**3GPP TSG RAN WG1 #117 R1-2405565**

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

**Title:** DRAFTLS on Rel-18 RAN1 UE features list for NR after RAN1#117

**Response to:** -

**Release:** Rel-18

**Work Items:** NR\_MIMO\_evo\_DL\_UL, NR\_pos\_enh2, Netw\_Energy\_NR, NR\_netcon\_repeater, NR\_NTN\_enh, NR\_Mob\_enh2, NR\_SL\_enh2, NR\_redcap\_enh, NR\_MC\_enh, NR\_XR\_Enh, NR\_FR1\_lessthan\_5MHz\_BW, NR\_DSS\_enh, NR\_BWP\_wor, NR\_cov\_enh2, TEI18

**Source:** Moderators (AT&T, NTT DOCOMO, INC.) [RAN WG1]

**To:** RAN WG2, RAN WG4

**CC:**

**Contact Person:**

#### Name: Hiroki Harada, Ralf Bendlin

E-mail Address: hiroki.harada.sv@nttdocomo.com, ralf\_bendlin@labs.att.com

**Attachment:**  R1-2405564.zip (Updated RAN1 UE features list for Rel-18 NR after RAN1#117)

**1. Overall Description:**

RAN1 has continued to discuss the Rel-18 RAN1 UE features list for NR and would like to share the latest version with RAN2 and RAN4 in the attachment R1-2405564.

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

For Netw\_Energy\_NR, it is RAN1’s understanding that RAN2 can implement all FGs despite the remaining yellow highlighting.

For NR\_pos\_enh2, RAN1 respectfully asks RAN2 to please review the proposed changes in the Appendix at the end of this LS for alignment between RAN1 agreements and RAN2 implementations according to RAN1’s understanding (see Section 4 below).

RAN1 would like to thank RAN2 for the LS R1-2404199/R2-2404014. RAN1 would like to inform RAN2 about the following conclusions.

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| **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.  |

RAN1 would like to thank RAN2 again for the LS R1-2401679/R2-2401834 which is now fully addressed. Specifically, RAN1 agreed to replace the remaining occurrences of the term “legacy” by appropriate meaningful description for each FG. Moreover, for Rel. 18 UE capabilities with "across all CCs”, RAN1 agreed the applicable revisions in the attachment R1-2405564. For Rel. 17 UE capabilities with "across all CCs”, RAN1 agreed the following:

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| **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 PCI2. 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 reported3. The maximum number of RRC-configured PCI(s) different from serving cell PCI for L1-RSRP measurement4. 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 maxNumberNonGroupBeamReportingNote: component 4 is also counted in FG16-1g/16-1g-1 | 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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| 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 repetition3. X per CC4. 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 repetition3. X per CC4. X across all CCs in a band  | 11-2, 23-2-1 | Yes |   | PDCCH repetition for Rel-16 PDCCH monitoring is 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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| 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 band3. 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 |

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RAN1 would like to thank RAN2 for the LS R1-2401941/R2-2401661. RAN1 would like to inform RAN2 about the following agreement. The corresponding new FGs (57-1 and 57-2) are captured into the updated RAN1 UE features list in R1-2405564.

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| **Agreements:*** Add following new FGs into RAN1 UE features list and inform RAN2 that added new FGs are based on RAN2 LS in R1-2401941 (FG57-1 is just based on RAN2 agreements).

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| 57-1 | Dynamic scheduling for multicast in RRC\_INACTIVE state | 1. Support of group-common PDCCH/PDSCH for multicast with CRC scrambled by Multicast MCCH-RNTI.2. Support of group-common PDCCH/PDSCH for multicast with CRC scrambled by G-RNTI.3. Support of CFR configuration for multicast.4. Support of CORESET and common search space configuration for multicast.5. Support of DCI format 4\_0 with CRC scrambled with Multicast MCCH-RNT for multicast MCCH.6. Support of DCI format 4\_1 with CRC scrambled with G-RNTI for multicast MTCH.7. Support one G-RNTI for multicast reception.8. Support of inter-slot TDM between group-common PDSCH for multicast and other PDSCHs in different slots. |  |  | Per band | N/A | N/A |  | Optional with capability signalling |
| 57-2 | Intra-slot TDM-ed unicast PDSCH and group-common PDSCH for multicast in RRC\_INACTIVE state | 1. Support TDM between one unicast PDSCH (e.g., small data transmission PDSCH) and one group-common PDSCH for multicast in a slot.2. For any two consecutive slots n and n+1, if there are more than 1 multicast/unicast PDSCH in either slot, whether to require the minimum time separation between starting time of any two multicast/unicast PDSCHs within the duration of these slots is 4 OFDM symbol for 30kHz and 7 OFDM symbol for 60kHz | 57-1 |  | Per band | N/A | N/A | Candidate value for component 2: require the minimum time separation time {yes, no}Note: UE indicating this FG shall support multicast reception and unicast reception e.g., SDT in RRC\_INACTIVE state. | Optional with capability signalling |

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RAN1 would like to thank RAN4 for the LS R1-2403833/R4-2406717. RAN1 would like to inform RAN4 and RAN2 about the following agreements. The corresponding updates are made in the updated RAN1 UE features list in R1-2405564.

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| **Agreements:*** FG51-1 is updated while FG51-1a is introduced as below.

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| 51-1 | Support for 3 MHz symmetric channel bandwidth in DL and UL | 1) Reception of 12 PRB PBCH based on RB-level puncturing2) Short RACH preamble formats with 15kHz SCS, and long PRACH formats with 1.25kHz SCS3) Reception of 15 PRB CORESET0 |  | Yes | N/A | UE is not able to support symmetric 3 MHz channel bandwidth | Per Band | FDD only | FR1 only | N/A | This FG is supported for 15 kHz SCS onlyThis FG is applicable only when an associated SS/PBCH block is located according to Table 5.4.3.3-2 in TS 38.101-1 in Rel-18Note: The UE supporting this FG supports configuration of 15 PRB BWP operation in DL and ULThis FG is only applicable to single-carrier operation. This FG is not applicable to UEs indicating supportOfRedCap-r17 (i.e., FG 28-1) or supportOfERedCap-r18 (i.e., FG 48-1). | Optional with capability signalling |
| 51-1a | Support for 3 MHz channel bandwidth in uplink with larger than 3 MHz channel BW in DL | 1) Short RACH preamble formats with 15kHz SCS, and long PRACH formats with 1.25kHz SCS |  | Yes | N/A | UE is not able to support 3 MHz channel bandwidth in uplink with larger than 3 MHz channel BW in DL. | Per UE | FDD only | FR1 only | N/A | This FG is supported for 15 kHz SCS onlyNote: This FG is applicable only when an associated SS/PBCH block is located at n28 according to Table 5.4.3.3-1 in TS 38.101-1 in Rel-18Note: The UE supporting this FG supports configuration of 15 PRB UL BWP operationThis FG is only applicable to single-carrier operation. This FG is not applicable to UEs indicating supportOfRedCap-r17 (i.e., FG 28-1) or supportOfERedCap-r18 (i.e., FG 48-1). | Optional with capability signalling |

**Agreements:*** From RAN1 perspective, there is no support of 3 MHz in downlink and 5 MHz or larger CBW in uplink in Rel-18.
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**2. Actions:**

**To RAN WG2**

**ACTION:** RAN1 respectfully asks RAN2 to take into account the RAN1 NR UE features in the attachment for designing corresponding capability signalling in Rel-18.

**To RAN WG4**

**ACTION:** RAN1 respectfully asks RAN4 to take into account the RAN1 NR UE features in the attachment especially related to RAN4 LS in R1-2403833/R4-2406717.

**3. Date of Next RAN WG1 Meetings:**

TSG-RAN WG1 Meeting #118 August 19 to 23, 2024 Maastricht, NL

TSG-RAN WG1 Meeting #118bis October 14 to 18, 2024 TBC, China

**4. Appendix**

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| 6.3.3 UE capability information elementsFirst 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-STARTFeatureSetUplink ::= 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

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| *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-STARTPosSRS-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-- ASN1STOPEnd of the change |