4d: CBG based transmission for UL with unicast PUSCH(s) per slot per CC with UE processing time Capability 1  cbgPUSCH-ProcessingType1-DifferentTB-PerSlot-r16 SEQUENCE {  scs-15kHz-r16 ENUMERATED {one-pusch, upto2, upto4, upto7} OPTIONAL,  scs-30kHz-r16 ENUMERATED {one-pusch, upto2, upto4, upto7} OPTIONAL,  scs-60kHz-r16 ENUMERATED {one-pusch, upto2, upto4, upto7} OPTIONAL,  scs-120kHz-r16 ENUMERATED {one-pusch, upto2, upto4, upto7} OPTIONAL  } OPTIONAL,  -- R1 22-3a/3b/3c/3d: CBG based transmission for UL with unicast PUSCH(s) per slot per CC with UE processing time Capability 2  cbgPUSCH-ProcessingType2-DifferentTB-PerSlot-r16 SEQUENCE {  scs-15kHz-r16 ENUMERATED {one-pusch, upto2, upto4, upto7} OPTIONAL,  scs-30kHz-r16 ENUMERATED {one-pusch, upto2, upto4, upto7} OPTIONAL,  scs-60kHz-r16 ENUMERATED {one-pusch, upto2, upto4, upto7} OPTIONAL,  scs-120kHz-r16 ENUMERATED {one-pusch, upto2, upto4, upto7} OPTIONAL  } OPTIONAL,  supportedSRS-PosResources-r16 SRS-AllPosResources-r16 OPTIONAL,  intraFreqDAPS-UL-r16 SEQUENCE {  dummy ENUMERATED {supported} OPTIONAL,  intraFreqTwoTAGs-DAPS-r16 ENUMERATED {supported} OPTIONAL,  dummy1 ENUMERATED {supported} OPTIONAL,  dummy2 ENUMERATED {supported} OPTIONAL,  dummy3 ENUMERATED {short, long} OPTIONAL  } OPTIONAL,  intraBandFreqSeparationUL-v1620 FreqSeparationClassUL-v1620 OPTIONAL,  -- R1 11-3: More than one PUCCH for HARQ-ACK transmission within a slot  multiPUCCH-r16 SEQUENCE {  sub-SlotConfig-NCP-r16 ENUMERATED {set1, set2} OPTIONAL,  sub-SlotConfig-ECP-r16 ENUMERATED {set1, set2} OPTIONAL  } OPTIONAL,  -- R1 11-3c: 2 PUCCH of format 0 or 2 for a single 7\*2-symbol subslot based HARQ-ACK codebook  twoPUCCH-Type1-r16 ENUMERATED {supported} OPTIONAL,  -- R1 11-3d: 2 PUCCH of format 0 or 2 for a single 2\*7-symbol subslot based HARQ-ACK codebook  twoPUCCH-Type2-r16 ENUMERATED {supported} OPTIONAL,  -- R1 11-3e: 1 PUCCH format 0 or 2 and 1 PUCCH format 1, 3 or 4 in the same subslot for a single 2\*7-symbol HARQ-ACK codebooks  twoPUCCH-Type3-r16 ENUMERATED {supported} OPTIONAL,  -- R1 11-3f: 2 PUCCH transmissions in the same subslot for a single 2\*7-symbol HARQ-ACK codebooks which are not covered by 11-3d and  -- 11-3e  twoPUCCH-Type4-r16 ENUMERATED {supported} OPTIONAL,  -- R1 11-3g: SR/HARQ-ACK multiplexing once per subslot using a PUCCH (or HARQ-ACK piggybacked on a PUSCH) when SR/HARQ-ACK  -- are supposed to be sent with different starting symbols in a subslot  mux-SR-HARQ-ACK-r16 ENUMERATED {supported} OPTIONAL,  dummy1 ENUMERATED {supported} OPTIONAL,  dummy2 ENUMERATED {supported} OPTIONAL,  -- R1 11-4c: 2 PUCCH of format 0 or 2 for two HARQ-ACK codebooks with one 7\*2-symbol sub-slot based HARQ-ACK codebook  twoPUCCH-Type5-r16 ENUMERATED {supported} OPTIONAL,  -- R1 11-4d: 2 PUCCH of format 0 or 2 in consecutive symbols for two HARQ-ACK codebooks with one 2\*7-symbol sub-slot based HARQ-ACK  -- codebook  twoPUCCH-Type6-r16 ENUMERATED {supported} OPTIONAL,  -- R1 11-4e: 2 PUCCH of format 0 or 2 for two subslot based HARQ-ACK codebooks  twoPUCCH-Type7-r16 ENUMERATED {supported} OPTIONAL,  -- R1 11-4f: 1 PUCCH format 0 or 2 and 1 PUCCH format 1, 3 or 4 in the same subslot for HARQ-ACK codebooks with one 2\*7-symbol  -- subslot based HARQ-ACK codebook  twoPUCCH-Type8-r16 ENUMERATED {supported} OPTIONAL,  -- R1 11-4g: 1 PUCCH format 0 or 2 and 1 PUCCH format 1, 3 or 4 in the same subslot for two subslot based HARQ-ACK codebooks  twoPUCCH-Type9-r16 ENUMERATED {supported} OPTIONAL,  -- R1 11-4h: 2 PUCCH transmissions in the same subslot for two HARQ-ACK codebooks with one 2\*7-symbol subslot which are not covered  -- by 11-4c and 11-4e  twoPUCCH-Type10-r16 ENUMERATED {supported} OPTIONAL,  -- R1 11-4i: 2 PUCCH transmissions in the same subslot for two subslot based HARQ-ACK codebooks which are not covered by 11-4d and  -- 11-4f  twoPUCCH-Type11-r16 ENUMERATED {supported} OPTIONAL,  -- R1 12-1: UL intra-UE multiplexing/prioritization of overlapping channel/signals with two priority levels in physical layer  ul-IntraUE-Mux-r16 SEQUENCE {  pusch-PreparationLowPriority-r16 ENUMERATED {sym0, sym1, sym2},  pusch-PreparationHighPriority-r16 ENUMERATED {sym0, sym1, sym2}  } OPTIONAL,  -- R1 16-5a: Supported UL full power transmission mode of fullpower  ul-FullPwrMode-r16 ENUMERATED {supported} OPTIONAL,  -- R1 18-5d: Processing up to X unicast DCI scheduling for UL per scheduled CC  crossCarrierSchedulingProcessing-DiffSCS-r16 SEQUENCE {  scs-15kHz-120kHz-r16 ENUMERATED {n1,n2,n4} OPTIONAL,  scs-15kHz-60kHz-r16 ENUMERATED {n1,n2,n4} OPTIONAL,  scs-30kHz-120kHz-r16 ENUMERATED {n1,n2,n4} OPTIONAL,  scs-15kHz-30kHz-r16 ENUMERATED {n2} OPTIONAL,  scs-30kHz-60kHz-r16 ENUMERATED {n2} OPTIONAL,  scs-60kHz-120kHz-r16 ENUMERATED {n2} OPTIONAL  } OPTIONAL,  -- R1 16-5b: Supported UL full power transmission mode of fullpowerMode1  ul-FullPwrMode1-r16 ENUMERATED {supported} OPTIONAL,  -- R1 16-5c-2: Ports configuration for Mode 2  ul-FullPwrMode2-SRSConfig-diffNumSRSPorts-r16 ENUMERATED {p1-2, p1-4, p1-2-4} OPTIONAL,  -- R1 16-5c-3: TPMI group for Mode 2  ul-FullPwrMode2-TPMIGroup-r16 SEQUENCE {  twoPorts-r16 BIT STRING(SIZE(2)) OPTIONAL,  fourPortsNonCoherent-r16 ENUMERATED{g0, g1, g2, g3} OPTIONAL,  fourPortsPartialCoherent-r16 ENUMERATED{g0, g1, g2, g3, g4, g5, g6} OPTIONAL  } OPTIONAL  }  FeatureSetUplink-v1630 ::= SEQUENCE {  -- R1 22-8: For SRS for CB PUSCH and antenna switching on FR1 with symbol level offset for aperiodic SRS transmission  offsetSRS-CB-PUSCH-Ant-Switch-fr1-r16 ENUMERATED {supported} OPTIONAL,  -- R1 22-8a: PDCCH monitoring on any span of up to 3 consecutive OFDM symbols of a slot and constrained timeline for SRS for CB  -- PUSCH and antenna switching on FR1  offsetSRS-CB-PUSCH-PDCCH-MonitorSingleOcc-fr1-r16 ENUMERATED {supported} OPTIONAL,  -- R1 22-8b: For type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS, monitoring occasion can be any OFDM symbol(s)  -- of a slot for Case 2 and constrained timeline for SRS for CB PUSCH and antenna switching on FR1  offsetSRS-CB-PUSCH-PDCCH-MonitorAnyOccWithoutGap-fr1-r16 ENUMERATED {supported} OPTIONAL,  -- R1 22-8c: For type 1 CSS with dedicated RRC configuration, type 3 CSS, and UE-SS, monitoring occasion can be any OFDM symbol(s)  -- of a slot for Case 2 with a DCI gap and constrained timeline for SRS for CB PUSCH and antenna switching on FR1  offsetSRS-CB-PUSCH-PDCCH-MonitorAnyOccWithGap-fr1-r16 ENUMERATED {supported} OPTIONAL,  dummy ENUMERATED {supported} OPTIONAL,  -- R1 22-9: Cancellation of PUCCH, PUSCH or PRACH with a DCI scheduling a PDSCH or CSI-RS or a DCI format 2\_0 for SFI  partialCancellationPUCCH-PUSCH-PRACH-TX-r16 ENUMERATED {supported} OPTIONAL  }  FeatureSetUplink-v1640 ::= SEQUENCE {  -- R1 11-4: Two HARQ-ACK codebooks with up to one sub-slot based HARQ-ACK codebook (i.e. slot-based + slot-based, or slot-based +  -- sub-slot based) simultaneously constructed for supporting HARQ-ACK codebooks with different priorities at a UE  twoHARQ-ACK-Codebook-type1-r16 SubSlot-Config-r16 OPTIONAL,  -- R1 11-4a: Two sub-slot based HARQ-ACK codebooks simultaneously constructed for supporting HARQ-ACK codebooks with different  -- priorities at a UE  twoHARQ-ACK-Codebook-type2-r16 SubSlot-Config-r16 OPTIONAL,  -- R1 22-8d: All PDCCH monitoring occasion can be any OFDM symbol(s) of a slot for Case 2 with a span gap and constrained timeline  -- for SRS for CB PUSCH and antenna switching on FR1  offsetSRS-CB-PUSCH-PDCCH-MonitorAnyOccWithSpanGap-fr1-r16 SEQUENCE {  scs-15kHz-r16 ENUMERATED {set1, set2, set3} OPTIONAL,  scs-30kHz-r16 ENUMERATED {set1, set2, set3} OPTIONAL,  scs-60kHz-r16 ENUMERATED {set1, set2, set3} OPTIONAL  } OPTIONAL  }  FeatureSetUplink-v16d0 ::= SEQUENCE {  pusch-RepetitionTypeB-v16d0 SEQUENCE {  maxNumberPUSCH-Tx-Cap1-r16 ENUMERATED {n2, n3, n4, n7, n8, n12},  maxNumberPUSCH-Tx-Cap2-r16 ENUMERATED {n2, n3, n4, n7, n8, n12}  } OPTIONAL  }  FeatureSetUplink-v1710 ::= SEQUENCE {  -- R1 23-3-1 Multi-TRP PUSCH repetition (type A) -codebook based  mTRP-PUSCH-TypeA-CB-r17 ENUMERATED {n1,n2,n4} OPTIONAL,  -- R1 23-3-1-2 Multi-TRP PUSCH repetition (type A) - non-codebook based  mTRP-PUSCH-RepetitionTypeA-r17 ENUMERATED {n1,n2,n3,n4} OPTIONAL,  -- R1 23-3-3 Multi-TRP PUCCH repetition-intra-slot  mTRP-PUCCH-IntraSlot-r17 ENUMERATED {pf0-2, pf1-3-4, pf0-4} OPTIONAL,  -- R1 23-8-4 Maximum 2 SP and 1 periodic SRS sets for antenna switching  srs-AntennaSwitching2SP-1Periodic-r17 ENUMERATED {supported} OPTIONAL,  -- R1 23-8-9 Extension of aperiodic SRS configuration for 1T4R, 1T2R and 2T4R  srs-ExtensionAperiodicSRS-r17 ENUMERATED {supported} OPTIONAL,  -- R1 23-8-10 1 aperiodic SRS resource set for 1T4R  srs-OneAP-SRS-r17 ENUMERATED {supported} OPTIONAL,  -- R4 16-8 UE power class per band per band combination  ue-PowerClassPerBandPerBC-r17 ENUMERATED {pc1dot5, pc2, pc3} OPTIONAL,  -- R4 17-8 UL transmission in FR2 bands within an UL gap when the UL gap is activated  tx-Support-UL-GapFR2-r17 ENUMERATED {supported} OPTIONAL  }  FeatureSetUplink-v1720 ::= SEQUENCE {  -- R1 25-3: Repetitions for PUCCH format 0, 1, 2, 3 and 4 over multiple PUCCH subslots with configured K = 2, 4, 8  pucch-Repetition-F0-1-2-3-4-RRC-Config-r17 ENUMERATED {supported} OPTIONAL,  -- R1 25-3a: Repetitions for PUCCH format 0, 1, 2, 3 and 4 over multiple PUCCH subslots using dynamic repetition indication  pucch-Repetition-F0-1-2-3-4-DynamicIndication-r17 ENUMERATED {supported} OPTIONAL,  -- R1 25-3b: Inter-subslot frequency hopping for PUCCH repetitions  interSubslotFreqHopping-PUCCH-r17 ENUMERATED {supported} OPTIONAL,  -- R1 25-8: Semi-static HARQ-ACK codebook for sub-slot PUCCH  semiStaticHARQ-ACK-CodebookSub-SlotPUCCH-r17 ENUMERATED {supported} OPTIONAL,  -- R1 25-14: PHY prioritization of overlapping low-priority DG-PUSCH and high-priority CG-PUSCH  phy-PrioritizationLowPriorityDG-HighPriorityCG-r17 INTEGER(1..16) OPTIONAL,  -- R1 25-15: PHY prioritization of overlapping high-priority DG-PUSCH and low-priority CG-PUSCH  phy-PrioritizationHighPriorityDG-LowPriorityCG-r17 SEQUENCE {  pusch-PreparationLowPriority-r17 ENUMERATED{sym0, sym1, sym2},  additionalCancellationTime-r17 SEQUENCE {  scs-15kHz-r17 ENUMERATED{sym0, sym1, sym2} OPTIONAL,  scs-30kHz-r17 ENUMERATED{sym0, sym1, sym2, sym3, sym4} OPTIONAL,  scs-60kHz-r17 ENUMERATED{sym0, sym1, sym2, sym3, sym4, sym5, sym6, sym7, sym8} OPTIONAL,  scs-120kHz-r17 ENUMERATED{sym0, sym1, sym2, sym3, sym4, sym5, sym6, sym7, sym8, sym9,  sym10, sym11, sym12, sym13, sym14, sym15, sym16} OPTIONAL  },  maxNumberCarriers-r17 INTEGER(1..16)  } OPTIONAL,  -- R4 17-5 Support of UL DC location(s) report  extendedDC-LocationReport-r17 ENUMERATED {supported} OPTIONAL  }  FeatureSetUplink-v1800 ::= SEQUENCE {  -- R1 40-3-3-1a: Supported maximum delay value larger than D\_basic  maxDelayValueBeyondD-Basic-r18 ENUMERATED {sl2,sl3,sl4,sl5,sl6,sl10} OPTIONAL,  -- R1 40-3-3-2: Number of delay values  tdcp-NumberDelayValue-r18 INTEGER (2..4) OPTIONAL,  -- R1 40-3-3-4: Phase report  phaseReportMoreThanOne-r18 ENUMERATED {supported} OPTIONAL,  -- R1 40-3-3-6: Maximum number of TRS resource sets in a report configuration  maxNumberTRS-ResourceSet-r18 INTEGER (2..3) OPTIONAL,  -- R1 40-3-3-7: Maximum number of TDCP report settings per-BWP  maxNumberTDCP-PerBWP-r18 INTEGER (1..4) OPTIONAL,  -- R1 40-4-6c: DMRS type for Rel.18 enhanced DMRS ports for PUSCH  pusch-DMRS-TypeEnh-r18 SEQUENCE {  dmrs-Type-r18 ENUMERATED {etype1, both},  pusch-TypeA-DMRS-r18 SEQUENCE {  -- R1 40-4-6: Basic feature of Rel.18 enhanced DMRS ports for PUSCH for scheduling type A for Rel.18 enhanced DMRS ports  dmrs-TypeA-r18 ENUMERATED {supported},  -- R1 40-4-6d: 2 symbols front-loaded DMRS (uplink) for Rel.18 enhanced DMRS ports for PUSCH  pusch-2SymbolFL-DMRS-r18 ENUMERATED {supported} OPTIONAL,  -- R1 40-4-6e: 2-symbol FL DMRS + one additional 2-symbols DMRS for Rel.18 enhanced DMRS ports for PUSCH  pusch-2SymbolFL-DMRS-Addition2Symbol-r18 ENUMERATED {supported} OPTIONAL,  -- R1 40-4-6f: 1 symbol FL DMRS and 3 additional DMRS symbols for Rel.18 enhanced DMRS ports for PUSCH  pusch-1SymbolFL-DMRS-Addition3Symbol-r18 ENUMERATED {supported} OPTIONAL,  -- R1 40-4-10: DMRS port configuration for PUSCH with 8Tx  pusch-DMRS8Tx-r18 ENUMERATED {rel15, both} OPTIONAL  } OPTIONAL,  -- R1 40-4-6a: Basic feature of Rel.18 enhanced DMRS ports for PUSCH for scheduling type B for Rel.18 enhanced DMRS ports  pusch-TypeB-DMRS-r18 ENUMERATED {supported} OPTIONAL,  -- R1 40-4-6g: 1 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 1-4  pusch-rank-1-4-1Port-r18 ENUMERATED {supported} OPTIONAL,  -- R1 40-4-6h: 1 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 5-8  pusch-rank-5-8-1Port-r18 ENUMERATED {supported} OPTIONAL,  -- R1 40-4-6i: 2 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 1-4  pusch-rank-1-4-2Port-r18 ENUMERATED {supported} OPTIONAL,  -- R1 40-4-6j: 2 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 5-8  pusch-rank-5-8-2Port-r18 ENUMERATED {supported} OPTIONAL  } OPTIONAL,  -- R1 40-4-13: Support Rel-18 UL DMRS with single-DCI based M-TRP  ul-DMRS-SingleDCI-M-TRP-r18 ENUMERATED {supported} OPTIONAL,  -- R1 40-4-14: Support Rel-18 UL DMRS with M-DCI based M-TRP  ul-DMRS-M-DCI-M-TRP-r18 ENUMERATED {supported} OPTIONAL,  -- R1 40-5-5: Maximum 2 SP and 1 periodic SRS sets for 8T8R antenna switching  srs-AntennaSwitching8T8R2SP-1Periodic-r18 ENUMERATED {supported} OPTIONAL,  -- R1 40-6-4: Single-DCI based STx2P SFN scheme for PUCCH  pucch-SingleDCI-STx2P-SFN-r18 ENUMERATED {pf0-2, pf1-3-4, pf0-4} OPTIONAL,  -- R1 41-4-6: Positioning SRS bandwidth aggregation in RRC\_CONNECTED  posSRS-BWA-RRC-Connected-r18 PosSRS-BWA-RRC-Connected-r18 OPTIONAL,  -- R1 41-4-7: Positioning SRS bandwidth aggregation independent from UL communication CA in RRC\_CONNECTED  posSRS-BWA-IndependentCA-RRC-Connected-r18 PosSRS-BWA-IndependentCA-RRC-Connected-r18 OPTIONAL,  -- R1 41-4-9: Indicate which other bands in the band combination are affected due to the need of a guard period  posSRS-BWA-AffectedBandList-r18 SEQUENCE (SIZE (1..maxBands)) OF FreqBandIndicatorNR OPTIONAL,  -- R4 27-1 TxDiversity for 4Tx  txDiversity4Tx-r18 ENUMERATED {supported} OPTIONAL,  -- R4 41-2: Power boosting for DFT-s-OFDM pi/2 BPSK and QPSK transmissions without modified spectrum flatness requirement  powerBoosting-pi2BPSK-QPSK-r18 ENUMERATED {supported} OPTIONAL,  -- R4 41-3: Power boosting for DFT-s-OFDM pi/2 BPSK and QPSK transmissions with modified spectrum flatness requirement shaping  powerBoosting-pi2BPSK-QPSK-Modified-r18 ENUMERATED {supported} OPTIONAL,  -- R4 44-1 TxDiversity for 2Tx  txDiversity2Tx-r18 ENUMERATED {supported} OPTIONAL  }  SubSlot-Config-r16 ::= SEQUENCE {  sub-SlotConfig-NCP-r16 ENUMERATED {n4,n5,n6,n7} OPTIONAL,  sub-SlotConfig-ECP-r16 ENUMERATED {n4,n5,n6} OPTIONAL  }  SRS-AllPosResources-r16 ::= SEQUENCE {  srs-PosResources-r16 SRS-PosResources-r16,  srs-PosResourceAP-r16 SRS-PosResourceAP-r16 OPTIONAL,  srs-PosResourceSP-r16 SRS-PosResourceSP-r16 OPTIONAL  }  SRS-PosResources-r16 ::= SEQUENCE {  maxNumberSRS-PosResourceSetPerBWP-r16 ENUMERATED {n1, n2, n4, n8, n12, n16},  maxNumberSRS-PosResourcesPerBWP-r16 ENUMERATED {n1, n2, n4, n8, n16, n32, n64},  maxNumberSRS-ResourcesPerBWP-PerSlot-r16 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14},  maxNumberPeriodicSRS-PosResourcesPerBWP-r16 ENUMERATED {n1, n2, n4, n8, n16, n32, n64},  maxNumberPeriodicSRS-PosResourcesPerBWP-PerSlot-r16 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}  }  SRS-PosResourceAP-r16 ::= SEQUENCE {  maxNumberAP-SRS-PosResourcesPerBWP-r16 ENUMERATED {n1, n2, n4, n8, n16, n32, n64},  maxNumberAP-SRS-PosResourcesPerBWP-PerSlot-r16 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}  }  SRS-PosResourceSP-r16 ::= SEQUENCE {  maxNumberSP-SRS-PosResourcesPerBWP-r16 ENUMERATED {n1, n2, n4, n8, n16, n32, n64},  maxNumberSP-SRS-PosResourcesPerBWP-PerSlot-r16 ENUMERATED {n1, n2, n3, n4, n5, n6, n8, n10, n12, n14}  }  SRS-Resources ::= SEQUENCE {  maxNumberAperiodicSRS-PerBWP ENUMERATED {n1, n2, n4, n8, n16},  maxNumberAperiodicSRS-PerBWP-PerSlot INTEGER (1..6),  maxNumberPeriodicSRS-PerBWP ENUMERATED {n1, n2, n4, n8, n16},  maxNumberPeriodicSRS-PerBWP-PerSlot INTEGER (1..6),  maxNumberSemiPersistentSRS-PerBWP ENUMERATED {n1, n2, n4, n8, n16},  maxNumberSemiPersistentSRS-PerBWP-PerSlot INTEGER (1..6),  maxNumberSRS-Ports-PerResource ENUMERATED {n1, n2, n4}  }  DummyF ::= SEQUENCE {  maxNumberPeriodicCSI-ReportPerBWP INTEGER (1..4),  maxNumberAperiodicCSI-ReportPerBWP INTEGER (1..4),  maxNumberSemiPersistentCSI-ReportPerBWP INTEGER (0..4),  simultaneousCSI-ReportsAllCC INTEGER (5..32)  }  PosSRS-BWA-RRC-Connected-r18 ::= SEQUENCE {  numOfCarriersIntraBandContiguous-r18 ENUMERATED {two, three, twoandthree},  maximumAggregatedBW-TwoCarriersFR1-r18 ENUMERATED { mhz20, mhz40, mhz50, mhz80, mhz100, mhz160, 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, 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,  ...  }  -- TAG-FEATURESETUPLINK-STOP  -- ASN1STOP   |  | | --- | | *FeatureSetUplink* field descriptions | | ***featureSetListPerUplinkCC***  Indicates which features the UE supports on the individual UL carriers of the feature set (and hence of a band entry that refers to the feature set). The UE shall hence include at least as many *FeatureSetUplinkPerCC-Id* in this list as the number of carriers it supports according to the *ca-BandwidthClassUL*, except if indicating additional functionality by reducing the number of *FeatureSetUplinkPerCC-Id* in the feature set (see NOTE 1 in *FeatureSetCombination* IE description). The order of the elements in this list is not relevant, i.e., the network may configure any of the carriers in accordance with any of the *FeatureSetUplinkPerCC-Id* in this list. |   Next change – *PosSRS-BWA-RRC-Inactive* The IE *PosSRS-BWA-RRC-Inactive* is used to convey the capabilities supported by the UE for support of positioning SRS bandwidth aggregation in RRC\_INACTIVE  *PosSRS-BWA-RRC-Inactive information element*  -- ASN1START  -- TAG-POSSRS-BWA-RRC-INACTIVE-START  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},  guardSPeriod-r18 ENUMERATED {n0, n30, n100, n140, n200},  powerClassForTwoaggregatedCarriers-r18 ENUMERATED {pc2, pc3} OPTIONAL,  powerClassForThreeaggregatedCarriers-r18 ENUMERATED {pc2, pc3} OPTIONAL,  ...  }  -- TAG-POSSRS-BWA-RRC-INACTIVE-STOP  -- ASN1STOP  End of the change |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 42. Netw\_Energy\_NR | 42-1 | Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for periodic CSI reporting | 1. Support of CSI feedback based on CSI report sub-configuration(s), each containing one port subset configuration/list of CSI-RS resource IDs for periodic CSI reporting  2. The max number of sub-configurations Lmax in one CSI report configuration  4. Supported maximum number of simultaneous NZP-CSI-RS resources per CC  5. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC  6. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs  7. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs  8. Support of single-panel type 1 codebook  9. Supported total number of periodic CSI reporting settings without sub-configurations plus the total number of sub-configurations across periodic CSI report settings with sub-configurations per BWP | FFS | Yes |  | UE does not support spatial domain adaptation for periodic CSI reporting | Per band | No | No | N/A | Component 1 candidate values: {SD-type1, SD-type2, SD-type1and2}  Note: SD-type1 refers to configuration contain one port subset  Note: SD-type2 refers to configuration contain list of CSI-RS resource IDs  Component 2 candidate values: {2,3,4}  Component 4 candidate values: SD Type 1: {1, 2, 3 … 32} SD Type 2: {1, 2, 3 … 32}  Component 5 candidate values: SD Type 1: {8, 16, 24, … 128 } SD Type 2: {8, 16, 24, … 128 }  Component 6 candidate values: SD Type 1: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64} SD Type 2: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}  Component 7 candidate value: SD Type 1: {8, 16, 24, …, 248, 256} SD Type 2: {8, 16, 24, …, 248, 256}  Component 9 candidate values: {2, 3, 4}  Note: Components 6 and 7 are signaled per BC | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-1a | Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for semi-persistent CSI reporting on PUSCH | 1. Support of CSI feedback based on CSI report sub-configuration(s), each containing one port subset configuration/list of CSI-RS resource IDs for semi-persistent CSI reporting on PUSCH  2. The max number of sub-configurations Lmax in one CSI report configuration  3. Report of N CSI sub-report(s) included in one SP-CSI report where each CSI sub-report corresponds to one sub-configuration.  4. Supported maximum number of simultaneous NZP-CSI-RS resources per CC  5. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC  6. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs  7. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs  8. Support of single-panel type 1 codebook  9. Supported total number of semi-persistent CSI reporting settings without sub-configurations plus the total number of sub-configurations across semi-persistent CSI report settings with sub-configurations per BWP | FFS | Yes |  | UE does not support spatial domain adaptation for semi-persistent CSI reporting on PUSCH | Per band | No | No | N/A | Component 1 candidate values: {SD-type1, SD-type2, SD-type1and2}  Note: SD-type1 refers to configuration contain one port subset  Note: SD-type2 refers to configuration contain list of CSI-RS resource IDs  Component 2 candidate values: {2,3,4,5,6,7,8}  Component 3 candidate values: {2,3,4}  Component 4 candidate values: {1, 2, 3 … 32}  Component 5 candidate values: {8, 16, 24, … 128}  Component 6 candidate values: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}  Component 7 candidate values: {8, 16, 24, …, 248, 256}  Component 9 candidate values: {2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}  Note: Components 6 and 7 are signaled per BC | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-1c | Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for semi-persistent CSI reporting on PUCCH | 1. Support of CSI feedback based on CSI report sub-configuration(s), each containing one port subset configuration/list of CSI-RS resource IDs for semi-persistent CSI reporting on PUCCH  2. The max number of sub-configurations Lmax in one CSI report configuration  3. Report of N CSI sub-report(s) included in one SP-CSI report where each CSI sub-report corresponds to one sub-configuration.  4. Supported maximum number of simultaneous NZP-CSI-RS resources per CC  5. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC  6. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs  7. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs  8. Support of single-panel type 1 codebook  9. Supported total number of semi-persistent CSI reporting settings without sub-configurations plus the total number of sub-configurations across semi-persistent CSI report settings with sub-configurations per BWP | FFS | Yes |  | UE does not support spatial domain adaptation for semi-persistent CSI reporting on PUCCH | Per band | No | No | N/A | Component 1 candidate values: {SD-type1, SD-type2, SD-type1and2}  Note: SD-type1 refers to configuration contain one port subset  Note: SD-type2 refers to configuration contain list of CSI-RS resource IDs  Component 2 candidate values: {2,3,4}  Component 3 candidate values: {2,3,4}  Component 4 candidate values: {1, 2, 3 … 32}  Component 5 candidate values: {8, 16, 24, … 128}  Component 6 candidate values: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}  Component 7 candidate values: {8, 16, 24, …, 248, 256}  Component 9 candidate values: {2, 3, 4}  Note: Components 6 and 7 are signaled per BC | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-1b | Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for aperiodic CSI reporting | 1. Support of CSI feedback based on CSI report sub-configuration(s), each containing one port subset configuration/list of CSI-RS resource IDs for aperiodic CSI reporting  2. The max number of sub-configurations Lmax in one CSI report configuration  3. Report of N CSI sub-report(s) included in one CSI report where each CSI sub-report corresponds to one sub-configuration  4. Supported maximum number of simultaneous NZP-CSI-RS resources per CC  5. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC  6. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs  7. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs  8. Support of single-panel type 1 codebook  9. Supported total number of aperiodic CSI reporting settings without sub-configurations plus the total number of sub-configurations across aperiodic CSI report settings with sub-configurations per BWP | FFS | Yes |  | UE does not support spatial domain adaptation for aperiodic CSI reporting | Per band | No | No | N/A | Component 1 candidate values: {SD-type1, SD-type2, SD-type1and2}  Note: SD-type1 refers to configuration contain one port subset  Note: SD-type2 refers to configuration contain list of CSI-RS resource IDs  Component 2 candidate values: {2,3,4,5,6,7,8}  Component 3 candidate values {2,3,4}  Component 4 candidate values: SD Type 1: {1, 2, 3 … 32} SD Type 2: {1, 2, 3 … 32}  Component 5 candidate values:  SD Type 1: {8, 16, 24, … 128 } SD Type 2: {8, 16, 24, … 128 }  Component 6 candidate values:  SD Type 1: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64} SD Type 2: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}  Component 7 candidate values:  SD Type 1: {8, 16, 24, …, 248, 256} SD Type 2: {8, 16, 24, …, 248, 256}  Note: Components 6 and 7 are signaled per BC  Component 9 candidate values: {2, 3, 4, 5, 6, 7, 8, 9, 10, 11,12} | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-2 | Power domain adaptation with CSI feedback based on CSI report sub-configuration(s) for periodic CSI reporting | 1. Support of CSI feedback based on CSI report sub-configuration(s), each containing one power offset for aperiodic CSI reporting  2. The max number of sub-configurations Lmax in one CSI report configuration  4. Supported maximum number of simultaneous NZP-CSI-RS resources per CC  5. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC  6. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs  7. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs  8. Support of single-panel type 1 codebook  9. Supported total number of periodic CSI reporting settings without sub-configurations plus the total number of sub-configurations across periodic CSI report settings with sub-configurations per BWP | FFS | Yes |  | UE does not support power domain adaptation for periodicCSI reporting | Per band | No | No | N/A | Component 2 candidate value: {2,3,4}  Component 4 candidate value: {1, 2, 3 … 32}  Component 5 candidate value: {8, 16, 24, … 128 }  Component 6 candidate value: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}  Component 7 candidate value: {8, 16, 24, …, 248, 256}  Note: Components 6 and 7 are signaled per BC  Component 9 candidate values: {2, 3, 4} | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-2a | Power domain adaptation with CSI feedback based on CSI report sub-configuration(s) for semi-persistent CSI reporting on PUSCH | Support of CSI feedback based on CSI report sub-configuration(s), each containing one power offset for semi-persistent CSI reporting  1. The max number of sub-configurations Lmax in one CSI report configuration on PUSCH  2. Report of N CSI sub-report(s) included in one SP-CSI report where each CSI sub-report corresponds to one sub-configuration.  3. Supported maximum number of simultaneous NZP-CSI-RS resources per CC  4. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC  5. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs  6. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs  7. Support of single-panel type 1 codebook  8. Supported total number of semi-persistent CSI reporting settings without sub-configurations plus the total number of sub-configurations across semi-persistent CSI report settings with sub-configurations per BWP | FFS | Yes |  | UE does not support power domain adaptation for semi-persistent CSI reporting on PUSCH | Per band | No | No | N/A | Component 1 candidate values: {2,3,4,5,6,7,8}  Component 2 candidate values: {2,3,4}  Component 3 candidate values: {1, 2, 3 … 32}  Component 4 candidate values: {8, 16, 24, … 128 }  Component 5 candidate values: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}  Component 6 candidate values: {8, 16, 24, …, 248, 256}  Component 8 candidate values: {2, 3, 4,5,6,7,8,9,10,11,12}  Note: Components 5 and 6 are signaled per BC | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-2c | Power domain adaptation with CSI feedback based on CSI report sub-configuration(s) for semi-persistent CSI reporting on PUCCH | Support of CSI feedback based on CSI report sub-configuration(s), each containing one power offset for semi-persistent CSI reporting on PUCCH  1. The max number of sub-configurations Lmax in one CSI report configuration  2. Report of N CSI sub-report(s) included in one SP-CSI report where each CSI sub-report corresponds to one sub-configuration.  3. Supported maximum number of simultaneous NZP-CSI-RS resources per CC  4. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC  5. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs  6. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs  7. Support of single-panel type 1 codebook  8. Supported total number of semi-persistent CSI reporting settings without sub-configurations plus the total number of sub-configurations across semi-persistent CSI report settings with sub-configurations per BWP | FFS | Yes |  | UE does not support power domain adaptation for semi-persistent CSI reporting on PUCCH | Per band | No | No | N/A | Component 1 candidate values: {2,3,4}  Component 2 candidate values: {2,3,4}  Component 3 candidate values: {1, 2, 3 … 32}  Component 4 candidate values: {8, 16, 24, … 128}  Component 5 candidate values: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}  Component 6 candidate values: {8, 16, 24, …, 248, 256}  Component 8 candidate values: {2, 3, 4}  Note: Components 5 and 6 are signaled per BC | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-2b | Power domain adaptation with CSI feedback based on CSI report sub-configuration(s) for aperiodic CSI reporting | 1. Support of CSI feedback based on CSI report sub-configuration(s), each containing one power offset for aperiodic CSI reporting  2. The max number of sub-configurations Lmax in one CSI report configuration  3. Report of N CSI sub-report(s) included in one CSI report where each CSI sub-report corresponds to one sub-configuration  4. Supported maximum number of simultaneous NZP-CSI-RS resources per CC  5. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC  6. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs  7. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs  8. Support of single-panel type 1 codebook  9. Supported total number of aperiodic CSI reporting settings without sub-configurations plus the total number of sub-configurations across aperiodic CSI report settings with sub-configurations per BWP | FFS | Yes |  | UE does not support power domain adaptation for aperiodic CSI reporting | Per band | No | No | N/A | Component 2 candidate values: {2,3,4,5,6,7,8}  Component 3 candidate values: {2,3,4}  Component 4 candidate values: {1, 2, 3 … 32}  Component 5 candidate values: {8, 16, 24, … 128 }  Component 6 candidate values: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}  Component 7 candidate values: {8, 16, 24, …, 248, 256}  Component 9 candidate values: {2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}  Note: Components 6 and 7 are signaled per BC | Optional with capability signaling |

**Agreement: The following notes are agreed for Rel. 18 Netw\_Energy\_NR UE features to be captured in the second to last column of the corresponding FG**

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| --- | --- |
| 42-1 | Note: For components 4~7 in FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2b and components 3~6 in FG 42-2a and 42-2c, NZP-CSI-RS resource and CSI-RS ports are counted for reporting settings with and without sub-configurations.  Note: If a UE reports more than one FG from FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c and if the UE is configured with CSI report settings with sub-configurations corresponding to a subset of the reported FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c, then the supported maximum of NZP-CSI-RS resources/ports is determined by the minimum of the reported values from that subset. |
| 42-1a | Note: For components 4~7 in FG42-1, 42-1a/b/c, 42-2, 42-2b and components 3~6 in FG42-2a/c, NZP-CSI-RS resource and CSI-RS ports are counted for reporting settings with and without sub-configurations.  Note: If a UE reports more than one FG from FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c and if the UE is configured with CSI report settings with sub-configurations corresponding to a subset of the reported FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c, then the supported maximum of NZP-CSI-RS resources/ports is determined by the minimum of the reported values from that subset. |
| 42-1c | Note: For components 4~7 in FG42-1, 42-1a/b/c, 42-2, 42-2b and components 3~6 in FG42-2a/c, NZP-CSI-RS resource and CSI-RS ports are counted for reporting settings with and without sub-configurations.  Note: If a UE reports more than one FG from FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c and if the UE is configured with CSI report settings with sub-configurations corresponding to a subset of the reported FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c, then the supported maximum of NZP-CSI-RS resources/ports is determined by the minimum of the reported values from that subset. |
| 42-1b | Note: For components 4~7 in FG42-1, 42-1a/b/c, 42-2, 42-2b and components 3~6 in FG42-2a/c, NZP-CSI-RS resource and CSI-RS ports are counted for reporting settings with and without sub-configurations.  Note: If a UE reports more than one FG from FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c and if the UE is configured with CSI report settings with sub-configurations corresponding to a subset of the reported FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c, then the supported maximum of NZP-CSI-RS resources/ports is determined by the minimum of the reported values from that subset. |
| 42-2 | Note: For components 4~7 in FG42-1, 42-1a/b/c, 42-2, 42-2b and components 3~6 in FG42-2a/c, NZP-CSI-RS resource and CSI-RS ports are counted for reporting settings with and without sub-configurations.  Note: If a UE reports more than one FG from FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c and if the UE is configured with CSI report settings with sub-configurations corresponding to a subset of the reported FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c, then the supported maximum of NZP-CSI-RS resources/ports is determined by the minimum of the reported values from that subset. |
| 42-2a | Note: For components 4~7 in FG42-1, 42-1a/b/c, 42-2, 42-2b and components 3~6 in FG42-2a/c, NZP-CSI-RS resource and CSI-RS ports are counted for reporting settings with and without sub-configurations.  Note: If a UE reports more than one FG from FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c and if the UE is configured with CSI report settings with sub-configurations corresponding to a subset of the reported FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c, then the supported maximum of NZP-CSI-RS resources/ports is determined by the minimum of the reported values from that subset. |
| 42-2c | Note: For components 4~7 in FG42-1, 42-1a/b/c, 42-2, 42-2b and components 3~6 in FG42-2a/c, NZP-CSI-RS resource and CSI-RS ports are counted for reporting settings with and without sub-configurations.  Note: If a UE reports more than one FG from FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c and if the UE is configured with CSI report settings with sub-configurations corresponding to a subset of the reported FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c, then the supported maximum of NZP-CSI-RS resources/ports is determined by the minimum of the reported values from that subset. |
| 42-2b | Note: For components 4~7 in FG42-1, 42-1a/b/c, 42-2, 42-2b and components 3~6 in FG42-2a/c, NZP-CSI-RS resource and CSI-RS ports are counted for reporting settings with and without sub-configurations.  Note: If a UE reports more than one FG from FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c and if the UE is configured with CSI report settings with sub-configurations corresponding to a subset of the reported FGs 42-1, 42-1a, 42-1b, 42-1c, 42-2, 42-2a, 42-2b, 42-2c, then the supported maximum of NZP-CSI-RS resources/ports is determined by the minimum of the reported values from that subset. |

**Agreement: The following notes are agreed for Rel. 18 Netw\_Energy\_NR UE features to be captured in the second to last column of the corresponding FG**

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| 42-1a | Note: If a UE reports both FGs 42-1a and 42-1c and if the UE is configured with CSI report settings with sub-configurations corresponding to both FGs 42-1a and 42-1c, then the supported total number of semi-persistent CSI reporting settings without sub-configurations plus the total number of sub-configurations across semi-persistent CSI report settings with sub-configurations per BWP is determined by the minimum of the reported values from both FGs 42-1a and 42-1c. |
| 42-1c | Note: If a UE reports both FGs 42-1a and 42-1c and if the UE is configured with CSI report settings with sub-configurations corresponding to both FGs 42-1a and 42-1c, then the supported total number of semi-persistent CSI reporting settings without sub-configurations plus the total number of sub-configurations across semi-persistent CSI report settings with sub-configurations per BWP is determined by the minimum of the reported values from both FGs 42-1a and 42-1c. |
| 42-2a | Note: If a UE reports both FGs 42-2a and 42-2c and if the UE is configured with CSI report settings with sub-configurations corresponding to both FGs 42-2a and 42-2c, then the supported total number of semi-persistent CSI reporting settings without sub-configurations plus the total number of sub-configurations across semi-persistent CSI report settings with sub-configurations per BWP is determined by the minimum of the reported values from both FGs 42-2a and 42-2c. |
| 42-2c | Note: If a UE reports both FGs 42-2a and 42-2c and if the UE is configured with CSI report settings with sub-configurations corresponding to both FGs 42-2a and 42-2c, then the supported total number of semi-persistent CSI reporting settings without sub-configurations plus the total number of sub-configurations across semi-persistent CSI report settings with sub-configurations per BWP is determined by the minimum of the reported values from both FGs 42-2a and 42-2c. |

**Question 1 :** Are the above intra-frequency and inter-frequency L1 measurement and reporting features (45-1 and 45-1a) prerequisites to support intra-frequency and inter-frequency LTM, respectively?

**Conclusion:** There is no consensus in RAN1 in regards to Question 1. At this point, RAN1 will not revisit question 1 and leaves final determination to other RAN WGs.

**Question 2:** The above features, 45-1 and 45-1a, from RAN1 and related RAN4 features (39-1, 39-2, 39-3-1, 39-3-2, 39-3-3, 39-3-4, 39-3-5, 39-3-6) are defined per BC for both intra-frequency and inter-frequency measurements. RAN2 would like check with RAN1/4 for which BC (e.g. BC of current serving cells, BC including current serving cells and cell to be measured or something else) these capabilities are to be considered for L1 intra-frequency and inter-frequency LTM measurements?

**Conclusion:** There is no consensus in RAN1 in regards to Question 2 at this point. It is RAN1’s understanding that RAN2 can implement this FG as is, and RAN1 will continue discussion at RAN1 #118.

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

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-1-1 | Basic feature for Rel-16-based CJT type-II codebook | Support of N=N\_TRP only  Support of N\_L=1 only  1. Support of mode 2 for Rel-16 eType-II codebook refinement for multi-TRP CJT  2. Support for PMI subband R=1.  3. Support of parameter combinations with L=2,4  4. Support of rank 1,2  5. A list of supported combinations, up to 16, across all CCs simultaneously, where each combination is  a) Maximum number of Tx ports in one NZP CSI-RS resource associated with multi-TRP CJT  b) Maximum total number of NZP CSI-RS resource associated with multi-TRP CJT  c) Maximum total number of Tx ports of NZP CSI-RS resources associated with multi-TRP CJT~~]~~  6. Supported frequency basis selection mode 2, i.e., common frequency basis selection among different TRPs  7. Scaling factor X for CPU occupation counting for Rel-16-based CJT type-II codebook  8. Maximum number of NZP CSI-RS resources in one NZP CSI-RS resource set associated with multi-TRP CJT | 2-35 | Yes | N/A | Mode 2 for Rel-16-based CJT type-II codebook is not supported | Per band and Per BC | No | N/A | N/A | Component 5 candidate values:  a) {4, 8, 12, 16, 24, 32}  b) {2,3,4 … 64}  c) {4, …, 256}  Component 7 candidate values: {1, 1.5, 2}  Component 8 candidate values: {2,3,4}  Note:  When NTRP=1 TRP is configured, OCPU =1.  When NTRP>1 TRPS are configured, OCPU = ceil(X \* NTRP)  Note: A-CSI is supported, and whether UE supports SP-CSI on PUSCH is dependent on FG2-32b  Note: A UE that supports CSI enhancement for Rel. 16 based type-II CJT must support this FG | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-1-1a | Support of mode 1 for Rel-16-based CJT type-II codebook with FD basis selection integer frequency offset | 1. Support of Rel-16 eType-II codebook refinement for multi-TRP CJT with PMI subband R=1.  2. Support of parameter combinations with L=2,4  3. Support of rank 1,2  4. A list of supported combinations, up to 16, across all CCs simultaneously, where each combination is  a) Maximum number of Tx ports in one NZP CSI-RS resource associated with multi-TRP CJT  b) Maximum total number of NZP CSI-RS resource associated with multi-TRP CJT  c) Maximum total number of Tx ports of NZP CSI-RS resources associated with multi-TRP CJT~~]~~  5. Supported frequency basis selection mode 1, i.e., common frequency basis selection among different TRPs with FD basis selection integer frequency offset | 40-3-1-1 | Yes | N/A | Mode 1 for Rel-16-based CJT type-II codebook with FD basis selection integer frequency offset is not supported | Per band and Per BC | N/A | N/A | N/A | Component 4 candidate values:  a) {4, 8, 12, 16, 24, 32}  b) {2,3,4 … 64}  c) {4, …, 256} | Optional with capability signaling |

**Conclusion:** For NR\_MIMO\_evo\_DL\_UL FG 40-3-2-11, RAN1 would like to clarify that aperiodic CSI reporting with P/SP CSI-RS is supported from RAN1 perspective.

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

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-7-1a | Codebook-based 8Tx PUSCH—codebook1 | 1. Support of codebook-based 8Tx PUSCH—codebook1  2. Support of (N1, N2) for codebook-based 8Tx PUSCH—codebook1 | 40-7-1 | Yes | n/a | Codebook-based 8Tx PUSCH—codebook1 is not supported | Per FSPC | No | No | No | ~~2.~~ Component 2 candidate values: {~~(4,1)~~ng1n4n1, ~~(2,2)~~ng1n2n2, both} | Optional with capability signaling |

**Agreement: Introduce the following new FG/row**

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| 40-1-14 | Two PHR reporting for STx2P | Support of PHR reporting related to STx2P | At least one of 40-6-1, 40-6-1a, 40-6-2, 40-6-2a, 40-6-3a, 40-6-3b | UE will report a PHR for an actual PUSCH transmission and PHR for the first indicated TCI state or PHR associated with coresetPoolIndex0 is reported if actual PUSCH transmission is based on STx2P schemes | Per Band | FR2 only | Note: If gNB does not configure corresponding RRC parameter for this FG, UE will report a PHR for an actual PUSCH transmission and PHR for the first indicated TCI state or PHR associated with coresetPoolIndex0 is reported if actual PUSCH transmission is based on STx2P schemes | Optional with capability signalling |

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

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-7-1 | Basic features for Codebook-based 8Tx PUSCH | 1. Maximum number of PUSCH MIMO layers for codebook based PUSCH  2. Maximum number of 8 port SRS resources per SRS resource set with usage set to 'codebook’ for codebook-based 8Tx PUSCH  3. SRS 8 Tx ports—for codebook |  | Yes | n/a | Codebook-based 8Tx PUSCH is not supported | Per FSPC | No | No | No | Component 1 candidate values: {1,2 ,3,4 ,5,6,7,8}  Component 2 candidate values: {1,2}  Component 3 candidate values: {noTDM, TDM and noTDM}  Note: the candidate value signalled in component 3 only applies to codebook2/codebook3/codebook4  A UE that supports FG 40-7-1 must support at least one of FGs 40-7-1a/b/c/d | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-7-1a | Codebook-based 8Tx PUSCH—codebook1 | 1. Support of codebook-based 8Tx PUSCH—codebook1  2. Support of (N1, N2) for codebook-based 8Tx PUSCH—codebook1  3. SRS 8 Tx ports—codebook1 | 40-7-1 | Yes | n/a | Codebook-based 8Tx PUSCH—codebook1 is not supported | Per FSPC | No | No | No | Component 2 candidate values: {ng1n4n1, ng1n2n2, both}  Component 3 candidate values: {noTDM, TDM and noTDM} | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-1-1 | Unified TCI with joint DL/UL TCI update for single-DCI based intra-cell multi-TRP with single activated TCI codepoint per CC | 1. Maximum number of configured joint TCI states per CC per BWP  2. Maximum number of activated joint TCI states across all CCs in a band | 23-1-1 | yes | n/a | Unified TCI with joint DL/UL TCI update for single-DCI based intra-cell multi-TRP with single activated TCI codepoint per CC is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {8, 12, 16, 24, 32, 48, 64, 128}  Component 2 candidate values: {2, 4, 6, 8, 16, 32}  Note: FG 16-2b-0 can be used to indicate support of two default beams | Optional with capability signalling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-1-2 | Unified TCI with separate DL/UL TCI update for single-DCI based intra-cell multi-TRP with single activated TCI codepoint per CC | 1. Maximum number of configured DL TCI states per CC per BWP  2. Maximum number of configured UL TCI states per CC per BWP  3. Maximum number of activated DL TCI states across all CCs in a band  4. Maximum number of activated UL TCI states across all CCs in a band | 40-1-1, 23-10-1 | yes | n/a | Unified TCI with separate DL/UL TCI update for single-DCI based intra-cell multi-TRP with single activated TCI codepoint per CC is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {4,8,12,16,24,32,48,64,128}  Component 2 candidate values: {4,8,12,16,24,32,48,64}  Component 3 candidate values: {2,4,8,16}  Component 4 candidate values: {2,4,8,16}  Note: FG 16-2b-0 can be used to indicate support of two default beams | Optional with capability signalling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-1-2a | Unified TCI with separate DL/UL TCI update for single-DCI based intra-cell multi-TRP with multiple activated TCI codepoints per CC | 1. TCI state indication for update and activation  a) MAC-CE+DCI-based TCI state indication (use of monitored DCI formats 1\_1 and if supported 1\_2) with DL assignment  b) MAC-CE+DCI-based TCI state indication (use of monitored DCI formats 1\_1 and if supported 1\_2) without DL assignment  2. Maximum number of activated DL TCI states across all CCs in a band  3. Maximum number of activated UL TCI states across all CCs in a band | 40-1-2 | yes | n/a | Unified TCI with separate DL/UL TCI update for single-DCI based intra-cell multi-TRP with multiple activated TCI codepoints per CC is not supported | Per band | n/a | n/a | n/a | Component 2 candidate values: {2,4,8,16}  Component 3 candidate values: {2,4,8,16}  Note: FG 16-2b-0 can be used to indicate support of two default beams | Optional with capability signalling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-1-7 | Unified TCI with joint DL/UL TCI update for multi-DCI based multi-TRP with single activated TCI codepoint per CORESETPoolIndex per CC | 1. Support of mTRP operation for M-DCI with joint TCI state  3. Maximum number of configured joint TCI states per BWP per CC  4. Maximum number of activated joint TCI states across all CCs in a band per ‘coresetPoolIndex’ value  5. One MAC-CE activates one joint TCI-states per CC in a band for a TRP associated with a ‘coresetPoolIndex’ value | 23-1-1 | yes | n/a | Unified TCI with joint DL/UL TCI update for multi-DCI based multi-TRP with single activated TCI codepoint per CORESETPoolIndex per CC is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values {intra-cell, intra-cell and inter-cell}  Component 3 candidate values: {8, 12, 16, 24, 32, 48, 64, 128}  Component 4 candidate values: {1, 2, 4, 8, 16}  Note: activated joint TCI state(s) include all PDCCH/PDSCH receptions and PUSCH/PUCCH transmissions  Note: FG 16-2a-6 can be used to indicate support of two default beams | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-1-9 | Unified TCI with separate DL/UL TCI update for multi-DCI based multi-TRP with single activated TCI codepoint per CORESETPoolIndex per CC | 0. Support of mTRP operation for M-DCI with separate DL/UL TCI state  1. Maximum number of configured DL TCI states per BWP per CC  2. Maximum number of configured UL TCI states per BWP per CC  3. Maximum number of activated DL TCI states across all CC in a band  4. Maximum number of activated UL TCI states across all CC in a band  5. One MAC-CE activated DL TCI-state per CC in a band for a TRP associated with a ‘coresetPoolIndex’ value.  6. One MAC-CE activated UL TCI-state per CC in a band for a TRP associated with a ‘coresetPoolIndex’ value. | 40-1-7, 23-10-1 | yes | n/a | Unified TCI with separate DL/UL TCI update for multi-DCI based multi-TRP with single activated TCI codepoint per CORESETPoolIndex per CC is not supported | Per band | n/a | n/a | n/a | Component 0 candidate values {intra-cell, intra-cell and inter-cell}  Component 1 candidate value {8, 12, 16, 24, 32, 48, 64, 128}  Component 2 candidate value {8, 12, 16, 24, 32, 48, 64}  Component 3 candidate values: {1, 2, 4, 8, 16}  Component 4 candidate values: {1, 2, 4, 8, 16} | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-2-8 | Maximum number of TAGs across all CCs | Maximum number of TAGs across all CCs in a band combination | 40-2-1 or 40-2-2 | yes | n/a | Maximum number of TAGs across all CCs is unknown when UE supports two TAGs per CC | Per BC | n/a | n/a | n/a | Component candidate values: {2,3,4}  Note: UE only supports the configuration where all UL CCs of the same frequency band are configured with up to 2 Timing Advance Group ID  Note: The same description of “supportedNumberTAG” in 38.306 applies to this FG as well | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-1-1 | Basic feature for Rel-16-based CJT type-II codebook | Support of N=N\_TRP only  Support of N\_L=1 only  1. Support of mode 2 for Rel-16 eType-II codebook refinement for multi-TRP CJT  2. Support for PMI subband R=1.  3. Support of parameter combinations with L=2,4  4. Support of rank 1,2  5. A list of supported combinations, up to 16, across all CCs in a band when reported per band, and across all CCs in a band combination when reported per BC simultaneously, where each combination is  a) Maximum number of Tx ports in one NZP CSI-RS resource associated with multi-TRP CJT  b) Maximum total number of NZP CSI-RS resource associated with multi-TRP CJT  c) Maximum total number of Tx ports of NZP CSI-RS resources associated with multi-TRP CJT]  6. Supported frequency basis selection mode 2, i.e., common frequency basis selection among different TRPs  7. Scaling factor X for CPU occupation counting for Rel-16-based CJT type-II codebook  8. Maximum number of NZP CSI-RS resources in one NZP CSI-RS resource set associated with multi-TRP CJT | 2-35 | Yes | N/A | Mode 2 for Rel-16-based CJT type-II codebook is not supported | Per band and Per BC | No | N/A | N/A | Component 5 candidate values:  a) {4, 8, 12, 16, 24, 32}  b) {2,3,4 … 64}  c) {4, …, 256}  Component 7 candidate values: {1, 1.5, 2}  Component 8 candidate values: {2,3,4}  Note:  When NTRP=1 TRP is configured, OCPU =1.  When NTRP>1 TRPS are configured, OCPU = ceil(X \* NTRP)  Note: A-CSI is supported, and whether UE supports SP-CSI on PUSCH is dependent on FG2-32b  Note: A UE that supports CSI enhancement for Rel. 16 based type-II CJT must support this FG | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-1-1a | Support of mode 1 for Rel-16-based CJT type-II codebook with FD basis selection integer frequency offset | 1. Support of Rel-16 eType-II codebook refinement for multi-TRP CJT with PMI subband R=1.  2. Support of parameter combinations with L=2,4  3. Support of rank 1,2  4. A list of supported combinations, up to 16, across all CCs in a band when reported per band, and across all CCs in a band combination when reported per BC simultaneously, where each combination is  a) Maximum number of Tx ports in one NZP CSI-RS resource associated with multi-TRP CJT  b) Maximum total number of NZP CSI-RS resource associated with multi-TRP CJT  c) Maximum total number of Tx ports of NZP CSI-RS resources associated with multi-TRP CJT]  5. Supported frequency basis selection mode 1, i.e., common frequency basis selection among different TRPs with FD basis selection integer frequency offset | 40-3-1-1 | Yes | N/A | Mode 1 for Rel-16-based CJT type-II codebook with FD basis selection integer frequency offset is not supported | Per band and Per BC | N/A | N/A | N/A | Component 4 candidate values:  a) {4, 8, 12, 16, 24, 32}  b) {2,3,4 … 64}  c) {4, …, 256} | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-1-3 | Support R=2 for Rel-16-based CJT codebook | 1. Support of Rel-16 eType-II codebook refinement for multi-TRP CJT with PMI subbands R=2  2. {Max # of Tx ports in one resource set, Max # of resource sets, total # of Tx ports}, across all CCs in a band when reported per band, and across all CCs in a band combination when reported per BC simultaneously, with R=2 | 40-3-1-1 | Yes | N/A | R=2 for Rel-16-based CJT codebook is not supported | Per band  Per BC | N/A | N/A | N/A | Component 2 candidate values:  a) {4,8,12,16,24,32}  b) {2 to 64}  c) {4 to 256} | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-1-5 | Basic feature for Rel-17-based CJT type-II codebook | Support of N=N\_TRP only  Support of N\_L=1 only  1. Support of Rel-17 FeType-II port selection codebook refinement for multi-TRP CJT  2. Support of PMI subband R=1.  3. Support of parameter combinations with M=1  4. Support of rank 1,2  5. A list of supported combinations, up to 16, across all CCs in a band when reported per band, and across all CCs in a band combination when reported per BC simultaneously, where each combination is  a) Maximum number of Tx ports in one NZP CSI-RS resource associated with multi-TRP CJT  b) Maximum total number of NZP CSI-RS resource associated with multi-TRP CJT  c) Maximum total number of Tx ports of NZP CSI-RS resources associated with multi-TRP CJT  6. Supported frequency basis selection mode 2, i.e., common frequency basis selection among different TRPs  7. Scaling factor X for CPU occupation counting for Rel-17-based CJT type-II codebook  8. Maximum number of NZP CSI-RS resources in one NZP CSI-RS resource set associated with multi-TRP CJT | 2-35 | Yes | N/A | Mode 2 for Rel-17-based CJT type-II codebook is not supported | Per band and Per BC | No | N/A | N/A | Component 4 candidate values:  a) {4, 8, 12, 16, 24, 32}  b) {2,3,4 … 64}  c) {4, …, 256}  Component 7 candidate values: {1, 1.5, 2}  Component 8 candidate values: {2,3,4}  Note:  When NTRP=1 TRP is configured, OCPU =1.  When NTRP>1 TRPS are configured, OCPU = ceil(X \* NTRP)  Note: A-CSI is supported, and whether UE supports SP-CSI on PUSCH is dependent on FG2-32b  Note: A UE that supports CSI enhancement for Rel 17 based type-II CJT must support this FG | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-1-5a | Support of mode 1 for Rel-17-based CJT type-II codebook with FD basis selection integer frequency offset | 1. Support of Rel-17 FeType-II port selection codebook refinement for multi-TRP CJT with PMI subband R=1.  2. Support of parameter combinations with M=1  3. Support of rank 1,2  4. A list of supported combinations, up to 16, across all CCs in a band when reported per band, and across all CCs in a band combination when reported per BC simultaneously, where each combination is  a) Maximum number of Tx ports in one NZP CSI-RS resource associated with multi-TRP CJT  b) Maximum total number of NZP CSI-RS resource associated with multi-TRP CJT  c) Maximum total number of Tx ports of NZP CSI-RS resources associated with multi-TRP CJT  5. Supported frequency basis selection mode 1, i.e., common frequency basis selection among different TRPs with FD basis selection integer frequency offset | 40-3-1-5 | Yes | N/A | Mode 1 for Rel-17-based CJT type-II codebook with FD basis selection integer frequency offset is not supported | Per band and per BC | N/A | N/A | N/A | Component 4 candidate values:  a) {4, 8, 12, 16, 24, 32}  b) {2,3,4 … 64}  c) {4, …, 256} | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-1-7 | Support of M=2 and R=1 for Rel-17-based CJT codebook | 1. Support of Rel-17 FeType-II port selection codebook refinement for multi-TRP CJT with M=2 and PMI subband R=1  2. {Max # of Tx ports in one resource set, Max # of resources and total # of Tx ports}, across all CCs in a band when reported per band, and across all CCs in a band combination when reported per BC simultaneously, with M=2 and R=1 | 40-3-1-5 or 40-3-1-5a | Yes | N/A | M=2 and R=1 for Rel-17-based CJT codebook are not supported | Per band and per BC | N/A | N/A | N/A | Component 2 candidate values:  a) {4, 8, 12, 16, 24, 32}  b) {2,3,4 … 64}  c) {4, …, 256} | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-1-8 | Support R=2 for Rel-17-based CJT codebook | 1. Support of Rel-17 FeType-II port selection codebook refinement for multi-TRP CJT with PMI subband R=2.  2. {Max # of Tx ports in one resource set, Max # of resources and total # of Tx ports}, across all CCs in a band when reported per band, and across all CCs in a band combination when reported per BC simultaneously, with R=2 | 40-3-1-5 or 40-3-1-5a | Yes | N/A | R=2 for Rel-17-based CJT codebook is not supported | Per band and Per BC | N/A | N/A | N/A | Component 2 candidate values:  a) {4, 8, 12, 16, 24, 32}  b) {2,3,4 … 64}  c) {4, …, 256} | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-2-1 | Support of Rel-16-based doppler CSI | 1. Support X=1 CQI based on the first/earliest slot of the CSI reporting window and the first/earliest predicted PMI (TDCQI=’1-1’)  2. Support of Rel-16 eType-II regular codebook refinement for predicted PMI with PMI subband R=1  3. Support parameter combinations with L=2,4  4. Support for rank = 1,2  5. A list of supported combinations, each combination is { Max # of Tx ports in one resource, Max # of resources and total # of Tx ports} across all CCs in a band when reported per band, and across all CCs in a band combination when reported per BC simultaneously  7. Value of Y for CPU occupation (OCPU = Y.N4), when P/SP-CSI-RS is configured for CMR  8. Value of Y for CPU occupation (OCPU = Y.K), when A-CSI-RS is configured for CMR  9. Support for the size of DD-basis, N4=1  10. Scaling factor for active resource counting Kp | 2-35 | Yes | N/A | Rel-16 based Type II doppler codebook is not supported | Per band  and Per BC | N/A | N/A | N/A | Component 5 candidate values  a. {4,8,12,16,24,32}  b. {2,3,4 … 64}  c. {4, …, 256}  Component 7 candidate values: {1, 2, 3}  Component 8 candidate values: {1, 2, 3}  Component 10 candidate values: {1, 2, 4}  Note: When N4=1, OCPU =4  Note: OCPU ≥ 4 when P/SP-CSI-RS is configured for CMR  Note: when K=12, OCPU =8  Note: A UE that supports CSI enhancement for Rel. 16 based type-II doppler must support this FG | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-2-1a | Support of Rel-16-based doppler measurement with N4>1 | 1. Support for the size of DD-basis, N4>1  2. A list of supported combinations, each combination is {Max N4, Max # of Tx ports in one resource, Max # of resources and total # of Tx ports} across all CCs in a band when reported per band, and across all CCs in a band combination when reported per BC simultaneously  3. A list of supported combinations, each combination is {Max N4, Max # of Tx ports in one resource, Max # of resources and total # of Tx ports} for one CSI report setting  4. Value of d=m for the DD unit size when A-CSI-RS is configured for CMR | 40-3-2-1 | Yes | N/A | Rel-16 based Type II doppler codebook with N4>1 is not supported | Per band  and Per BC | N/A | N/A | N/A | Component 2 candidate values  a. {1,2,4,8}  b. {4,8,12,16,24,32}  c. {2,3,4 … 64}  d. {4, …, 256}  Component 3 Candidate values  a. {1,2,4,8}  b. {4,8,12,16,24,32}  c. {4,8,12}  d.{4, …, 256} | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-2-2 | Support R=2 for Rel-16-based doppler codebook | A list of supported combinations {Max # of Tx ports in one resource, Max # of resources and total # of Tx ports}, across all CCs in a band when reported per band, and across all CCs in a band combination when reported per BC simultaneously, with R=2 | 40-3-2-1 | Yes | N/A | R=2 for Rel-16-based doppler codebook is not supported | Per band and per BC | N/A | N/A | N/A | Candidate values for component 1:  - Maximum 16 triplets  - Max # of Tx ports in one resource: {4,8,12,16,24,32}  - Max # resources: {1 to 64}  - Max # total ports: {4 to 256} | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-2-5 | Support of M=2 and R=1 for Rel-17-based doppler codebook | 1. Support of Rel-17 FeType-II port selection codebook refinement for predicted PMI with M=2 and PMI subband R=1  2. A list of supported combinations, up to 16, across all CCs in a band when reported per band, and across all CCs in a band combination when reported per BC simultaneously, where each combination is  a) Maximum number of Tx ports in one NZP CSI-RS resource  b) Maximum total number of NZP CSI-RS resource  c) Maximum total number of Tx ports of NZP CSI-RS resources | 40-3-2-4 | Yes | N/A | M=2 and R=1 for Rel-17-based doppler codebook is not supported | Per-band  and Per-BC | N/A | N/A | N/A | Component 2 candidate values:  a) {4, 8, 12, 16, 24, 32}  b) {2,3,4 … 64}  c) {4, …, 256} | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-2-6 | Support R=2 for Rel-17-based doppler codebook | 1. Support of Rel-17 FeType-II port selection codebook refinement for predicted PMI with PMI subbands R=2  2. A list of supported combinations, up to 16, across all CCs in a band when reported per band, and across all CCs in a band combination when reported per BC simultaneously, where each combination is  a) Maximum number of Tx ports in one NZP CSI-RS resource  b) Maximum total number of NZP CSI-RS resource  c) Maximum total number of Tx ports of NZP CSI-RS resources | 40-3-2-4 | Yes | N/A | R=2 for Rel-17-based doppler codebook is not supported | Per band and per BC | N/A | N/A | N/A | Component 2 candidate values:  a) {4, 8, 12, 16, 24, 32}  b) {2,3,4 … 64}  c) {4, …, 256} | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-3-1 | TDCP (Time Domain Channel Properties) report | 1. Support of Y=1 delay value for TDCP report 2. Basic delay value, component candidate value <= D\_basic = 1 slot  3. Support of amplitude report  4. Value of X for CPU occupation (OCPU=(Y+1).X)  5. Support to configure KTRS = 1 TRS resource set  6. Maximum number of simultaneously active CSI-RS resources for TDCP across all CCs in a band when reported per band, and across all CCs in a band combination when reported per BC | 2-35 | Yes | N/A | Time Domain Channel Properties report is not supported | Per band and Per BC | N/A | N/A | N/A | Component 4 candidate values: {1,2}  Component 6, candidate values {4, 6, 8, 10, 12, 14, 16, 18, 20, 22, …, 60, 62, 64}  Note: counting of simultaneously active CSI-RS resources follows existing specification TS38.214 | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-3-5 | Number of CSI-RS resources for TDCP | 1. Maximum number of configured CSI-RS resources for TDCP per CC  2. Maximum number of configured CSI-RS resources for TDCP across all CCs in a band when reported per band, and across all CCs in a band combination when reported per BC  3. Maximum number of simultaneously active CSI-RS resources for TDCP per CC | 40-3-3-1 | Yes | N/A | Number of CSI-RS resources for TDCP is not reported | Per band and Per BC | N/A | N/A | N/A | Component 1 candidate values: {2, 4, 6, 8, 10, 12}  Component 2 candidate values: {2, 4, 6, 8, 12, … 64}  Component 3 candidate values: {2, 4, 6, 8, 12, 16, 20, 24, 28, 32}  Note: counting of simultaneously active CSI-RS resources follows existing specification TS38.214 | Optional with capability signaling |

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

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-5 | Support grouped-based beam reporting for STx2P | 1. Support group based L1-RSRP reporting for STxMP based transmission  2. Max number N of beam groups (M=2 beams per beam group) in a single L1-RSRP reporting instance based on measurement on two CMR resource sets  3. Maximum number of SSB and CSI-RS resources for measurement in both CMR sets within a slot across all CCs in a band  4. Maximum number of configured SSB and CSI-RS resources for measurement in both CMR sets across all CCs in a band | 23-5-1 | Yes | n/a | Grouped-based beam reporting for STx2P is not supported | Per Band | n/a | FR2 only | n/a | Component 1 candidate values: {JointULandDL, ULOnly, both}  Component 2 candidate values: {1,2,3,4}  Component 3 candidate values: {2,3,4,8,16,32,64}  Component 4 candidate values: {8, 16, 32, 64, 128}  Note: components 3 and 4 are also counted in FG 16-1g, 16-1g-1, and 23-5-1 | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-7-2a | Association between CSI-RS and SRS for non-codebook case | 1. Support association between NZP-CSI-RS and SRS resource set via RRC parameter "SRS-ResourceSet" for noncodebook 8Tx PUSCH operation  2. A list of supported combinations, each combination is {Max # of Tx ports in one resource, Max # of resources, and total # of Tx ports} ~~across all CCs~~ simultaneously | 40-7-2 | yes | n/a | Association between CSI-RS and SRS for non-codebook case is not supported | Per FSPC | No | No | No | Component 2 candidate value: Maximum size of the list is 16.  The candidate values for the max # of Tx port in one resource is  {2, 4, 8, 12, 16, 24, 32}  The candidate value set of the max # of resources is:  {1 to 64}  The candidate value set of total # of ports is:  {2 to 256}  Note: Component 2 is reported per BC | Optional with capability signalling |

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

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| 55. TEI18 | 55-6h | PDCCH repetition for Rel-16 PDCCH monitoring | 1. Support of PDCCH repetition with Rel-16 PDCCH monitoring capability as defined in FG 11-2 family.  2. Supported mode of PDCCH repetition  3. X per CC  4. X across all CCs in a band | FG23-2-1, and;    FG11-2 for (7, 3) or (4, 4) span based PDCCH monitoring;    FG55-6 for (2, 2) span based PDCCH monitoring with additional restriction(s) | Yes | N/A |  | Per FS | N/A | N/A |  | Component 3: {4, 8, 16, 32, 44, 64, no limit}  Component 4: {4, 8, 16, 32, 44, 64, 128, 256, 512, no limit}    NOTE:  Ÿ   Components 3 and 4 are reported only if UE supports inter-span PDCCH repetition.  Ÿ   The limit X is associated with the total number of linked candidates of which the first candidate is received and the second one has not been received at any given span, where "received" and "not been received" is w.r.t. the end of the corresponding span of PDCCH candidate.  Ÿ   The limit X is indicated as a total count assuming count 1 for AL=1; 2 for AL=2; 4 for AL=4 or 8 or 16.  Ÿ   Candidate value "no limit" does not imply BD limit can be exceeded    When a UE reports both FG 23-2-1e and this FG, the value reported in this FG is used if the configured span pattern of any serving cell satisfies FG 55-6    This capability is signalled for SCS 15 kHz and 30 kHz. | Optional with capability signalling |

**Agreement:**

* **For mTRP-CSI-EnhancementPerBC-r17, “across all CCs” means “across all CCs in a band combination”**
* **For mTRP-CSI-EnhancementPerBand-r17, “across all CCs” means “across all CCs in a band”**

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

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| 23-1-2 | Inter-cell beam measurement and reporting (for inter-cell BM and mTRP) | 1. Support of L1-RSRP measurement and reporting on SSB(s) with PCI(s) different from serving cell PCI  2. Support of up to K SSBRI-RSRP pairs in one report where a pair is associated with a PCI different from serving cell PCI can be reported  3. The maximum number of RRC-configured PCI(s) different from serving cell PCI for L1-RSRP measurement  4. The max number of SSB resources configured to measure L1-RSRP within a slot with PCI(s) same as or different from serving cell PCI across all CC in a band |  | Yes |  | Inter-cell beam measurement and reporting (for inter-cell BM and mTRP) is not supported | per band | n/a | n/a | n/a | Component 3 candidate values: {1, 2, 3, 4, 5, 6, 7}  Component 4 candidate values: {1, 2, 4, 8}  Note: K is equal to maxNumberNonGroupBeamReporting  Note: component 4 is also counted in FG16-1g/16-1g-1 | Optional with capability signalling |

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| 23-2-1d | PDCCH repetition for Case 2 PDCCH monitoring with a span gap | 1. Support of PDCCH repetition for PDCCH monitoring of any occasions with span gap as defined in FG 3-5b.  2. Supported mode of PDCCH repetition  3. X per CC  4. X across all CCs in a band | 3-5b, 23-2-1 | Yes |  | PDCCH repetition for Case 2 PDCCH monitoring with a span gap is not supported | Per FS | n/a | n/a | n/a | This capability is necessary for each SCS.  Component 2 candidate values: {intra-span, inter-span, both}  Component 3 candidate values: {4, 8, 16, 32, 44, 64, no limit}  Component 4 candidate values: {4, 8, 16, 32, 44, 64, 128, 256, 512, no limit}  Note:   * Components 3 and 4 are reported only if UE supports inter-span PDCCH repetition. * The limit (X) is associated with the total number of linked candidates of which the first candidate is received and the second one has not been received at any given span, where “received” and “not been received” is wrt the end of the corresponding span of PDCCH candidate. * The limit X is indicated as a total count assuming count 1 for AL=1; 2 for AL=2; 4 for AL=4 or 8 or 16. * Candidate value “no limit” does not imply BD limit can be exceeded | Optional with capability signalling |
| 23-2-1e | PDCCH repetition for Rel-16 PDCCH monitoring | 1. Support of PDCCH repetition with Rel-16 PDCCH monitoring capability as defined in FG 11-2 family.  2. Supported mode of PDCCH repetition  3. X per CC  4. X across all CCs in a band | 11-2, 23-2-1 | Yes |  | PDCCH repetition for Rel-16 PDCCH monitoringis not supported | Per FS | n/a | n/a | n/a | This capability is signalled for SCS 15 kHz and 30 kHz.    Component2: {intra-span, inter-span, both}    Component3: {4, 8, 16, 32, 44, 64, no limit}    Component 4: {4, 8, 16, 32, 44, 64, 128, 256, 512, no limit}    Note:   * Components 3 and 4 are reported only if UE supports inter-span PDCCH repetition. * The limit X is associated with the total number of linked candidates of which the first candidate is received and the second one has not been received at any given span, where “received” and “not been received” is wrt the end of the corresponding span of PDCCH candidate. * The limit X is indicated as a total count assuming count 1 for AL=1; 2 for AL=2; 4 for AL=4 or 8 or 16. * Candidate value “no limit” does not imply BD limit can be exceeded | Optional with capability signalling |

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

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-1a | Single-DCI based STx2P SDM scheme for PUSCH—noncodebook | 1. Dynamic switching by DCI 0\_1/0\_2 between single-DCI STxMP SDM and sTRP for PUSCH—noncodebook  2. 1 PTRS port for single-DCI based STx2P SDM scheme for PUSCH—noncodebook  3. Support of two SRS resource sets with usage set to 'noncodebook'  4. Maximum number of SRS resources in one SRS resource set  5. Maximum number of layers of each panel for Single-DCI STx2P with SDM  8. Maximum number of simultaneous transmitted SRS resources from one SRS resource set ~~at~~ in one symbol  9. Maximum number of simultaneous transmitted SRS resources from two SRS resource sets in one symbol | 2-15 | Yes | N/A | Single-DCI based STx2P SDM scheme for PUSCH—noncodebook is not supported | Per FSPC | No | FR2 only | n/a | Component 4 candidate values: {1, 2 ,3, 4}  Component 5 candidate values: {1, 2}  Component 8 candidate values: {1, 2, 3, 4}  Component 9 candidate values: {1, 2, 3, 4, 5, 6, 7, 8} | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-2a | Single-DCI based STx2P SFN scheme for PUSCH—noncodebook | 2.Dynamic switching by DCI 0\_1/0\_2 between single-DCI STxMP SFN and sTRP  3. 1 PTRS port for single-DCI based STx2P SFN scheme for PUSCH—noncodebook  4. Support of two SRS resource sets with usage set to 'noncodebook'  5. Maximum number of SRS resources in one SRS resource set  6. Maximum number of MIMO layers of each SRS resource set for NCB PUSCH with SFN scheme  8. Maximum number of simultaneous transmitted SRS resources from one SRS resource set ~~at~~ in one symbol  9. Maximum number of simultaneous transmitted SRS resources from two SRS resource sets in one symbol | 2-15 | Yes | n/a | Single-DCI based STx2P SFN scheme for PUSCH—noncodebook is not supported | Per FSPC | n/a | FR2 only | n/a | Component 5 candidate values: {1, 2 ,3, 4}  Component 6 candidate values: {1, 2}  Component 8 candidate values: {1, 2, 3, 4}  Component 9 candidate values: {1, 2, 3, 4, 5, 6, 7, 8} | Optional with capability signaling |

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

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-5-5 | Maximum 2 SP and 1 periodic SRS sets for 8T8R antenna switching | Support of maximum 2 SP SRS resource sets and maximum 1 periodic SRS resource set for 8T8R antenna switching | 40-5-4 | Yes | n/a | ~~Maximum 2 SP and 1 periodic SRS sets for 8T8R antenna switching is not supported~~ Maximum one SRS resource set for periodic SRS and maximum one SRS resource set for semi-persistent SRS is supported | Per FS | n/a | n/a | n/a | ~~Note: If UE does NOT support this feature, support maximum one SRS resource set for periodic SRS and maximum one SRS resource set for semi-persistent SRS~~  Note: The two SP-SRS resource sets are not activated at the same time | Optional with capability signalling |

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

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| 23-5-1 | Group based L1-RSRP reporting enhancements | 1. Max number N of beam groups (M=2 beams per beam group) in a single L1-RSRP reporting instance based on measurement on two CMR resource sets  2. Maximum number of SSB and CSI-RS resources for measurement in both CMR sets within a slot across all CCs in a band  3. Maximum number of configured SSB and CSI-RS resources for measurement in both CMR sets across all CCs in a band |  | Yes |  | Group based L1-RSRP reporting enhancements are not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {1,2,3,4}  Component 2 candidate values: {2,3,4,8,16,32,64}  Component 3 candidate values: {8, 16, 32, 64, 128}  Note: component 2 and 3 are also counted in FG 16-1g and 16-1g-1 | Optional with capability signalling |

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

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-7-1g-1 | SRS resources for UL full power transmission mode 2 | 1. SRS configurations with different number of antenna ports per SRS resource for mode 2 | 40-7-1g | yes | n/a | SRS resources for UL full power transmission mode 2 cannot be signaled | Per FSPC | n/a | n/a | n/a | ~~Component 1 candidate values: 3 bit bitmap {b0, b1, b2}~~  ~~b0 indicates whether SRS resource can be configured with 1 port~~  ~~b1 indicates whether SRS resource can be configured with 2 port~~  ~~b2 indicates whether SRS resource can be configured with 4 port~~  Component 1 candidate values: {1\_8, 1\_2\_8, 1\_4\_8, 1\_2\_4\_8}  1st state (1\_8): each SRS resource can be configured with 1 port or 8 ports  2nd state (1\_2\_8): each SRS resource can be configured with 1 port or 2 ports or 8 ports  3rd state (1\_4\_8): each SRS resource can be configured with 1 port or 4 ports or 4 ports  4th state (1\_2\_4\_8): each SRS resource can be configured with 1 port or 2 ports or 4 ports or 8 ports  Note: Any of the above states can be used if FG 40-7-1g is reported as 2 or 4 | Optional with capability signalling |

**Proposal: Define the two groups of 8 Tx full power Mode 2 precoders/TPMIs for FG 40-7-1g-2 component 1 for ranks 1-4 for 8 Tx, where the full power precoders constitute a single non-zero submatrix in the intermediate precoder matrix from 38.211 Table 6.3.1.5-29 through Table 6.3.1.5-32 for 1 to 4 layers, respectively. The UE indicates support for only one of the groups**

* **Capture the TPMI group definitions for 40-7-1g-2 in 38.306 as described below.**

| ***Definitions for parameters*** | Per | M | FDD-TDD  DIFF | FR1-FR2  DIFF |
| --- | --- | --- | --- | --- |
| ***tpmi-FullPwrCodebook2-r18***  Indicates which of a first or a second TPMI group delivers full power when UE is capable of, and configured with, 8 Tx codebook based PUSCH operation with codebook2.  The TPMI groups are defined as follows, where intermediate precoder matrices are provided in Table 6.3.1.5-29 through Table 6.3.1.5-32 for 1 to 4 layers, respectively.  A UE that indicates support of this feature shall also indicate support of *ul-FullPwrTransMode2-r18.*   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | **TPMI Group** | | | | | **# Layers** | **first** | | **second** | | | **TPMIs** | **Intermediate precoder matrix** | **TPMIs** | **Intermediate precoder matrix** | | **1** | 0-15 |  | 16-31 |  | | **2** | 0-7 |  | 8-15 |  | | **3** | 0-3 |  | 4-7 |  | | **4** | 0-1 |  | 2-3 |  |   NOTE: A UE that supports this feature must report at least one of the values. | FSPC | No | N/A | N/A |

[R1-2403919](file:///Users/Docs/R1-2403919.zip) UE features for other Rel-18 work items (Topics B) Huawei, HiSilicon

[R1-2403972](file:///Users/Docs/R1-2403972.zip) UE features for Rel-18 Work Items (Topics B) Intel Corporation

[R1-2404102](file:///Users/Docs/R1-2404102.zip) UE features for other Rel-18 work items (Topics B) Samsung

[R1-2404164](file:///Users/Docs/R1-2404164.zip) Discussion on Rel-18 UE features topics B (Positioning) vivo

[R1-2404271](file:///Users/Docs/R1-2404271.zip) Discussion on UE Feature Topics B Apple

[R1-2404383](file:///Users/Docs/R1-2404383.zip) Remaining issues on UE features for expanded and improved NR positioning CATT

[R1-2404485](file:///Users/Docs/R1-2404485.zip) UE Features for Other Topics B (MIMO, Pos, NES, MobEnh, IoT-NTN, NR-NTN) Nokia

[R1-2404824](file:///Users/Docs/R1-2404824.zip) UE features for other Rel-18 work items (Topics B) OPPO

[R1-2404887](file:///Users/Docs/R1-2404887.zip) Discussion on UE features for NES LG Electronics

[R1-2404910](file:///Users/Docs/R1-2404910.zip) Discussion on BWP Without Restriction maintenance Vodafone

[R1-2405004](file:///Users/Docs/R1-2405004.zip) UE features for other Rel-18 work items (Topics B) ZTE

[R1-2405029](file:///Users/Docs/R1-2405029.zip) Discussion on UE features for other Rel-18 work items (Topics B) NTT DOCOMO, INC.

[R1-2405104](file:///Users/Docs/R1-2405104.zip) Rel-18 UE features topics set B Ericsson

[R1-2405142](file:///Users/Docs/R1-2405142.zip) UE features for other Rel-18 work items (Topics B) Qualcomm Incorporated