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

**Changsha, Hunan Province, China, April 15th – 19th, 2024**

**Source: Ad-Hoc Chair (NTT DOCOMO, INC.)**

**Title: Session Notes of AI 8.5.3**

**Agenda Item:** **8.5.3**

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

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

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

**R1-2403571** Summary of UE features for other Rel-18 work items (Topics B) Moderator (AT&T)

#### NR\_ATG

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 56. NR\_ATG | 56-1 | Uplink Time and Frequency pre-compensation and timing relationship enhancements | Support of UE specific TA calculation based on its GNSS-acquired position and the indicated BS location.Support of open (i.e. UE autonomous TA estimation) and closed (i.e., received TA commands) loop control for TA update in RRC\_CONNECTED state.Support of pre-compensation of the calculated TA in the uplink transmissions.Support of frequency pre-compensation to account for the Doppler experienced on the service link.Support of determining timing of the scheduling of PUSCH, PUCCH and PDCCH ordered PRACH, CSI reference resource, transmission of aperiodic SRS activation of TA command, first PUSCH transmission in CG Type 2 with cell-specific K\_offset if indicated.Support of UE receiving cell-specific K\_offset in system information. |  | Yes | N/A | If UE does not support this feature, the performance of ATG UE cannot be guaranteed due to the large propagation delay. | ~~FFS~~ Per UE | No | FR1 only | N/A | Note: This UE feature group is applicable only for bands defined in Section 5.2J in TS 38.101-1 | Mandatory with capability signaling for UE supports NR communication via ATG |
| 56. NR\_ATG | 56-2 | UE reporting of TA information | Support UE reporting of TA information | 56-1 | Yes | N/A | If UE does not support this feature, UE cannot report the TA information to network. | ~~FFS~~ Per UE | No | FR1 only | N/A | Note: This UE feature group is applicable only for bands defined in Section 5.2J in TS 38.101-1 | Optional with capability siganling |
| 56. NR\_ATG | 56-3 | Increasing the number of HARQ processes | The maximal supported HARQ process number is X for UL and Y for DL |  | Yes | N/A | If UE does not support this feature, the HARQ process is number is limited. | ~~FFS~~ Per UE | No | FR1 only | N/A | Candidate component values for (X,Y): {(16,32),(32,16),(32,32)}Note: This UE feature group is applicable only for bands defined in Section 5.2J in TS 38.101-1 | Optional with capability signalling |
| 56. NR\_ATG | 56-4 | K1 range extension | Support of extended K1 value range of (0..31) for unpaired spectrum |  | Yes | N/A | If UE does not support this feature, K1 value is limited. | ~~FFS~~ Per UE | TDD only | FR1 only | N/A | Note: This UE feature group is applicable only for bands defined in Section 5.2J in TS 38.101-1 | Optional with capability signalling |

#### Netw\_Energy\_NR

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| 42. Netw\_Energy\_NR | 42-8 | simultaneousCSI-SubReportsPerCC-r18 | Indicates the number of CSI report(s) for which the UE can measure and process reference signals simultaneously in a CC of the band for which this capability is provided. The CSI report comprises periodic, semi-persistent and aperiodic CSI and any latency classes and codebook types. The CSI report in *simultaneousCSI-SubReportsPerCC-r18* includes the beam report, and CSI report without sub-configurations plus CSI sub-report across CSI reports |  | Yes |  | UE does not support spatial or power domain adaptation for CSI reporting | Per Band | No | No | N/A | Component 1 candidate values: {1, 2, 3, 4, 5, 6, 7, 8}Note: UE shall report the value in this feature group being equal to or larger than that in *simultaneousCSI-ReportsPerCC* | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-9 | simultaneousCSI-SubReportsAllCC-r18 | Indicates whether the UE supports CSI report framework and the number of CSI report(s) which the UE can simultaneously process across all CCs, and across MCG and SCG in case of NR-DC. The CSI report comprises periodic, semi-persistent and aperiodic CSI and any latency classes and codebook types. The CSI report in *simultaneousCSI-SubReportsAllCC-r18* includes the beam report, and CSI report without sub-configurations plus CSI sub-report across CSI reports. This parameter may further limit *simultaneousCSI-SubReportsPerCC-r18* in MIMO-ParametersPerBand and Phy-ParametersFRX-Diff for each band in a given band combination |  | Yes |  | UE does not support spatial or power domain adaptation for CSI reporting | Per BC | No | No | N/A | Component 1 candidate values: {5, 6, 7, ..., 32}Note: UE shall report the value in this feature group being equal to or larger than that in *simultaneousCSI-ReportsAllCC* | Optional with capability signaling |

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 42. Netw\_Energy\_NR | 42-8 | simultaneousCSI-SubReportsPerCC-r18 | Indicates the number of CSI report(s) for which the UE can measure and process reference signals simultaneously in a CC of the band for which this capability is provided. The CSI report comprises periodic, semi-persistent and aperiodic CSI and any latency classes and codebook types. The CSI report in *simultaneousCSI-SubReportsPerCC-r18* includes the beam report, and CSI report without sub-configurations plus CSI sub-report across CSI reports | 2-35 | Yes |  | UE does not support spatial or power domain adaptation for CSI reporting | Per Band | No | No | N/A | Component 1 candidate values: {1, 2, 3, 4, 5, 6, 7, 8}Note ~~1~~: UE shall report the value in this feature group being equal to or larger than that in *simultaneousCSI-ReportsPerCC*Note: If UE is configured with CSI report setting without sub-configuration for the carrier, UE shall use *simultaneousCSI-ReportsPerCC*; otherwise, UE shall use *simultaneousCSI-SubReportsPerCC-r18*Note: UE supporting at least one of FG 42-1/1a/1b/1c/2/2a/2b/2c must report this FG | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-9 | simultaneousCSI-SubReportsAllCC-r18 | Indicates whether the UE supports CSI report framework and the number of CSI report(s) which the UE can simultaneously process across all CCs, and across MCG and SCG in case of NR-DC. The CSI report comprises periodic, semi-persistent and aperiodic CSI and any latency classes and codebook types. The CSI report in *simultaneousCSI-SubReportsAllCC-r18* includes the beam report, and CSI report without sub-configurations plus CSI sub-report across CSI reports. This parameter may further limit *simultaneousCSI-SubReportsPerCC-r18* in MIMO-ParametersPerBand and Phy-ParametersFRX-Diff for each band in a given band combination | 2-35 | Yes |  | UE does not support spatial or power domain adaptation for CSI reporting | Per BC | No | No | N/A | Component 1 candidate values: {5, 6, 7, ..., 32}Note ~~1~~: UE shall report the value in this feature group being equal to or larger than that in *simultaneousCSI-ReportsAllCC*Note: If UE is configured with CSI report setting without sub-configuration for any carrier, UE shall use *simultaneousCSI-ReportsAllCC*; otherwise, UE shall use *simultaneousCSI-SubReportsAllCC-r18*Note: UE supporting at least one of FG 42-1/1a/1b/1c/2/2a/2b/2c must report this FG | Optional with capability signaling |

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

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| 42. Netw\_Energy\_NR | 42-1 | Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for periodic CSI reporting | 1. Support of CSI feedback based on CSI report sub-configuration(s), each containing one port subset configuration/list of CSI-RS resource IDs for periodic CSI reporting2. The max number of sub-configurations Lmax in one CSI report configuration4. Supported maximum number of simultaneous NZP-CSI-RS resources per CC5. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC6. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs7. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs8. Support of single-panel type 1 codebook9. Supported total number of periodic CSI reporting settings without sub-configurations plus the total number of sub-configurations across periodic CSI report settings with sub-configurations per BWP | FFS | Yes |  | UE does not support spatial domain adaptation for periodicCSI reporting | Per band | No | No | N/A | Component 1 candidate values: {SD-type1, SD-type2, SD-type1and2}Note: SD-type1 refers to configuration contains one port subsetNote: SD-type2 refers to configuration contains list of CSI-RS resource IDsComponent 2 candidate values: {2,3,4}Component 4 candidate values: SD Type 1: {1, 2, 3 … 32}SD Type 2: {1, 2, 3 … 32}Component 5 candidate values: SD Type 1: {8, 16, 24, … 128 }SD Type 2: {8, 16, 24, … 128 }Component 6 candidate values: SD Type 1: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}SD Type 2: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}Component 7 candidate value: SD Type 1: {8, 16, 24, …, 248, 256}SD Type 2: {8, 16, 24, …, 248, 256}Component 9 candidate values: {2, 3, 4}Note: Components 6 and 7 are signaled per BC | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-1a | Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for semi-persistent CSI reporting on PUSCH | 1. Support of CSI feedback based on CSI report sub-configuration(s), each containing one port subset configuration/list of CSI-RS IDs for semi-persistent CSI reporting on PUSCH2. The max number of sub-configurations Lmax in one CSI report configuration3. Report of N CSI sub-report(s) included in one SP-CSI report where each CSI sub-report corresponds to one sub-configuration.4. Supported maximum number of simultaneous NZP-CSI-RS resources per CC5. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC6. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs7. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs8. Support of single-panel type 1 codebook9. Supported total number of semi-persistent CSI reporting settings without sub-configurations plus the total number of sub-configurations across semi-persistent CSI report settings with sub-configurations per BWP which is transmitted on PUSCH | FFS | Yes |  | UE does not support spatial domain adaptation for semi-persistent CSI reporting on PUSCH | Per band | No | No | N/A | Component 1 candidate values: {SD-type1, SD-type2, SD-type1and2}Note: SD-type1 refers to configuration contains one port subsetNote: SD-type2 refers to configuration contains list of CSI-RS resource IDsComponent 2 candidate values: {2,3,4,5,6,7,8}Component 3 candidate values: {2,3,4}Component 4 candidate values: {1, 2, 3 … 32}Component 5 candidate values: {8, 16, 24, … 128}Component 6 candidate values: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}Component 7 candidate values: {8, 16, 24, …, 248, 256}Component 9 candidate values: {2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}Note: Components 6 and 7 are signaled per BC | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-1b | Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for aperiodic CSI reporting | 1. Support of CSI feedback based on CSI report sub-configuration(s), each containing one port subset configuration/list of CSI-RS IDs for aperiodic CSI reporting2. The max number of sub-configurations Lmax in one CSI report configuration3. Report of N CSI sub-report(s) included in one CSI report where each CSI sub-report corresponds to one sub-configuration4. Supported maximum number of simultaneous NZP-CSI-RS resources per CC5. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC6. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs7. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs8. Support of single-panel type 1 codebook9. Supported total number of aperiodic CSI reporting settings without sub-configurations plus the total number of sub-configurations across aperiodic CSI report settings with sub-configurations per BWP | FFS | Yes |  | UE does not support spatial domain adaptation for aperiodic CSI reporting | Per band | No | No | N/A | Component 1 candidate values: {SD-type1, SD-type2, SD-type1and2}Note: SD-type1 refers to configuration contains one port subsetNote: SD-type2 refers to configuration contains list of CSI-RS resource IDsComponent 2 candidate values: {2,3,4,5,6,7,8}Component 3 candidate values {2,3,4}Component 4 candidate values: SD Type 1: {1, 2, 3 … 32}SD Type 2: {1, 2, 3 … 32}Component 5 candidate values: SD Type 1: {8, 16, 24, … 128 }SD Type 2: {8, 16, 24, … 128 }Component 6 candidate values: SD Type 1: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}SD Type 2: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}Component 7 candidate values: SD Type 1: {8, 16, 24, …, 248, 256}SD Type 2: {8, 16, 24, …, 248, 256}Note: Components 6 and 7 are signaled per BCComponent 9 candidate values: {2, 3, 4, 5, 6, 7, 8, 9, 10, 11,12} | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-1c | Spatial domain adaptation with CSI feedback based on CSI report sub-configuration(s) for semi-persistent CSI reporting on PUCCH | 1. Support of CSI feedback based on CSI report sub-configuration(s), each containing one port subset configuration/list of CSI-RS IDs for semi-persistent CSI reporting on PUCCH2. The max number of sub-configurations Lmax in one CSI report configuration3. Report of N CSI sub-report(s) included in one SP-CSI report where each CSI sub-report corresponds to one sub-configuration.4. Supported maximum number of simultaneous NZP-CSI-RS resources per CC5. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC6. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs7. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs8. Support of single-panel type 1 codebook9. Supported total number of semi-persistent CSI reporting settings without sub-configurations plus the total number of sub-configurations across semi-persistent CSI report settings with sub-configurations per BWP which is transmitted on PUCCH | FFS | Yes |  | UE does not support spatial domain adaptation for semi-persistent CSI reporting on PUCCH | Per band | No | No | N/A | Component 1 candidate values: {SD-type1, SD-type2, SD-type1and2}Note: SD-type1 refers to configuration contains one port subsetNote: SD-type2 refers to configuration contains list of CSI-RS resource IDsComponent 2 candidate values: {2,3,4}Component 3 candidate values: {2,3,4}Component 4 candidate values: {1, 2, 3 … 32}Component 5 candidate values: {8, 16, 24, … 128}Component 6 candidate values: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}Component 7 candidate values: {8, 16, 24, …, 248, 256}Component 9 candidate values: {2, 3, 4}~~Note: Maximum value of Lmax is no larger than 8 for semi-persistent CSI reporting on PUCCH~~~~Note: Maximum value of N is no larger than 4 for semi-persistent CSI reporting on PUCCH~~Note: Components 6 and 7 are signaled per BC | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-2 | Power domain adaptation with CSI feedback based on CSI report sub-configuration(s) for periodic CSI reporting | 1. Support of CSI feedback based on CSI report sub-configuration(s), each containing one power offset foraperiodic CSI reporting2. The max number of sub-configurations Lmax in one CSI report configuration4. Supported maximum number of simultaneous NZP-CSI-RS resources per CC5. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC6. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs7. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs8. Support of single-panel type 1 codebook9. Supported total number of periodic CSI reporting settings without sub-configurations plus the total number of sub-configurations across periodic CSI report settings with sub-configurations per BWP | FFS | Yes |  | UE does not support power domain adaptation for periodicCSI reporting | Per band | No | No | N/A | Component 2 candidate value: {2,3,4}Component 4 candidate value: {1, 2, 3 … 32}Component 5 candidate value: {8, 16, 24, … 128 }Component 6 candidate value: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}Component 7 candidate value: {8, 16, 24, …, 248, 256}Note: Components 6 and 7 are signaled per BCComponent 9 candidate values: {2, 3, 4} | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-2a | Power domain adaptation with CSI feedback based on CSI report sub-configuration(s) for semi-persistent CSI reporting on PUSCH | Support of CSI feedback based on CSI report sub-configuration(s), each containing one power offset for semi-persistent CSI reporting1. The max number of sub-configurations Lmax in one CSI report configuration on PUSCH2. Report of N CSI sub-report(s) included in one SP-CSI report where each CSI sub-report corresponds to one sub-configuration.3. Supported maximum number of simultaneous NZP-CSI-RS resources per CC4. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC5. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs6. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs7. Support of single-panel type 1 codebook8. Supported total number of semi-persistent CSI reporting settings without sub-configurations plus the total number of sub-configurations across semi-persistent CSI report settings with sub-configurations per BWP which is transmitted on PUSCH | FFS | Yes |  | UE does not support power domain adaptation for semi-persistent CSI reporting on PUSCH | Per band | No | No | N/A | Component 1 candidate values: {2,3,4,5,6,7,8}Component 2 candidate values: {2,3,4}Component 3 candidate values: {1, 2, 3 … 32}Component 4 candidate values: {8, 16, 24, … 128}Component 5 candidate values: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}Component 6 candidate values: {8, 16, 24, …, 248, 256}Component 8 candidate values: {2, 3, 4,5,6,7,8,9,10,11,12}Note: Components 5 and 6 are signaled per BC | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-2b | Power domain adaptation with CSI feedback based on CSI report sub-configuration(s) for aperiodic CSI reporting | 1. Support of CSI feedback based on CSI report sub-configuration(s), each containing one power offset for aperiodic CSI reporting2. The max number of sub-configurations Lmax in one CSI report configuration3. Report of N CSI sub-report(s) included in one CSI report where each CSI sub-report corresponds to one sub-configuration4. Supported maximum number of simultaneous NZP-CSI-RS resources per CC5. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC6. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs7. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs8. Support of single-panel type 1 codebook9. Supported total number of aperiodic CSI reporting settings without sub-configurations plus the total number of sub-configurations across aperiodic CSI report settings with sub-configurations per BWP | FFS  | Yes |  | UE does not support power domain adaptation for aperiodic CSI reporting | Per band | No | No | N/A | Component 2 candidate values: {2,3,4,5,6,7,8}Component 3 candidate values: {2,3,4}Component 4 candidate values: {1, 2, 3 … 32}Component 5 candidate values: {8, 16, 24, … 128}Component 6 candidate values: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}Component 7 candidate values: {8, 16, 24, …, 248, 256}Component 9 candidate values: {2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12}Note: Components 6 and 7 are signaled per BC | Optional with capability signaling |
| 42. Netw\_Energy\_NR | 42-2c | Power domain adaptation with CSI feedback based on CSI report sub-configuration(s) for semi-persistent CSI reporting on PUCCH | Support of CSI feedback based on CSI report sub-configuration(s), each containing one power offset for semi-persistent CSI reporting on PUCCH1. The max number of sub-configurations Lmax in one CSI report configuration2. Report of N CSI sub-report(s) included in one SP-CSI report where each CSI sub-report corresponds to one sub-configuration.3. Supported maximum number of simultaneous NZP-CSI-RS resources per CC4. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources per CC5. Supported maximum number of simultaneous NZP-CSI-RS resources in active BWPs across all CCs6. Supported maximum number of total CSI-RS ports in simultaneous NZP-CSI-RS resources in active BWPs across all CCs7. Support of single-panel type 1 codebook8. Supported total number of semi-persistent CSI reporting settings without sub-configurations plus the total number of sub-configurations across semi-persistent CSI report settings with sub-configurations per BWP which is transmitted on PUCCH | FFS | Yes |  | UE does not support power domain adaptation for semi-persistent CSI reporting on PUCCH | Per band | No | No | N/A | Component 1 candidate values: {2,3,4}Component 2 candidate values: {2,3,4}Component 3 candidate values: {1, 2, 3 … 32}Component 4 candidate values: {8, 16, 24, … 128}Component 5 candidate values: {5, 6, 7, 8, 9, 10, 12, 14, 16, …, 62, 64}Component 6 candidate values: {8, 16, 24, …, 248, 256}Component 8 candidate values: {2, 3, 4}~~Note: Maximum value of Lmax is no larger than 8 for semi-persistent CSI reporting on PUCCH~~~~Note: Maximum value of N is no larger than 4 for semi-persistent CSI reporting on PUCCH~~Note: Components 5 and 6 are signaled per BC | Optional with capability signaling |

#### NR\_pos\_enh2

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

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| 41. NR\_pos\_enh2 | 41-4-6 | Positioning SRS bandwidth aggregation in RRC\_CONNECTED | 1. The number of supported aggregated carriers in intra band contiguous carriers2. Maximum aggregated UL SRS bandwidth in MHz, which is supported and reported by UE5. Max number of aggregated SRS resource sets for positioning supported by UE for SRS bandwidth aggregation6. Maximum number of aggregated SRS resources for bandwidth aggregation7. Maximum number of aggregated SRS resources for bandwidth aggregation per slot8. Support the same SRS power reduction across aggregated carriers | 13-8, 6-6 | Yes | n/a | Positioning SRS bandwidth aggregation in RRC\_CONNECTED is not supported | Per FS | n/a | n/a | n/a | Component 1 candidate values: {2,3,2and3}Component 2 candidate values:For 2 in Component 1:FR1 bands: {20, 40, 50, 80, 100, 160, 180, 190, 200~~M~~}FR2 bands: {50, 100, 200, 400, 600, 800}For 3 in Component 1:FR1 bands: {80, 100, 160, 200, 240, 300}FR2 bands: {50, 100, 200, 300, 400, 600, 800, 1000, 1200}Component 5 candidate values: {1, 2, 4, 8, 12, 16}Component 6 candidate values:Periodic: {1,2,4,8,16,32,64}Aperiodic: {0,1,2,4,8,16,32,64}Semi-persistent: {0,1,2,4,8,16,32,64}Component 7 candidate values:Periodic: {1,2,3,4,5,6,8,10,12,14}Aperiodic: {0,1,2,3,4,5,6,8,10,12,14}Semi-persistent: {0,1,2,3,4,5,6,8,10,12,14}Note: For component 1, it shall be less than or equal to the maximum number of the component carrier associated with IE ca-BandwidthClassUL-NR.Note: For component 2, it shall be less than or equal to the maximum aggregated transmission bandwidth associated with IE ca-BandwidthClassUL-NR. Additionally, it shall be less than or equal to the maximum aggregated bandwidth for the supported CA configuration in Table 5.5A.1-1 in TS 38.101-1 for FR1 bands or Table 5.5A.1-1 in TS 38.101-2 for FR2 bands for the band where aggregated SRS CCs is configured.Note: The UE supports the simultaneous transmission in a coherent manner of 2 or 3 SRS resources in 2 or 3 intra-band contiguous CCs.Note: each two or three linked SRS resources are counted as 1 resourceNote: A UE that support FG 13-8a must signal a non-zero value for components 6 and 7 for aperiodicNeed for location server to know if the feature is supported. UE only reports the number on bands for the current configured CA band combination. | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-4-7 | Positioning SRS bandwidth aggregation independent from UL communication CA in RRC\_CONNECTED | 1. The number of supported aggregated carriers in intra band contiguous carriers2. Maximum aggregated UL SRS bandwidth in MHz, which is supported and reported by UE5. Max number of aggregated SRS resource sets for positioning supported by UE for SRS bandwidth aggregation6. Maximum number of aggregated SRS resources for bandwidth aggregation7. Maximum number of aggregated SRS resources for bandwidth aggregation per slot8. Support the same SRS power reduction across aggregated carriers9. Guard period in microseconds10. Power class of supported aggregated carriers in intra band contiguous carriers | 13-8 | Yes | n/a | Positioning SRS bandwidth aggregation independent from UL communication CA in RRC\_CONNECTED is not supported | Per FS | n/a | n/a | n/a | Component 1 candidate values: {2,3,2and3}Component 2 candidate values:For 2 in Component 1:FR1 bands: {20, 40, 50, 80, 100, 160, 180, 190, 200~~M~~}FR2 bands: {50, 100, 200, 400, 600, 800}For 3 in Component 1:FR1 bands: {80, 100, 160, 200, 240, 300}FR2 bands: {50, 100, 200, 300, 400, 600, 800, 1000, 1200}Component 5 candidate values: {1, 2, 4, 8, 12, 16}Component 6 candidate values:Periodic: {1,2,4,8,16,32,64}Aperiodic: {0,1,2,4,8,16,32,64}Semi-persistent: {0,1,2,4,8,16,32,64}Component 7 candidate values:Periodic: {1,2,3,4,5,6,8,10,12,14}Aperiodic: {0,1,2,3,4,5,6,8,10,12,14}Semi-persistent: {0,1,2,3,4,5,6,8,10,12,14}Component 9 candidate values: {0~~ms~~, 30~~ms~~, 100~~ms~~, 140~~ms~~, 200~~ms~~}Component 10 candidate values:* For 2 in component 1: {PC2, PC3}
* For 3 in component 1: {PC2, PC3}

Note: Component 10 is only applicable for FR1 bandsNote: For a given band, independent of the band combination, the UE must signal the same guard periodNote: The UE supports the simultaneous transmission in a coherent manner of 2 or 3 SRS resources in 2 or 3 intra-band contiguous CCs.Note: each two or three linked SRS resources are counted as 1 resourceNeed for location server to know if the feature is supported. UE only reports the number on bands for the current configured CA band combination.Note: Guard period is needed before and after the aggregated SRS transmissions when SRS resource is configured within a CC without PUSCH/PUCCH is linked for aggregation with an SRS resource configured within an UL active BWP of a UL communication CC | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-4-8 | Positioning SRS bandwidth aggregation in RRC\_INACTIVE | 1. The number of supported aggregated carriers in intra band contiguous carriers2. Maximum aggregated UL SRS bandwidth in MHz, which is supported and reported by UE5. Max number of aggregated SRS resource sets for positioning supported by UE for SRS bandwidth aggregation6. Maximum number of aggregated SRS resources for bandwidth aggregation7. Maximum number of aggregated SRS resources for bandwidth aggregation per slot8. Support the same SRS power reduction across aggregated carriers9. Guard period in microseconds10. Power class of supported aggregated carriers in intra band contiguous carriers | 27-15b | Yes | n/a | Positioning SRS bandwidth aggregation in RRC\_INACTIVE is not supported | Per band | n/a | n/a | n/a | Component 1 candidate values: {2,3,2and3}Component 2 candidate values:For 2 in Component 1:FR1 bands: {20, 40, 50, 80, 100, 160, 180, 190, 200~~M~~ }FR2 bands: {50, 100, 200, 400, 600, 800}For 3 in Component 1:FR1 bands: {80, 100, 160, 200, 240, 300}FR2 bands: {50, 100, 200, 300, 400, 600, 800, 1000, 1200}Component 5 candidate values: {1, 2, 4, 8, 12, 16}Component 6 candidate values:Periodic: {1,2,4,8,16,32,64}Semi-persistent: {0,1,2,4,8,16,32,64}Component 7 candidate values:Periodic: {1,2,3,4,5,6,8,10,12,14}Semi-persistent: {0,1,2,3,4,5,6,8,10,12,14}Component 9 candidate values: {0~~ms~~, 30~~ms~~, 100~~ms~~, 140~~ms~~, 200~~ms~~}Component 10 candidate values:* For 2 in component 1: {PC2, PC3}
* For 3 in component 1: {PC2, PC3}

Note: Component 10 is only applicable for FR1 bandsNeed for location server to know if the feature is supported. | 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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| 41. NR\_pos\_enh2 | 41-1-1 | Common SL PRS Processing Capability in a SL BWP | 1. Maximum SL PRS bandwidth in MHz in a resource pool for positioning, which is supported and reported by UE for SL-PRS measurement2. Maximum number of active SL PRS resources across all configured RPs in a slot assuming maximum SL PRS bandwidth in MHz, which is supported and reported by UE3. Maximum number of slots with active SL PRS resources across all configured RPsassuming maximum SL PRS bandwidth in MHz, which is supported and reported by UE4. Minimum time after the end of a slot carrying the active SL-PRS resource(s) assuming maximum number of symbols and maximum bandwidth for a UE to finish the SL-PRS resource and the associated PSCCH processing which is supported and reported by UE |  | Yes | No | The UE does not support the reception and processing of SL PRS | ~~WA:~~ Per Band | n/a | n/a | n/a | Component 1 candidate values:FR1 bands: {5, 10, 20, 40, 50, 80, 100}FR2 bands: {50, 100, 200, 400}Component 2 candidate values:FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24} for each SCS: 15kHz, 30kHz, 60kHzFR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64, 128} for each SCS: 60kHz, 120kHzComponent 3 candidate values:FR1: {1, 2, 3, 4, 6, 8}FR2: {1, 2, 4, 8, 12, 16, 24, 32, 48, 64}Component 4 candidate values: {20ms, 30ms, 40ms, 50ms, 80ms, 100ms, 160ms}Note: a SL PRS resource is considered as active starting at the end of the last symbol of the PSCCH carrying the SCI trigger and the occupancy is released at the end of timeline indicated in component 4Need for location server/ UE to know if the feature is supported | Optional with capability signaling |
| 41. NR\_pos\_enh2 | 41-1-1a | Common SL PRS Processing Capability | 1. Maximum number of active SL PRS resources across all configured RPs across all bands in a slot assuming maximum SL PRS bandwidth in MHz, which is supported and reported by UE2. Maximum number of slots with active SL PRS resources across all configured RPsacross all bands assuming maximum SL PRS bandwidth in MHz, which is supported and reported by UE | 41-1-1 | Yes | No | The UE does not support the reception and processing of SL PRS | Per UE | No | No | No | Component 1 candidate values:FR1 bands: {1, 2, 4, 6, 8, 12, 16, 24} for each SCS: 15kHz, 30kHz, 60kHzFR2 bands: {1, 2, 4, 6, 8, 12, 16, 24, 32, 48, 64, 128} for each SCS: 60kHz, 120kHzComponent 2 candidate values: FR1: {1, 2, 3, 4, 6, 8}FR2: {1, 2, 4, 8, 12, 16, 24, 32, 48, 64}Need for location server/ UE to know if the feature is supported~~This row/FG is a WA~~ | 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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| 41. NR\_pos\_enh2 | 41-1-10 | Support of full sensing in a dedicated resource pool | 1. UE can transmit SL-PRS and associated PSCCH using full sensing2. Support DL pathloss based open loop power control when configured by NR Uu | ~~FFS~~  | Yes | No | UE cannot transmit SL-PRS using full sensing in a dedicated resource pool | ~~WA:~~ Per band~~]~~ | n/a | n/a | n/a | Note: Configuration by NR Uu is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1Note: Component 2 is not required to be supported in a band indicated with only the PC5 interface in 38.101-1 Table 5.2E.1-1Note: UE supporting this FG also support receiving SCI format 1B | 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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| 41. NR\_pos\_enh2 | 41-1-2 | Receiving SL-PRS in a shared resource pool | 1. Support SL-PRS in shared resource pool2. Support receiving SCI format 2D | ~~[~~15-1, ~~15-4,~~ 41-1-1~~]~~ | Yes | No | Receiving SL-PRS in a shared resource pool is not supported | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported~~[UE indicating support of FG 41-1-1 must indicate either this feature group or feature group 41-1-3 is supported or both are supported]~~ | Optional with capability signaling |

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

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| 41. NR\_pos\_enh2 | 41-1-3 | Receiving SL-PRS in a dedicated resource pool | 1. Support SL-PRS in dedicated resource pool2. Support receiving SCI format 1B3. UE can receive X PSCCH in a slot4. UE can receive using 30 kHz subcarrier spacing with normal CP in FR1 | ~~[15-1, 15-4,~~ 41-1-1~~]~~ | Yes | No | Receiving SL-PRS in a dedicated resource pool is not supported | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported~~[UE support of FG 41-1-1 must indicate either this feature group or feature group 41-1-2 is supported or both are supported]~~Component 3 candidate values: {floor (NRB /10 RBs), 2\*floor (NRB /10 RBs)}Component 4 candidate values:* FR1: {{15 kHz}, {30 kHz}, {60 kHz}, {15, 30 kHz}, {30, 60 kHz}, {15, 60 kHz}, {15, 30, 60 kHz}}
* CP length: {NCP,NCP and ECP}

Note: ECP only applies to SCS of 60 kHz | Optional with capability signaling |

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

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| 41. NR\_pos\_enh2 | 41-1-4c | Transmitting SL-PRS mode 2 in a dedicated resource pool | 1. UE can transmit SL-PRS and PSCCH within a slot without PSSCH in dedicated resource pool2. UE can transmit SL-PRS according to the mapping rule between PSCCH and SL-PRS3. Support transmitting SCI format 1B | ~~[15-[x], 41-1-3],~~ at least one of {41-1-8, 41-1-10} | Yes | No | Transmitting SL-PRS mode 2 in a dedicated resource pool is not supported | Per band | n/a | n/a | n/a | Need for location server/ UE to know if the feature is supported | Optional with capability signaling |

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

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| 41. NR\_pos\_enh2 | 41-4-9 | Affected bands if guard period is needed in SRS bandwidth aggregation | Indicate which other bands in the band combination are affected due to the need of a guard period | 41-4-7 or 41-4-8 | Yes | n/a | If not reported, all the bands of the UE are affected when a guard period is needed in SRS bandwidth aggregation | Per FS | n/a | n/a | n/a | For each band in the band combination, the UE can indicate which other bands in the band combination are affected by the SRS switch.Note: UE may indicate no other bands in the band combination are affected by the SRS switch, in which case, only the band with the aggregated SRS transmissions is affectedNote: Guard period is needed before and after the aggregated SRS transmissions when SRS resource is configured within a CC without PUSCH/PUCCH is linked for aggregation with an SRS resource configured within an UL active BWP of a UL communication CC | Optional with capability signaling |

#### NR\_NTN\_enh

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

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| 44. NR\_NTN\_enh | 44-2 | NTN DMRS bundling enhancement for PUSCH in NGSO scenarios | 1. Support of DM-RS bundling for PUSCH over consecutive slots in NGSO scenarios2. Support of pre-compensation to keep phase rotation due to timing drift within the phase difference limit3. Maximum duration during which UE is able to maintain power consistency and phase continuity to support NTN DM-RS bundling for PUSCH over consecutive slots | At least one of {30-4a/b/c}, 26-1 | Yes | No | UE does not support DM-RS bundling enhancement for PUSCH in NGSO scenarios  | Per Band | N/A | N/A | N/A | Component 3 candidate values: {4, 8, 16, 32}Note: This UE feature group is applicable only for bands in Tables 5.2.2-1 ~~and~~ ~~[TBD for FR2-NTN bands]~~ in TS 38.101-5 and HAPS operation bands in Clause 5.2 of TS 38.104Note: a UE that does not report support of this FG and reports support of FG 30-4 for an NTN band can perform DMRS bundling only in GSO scenario in the NTN bandNOTE: DM-RS bundling is only applicable for UL transmissions with pi/2 BPSK, BPSK, and QPSK modulation ordersNote: for bands in Table 5.2.2-1 ~~and~~ ~~[TBD for FR2-NTN bands]~~ in TS 38.101-5, reported value in FG 30-4 is applied only for GSO scenario | Optional with capability signaling |

#### NR\_Mob\_enh2

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

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| 45. NR\_Mob\_enh2 | 45-5a | RACH-based early TA acquisition with simultaneous transmission | Support of simultaneous transmission to handle the overlap between UL transmission on serving cell(s) and PRACH on candidate cell(s) | 45-5 | Yes | No | Support of RACH-based early TA acquisition with simultaneous transmission is not supported | ~~[~~Per band~~]~~ pair per band combination (between the target band for RACH transmission and band under UE’s current band combo)  | No | No | n/a |  | Optional with capability signalling |

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

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| 45. NR\_Mob\_enh2 | 45-5 | RACH-based early TA acquisition | 1. Maximum number of candidate cells for TA acquisition based on PDCCH ordered CFRA procedure before receiving cell switch command MAC-CE2. Power ramping for PRACH retransmission based on PDCCH order indication3. Support of dropping the serving cell UL to handle the overlap between UL transmission on serving cell(s) and PRACH on candidate cell(s) | ~~FFS~~ 45-7, RAN2 FG for LTM | Yes | No | RACH-based early TA acquisition is not supported | Per band | No | No | n/a | Component 1 candidate values {1,2,3,4,5,6,7,8} | Optional with capability signalling |

#### IoT\_NTN\_enh

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

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| 2. IoT\_NTN\_enh | 2-4a | GNSS position fix in RRC Connected state for eMTC—autonomous | 1. UE re-acquires GNSS autonomously (when configured by the network) if it does not receive eNB GNSS measurement trigger2. UE reports GNSS position fix time duration for measurement at least during the initial access stage and in connected mode via RRCConnectionReestablishmentComplete and RRCConnectionReconfigurationComplete for HO case3. UE reports the remaining GNSS validity duration with MAC CE in connected mode | ~~[Rel. 18 2-3a]~~ Rel. 17 2-1 | Yes | N/A | Release 18 eMTC UE cannot get autonomous GNSS position fix in RRC Connected state | Per UE | No  | No | Note: This applies to non-DRX | Optional with capability signalling |
| 2. IoT\_NTN\_enh | 2-4b | GNSS position fix in RRC Connected state for NB-IoT—autonomous | 1. UE re-acquires GNSS autonomously (when configured by the network) if it does not receive eNB GNSS measurement trigger2. UE reports GNSS position fix time duration for measurement at least during the initial access stage and in connected mode via RRCConnectionReestablishmentComplete-NB3. UE reports the remaining GNSS validity duration with MAC CE in connected mode | ~~[Rel. 18 2-3b],~~ Rel. 17 2-1b |  |  | Release 18 NB-IoT UE cannot get autonomous GNSS position fix in RRC Connected state | Per UE | No | No | Note: This applies to non-DRX | Optional with capability signalling |

R1-2403615 Summary#2 of UE features for other Rel-18 work items (Topics B) Moderator (AT&T)

#### NR\_MIMO\_evo\_DL\_UL

**Agreement:**

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

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-2-11 | Aperiodic CSI report timing relaxation for doppler codebook based on Type-II codebook | 1. Aperiodic CSI report timing relaxation, w, for doppler codebook based on Type-II codebook.2. Aperiodic CSI report timing relaxation for doppler codebook based on Type-II codebook | At least one of {40-3-2-1, 40-3-2-4} | Yes | N/A | Aperiodic CSI report timing relaxation for doppler codebook based on Type-II codebook is unknown | Per FS | N/A | N/A | N/A | Component 1 candidate values: UE reports candidate value, w, independently for each SCS in unit of symbols: {14\*(KP–1)\*d, 14\*KP\*d}Note: Kp is according to Component 10 of FG 40-3-2-1, or according to Component 9 of FG 40-3-2-4Note: d=4 (minimum periodicity of periodic CSI-RS)~~For 15kHz SCS: {0, 4, 8, 16, 32}~~~~For 30kHz SCS: {0, 8, 16, 32, 64}~~~~For 60kHz SCS: {0, 16, 32, 64, 128}~~~~For 120kHz SCS: {0, 16, 32, 64, 128}~~~~For 480kHz SCS: {0, 64, 128, 256, 512}~~~~For 960kHz SCS: {0, 128, 256, 512, 1024}~~Component 2 candidate values: ~~[~~{CAP1, CAP2}~~]~~For N4 = 1 1) For AP CSI-RS: (Z,Z’) = (Z2 + 14\*(K–1)\*m, Z'2)2) For P/SP CSI-RS: (Z,Z’) = (Z2 + w, Z'2)For N4 > 1 and CAP1 in component 2 1) For AP CSI-RS: (Z,Z’) = (Z2 + 14\*(K–1)\*m, Z'2)2) For P/SP CSI-RS: (Z,Z’) = (Z2 + w, Z'2)For N4 > 1 and CAP2 in component 2 1) For AP CSI-RS: (Z,Z’) = (Z2 + 14\*(K–1)\*m + Z'2, 2Z'2)2) For P/SP CSI-RS: (Z,Z’) = (Z2 + w + Z'2, 2Z'2)Z2/Z'2 are defined in Table 5.4-2 in TS38.214K = {4,8,12}, is the number of AP CSI-RS resources for the CMR in a CSI report settingM = {1,2}, is the offset between two adjacent AP CSI-RS resources for the CMR in slotsNote: A UE that supports FG 40-3-2-1 or FG 40-3-2-4 must signal this FG  | Optional with capability signalling |

**Agreement:**

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

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-6 | Basic feature of Rel.18 enhanced DMRS ports for PUSCH for scheduling of mapping 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 for one port | 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 | 40-4-6k | 1 symbol FL DMRS and 2 additional DMRS symbols for more than one port for Rel.18 enhanced DMRS ports for PUSCH | Support of 1 symbol FL DMRS and 2 additional DMRS symbols for more than one port for Rel.18 enhanced DMRS ports for PUSCH | 40-4-6 | 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 PUSCH | Per FS | No | No | n/a |  | Optional with capability signaling |

**Agreement:**

* **Replace “scheduling type A” by “scheduling of mapping type A” for FG40-4-x family**
* **Replace “scheduling type B” by “scheduling of mapping type B” for FG40-4-x family**
* **Replace “mapping type A” by “scheduling of mapping type A” for FG40-4-x family**
* **Replace “mapping type B” by “scheduling of mapping type B” for FG40-4-x family**

**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 | 40-4-10 | DMRS port configuration for PUSCH with 8Tx | DMRS port configuration for PUSCH with 8Tx for Rel 15 and Rel. 18 | ~~40-4-6~~  | Yes | n/a | DMRS port configuration for PUSCH with 8Tx is not supported  | Per FS | No | No | n/a | Candidate values: {Rel. 15 DMRS, Rel. 15 DMRS and Rel. 18 DMRS}  | 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 | 40-4-5a | Additional row(s) for antenna ports (0,2,3) for Rel.18 DL DMRS ports for single-DCI based M-TRP | Support of additional row(s) for antenna ports (0,2,3) for Rel.18 DL 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 DL DMRS for single-DCI based M-TRP are not supported  | Per FS | No | No | 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 | 40-6-1-2 | New UL DMRS port entry for single-DCI based SDM scheme for Rel-15 DMRS port and/or Rel-18 DMRS port | Support of new UL DMRS port entry {0, 2, 3} | 40-6-1 or 40-6-1a | Yes | N/A | New UL DMRS port entry for single-DCI based SDM scheme is not supported | Per Band | n/a | FR2 only | n/a |  | Optional with capability signalling |

**Agreement:**

**Introduce the following new FG/row**

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-4-2 | Capability on the maximum number of configured DMRS types for PDSCH across all DL DCI formats per cell | Maximum number of configured DMRS types for PDSCH across all DL DCI formats per cell | 2-10, 40-4-1g | Yes | n/a | Capability on the maximum number of configured DMRS types for PDSCH across all DL DCI formats per cell is not supported  | Per FS | No | No | n/a | Component candidate values: {2, 3, 4} | Optional with capability signaling |

**Agreement:**

**Introduce the following new FG/row**

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-1-14a | Dynamic switching - scheme A | Support of dynamic switching between single-TRP and PDSCH SFN scheme A by TCI selection field in DCI formats 1\_1, 1\_2 | 40-1-1c, 23-6-1a | Yes | n/a | dynamic switching between single-TRP and PDSCH SFN scheme A by TCI selection field in DCI formats 1\_1, 1\_2 is not supported | Per FS | n/a | n/a | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-1-14b | Dynamic switching - scheme B | Support of dynamic switching between single-TRP and PDSCH SFN scheme B by TCI selection field in DCI formats 1\_1, 1\_2 | 40-1-1c, 23-6-2a | Yes | n/a | dynamic switching between single-TRP and PDSCH SFN scheme B by TCI selection field in DCI formats 1\_1, 1\_2 is not supported | Per FS | n/a | n/a | n/a |  | Optional with capability signaling |

**Agreement:**

**Introduce the following new FG/row**

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-1-3a | Per aperiodic CSI-RS resource/resource set configuration for TCI selection in M-DCI based MTRP | Support of per aperiodic CSI-RS resource/resource set configuration for TCI selection in M-DCI based MTRP | 40-1-7 | yes | n/a | Per aperiodic CSI-RS resource/resource set configuration for TCI selection in M-DCI based MTRP is not supported | Per band | n/a | n/a | n/a | Component candidate values: {per resource, per resource set, both} | Optional with capability signalling |

**Agreement:**

**Introduce the following new FG/row**

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-2-[12] | Supported maximum periodicity of CMR when configured as periodic CSI-RS | Maximum periodicity of periodic CSI-RS (in slots) UE can handle for Type-II-Doppler CSI report | At least one of {40-3-2-1, 40-3-2-4} | Yes | n/a |  | Per band  | No | n/a | n/a | Component candidate values (in slots): {4, 5, 8, 10, 20}UE supporting at least one of {40-3-2-1, 40-3-2-4} must report this FG | 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 | 40-6-6 | Out-of-order operation for multi-DCI based STx2P PUSCH+PUSCH | Support of out-of-order operation for multi-DCI based STx2P PUSCH+PUSCH | 40-6-3a or 40-6-3b | Yes | N/A | Out-of-order operation for multi-DCI based STx2P PUSCH+PUSCH is not supported | Per FSPC | N/A | ~~N/A~~ FR2 only | N/A |  | Optional with capability signalling |

**Agreement:**

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

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-5-1a | Comb offset hopping time-domain behavior when repetition factor R>1 | Supported comb offset hopping granularity in time when repetition factor R>1 is configured | 40-5-1 | Yes | n/a | Comb offset hopping ~~time-domain behavior when repetition factor R>1~~ is not supported when repetition factor R>1 | Per band | n/a | n/a | n/a | Component candidate values: {‘per SRS symbol’,’per R SRS symbols’, ‘both’} | Optional with capability signaling |

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

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-5-1b | SRS comb offset hopping combined with ~~legacy~~ group/sequence hopping | Support of SRS comb offset hopping combined with ~~legacy~~ group/sequence hopping supported in NR SRS basic feature (FG 2-52) | 40-5-1 | Yes | n/a | SRS comb offset hopping combined with legacy group/sequence hopping supported in NR SRS basic feature (FG 2-52) is not supported | Per band | n/a | n/a | n/a |  | Optional with capability signaling |
| 40. NR\_MIMO\_evo\_DL\_UL | 40-5-2b | SRS cyclic shift hopping combined with ~~legacy~~ group/sequence hopping | Support of SRS cyclic shift hopping combined with ~~legacy~~ group/sequence hopping supported in NR SRS basic feature (FG 2-52) | 40-5-2 | Yes | n/a | SRS cyclic shift hopping combined with legacy group/sequence hopping supported in NR SRS basic feature (FG 2-52) is not supported | Per band | n/a | n/a | n/a |  | Optional with capability signaling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-1-3 | Per aperiodic CSI-RS resource/resource set configuration for TCI selection in S-DCI based MTRP | Support of per aperiodic CSI-RS resource/resource set configuration for TCI selection in S-DCI based MTRP | 40-1-1 | yes | n/a | Per aperiodic CSI-RS resource/resource set configuration for TCI selection in S-DCI based MTRP is not supported | Per band | n/a | n/a | n/a | Component candidate values: {per resource, per resource set, both}Note: when the UE supports NCJT CSI under 23-7-1 or CJT CSI under 40-1-4, UE is expected to support “per resource” when the corresponding NCJT CSI or CJT CSI is configured | 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 ~~or 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 | 40-2-2 | Basic feature for multi-DCI based inter-cell Multi-TRP operation with two TA enhancement | 1. Support of two TA enhancement for multi-DCI based inter-cell Multi-TRP operation2. Maximum number of n-TimingAdvanceOffset value per serving cell | 23-4 | yes | n/a | Two TA enhancement for multi-DCI based inter-cell Multi-TRP operation is not supported | Per FSPC | n/a | n/a | n/a | Component 2 candidate values: {1,2} | 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, 40-6-3a or 40-6-3b  | yes | n/a | Two TAs for multi-DCI STxMP PUSCH+PUSCH is not supported | Per FSPC | n/a | n/a | n/a | Note: A UE that support this FG can transmit PUSCH in two consecutive slots using different TA without reducing the later slot | Optional with capability signalling |

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| 40. NR\_MIMO\_evo\_DL\_UL | 40-3-1-24 | Timeline for regular eType-II-CJT CSI, or for port selection FeType-II-CJT CSI | Timeline relaxation parameter  | 40-3-1-1, or 40-3-1-5 | Yes | N/A | Relaxed timeline is not supported | Per band andPer-BC  | No | N/A | N/A | Component candidate value: {0, Z2’}Note: A UE that supports FG 40-3-1-1 or FG 40-3-1-5 must signal this FG | Optional with capability signaling |

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| 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, 40-4-1j | 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 | 40-4-1g | DMRS type for Rel.18 enhanced DMRS ports for PDSCH | Support of DMRS type for Rel.18 enhanced DMRS ports for PDSCH | 40-4-1 | Yes | n/a | UE does not support DMRS type for Rel.18 enhanced DMRS ports for PDSCH | Per FS | No | No | n/a | Component 1 candidate values: {etype 1, both etype 1 and etype 2}Note: A UE supporting one of FG 40-4-1 or FG 40-4-1a must support this FG | 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 |

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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 7. Max number of NZP PUSCH ports associated with one SRS resource set8. Maximum number of SRS antenna ports for each SRS resource in each SRS resource set9. Support of separate configured maximum output power for each of indicated joint/UL TCI states | 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 |

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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 8. Maximum number of simultaneous transmitted SRS resources from one SRS resource set at one symbol9. Support of separate configured maximum output power for each of indicated joint/UL TCI states | 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 |

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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 scheme3. Support of separate configured maximum output power for each of indicated joint/UL TCI states |  | 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 | 40-7-1g | 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 operation2. Maximum number of SRS resources in one SRS resource set with usage set to 'codebook' for 8Tx codebook based PUSCH for Mode 2 | 40-7-1 | yes | n/a | UL full power transmission mode 2 is not supported | Per FSPC | n/a | n/a | n/a | Component 2 candidate values: {1, 2, 4}Note: A UE that supports FG 40-7-1g supports at least full power operation with single port | Optional with capability signalling |

R1-2402008 UE features for other Rel-18 WIs (Topics B) Huawei, HiSilicon

R1-2402143 UE features for Rel-18 Work Items (Topics B) Intel Corporation

R1-2402229 Discussion on UE features for Topic B vivo

R1-2402315 UE features for other Rel-18 work items (Topics B) OPPO

R1-2402365 Remaining issues on UE features for MIMO and Positioning CATT

R1-2402453 UE features for other Rel-18 work items (Topic B) Samsung

R1-2402552 Discussion on UE features for NR ATG CMCC

R1-2402605 Remaining issues of UE Features for Other Topics B (MIMO, FePos, NES, MobEnh, NCR, IoT-NTN, NR-NTN, BWP\_wor) Nokia, Nokia Shanghai Bell

R1-2402647 Discussion on UE features for NR MIMO evolution Xiaomi

R1-2402702 UE features for other Rel-18 work items (Topics B) ZTE Corporation

R1-2402868 Views on UE features for other Rel-18 work items (Topics B) Apple

R1-2402955 UE features for other Rel-18 work items (Topics B) MediaTek

R1-2403116 Discussion on UE features for NES LG Electronics

R1-2403181 UE features for other Rel-18 work items (Topics B) Qualcomm Incorporated

R1-2403231 Discussion on UE features for other Rel-18 work items (Topics B) NTT DOCOMO, INC.

R1-2403271 Rel-18 UE features topics set B Ericsson

R1-2403409 Views on UE features for other Rel-18 work items (Topics B) Apple