**3GPP TSG RAN WG1 #115 R1-23nnnnn**

**Chicago, USA, November 13th – November 17th, 2023**

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

**Title: Session Notes of AI 8.16.1**

**Agenda Item:** **8.16.1**

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

### 8.16.1 UE features for NR MIMO evolution

**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 | 40-1-4 | Two TCI states for CJT Tx scheme for PDSCH | Support of two TCI states for CJT Tx scheme for PDSCH~~[FFS: for CSI-RS]~~ |  | yes | n/a | Two TCI states for CJT Tx scheme for PDSCH are not supported | Per band | n/a | n/a | n/a | Component candidate values: {CJT Scheme-A, CJT scheme-B, both}CJT Scheme-A: PDSCH DMRS port(s) is QCLed with the DL RSs of both indicated joint/DL TCI states with respect to QCL-TypeACJT Scheme-B: PDSCH DMRS port(s) is QCLed with the DL RSs of both indicated joint/DL TCI states with respect to QCL-TypeA except for QCL parameters {Doppler shift, Doppler spread} of the second indicated joint/DL TCI state | 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 | ~~FFS:~~ 1. Maximum number of configured joint TCI states per CC per BWP~~FFS:~~ 2. Maximum number of activated joint TCI states across all CCs~~FFS: what to do/signal about additional support of applying different TCI state of PDSCH, PUCCH or PUSCH from that of the scheduled/activated PDCCH when the UE applies one indicated joint/DL/UL TCI state to the PDSCH, PUCCH or PUSCH~~ | FFS | 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 |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-1-1a | Unified TCI with joint 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 assignmentb) MAC-CE+DCI-based TCI state indication (use of monitored DCI formats 1\_1 and if supported 1\_2) without DL assignment~~FFS~~: 2. Maximum number of activated joint TCI states per CC | ~~FFS~~ 40-1-1 | yes | n/a | Unified TCI with joint 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: {2,3, 4, 5, 6, 7, 8} Note: FG 16-2b-0 can be used to indicate support of two default beams | Optional with capability signalling |

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| 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 | ~~FFS:~~ Maximum number of configured DL TCI states per CC per BWP~~FFS:~~ Maximum number of configured UL TCI states per CC per BWP ~~FFS:~~ Maximum number of activated DL TCI states across all CCs~~FFS:~~ Maximum number of activated UL TCI states across all CCs  | ~~FFS~~ 40-1-1 | 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 |

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| 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 assignmentb) MAC-CE+DCI-based TCI state indication (use of monitored DCI formats 1\_1 and if supported 1\_2) without DL assignment~~FFS:~~ 2. Maximum number of activated DL TCI states across all CCs~~FFS:~~ 3. Maximum number of activated UL TCI states across all CCs | FFS | 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 |

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| 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 ~~[intra-cell]~~ mTRP operation for M-DCI with joint TCI state~~[2. Support of a single default beam for PDSCH with scheduling offset less than a threshold unless UE indicates the support of two default beams]~~3. Maximum number of configured joint TCI states per BWP per CC4. Maximum number of activated joint TCI states across all CCs per ‘coresetPoolIndex’ value5. One MAC-CE activates one joint TCI-states per CC in a band for a TRP associated with a ‘coresetPoolIndex’ value | [16-2a, 23-4, 40-6-1, 40-6-2, 40-6-3a, 40-6-3b, 40-6-4] | 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 transmissionsNote: FG 16-2a-6 can be used to indicate support of two default beams | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-1-7a | Unified TCI with joint DL/UL TCI update for multi-DCI based multi-TRP with multiple activated TCI codepoints per CORESETPoolIndex 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 MAC-CE activated joint TCI states ~~per BWP~~ per CC per coresetpoolindex~~[3. The minimum beam application time in symbols]~~ | 40-1-7, [FFS] | yes | n/a | Unified TCI with joint DL/UL TCI update for multi-DCI based multi-TRP with multiple activated TCI codepoints per CORESETPoolIndex per CC is not supported | ~~[~~Per band~~]~~ | n/a | n/a | n/a | Component 2 candidate values: {2,3,4,5,6,7,8)~~Component 3 candidate values: {1, 2, 4, 7, 14, 28, 42, 56, 70, 84, 98, 112, 224, 336}, where {84, 98, 112, 224, 336 } only can be applicable in FR2~~  | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-2-1 | Basic feature for multi-DCI based intra-cell Multi-TRP operation with two TA enhancement | ~~FFS: Maximum number of n-TimingAdvanceOffset value per serving cell~~ Support of two TA enhancement for multi-DCI based intra-cell Multi-TRP operation | 16-2a | yes | n/a | Two TA enhancement for multi-DCI based intra-cell Multi-TRP operation is not supported | ~~[~~Per ~~band~~ FSPC~~]~~ | n/a | n/a | n/a |  | Optional with capability signalling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-2-2 | Basic feature for multi-DCI based inter-cell Multi-TRP operation with two TA enhancement | Support of two TA enhancement for multi-DCI based inter-cell Multi-TRP operation~~FFS:~~ Maximum number of n-TimingAdvanceOffset value per serving cell | 16-2a | yes | n/a | Two TA enhancement for multi-DCI based inter-cell Multi-TRP operation is not supported | ~~[~~Per ~~band~~ FSPC~~]~~ | n/a | n/a | n/a | Candidate values: {1,2} | Optional with capability signalling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-2-8 | ~~The~~ Maximum number of TAGs across all CCs | Maximum number of TAGs across all CCs | FFS | yes | n/a |  | ~~[~~Per ~~band~~ 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 IDNote: The same description of “supportedNumberTAG” in 38.306 applies to this FG as well | Optional with capability signaling |

**Working assumption: 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 | 40-6-3a | Codebook multi-DCI based STx2P PUSCH+PUSCH for DG+DG | 1. Support of multi-DCI based STx2P PUSCH+PUSCH for codebook-based PUSCH with fully~~[/partial]~~ overlapping PUSCHs in time and ~~[~~non-overlapping in frequency~~]~~2. Support of two SRS resource sets with usage set to 'codebook' associated with two coresetPoolIndex values3. Maximum number of SRS resources in one SRS resource set4. Maximum number of layers of each PUSCH of PUSCH+PUSCH overlapping in time domain~~[~~5. Maximum ~~Supported~~ number of NZP PUSCH ports for each PUSCH of PUSCH+PUSCH overlapping in time domain~~]~~6. Maximum number of PUSCHs per CORESETPoolIndex per slot7. Maximum total number of layers across two overlapping PUSCH8. Maximum number of SRS antenna ports for each SRS resource in each SRS resource set | 2-14 | Yes | N/A | Codebook multi-DCI based STx2P PUSCH+PUSCH is not supported | [Per Band] | n/a | FR2 only | n/a | Note: Processing capability 2 is not supported in any CC if at least one CC is configured with two values of CORESETPoolIndex.Component 3 candidate values: {1,2,4}Note: If value 4 is reported for component 3, UE also reports value 4 in FG 16-5c.Component 4 candidate values: {1,2}~~[~~Component 5 candidate values: {1,2,4}Note: If a row of the TPMI consists of all 0’s, the corresponding PUSCH port is not counted~~.]~~Component 6 candidate values: {1,2,3,4,7}Note: per SCS, similar with Rel-15Component 7 candidate values: {2 ,3, 4}Component 8 candidate values: {1, 2 ,4} | Optional with capability signaling |

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| 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 isa) Maximum number of Tx ports in one NZP CSI-RS resource associated with multi-TRP CJTb) Maximum total number of NZP CSI-RS resource associated with multi-TRP CJTc) 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 |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-1-11 | Active CSI-RS resources and ports for mixed codebook types including Type-II-CJT in any slot | 1. List of codebook combinations2. List of {max number of ports per resource, max number of resources, max number of total ports} for each codebook combination | 40-3-1-1,40-3-1-5,2-36, 2-40 | Yes | N/A | Active CSI-RS resources and ports for mixed Type-II-CJT codebook types in any slot is not supported | ~~[~~Per-band and Per-BC~~/Per FS]~~ | N/A | N/A | N/A | ~~[~~Codebook 1 = {Type I SP, Type I MP}(Codebook 2, Codebook 3) = {(eType-II-CJT R=1, NULL), (eType-II-CJT R=2, NULL), (FeType-II-CJT PS R=1 M=1, NULL), (FeType-II-CJT PS R=1 M=2, NULL), (FeType-II-CJT PS R=2 M=2, NULL)~~, (FFS CB combos…)~~}~~]~~Component 2 candidate values:- Maximum 16 triplets for eachcodebook combination- Max # of Tx ports in oneresource: {4,8,12,16,24,32}- Max # resources: {1 to 64}- Max # total ports: {4 to 256} | Optional with capability signaling |

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| 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 = 1,25. A list of supported combinations, each combination is {Max # of time unit, Max # of Tx ports in one resource, Max # of resources and total # of Tx ports} across all CCs simultaneously~~[6. A list of supported combinations, each combination is {Max # of Tx ports in one resource, Max # of resources and total # of Tx ports} for one CSI report setting]~~7. Value of Y for CPU occupation (OCPU = Y.N4), when P/SP-CSI-RS is configured for CMR8. Value of Y for CPU occupation (OCPU = Y.K), when A-CSI-RS is configured for CMR9. Support for the size of DD-basis, N4=110. 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 valuesa. {[1,2,4,8]}b. {4,8,12,16,24,32}c. {2,3,4 … 64}d. {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 =4Note: OCPU ≥ 4 when P/SP-CSI-RS is configured for CMRNote: when K=12, OCPU =8Note: A UE that supports CSI enhancement for Rel. 16 based type-II doppler must support this FG | Optional with capability signaling |

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| 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 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~~]~~ | 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 valuesa. {1,2,4,8}b. {4,8,12,16,24,32}c. {2,3,4 … 64}d. {4, …, 256}Component 3 Candidate valuesa. {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 | 40-3-2-1 | 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 = 1,25. A list of supported combinations, each combination is {~~Max # of time unit,~~ Max # of Tx ports in one resource, Max # of resources and total # of Tx ports} across all CCs simultaneously7. Value of Y for CPU occupation (OCPU = Y.N4), when P/SP-CSI-RS is configured for CMR8. Value of Y for CPU occupation (OCPU = Y.K), when A-CSI-RS is configured for CMR9. Support for the size of DD-basis, N4=110. 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. {[1,2,4,8]}~~b. {4,8,12,16,24,32}c. {2,3,4 … 64}d. {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 =4Note: OCPU ≥ 4 when P/SP-CSI-RS is configured for CMRNote: when K=12, OCPU =8Note: A UE that supports CSI enhancement for Rel. 16 based type-II doppler must support this FG | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-2-4 | Support of Rel-17-based doppler CSI ~~measurement~~ | 1. Support X=1 CQI based on the first/earliest slot of the CSI reporting window and the first/earliest predicted PMI2. Support of Rel-17 FeType-II port selection codebook refinement for predicted PMI with PMI subband R=13. Support of parameter combinations with M = 1 4. Support for rank = 1,25: A list of supported combinations, each combination is {~~Max # of time unit,~~ Max # of Tx ports in one resource, Max # of resources and total # of Tx ports} for one doppler CSI measurement~~[6. A list of supported combinations, each combination is {Max # of Tx ports in one resource, Max # of resources and total # of Tx ports} for one CSI report setting]~~7. Value of Y for CPU occupation (OCPU = Y.K), when A-CSI-RS is configured for CMR8. Support for N4=19. Scaling factor for active resource counting Kp | 40-3-2-1, 2-35 | Yes | N/A | Rel-17 based Type II doppler codebook is not supported | Per-band and Per-BC | N/A | N/A | N/A | Component 5 candidate valuesa. {4,8,12,16,24,32}b. {1, 2,3,4 … 64}c. {4, …, 256}Component 7 candidate values: {1, 2, 3}Component 9 candidate values: {1, 2, 4}Note: OCPU = 4 when P/SP-CSI-RS is configured for CMRNote: when K=12, OCPU =8Note: A UE that supports CSI enhancement for Rel. 17-based type-2 doppler must support this FG | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-5-4 | SRS without TDMed 8 Tx ports—antenna switching | 1. Support of 8T8R2. Downgrade ~~Support of~~ ~~SRS with 8 Tx ports—~~antenna switching configurations3. Report the entry number of the first-listed band with UL in the band combination that affects this DL4. Report the entry number of the first-listed band with UL in the band combination that switches together with this UL ~~FFS: detailed components~~~~FFS: separate row for comb8~~ | FFS | Yes | n/a | SRS with 8 Tx ports—antenna switching is not supported  | ~~[~~Per ~~band~~ FS~~PC]~~ | n/a | n/a | n/a | Component 2 candidate value: one or more of {1T1R, 1T2R, 1T4R, 1T6R, 1T8R, 2T2R, 2T4R, 2T6R, 2T8R, 4T4R, 4T8R} Component 3 candidate value: {1,2,…,32}Component 4 candidate value: {1,2,…,32}Note: UE reports support of SRS with 8 Tx ports and Comb8 mapping —antenna switching via FG 23-8-8 | Optional with capability signaling |

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| ~~40. NR\_MIMO\_evo\_DL\_UL~~ | ~~40-5-4a~~ | ~~SRS without TDMed 8 Tx ports—codebook~~ | ~~Support of SRS with 8 Tx ports—codebook~~~~FFS: detailed components~~~~FFS: separate row for comb8~~ | ~~FFS~~ | ~~Yes~~ | ~~n/a~~ | ~~SRS with 8 Tx ports—codebook is not supported~~ | ~~[Per band FSPC]~~ | ~~n/a~~ | ~~n/a~~ | ~~n/a~~ |  | ~~Optional with capability signaling~~ |
| ~~40. NR\_MIMO\_evo\_DL\_UL~~ | ~~40-5-7~~ | ~~SRS with TDMed 8 Tx ports—codebook~~ | ~~Support of SRS with TDMed 8 Tx ports—codebook~~~~FFS: detailed components~~~~FFS: merge with antenna switching~~ | ~~40-7-1~~ | ~~Yes~~ | ~~n/a~~ | ~~SRS with TDMed 8 Tx ports—codebook is not supported~~ | ~~[Per band]~~ | ~~n/a~~ | ~~n/a~~ | ~~n/a~~ |  | ~~Optional with capability signaling~~ |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-7-1 | Basic features for Codebook-based 8Tx PUSCH | 1. ~~Supported~~ Maximum~~al~~ number of PUSCH MIMO layers for codebook based PUSCH2. ~~Supported~~ Maximum number of 8 port SRS resources per SRS resource set with usage set to 'codebook’ for codebook-based 8Tx PUSCH3. SRS 8 Tx ports—codebook | FFS | 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, TDM and noTDM}]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 |

**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 PUSCH2. Maximum number of 8 port SRS resources per SRS resource set with usage set to 'codebook’ for codebook-based 8Tx PUSCH3. SRS 8 Tx ports—codebook | FFS | 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,~~ TDM and noTDM}~~]~~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 |

**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~~ | ~~40-5-6~~ | ~~SRS with TDMed 8 Tx ports—antenna switching~~ | ~~1. Support of SRS with TDMed 8 Tx ports—antenna switching~~~~FFS: detailed components~~~~FFS: separate row for comb8~~ | ~~40-5-4~~ | ~~Yes~~ | ~~n/a~~ | ~~SRS with TDMed 8 Tx ports—antenna switching is not supported~~ | ~~[Per band]~~ | ~~n/a~~ | ~~n/a~~ | ~~n/a~~ |  | ~~Optional with capability signaling~~ |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-5-4 | SRS ~~without TDMed~~ 8 Tx ports—antenna switching | 1. Support of 8T8R for antenna switching2. Downgrade antenna switching configurations3. Report the entry number of the first-listed band with UL in the band combination that affects this DL4. Report the entry number of the first-listed band with UL in the band combination that switches together with this UL  | FFS | Yes | n/a | SRS with 8 Tx ports—antenna switching is not supported  | Per FS | n/a | n/a | n/a | Component 1 candidate values: {noTDM, TDM and noTDM}Component 2 candidate value: combination (including empty) ~~one or more~~ of {1T1R, 1T2R, 1T4R, 1T6R, 1T8R, 2T2R, 2T4R, 2T6R, 2T8R, 4T4R, 4T8R} Component 3 candidate value: {1,2,…,32}Component 4 candidate value: {1,2,…,32}Note: UE reports support of SRS with 8 Tx ports and Comb8 mapping —antenna switching via FG 23-8-8 | 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 | 40-7-1a | Codebook-based 8Tx PUSCH—~~[full-coherent~~ codebook1~~]~~ | Support of codebook-based 8Tx PUSCH—~~[full-coherent~~ codebook1~~]~~2. Support of (N1, N2) for codebook-based 8Tx PUSCH—codebook1 | 40-7-1 | Yes | n/a | Codebook-based 8Tx PUSCH—~~[full-coherent]~~ codebook1 is not supported | ~~[~~Per FSPC~~]~~ | No | No | No | ~~FFS: whether to (N1,N2) as component or new row~~2. Component candidate values: {(4,1), (2,2), both} | 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 | 40-7-1b | Codebook-based 8Tx PUSCH—~~[partial-coherent~~ codebook2~~], Ng=2~~ | Support of codebook-based 8Tx PUSCH—~~[partial-coherent~~ codebook2~~], Ng=2~~ | 40-7-1 | Yes | n/a | Codebook-based 8Tx PUSCH—[~~partial-coherent~~ codebook2~~], Ng=2~~ is not supported | ~~[~~Per FSPC~~]~~ | No | No | No |  | 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 | 40-7-1c | Codebook-based 8Tx PUSCH— ~~[partial-coherent~~ codebook3~~], Ng=4~~ | Support of codebook-based 8Tx PUSCH— ~~[partial-coherent~~ codebook3~~], Ng=4~~ | 40-7-1 | Yes | n/a | Codebook-based 8Tx PUSCH— ~~[partial-coherent~~ codebook3~~], Ng=4~~ is not supported | ~~[~~Per FSPC~~]~~ | No | No | No |  | 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 | 40-7-1d | Codebook-based 8Tx PUSCH— ~~[non-coherent~~ codebook4~~]~~ | Support of codebook-based 8Tx PUSCH— ~~[non-coherent~~ codebook4~~]~~ | 40-7-1 | Yes | n/a | Codebook-based 8Tx PUSCH— ~~[non-coherent~~ codebook4~~]~~ is not supported | ~~[~~Per FSPC~~]~~ | No | No | No |  | 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 | 40-7-1g | UL full power transmission mode 2 with 1/2/4 resources | 1. Support of UL full power transmission mode of fullpowerMode2 when UE is capable of 8 Tx codebook based PUSCH operation~~[~~2. Maximum number of SRS resources in one SRS resource set with usage set to 'codebook' for 8Tx codebook based PUSCH for Mode 2~~]~~~~This is a WA~~ | FFS | yes | n/a | ~~FFS~~ UL full power transmission mode 2 is not supported | ~~[~~Per FSPC] | n/a | n/a | n/a | Component 2 candidate values: {1, 2, 4} | Optional with capability signalling |
| 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 respource 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: FFS | Optional with capability signalling |

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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.~~]~~ | FFS | 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}] | Optional with capability signalling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-3c | ~~[~~Codebook multi-DCI based STx2P PUSCH+PUSCH – ~~Parti~~al- Fully overlapping PUSCHs in time and fully ~~non-~~overlapping in frequency~~]~~ | ~~[~~Support of ~~parti~~al- fully overlapping PUSCHs in time and fully ~~non-~~overlapping in frequency~~]~~ | ~~[~~40-6-3a~~]~~ | ~~[~~Yes~~]~~ | ~~[~~N/A~~]~~ | ~~[Parti~~al- Fully overlapping PUSCHs in time and fully ~~non-~~overlapping in frequency for codebook multi-DCI based STx2P PUSCH+PUSCH is not supported~~]~~ | ~~[~~Per Band~~]~~ | ~~[~~n/a~~]~~ | ~~[~~FR2 only~~]~~ | ~~[~~n/a~~]~~ |  | ~~[~~Optional with capability signaling~~]~~ |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-3d | ~~[~~Codebook multi-DCI based STx2P PUSCH+PUSCH – Fully overlapping PUSCHs in time and partially overlapping in frequency~~]~~ | ~~[~~Support of fully overlapping PUSCHs in time and partially overlapping in frequency~~]~~ | ~~[~~40-6-3a~~]~~ | ~~[~~Yes~~]~~ | ~~[~~N/A~~]~~ | ~~[~~Fully overlapping PUSCHs in time and partially overlapping in frequency for codebook multi-DCI based STx2P PUSCH+PUSCH is not supported~~]~~ | ~~[~~Per Band~~]~~ | ~~[~~n/a~~]~~ | ~~[~~FR2 only~~]~~ | ~~[~~n/a~~]~~ |  | ~~[~~Optional with capability signaling~~]~~ |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-3e | ~~[~~Codebook multi-DCI based STx2P PUSCH+PUSCH – Partially ~~Fully~~ overlapping PUSCHs in time ~~both frequency~~ and fully overlapping in frequency ~~time]~~ | ~~[~~Support of partially ~~fully~~ overlapping PUSCHs in time ~~both frequency~~ and fully overlapping in frequency ~~time]~~ | ~~[~~40-6-3a~~]~~ | ~~[~~Yes~~]~~ | ~~[~~N/A~~]~~ | ~~[~~Partially ~~Fully~~ overlapping PUSCHs in time ~~both frequency~~ and fully overlapping in frequency ~~time~~ for codebook multi-DCI based STx2P PUSCH+PUSCH is not supported~~]~~ | ~~[~~Per Band~~]~~ | ~~[~~n/a~~]~~ | ~~[~~FR2 only~~]~~ | ~~[~~n/a~~]~~ |  | ~~[~~Optional with capability signaling~~]~~ |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-3f | ~~[~~Codebook multi-DCI based STx2P PUSCH+PUSCH – Partially ~~Fully~~ overlapping PUSCHs in time ~~frequency~~, partially overlapping in ~~time~~ frequency~~]~~ | ~~[~~Support of partially ~~fully~~ overlapping PUSCHs in time ~~frequency~~, partially overlapping in ~~time~~ frequency~~]~~ | ~~[~~40-6-3a~~]~~ | ~~[~~Yes~~]~~ | ~~[~~N/A~~]~~ | ~~[~~Partially ~~Fully~~ overlapping PUSCHs in time ~~frequency~~, partially overlapping in ~~time~~ frequency for codebook multi-DCI based STx2P PUSCH+PUSCH is not supported~~]~~ | ~~[~~Per Band~~]~~ | ~~[~~n/a~~]~~ | ~~[~~FR2 only~~]~~ | ~~[~~n/a~~]~~ |  | ~~[~~Optional with capability signaling~~]~~ |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-3g | ~~[~~Codebook multi-DCI based STx2P PUSCH+PUSCH – Partially ~~or non-overlapping~~ PUSCHs in time ~~frequency~~, ~~partially or fully~~ non-overlapping in ~~time~~ frequency~~]~~ | ~~[~~Support of partially ~~or non-overlapping~~ PUSCHs in time ~~frequency~~, ~~partially or fully~~ non-overlapping in ~~time~~ frequency~~]~~ | ~~[~~40-6-3a~~]~~ | ~~[~~Yes~~]~~ | ~~[~~N/A~~]~~ | ~~[~~Partially ~~or non-overlapping~~ PUSCHs in time ~~frequency~~, ~~partially or fully~~ non-overlapping in ~~time~~ frequency for codebook multi-DCI based STx2P PUSCH+PUSCH is not supported~~]~~ | ~~[~~Per Band~~]~~ | ~~[~~n/a~~]~~ | ~~[~~FR2 only~~]~~ | ~~[~~n/a~~]~~ |  | ~~[~~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 | 40-6-3b-1 | Associated CSI-RS resources for noncodebook multi-DCI based STx2P PUSCH+PUSCH | 1. Support of up to two NZP CSI-RS resources associated with the two SRS resource sets for multi-DCI non-codebook based STxMP scheme for PUSCH2. Maximum number of periodic SRS resources associated with first and second CSI-RS per BWP3. Maximum number of aperiodic SRS resources associated with first and second CSI-RS per BWP4. Maximum number of semi-persistent SRS resources associated with first and second CSI-RS per BWP5. UE can process Y SRS resources associated with first and second CSI-RS resources simultaneously in a CC. Includes P/SP/A SRS6. UE can process up to X CSI-RS resources associated with SRS for non-codebook-based transmission simultaneously | FFS | Yes | n/a | Associated CSI-RS resources for noncodebook multi-DCI based STx2P PUSCH+PUSCH is not supported | Per Band | n/a | FR2 only | n/a | Component 2 candidate values: {1 to 8}Component 3 candidate values: {1 to 8}Component 4 candidate values: {0 to 8}Component 5 candidate values: {1 to 16}Component 6 candidate values: {1 to 2} | Optional with capability signaling |

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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 transmission2. 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 CCs4. Maximum number of configured SSB and CSI-RS resources for measurement in both CMR sets across all CCs | FFS | 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 | 40-6-3h | Codebook multi-DCI based STx2P PUSCH+PUSCH for CG+CG | Support of multi-DCI based STxMP CG-PUSCH+CG-PUSCH~~[FFS: other components]~~ | [40-6-3a] | Yes | N/A | Multi-DCI based STx2P for CG+CG is not supported for codebook | ~~[~~Per Band~~]~~ | n/a | FR2 only | n/a |  | 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 | 40-6-3i | Codebook multi-DCI based STx2P PUSCH+PUSCH for DG+CG | Support of multi-DCI based STxMP DG-PUSCH+CG-PUSCH~~[FFS: other components]~~ | [40-6-3a] | Yes | N/A | Multi-DCI based STx2P for DG+CG is not supported for codebook | ~~[~~Per Band~~]~~ | n/a | FR2 only | n/a |  | 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 | 40-6-3o | Noncodebook multi-DCI based STx2P PUSCH+PUSCH for CG+CG | Support of multi-DCI based STxMP CG-PUSCH+CG-PUSCH for noncodebook~~[FFS: other components]~~ | [40-6-3a] | Yes | N/A | Multi-DCI based STx2P for CG+CG is not supported for noncodebook ~~is not supported~~ | ~~[~~Per Band~~]~~ | n/a | FR2 only | n/a |  | 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 | 40-6-3p | Noncodebook multi-DCI based STx2P PUSCH+PUSCH for DG+CG | Support of multi-DCI based STxMP DG-PUSCH+CG-PUSCH for noncodebook~~[FFS: other components]~~ | [40-6-3a] | Yes | N/A | Multi-DCI based STx2P for DG+CG is not supported for noncodebook ~~is not supported~~ | ~~[~~Per Band~~]~~ | n/a | FR2 only | n/a |  | 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 | 40-6-1 | Single-DCI based STx2P SDM scheme for PUSCH—codebook  | 1. Dynamic switching by DCI 0\_1/0\_2 between single-DCI STxMP SDM and sTRP for PUSCH—codebook2. 1 PTRS port for single-DCI based STx2P SDM scheme for PUSCH—codebook3. Support of two SRS resource sets with usage set to 'codebook'4. Maximum number of SRS resources in one SRS resource set5. Maximum number of layers of each panel for Single-DCI STx2P with SDM ~~[6. Maximum total number of layers across both panels for Single-DCI STx2P with SDM]~~~~[~~7. Max number of NZP PUSCH ports associated with one SRS resource set~~]~~8. Maximum number of SRS antenna ports for each SRS resource in each SRS resource set | 2-14 | Yes | N/A | Single-DCI based STx2P SDM scheme for PUSCH—codebook is not supported  | ~~[~~Per FSPC~~]~~ | No | FR2 only | n/a | Component 4 candidate values: {1, 2 ,4}Component 5 candidate values: {1, 2}Component 7 candidate values: {1, 2 ,4}Component 8 candidate values: {1, 2 ,4}Note: For component 7, if a row of the TPMI consists of all 0’s, the corresponding PUSCH port is not countedNote: If value 4 is reported for component 4, UE also reports value 4 in FG 16-5c | 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 | 40-6-1a | 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—noncodebook2. 1 PTRS port for single-DCI based STx2P SDM scheme for PUSCH—noncodebook3. Support of two SRS resource sets with usage set to 'noncodebook'4. Maximum number of SRS resources in one SRS resource set5. Maximum number of layers of each panel for Single-DCI STx2P with SDM ~~[6. Maximum total number of layers across both panels for Single-DCI STx2P with SDM]~~~~[7. Maximum number of simultaneous transmitted SRS resources at one symbol]~~~~[~~8. Maximum number of simultaneous transmitted SRS resources from one SRS resource set at one symbol~~]~~ | ~~FFS~~ 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} | 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 | 40-6-2 | Single-DCI based STx2P SFN scheme for PUSCH—codebook  | ~~1. Support of single-DCI based STx2P SFN scheme for codebook based PUSCH~~2.Dynamic switching by DCI 0\_1/0\_2 between single-DCI STxMP SFN and sTRP3. 1 PTRS port for single-DCI based STx2P SFN scheme for PUSCH—codebook4. Support of two SRS resource sets with usage set to 'codebook'5. ~~Supported~~ Maximum number of SRS resources in one SRS resource set6. ~~Supported~~ Maximum~~al~~ number of MIMO layers of each SRS resource set for CB PUSCH with SFN scheme~~[~~7. Maximum number of SRS antenna ports for each SRS resource in each SRS resource set~~]~~~~[8. Maximum total number of layers across both panels for Single-DCI STx2P with SFN]~~~~[~~9. Max number of NZP PUSCH ports associated with one SRS resource set~~]~~ | 2-14 | Yes | n/a | Single-DCI based STx2P SFN scheme for PUSCH—codebook is not supported | ~~[~~Per FSPC~~]~~ | n/a | FR2 only | n/a | Component 5 candidate values: {1, 2 ,4}Component 6 candidate values: {1, 2}Component 7 candidate values: {1, 2, 4}Component 9 candidate values: {1, 2, 4}Note: For component 9, if a row of the TPMI consists of all 0’s, the corresponding PUSCH port is not countedNote: If value 4 is reported for component 5, UE also reports value 4 in FG 16-5c | 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 | 40-6-2a | Single-DCI based STx2P SFN scheme for PUSCH—noncodebook | ~~1. Support of single-DCI based STx2P SFN scheme for noncodebook based PUSCH~~2.Dynamic switching by DCI 0\_1/0\_2 between single-DCI STxMP SFN and sTRP3. 1 PTRS port for single-DCI based STx2P SFN scheme for PUSCH—noncodebook4. Support of two SRS resource sets with usage set to 'noncodebook'5. ~~Supported~~ Maximum number of SRS resources in one SRS resource set6. ~~Supported~~ Maximum~~al~~ number of MIMO layers of each SRS resource set for NCB PUSCH with SFN scheme~~[7. Maximum number of simultaneous transmitted SRS resources at one symbol]~~~~[~~8. Maximum number of simultaneous transmitted SRS resources from one SRS resource set at one symbol~~]~~ | ~~FFS~~ 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} | 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 | 40-2-6 | Rx timing difference larger than CP length | 1. Support of the Rx timing difference between the two DL reference timings is larger than CP length |  | yes | N/A | Rx timing difference larger than CP is not supported | Per FSPC | n/a | n/a | n/a |  | 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 | 40-6-3a | Codebook multi-DCI based STx2P PUSCH+PUSCH for DG+DG | 1. Support of multi-DCI based STx2P PUSCH+PUSCH for codebook-based PUSCH with fully~~[/partial]~~ overlapping PUSCHs in time and ~~[~~non-overlapping in frequency~~]~~2. Support of two SRS resource sets with usage set to 'codebook' associated with two coresetPoolIndex values3. Maximum number of SRS resources in one SRS resource set4. Maximum number of layers of each PUSCH of PUSCH+PUSCH overlapping in time domain~~[~~5. Maximum ~~Supported~~ number of NZP PUSCH ports for each PUSCH of PUSCH+PUSCH overlapping in time domain~~]~~6. Maximum number of PUSCHs per CORESETPoolIndex per slot7. Maximum total number of layers across two overlapping PUSCH8. Maximum number of SRS antenna ports for each SRS resource in each SRS resource set | 2-14 | Yes | N/A | Codebook multi-DCI based STx2P PUSCH+PUSCH is not supported | [Per ~~Band~~ FSPC] | n/a | FR2 only | n/a | Note: Processing capability 2 is not supported in any CC if at least one CC is configured with two values of CORESETPoolIndex.Component 3 candidate values: {1,2,4}Note: If value 4 is reported for component 3, UE also reports value 4 in FG 16-5c.Component 4 candidate values: {1,2}~~[~~Component 5 candidate values: {1,2,4}Note: If a row of the TPMI consists of all 0’s, the corresponding PUSCH port is not counted~~.]~~Component 6 candidate values: {1,2,3,4,7}Note: per SCS, similar with Rel-15Component 7 candidate values: {2 ,3, 4}Component 8 candidate values: {1, 2 ,4} | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-3b | Noncodebook multi-DCI based STx2P PUSCH+PUSCH for DG+DG | 1. Support of multi-DCI based STxMP PUSCH+PUSCH for noncodebook-based PUSCH with fully~~[/partial]~~ overlapping PUSCHs in time and ~~[~~non-overlapping in frequency~~]~~2. Support of two SRS resource sets with usage set to 'noncodebook' associated with two coresetPoolIndex values3. Maximum number of SRS resources in one SRS resource set4. Maximum number of layers of each PUSCH of PUSCH+PUSCH overlapping in time domain~~[~~5. Maximum number of simultaneously transmitted SRS resources in one symbol per SRS resource set~~]~~6. Maximum number of PUSCHs per coresetPoolIndex per slot7. Maximum total number of layers across two overlapping PUSCH | 2-1~~4~~5 | Yes | N/A | Noncodebook multi-DCI based STx2P PUSCH+PUSCH is not supported | [Per ~~Band~~ FSPC] | n/a | FR2 only | n/a | Note: Processing capability 2 is not supported in any CC if at least one CC is configured with two values of CORESETPoolIndex.Component 3 candidate values: {1,2,~~[~~3,~~]~~4}Component 4 candidate values: {1,2}~~[~~Component 5 candidate values: {1,2,~~[~~3,4~~]~~}~~]~~Component 6 candidate values: {1,2,3,4,7}Note: per SCS, similar with Rel-15Component 7 candidate values: {2 ,3, 4} | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-3j | ~~[~~Noncodebook multi-DCI based STx2P PUSCH+PUSCH – ~~Parti~~al- Fully overlapping PUSCHs in time and fully ~~non-~~overlapping in frequency~~]~~ | ~~[~~Support of ~~parti~~al- fully overlapping PUSCHs in time and fully ~~non-~~overlapping in frequency~~]~~ | ~~[~~40-6-3b~~a]~~ | ~~[~~Yes~~]~~ | ~~[~~N/A~~]~~ | ~~[Parti~~al- Fully overlapping PUSCHs in time and fully ~~non-~~overlapping in frequency for Noncodebook multi-DCI based STx2P PUSCH+PUSCH is not supported~~]~~ | ~~[~~Per Band~~]~~ | ~~[~~n/a~~]~~ | ~~[~~FR2 only~~]~~ | ~~[~~n/a~~]~~ |  | ~~[~~Optional with capability signaling~~]~~ |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-3k | ~~[~~Noncodebook multi-DCI based STx2P PUSCH+PUSCH – Fully overlapping PUSCHs in time and partially overlapping in frequency~~]~~ | ~~[~~Support of fully overlapping PUSCHs in time and partially overlapping in frequency~~]~~ | ~~[~~40-6-3 b~~a]~~ | ~~[~~Yes~~]~~ | ~~[~~N/A~~]~~ | ~~[~~Fully overlapping PUSCHs in time and partially overlapping in frequency for Noncodebook multi-DCI based STx2P PUSCH+PUSCH is not supported~~]~~ | ~~[~~Per Band~~]~~ | ~~[~~n/a~~]~~ | ~~[~~FR2 only~~]~~ | ~~[~~n/a~~]~~ |  | ~~[~~Optional with capability signaling~~]~~ |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-3l | ~~[~~Noncodebook multi-DCI based STx2P PUSCH+PUSCH – Partially ~~Fully~~ overlapping PUSCHs in time ~~both frequency~~ and fully overlapping in frequency ~~time]~~ | ~~[~~Support of partially ~~fully~~ overlapping PUSCHs in time ~~both frequency~~ and fully overlapping in frequency ~~time]~~ | ~~[~~40-6-3 b~~a]~~ | ~~[~~Yes~~]~~ | ~~[~~N/A~~]~~ | ~~[~~Partially ~~Fully~~ overlapping PUSCHs in time ~~both frequency~~ and fully overlapping in frequency ~~time~~ for Noncodebook multi-DCI based STx2P PUSCH+PUSCH is not supported~~]~~ | ~~[~~Per Band~~]~~ | ~~[~~n/a~~]~~ | ~~[~~FR2 only~~]~~ | ~~[~~n/a~~]~~ |  | ~~[~~Optional with capability signaling~~]~~ |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-3m | ~~[~~Noncodebook multi-DCI based STx2P PUSCH+PUSCH – Partially ~~Fully~~ overlapping PUSCHs in time ~~frequency~~, partially overlapping in ~~time~~ frequency~~]~~ | ~~[~~Support of partially ~~fully~~ overlapping PUSCHs in time ~~frequency~~, partially overlapping in ~~time~~ frequency~~]~~ | ~~[~~40-6-3 b~~a]~~ | ~~[~~Yes~~]~~ | ~~[~~N/A~~]~~ | ~~[~~Partially ~~Fully~~ overlapping PUSCHs in time ~~frequency~~, partially overlapping in ~~time~~ frequency for Noncodebook multi-DCI based STx2P PUSCH+PUSCH is not supported~~]~~ | ~~[~~Per Band~~]~~ | ~~[~~n/a~~]~~ | ~~[~~FR2 only~~]~~ | ~~[~~n/a~~]~~ |  | ~~[~~Optional with capability signaling~~]~~ |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-3n | ~~[~~Noncodebook multi-DCI based STx2P PUSCH+PUSCH – Partially ~~or non-overlapping~~ PUSCHs in time ~~frequency~~, ~~partially or fully~~ non-overlapping in ~~time~~ frequency~~]~~ | ~~[~~Support of partially ~~or non-overlapping~~ PUSCHs in time ~~frequency~~, ~~partially or fully~~ non-overlapping in ~~time~~ frequency~~]~~ | ~~[~~40-6-3 b~~a]~~ | ~~[~~Yes~~]~~ | ~~[~~N/A~~]~~ | ~~[~~Partially ~~or non-overlapping~~ PUSCHs in time ~~frequency~~, ~~partially or fully~~ non-overlapping in ~~time~~ frequency for Noncodebook multi-DCI based STx2P PUSCH+PUSCH is not supported~~]~~ | ~~[~~Per Band~~]~~ | ~~[~~n/a~~]~~ | ~~[~~FR2 only~~]~~ | ~~[~~n/a~~]~~ |  | ~~[~~Optional with capability signaling~~]~~ |

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| 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 | 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 CC4. Maximum number of activated UL TCI states across all CC5. 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. | [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 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 | 40-1-9a | Unified TCI with separate DL/UL TCI update for multi-DCI based multi-TRP with multiple activated TCI codepoints per CORESETPoolIndex per CC | 1. TCI state indication for update and activation a) MAC-CE+DCI-based TCI state indication (use of DCI formats 1\_1 and if supported 1\_2 with DL assignment) b) MAC-CE+DCI-based TCI state indication (use of DCI formats 1\_1 and if supported 1\_2 without DL assignment)2. maximum number of activated DL TCI states per CORESETPoolIndex per BWP per CC3. maximum number of activated UL TCI states per CORESETPoolIndex per BWP per CC | [23-10-1b, 40-1-9] | yes | n/a | Unified TCI with separate DL/UL TCI update for multi-DCI based multi-TRP with multiple activated TCI codepoints per CORESETPoolIndex per CC is not supported | ~~[~~Per band~~]~~ | n/a | n/a | n/a | Component 2 candidate values: {1, 2, 3, 4, 5, 6, 7, 8}Component 3 candidate values: {1, 2, 3, 4, 5, 6, 7, 8,} | Optional with capability signalling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-1-12 | Common multi-CC TCI state ID update and activation for single-DCI based multi-TRP | 1. Support of common multi-CC TCI state ID update and activation for single-DCI based multi-TRP2. Maximum number of CC list(s)  | [40-1-1, 40-1-1, 40-1-2] | yes | n/a | Common multi-CC TCI state ID update and activation for single-DCI based multi-TRP is not supported | ~~[~~Per band~~]~~ | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4} | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-1-13 | Common multi-CC TCI state ID update and activation for multi-DCI based multi-TRP | 1. Support of common multi-CC TCI state ID update and activation for multi-DCI based multi-TRP2. Maximum number of CC list(s) | [40-1-7] | yes | n/a | Common multi-CC TCI state ID update and activation for multi-DCI based multi-TRP is not supported | ~~[~~Per band~~]~~ | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4} | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-2-4 | ~~Support of a~~ PDCCH order sent by one TRP triggers RACH procedure (specifically PRACH) towards a different TRP based on CFRA for inter-cell | Support of cross-TRP PDCCH order based on CFRA for inter-cell ~~[WA: and intra-cell]~~ multi-DCI based mTRP |  | yes | N/A | Inter-cell cross-TRP PDCCH ordered PRACH transmission is not supported | ~~[~~Per band~~]~~ | No | No | N/A |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-2-4a | PDCCH order sent by one TRP triggers RACH procedure (specifically PRACH) towards a different TRP based on CFRA for intra-cell | Support of cross-TRP PDCCH order based on CFRA for intra-cell multi-DCI based mTRP |  | yes | N/A | Intra-cell cross-TRP PDCCH ordered PRACH transmission is not supported | Per band | No | No | N/A |  | Optional with capability signaling |

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| ~~40. NR\_MIMO\_evo\_DL\_UL~~ | ~~40-2-5~~ | ~~TCI states of one coresetPoolIndex associated to both TAGs~~ | ~~Support of UL/joint TCI states of UL signals/channels associated to one coresetPoolIndex correspond to both TAGs This is a WA~~ | ~~FG 40-2-1 or 40-2-2~~ | ~~yes~~ | ~~n/a~~ | ~~All UL channels associated to one coresetPoolIndex must correspond to one TAG~~ | ~~[Per band]~~ | ~~n/a~~ | ~~n/a~~ | ~~n/a~~ |  | ~~Optional with capability signalling~~ |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-2-7 | Two TAs for multi-DCI STxMP PUSCH+PUSCH | Support of two TAs for multi-DCI STxMP PUSCH+PUSCH | [40-2-1 or 40-2-2, FFS more] | yes | n/a | Two TAs for multi-DCI STxMP PUSCH+PUSCH is not supported | ~~[~~Per ~~band~~ FSPC] | n/a | n/a | n/a |  | Optional with capability signalling |

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| 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 report2. Basic delay value, component candidate value <= D\_basic = 1 slot 3. Support of amplitude report4. Value of X for CPU occupation (OCPU=(Y+1).X)5. Support to configure KTRS = 1 TRS resource set6. Maximum number of simultaneously active CSI-RS resources for TDCP across all CCs~~Note: counting of simultaneously active CSI-RS resources follows existing specification TS38.214~~ | [2-35] | Yes | N/A | Time Domain Channel Properties report is not supported | ~~[~~Per band and Per BC~~]~~ | N/A | N/A | N/A | Note: counting of simultaneously active CSI-RS resources follows existing specification TS38.214 | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-3-2 | Number of delay values | Number Y>1 of delay values for which TDCP is reported | 40-3-3-1 | Yes | N/A | TDCP is not reported for more than 1 delay value | ~~[~~Per FS ~~-band Per-BC]~~ | N/A | N/A | N/A | Candidate values: {2,3,4} | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-3-1a | Supported maximum delay value larger than D\_basic | Support of maximum delay value larger than D\_basic =1 slot | 40-3-3-1 | Yes | N/A | delay value(s) larger than D\_basic are not supported | ~~[~~Per FS ~~-band Per-BC]~~ | N/A | N/A | N/A | Candidate values: {2 slots, 3 slots, 4 slots, 5 slots, 6 slots, 10 slots}~~[~~Note: 10 slots is only applicable for SCS >= 30 kHz, and 6 slots is maximum for SCS = 15 kHz~~]~~ | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-3-4 | Phase report | Support of phase report for Y>=1 | 40-3-3-1 | Yes | N/A | Phase report for Y>=1 is not supported | ~~[~~Per FS ~~-band Per-BC]~~ | N/A | N/A | N/A |  | Optional with capability signaling |

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| 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 CC2. Maximum number of configured CSI-RS resources for TDCP across all CCs3. Maximum number of simultaneously active CSI-RS resources for TDCP per CCNote: counting of simultaneously active CSI-RS resources follows existing specification TS38.214 | 40-3-3-1 | Yes | N/A | Number of CSI-RS resources for TDCP is not reported | [Per band andPer-BC] | N/A | N/A | N/A |  | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-3-6 | Maximum number of TRS resource sets in a report configuration | Max number of TRS resource sets in a single CSI-RS resource setting | 40-3-3-1 | Yes | N/A | More than 1 TRS resource set in a report configuration is not supported | ~~[~~Per FS ~~-band Per-BC]~~ | N/A | N/A | N/A | Candidate values: {2,3} | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-1 | Basic feature of Rel.18 enhanced DMRS ports for PDSCH for mapping type A | 1) Support 1 symbol FL DMRS without additional symbol(s) 2) Support 1 symbol FL DMRS and 1 additional DMRS symbol  | [2-5] | Yes | n/a | Rel.18 enhanced DMRS ports for PDSCH for mapping type A is not supported | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-1a | Basic feature of Rel.18 enhanced DMRS ports for PDSCH for mapping type B | 1) Support 1 symbol FL DMRS without additional symbol(s)2) Support 1 symbol FL DMRS and 1 additional DMRS symbol | [2-5] | Yes | n/a | UE does not support basic feature of Rel.18 enhanced DMRS ports for PDSCH for mapping type B | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-1b | 1 symbol FL DMRS and 2 additional DMRS symbols for more than one port for Rel.18 enhanced DMRS ports for PDSCH | Support of 1 symbol FL DMRS and 2 additional DMRS symbols for more than one port for Rel.18 enhanced DMRS ports for PDSCH | 40-4-1 | Yes | n/a | UE does not support 1 symbol FL DMRS and 2 additional DMRS symbols for more than one port for Rel.18 enhanced DMRS ports for PDSCH | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-1c | Alternative additional DMRS position for co-existence with LTE CRS for Rel.18 enhanced DMRS ports for PDSCH | Support of alternative additional DMRS position for co-existence with LTE CRS for Rel.18 enhanced DMRS ports for PDSCH | 40-4-1, 5-28 | Yes | n/a | UE does not support alternative additional DMRS position for co-existence with LTE CRS for Rel.18 enhanced DMRS ports for PDSCH | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-1d | 2 symbols FL-DMRS for Rel.18 enhanced DMRS ports for PDSCH | Support of 2 symbols FL-DMRS for Rel.18 enhanced DMRS ports for PDSCH | 40-4-1 | Yes | n/a | UE does not support 2 symbols FL-DMRS for Rel.18 enhanced DMRS ports for PDSCH | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-1e | 2-symbol FL DMRS + one additional 2-symbols DMRS for Rel.18 enhanced DMRS ports for PDSCH | Support of 2-symbol FL DMRS + one additional 2-symbols DMRS for Rel.18 enhanced DMRS ports for PDSCH | 40-4-1 | Yes | n/a | UE does not support 2-symbol FL DMRS + one additional 2-symbols DMRS for Rel.18 enhanced DMRS ports for PDSCH | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-1f | 1 symbol FL DMRS and 3 additional DMRS symbols for Rel.18 enhanced DMRS ports for PDSCH | Support of 1 symbol FL DMRS and 3 additional DMRS symbols for Rel.18 enhanced DMRS ports for PDSCH | 40-4-1 | Yes | n/a | UE does not support 1 symbol FL DMRS and 3 additional DMRS symbols for Rel.18 enhanced DMRS ports for PDSCH | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-1g | DMRS type for Rel.18 enhanced DMRS ports for PUSCH | Support of DMRS type for Rel.18 enhanced DMRS ports for PUSCH | 40-4-1 | Yes | n/a | UE does not support DMRS type for Rel.18 enhanced DMRS ports for PUSCH | ~~[~~Per FS~~]~~ | No | No | n/a | Component 1 candidate values: {etype 1, both etype 1 and etype 2} | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-1h | 1 port DL PTRS for Rel.18 enhanced DMRS ports for PDSCH with rank 1-8 | Support of 1 port DL PTRS for Rel.18 enhanced DMRS ports for PDSCH with rank 1-8 | 40-4-1 | Yes | n/a | 1 port DL PTRS for Rel.18 enhanced DMRS ports for PDSCH with rank 1-8 is not supported | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-1i | 2 port DL PTRS for Rel.18 enhanced DMRS ports for PDSCH with rank 1-8 | Support of 2 port DL PTRS for Rel.18 enhanced DMRS ports for PDSCH with rank 1-8 | 40-4-1, FFS more | Yes | n/a | 2 port DL PTRS for Rel.18 enhanced DMRS ports for PDSCH with rank 1-8 is not supported | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-1j | Support 1 symbol FL DMRS and 2 additional DMRS symbols for at least one port for mapping type A | Support of Support 1 symbol FL DMRS and 2 additional DMRS symbols for at least one port for mapping type A | 40-4-1 | Yes | n/a | Support 1 symbol FL DMRS and 2 additional DMRS symbols for at least one port is not supported for mapping type A | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-4 | Reception of PDSCH without the scheduling restriction for Rel.18 eType1 DMRS ports | Support reception of PDSCH without the scheduling restriction for Rel.18 eType1 DMRS ports | 40-4-1 | Yes | n/a | Reception of PDSCH without the scheduling restriction for Rel.18 eType1 DMRS ports is not supported | ~~[~~Per FS~~]~~ | No | No | n/a | Note: If this feature is not supported, UE expects that gNB shall apply at least the following scheduling restriction for PDSCH for FD-OCC 4 in Rel.18 eType 1 DMRS1) The number of consecutively scheduled PRBs for PDSCH is even2) The number of PRBs offset of scheduled PDSCH from point A (common resource block 0) is even | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-5 | Rel-18 DL DMRS with single DCI based M-TRP | Support of Rel-18 DL DMRS with single DCI based M-TRP | 40-4-1, FFS more | Yes | n/a | Rel-18 DL DMRS with single DCI based M-TRP is not supported | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-5a | Additional row(s) for antenna ports (0,2,3) for Rel.18 DMRS ports for single-DCI based M-TRP | Support of additional row(s) for antenna ports (0,2,3) for Rel.18 DMRS ports for single-DCI based M-TRP | 40-4-5 | Yes | n/a | Additional row(s) for antenna ports (0,2,3) for Rel.18 DMRS ports for single-DCI based M-TRP are not supported  | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-7 | Rel-18 DL DMRS with M-DCI based M-TRP | Support of Rel-18 DL DMRS with multi- DCI based M-TRP PDSCH operation | FFS | Yes | n/a | Rel-18 DL DMRS with M-DCI based M-TRP is not supported | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-6 | Basic feature of Rel.18 enhanced DMRS ports for PUSCH for scheduling type A for Rel.18 enhanced DMRS ports | 1) Support 1 symbol FL DMRS without additional symbol(s)2) Support 1 symbol FL DMRS and 1 additional DMRS symbols 3) Support 1 symbol FL DMRS and 2 additional DMRS symbols | [2-16] | Yes | n/a | Basic feature of Rel.18 enhanced DMRS ports for PUSCH for scheduling type A for Rel.18 enhanced DMRS ports is not supported | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-6a | Basic feature of Rel.18 enhanced DMRS ports for PUSCH for scheduling type B for Rel.18 enhanced DMRS ports | 1) Support 1 symbol FL DMRS without additional symbol(s)2) Support 1 symbol FL DMRS and 1 additional DMRS symbol | [2-16a] | Yes | n/a | Basic feature of Rel.18 enhanced DMRS ports for PUSCH for scheduling type B for Rel.18 enhanced DMRS ports is not supported | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-6c | DMRS type for Rel.18 enhanced DMRS ports for PUSCH | Support of DMRS type for Rel.18 enhanced DMRS ports for PUSCH | 40-4-6 | Yes | n/a | DMRS type for Rel.18 enhanced DMRS ports for PUSCH is not supported | ~~[~~Per FS~~]~~ | No | No | n/a | Component candidate values: {eType 1, both eType 1 and eType 2}[Note: A UE supporting one of FG 40-4-6 or FG 40-4-6a must support this FG] | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-6d | 2 symbols front-loaded DMRS (uplink) for Rel.18 enhanced DMRS ports for PUSCH | Support of 2 symbols front-loaded DMRS (uplink) for Rel.18 enhanced DMRS ports for PUSCH | 40-4-6 | Yes | n/a | 2 symbols front-loaded DMRS (uplink) for Rel.18 enhanced DMRS ports for PUSCH is not supported | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-6e | 2-symbol FL DMRS + one additional 2-symbols DMRS for Rel.18 enhanced DMRS ports for PUSCH | Support of 2-symbol FL DMRS + one additional 2-symbols DMRS for Rel.18 enhanced DMRS ports for PUSCH | 40-4-6 | Yes | n/a | 2-symbol FL DMRS + one additional 2-symbols DMRS for Rel.18 enhanced DMRS ports for PUSCH is not supported | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-6f | 1 symbol FL DMRS and 3 additional DMRS symbols for Rel.18 enhanced DMRS ports for PUSCH | Support of 1 symbol FL DMRS and 3 additional DMRS symbols for Rel.18 enhanced DMRS ports for PUSCH | 40-4-6 | Yes | n/a | 1 symbol FL DMRS and 3 additional DMRS symbols for Rel.18 enhanced DMRS ports for PUSCH is not supported | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-6g | 1 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 1-4 | Support of 1 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 1-4 | 40-4-6, FFS more | Yes | n/a | 1 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 1-4 is not supported | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-6h | 1 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 5-8 | Support of 1 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 5-8 | 40-4-6, FFS more | Yes | n/a | 1 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 5-8 is not supported | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-6i | 2 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 1-4 | Support of 2 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 1-4 | 40-4-6, FFS more | Yes | n/a | 2 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 1-4 is not supported | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-6j | 2 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 5-8 | Support of 2 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 5-8 | 40-4-6, FFS more | Yes | n/a | 2 port UL PTRS for Rel.18 enhanced DMRS ports for PUSCH with rank 5-8 is not supported | ~~[~~Per FS~~]~~ | No | No | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-10 | DMRS port configuration for PUSCH [with rank 5-8/ with 8Tx] | DMRS port configuration for PUSCH [with rank 5-8 / with 8Tx] for Rel 15 and Rel. 18 | [40-4-6] | Yes | n/a | Port configuration for PUSCH [with rank 5-8 / with 8Tx] is not supported | ~~[~~Per FS~~]~~ | No | No | n/a | Candidate values: {Rel. 15 DMRS, Rel. 15 DMRS and Rel. 18 DMRS} [Note: A UE supporting 8 Tx must support this FG] | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-1-1 | 2 PTRS ports for single-DCI based STx2P SDM scheme for PUSCH—codebook | Support of 2 PTRS ports for single-DCI based STx2P SDM scheme for PUSCH—codebook | 40-6-1 | Yes | N/A | 2 PTRS ports for single-DCI based STx2P SDM scheme for PUSCH—codebook is not supported | ~~[~~Per band ~~FSPC]~~ | No | FR2 only | n/a |  | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-1a-1 | 2 PTRS ports for single-DCI based STx2P SDM scheme for PUSCH—noncodebook | Support of 2 PTRS ports for single-DCI based STx2P SDM scheme for PUSCH—noncodebook | 40-6-1a | Yes | N/A | 2 PTRS ports for single-DCI based STx2P SDM scheme for PUSCH—noncodebook is not supported | ~~[~~Per band ~~FSPC]~~ | No | FR2 only | n/a |  | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-1b | Association between CSI-RS and SRS for noncodebook single-DCI based STx2P SDM scheme for PUSCH | 1. Support of up to two NZP CSI-RS resources associated with the two SRS resource sets for non-codebook based STxMP SDM scheme for PUSCH2. Maximum number of periodic SRS resources associated with first and second CSI-RS per BWP3. Maximum number of aperiodic SRS resources associated with first and second CSI-RS per BWP4. Maximum number of semi-persistent SRS resources associated with first and second CSI-RS per BWP5. UE can process Y SRS resources associated with first and second CSI-RS resources simultaneously in a CC. Includes P/SP/A SRS6. UE can process up to X CSI-RS resources associated with SRS for non-codebook-based transmission simultaneously | ~~[~~2-15a, 40-6-1a | Yes | N/A | Associated CSI-RS resources for non-codebook single-DCI based STxMP SDM scheme for PUSCH is not supported | ~~[~~Per Band~~]~~ | n/a | FR2 only | n/a | Component 2 candidate values: {1, 2,…,8}Component 3 candidate values: {1, 2,…,8}Component 4 candidate values: {0,1, 2,…,8}Component 5 candidate values: {1, 2,…,16}Component 6 candidate values: {1,2} | Optional with capability signalling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-1-2 | New DMRS port entry for single-DCI based SDM scheme | Support of new DMRS port entry {0, 2, 3} | 40-6-1,40-6-1a | Yes | N/A | New DMRS port entry for single-DCI based SDM scheme is not supported | ~~[~~Per Band~~]~~ | n/a | FR2 only | n/a |  | Optional with capability signalling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-2-1 | 2 PTRS ports for single-DCI based STx2P SFN scheme for PUSCH—codebook | Support of 2 PTRS ports for single-DCI based STx2P SFN scheme for PUSCH—codebook | 40-6-2 | Yes | n/a | 2 PTRS ports for single-DCI based STx2P SFN scheme for PUSCH—codebook is not supported | ~~[~~Per Band ~~FS]~~  | n/a | FR2 only | n/a |  | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-2a-1 | 2 PTRS ports for single-DCI based STx2P SFN scheme for PUSCH—noncodebook | Support of 2 PTRS ports for single-DCI based STx2P SFN scheme for PUSCH—noncodebook | 40-6-2a | Yes | n/a | 2 PTRS ports for single-DCI based STx2P SFN scheme for PUSCH—noncodebook is not supported | ~~[~~Per Band ~~FS]~~ | n/a | FR2 only | n/a |  | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-2b | Association between CSI-RS and SRS for noncodebook single-DCI based STx2P SFN scheme for PUSCH | 1. Support of up to two NZP CSI-RS resources associated with the two SRS resource sets for non-codebook based STxMP SFN scheme for PUSCH2. Maximum number of periodic SRS resources associated with first and second CSI-RS per BWP3. Maximum number of aperiodic SRS resources associated with first and second CSI-RS per BWP4. Maximum number of semi-persistent SRS resources associated with first and second CSI-RS per BWP5. UE can process Y SRS resources associated with first and second CSI-RS resources simultaneously in a CC. Includes P/SP/A SRS6. UE can process up to X CSI-RS resources associated with SRS for non-codebook-based transmission simultaneously | 2-15a, 40-6-2a | Yes | n/a | Associated CSI-RS resources for non-codebook single-DCI based STxMP SFN scheme for PUSCH is not supported | ~~[~~Per Band~~]~~ | n/a | FR2 only | n/a | Component 2 candidate values: {1, 2,…,8}Component 3 candidate values: {1, 2,…,8}Component 4 candidate values: {0,1, 2,…,8}Component 5 candidate values: {1, 2,…,16}Component 6 candidate values: {1,2} | Optional with capability signalling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-6-4 | Single-DCI based STx2P SFN scheme for PUCCH | 1. Support of single-DCI based STx2P SFN scheme for PUCCH2. Supported PUCCH formats for STxMP SFN scheme | ~~23-3-2d~~  | Yes | n/a | Single-DCI based STx2P SFN scheme for PUCCH is not supported | ~~[~~Per FS~~]~~ | n/a | FR2 only | n/a | Component 2 candidate values: {PF0/2, PF1/3/4, PF0-4) | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-7-1e | UL full power transmission mode 0  | Support of UL full power transmission mode of fullpower when UE is capable of 8 Tx codebook based PUSCH operation  | FFS | yes | n/a | ~~FFS~~ UL full power transmission mode 0 is not supported | ~~[~~Per FSPC~~]~~ | n/a | n/a | n/a |  | Optional with capability signalling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-7-1f | UL full power transmission mode 1  | Support of UL full power transmission mode of fullpowerMode1 when UE is capable of 8 Tx codebook based PUSCH operation~~This is a WA~~ | FFS | yes | n/a | ~~FFS~~ UL full power transmission mode 1 is not supported | ~~[~~Per FSPC~~]~~ | n/a | n/a | n/a |  | Optional with capability signalling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-7-2 | Basic features for Non-Codebook-based 8Tx PUSCH | 1. Supported maximal PUSCH MIMO layers for non-codebook based PUSCH2. Supported maximum number of SRS resources per SRS resource set with usage set to 'nonCodebook’ 3. Maximum number of simultaneous transmitted SRS resources at one symbol  | FFS | Yes | n/a | Non-codebook based 8Tx PUSCH is not supported | ~~[~~Per FSPC~~]~~ | No | No | No |  | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-7-3 | CBG based 2 CWs PUSCH with rank >4 | Support CBG based transmission for 2 CWs PUSCH | FFS | yes | n/a | CBG based transmission for 2 CWs PUSCH is not supported | ~~[~~Per FSPC~~]~~ | No | No | No |  | Optional with capability signalling |

R1-2310889 On UE features for Rel. 18 MIMO evolution WI Nokia, Nokia Shanghai Bell

R1-2310907 Discussion on UE features for Rel18 MIMO Ericsson

R1-2310956 Discussion on UE features for NR MIMO evolution ZTE

R1-2311049 Discussion on UE features for NR MIMO evolution Fujitsu

R1-2311117 Discussion on Rel-18 MIMO UE features vivo

R1-2311150 UE features for NR-MIMO evolution Intel Corporation

R1-2311220 UE features for Rel-18 MIMO evolution OPPO

R1-2311328 Further discussion on UE features for NR MIMO evolution CATT

R1-2311392 Further discussion on UE features for NR MIMO evolution xiaomi

R1-2311438 Discussion on Rel-18 MIMO UE features LG Electronics

R1-2311501 Discussion on UE features for NR MIMO evolution CMCC

R1-2311576 UE feature on NR MIMO evolution Google

R1-2311642 Discussion on UE features for NR MIMO evolution NTT DOCOMO, INC.

R1-2311706 Views on UE features for Rel-18 NR MIMO evolution Apple

R1-2311867 UE features for Rel-18 MIMO Samsung

R1-2311974 UE Features for NR MIMO Evolution MediaTek Inc.

R1-2312061 UE features for NR MIMO evolution Qualcomm Incorporated

R1-2312079 Summary of UE features for NR MIMO evolution Moderator (AT&T)

R1-2312152 UE features for NR MIMO evolution Huawei, HiSilicon