**3GPP TSG RAN WG1 #122 R1-2506229**

**Bengaluru, India, Aug 25th – 29th, 2025**

**Agenda Item: 9.6**

**Source: Moderator (AT&T)**

**Title: Summary of UE features for NR mobility enhancements Phase 4**

**Document for:** **Discussion/Decision**

# Introduction

This document presents the summary of email discussion [122-R19-UE\_features] during RAN1 #122. According to the Chair’s Notes:

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| [122-R19-UE\_features] Email discussion on Rel-19 UE features – Ralf (AT&T), Naoya (DOCOMO), Ralf (AT&T)   * To be used for sharing updates on online/offline schedule, details on what is to be discussed in online/offline sessions, tdoc number of the moderator summary for online session, etc |

The following was discussed during RAN1 #122 within the scope of [122-R19-UE\_features]. All proposals are based on the latest RAN1 UE features list for Rel. 19 in [1].

# Summary of Contributions Submitted to RAN1 #122

The following is the moderator’s summary of contributions submitted to RAN1 #122 in this agenda item.

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| 63. NR\_Mob\_Ph4 | 63-1 | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on periodic CSI-RS(s) of candidate cell(s)  2. Maximum number of RRC configured candidate cells for intra-frequency L1-RSRP measurement on CSI-RS resource  3. Support of up to L candidate cells and M beams in one report where a CRI-RSRP pair is used for each beam report for intra-frequency L1-RSRP measurement  4. Maximum number of LTM CSI report configs using periodic CSI-RS as measurement resource | FFS | Yes | No | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values:  L: {1, 2,3,4}  M: {1, 2,3,4}  M × L: {1,2,3,4, 6, 8, 9, 12, 16}  Component 4 candidate values:  Aperiodic: {0,1,2,3,4}  Periodic: {1,2,3,4}  Semi-persistent: {0,1,2,3,4} | Optional with capability signaling |

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| Company | Summary |
| Nokia [2] | The pre-requisite FGs for FG 63-1 should be aligned with those of FG 45-1, i.e., 2-21 or 2-22 or 2-23 or 2-23a   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-1 | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on periodic CSI-RS(s) of candidate cell(s)  2. Maximum number of RRC configured candidate cells for intra-frequency L1-RSRP measurement on CSI-RS resource  3. Support of up to L candidate cells and M beams in one report where a CRI-RSRP pair is used for each beam report for intra-frequency L1-RSRP measurement  4. Maximum number of LTM CSI report configs using periodic CSI-RS as measurement resource | 2-21 or 2-22 or 2-23 or 2-23a ~~FFS~~ | Yes | No | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values:  L: {1, 2,3,4}  M: {1, 2,3,4}  M × L: {1,2,3,4, 6, 8, 9, 12, 16}  Component 4 candidate values:  Aperiodic: {0,1,2,3,4}  Periodic: {1,2,3,4}  Semi-persistent: {0,1,2,3,4} | Optional with capability signaling | |
| ZTE Corporation/Sanechips [3] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-1 | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on periodic CSI-RS(s) of candidate cell(s)  2. Maximum number of RRC configured candidate cells for intra-frequency L1-RSRP measurement on CSI-RS resource  3. Support of up to L candidate cells and M beams in one report where a CRI-RSRP pair is used for each beam report for intra-frequency L1-RSRP measurement  4. Maximum number of LTM CSI report configs using periodic CSI-RS as measurement resource | ~~FFS~~  2-21 or 2-22 or 2-23 or 2-23a | Yes | No | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values:  L: {1, 2,3,4}  M: {1, 2,3,4}  M × L: {1,2,3,4, 6, 8, 9, 12, 16}  Component 4 candidate values:  Aperiodic: {0,1,2,3,4}  Periodic: {1,2,3,4}  Semi-persistent: {0,1,2,3,4} | Optional with capability signaling | |
| CATT [4] |  |
| Huawei/HiSilicon [5] | In RAN1#121b, the prerequisite of FG63-1 is FFS. The divergence is whether SSB-based L1-RSRP should be prerequisite for CSI-based L1-RSRP measurement. According to RAN4 agreement in RAN4#113 [1], before measuring the CSI-RS(s) in a candidate cell, a FR2-1 UE should accomplish P2 procedure based on the SSB in the corresponding cells. Skipping the SSB measurement before CSI-RS measurement is up to UE capability. Thus, we think FG45-1 should be prerequisite of this FG at least for FR2-1. For UE support FR1 only, we think similar prerequisite can be assumed as in FR2-1 to simplify UE capability report.  ***Proposal 1: Support FG45-1 as the pre-requisite for FG 63-1.***   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-1 | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on periodic CSI-RS(s) of candidate cell(s)  2. Maximum number of RRC configured candidate cells for intra-frequency L1-RSRP measurement on CSI-RS resource  3. Support of up to L candidate cells and M beams in one report where a CRI-RSRP pair is used for each beam report for intra-frequency L1-RSRP measurement  4. Maximum number of LTM CSI report configs using periodic CSI-RS as measurement resource | 45-1 | Yes | No | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values:  L: {1, 2,3,4}  M: {1, 2,3,4}  M × L: {1,2,3,4, 6, 8, 9, 12, 16}  Component 4 candidate values:  Aperiodic: {0,1,2,3,4}  Periodic: {1,2,3,4}  Semi-persistent: {0,1,2,3,4} | Optional with capability signaling | |
| Vivo [6] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-1 | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on periodic CSI-RS(s) of candidate cell(s)  2. Maximum number of RRC configured candidate cells for intra-frequency L1-RSRP measurement on CSI-RS resource  3. Support of up to L candidate cells and M beams in one report where a CRI-RSRP pair is used for each beam report for intra-frequency L1-RSRP measurement  4. Maximum number of LTM CSI report configs using periodic CSI-RS as measurement resource | 45-1 | Yes | No | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values:  L: {1, 2,3,4}  M: {1, 2,3,4}  M × L: {1,2,3,4, 6, 8, 9, 12, 16}  Component 4 candidate values:  Aperiodic: {0,1,2,3,4}  Periodic: {1,2,3,4}  Semi-persistent: {0,1,2,3,4} | Optional with capability signaling | |
| Samsung [7] |  |
| Ericsson [8] | The prerequisite feature group for 63-1 should be the corresponding LTM feature for L1 SSB measurements, 45-1.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 63-1 | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on periodic CSI-RS(s) of candidate cell(s)  2. Maximum number of RRC configured candidate cells for intra-frequency L1-RSRP measurement on CSI-RS resource  3. Support of up to L candidate cells and M beams in one report where a CRI-RSRP pair is used for each beam report for intra-frequency L1-RSRP measurement  4. Maximum number of LTM CSI report configs using periodic CSI-RS as measurement resource | 45-1 | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | Per BC | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values:  L: {1, 2,3,4}  M: {1, 2,3,4}  M × L: {1,2,3,4, 6, 8, 9, 12, 16}  Component 4 candidate values:  Aperiodic: {0,1,2,3,4}  Periodic: {1,2,3,4}  Semi-persistent: {0,1,2,3,4} | |
| OPPO [9] | For CSI-RS based beam measurement, the UE measures the CSI-RS resource for beam management of one or more candidate cells. Thus, the maximum number of CSI-RS resources for L1-RSRP measurement of each candidate cell shall be up to UE capability. And the UE is configured to measure multiple candidate cells simultaneously. Thus, the maximum number of CSI-RS resources of all candidate cells shall be UE capability too.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-1 | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on periodic CSI-RS(s) of candidate cell(s)  2. Maximum number of RRC configured candidate cells for intra-frequency L1-RSRP measurement on CSI-RS resource  3. Support of up to L candidate cells and M beams in one report where a CRI-RSRP pair is used for each beam report for intra-frequency L1-RSRP measurement  4. Maximum number of LTM CSI report configs using periodic CSI-RS as measurement resource.  5. Maximum number of periodic CSI-RS resources of one candidate cell configured for intra-frequency L1-RSRP measurement  6. Maximum total number of periodic CSI-RS resources of all candidate cells configured for intra-frequency L1-RSRP measurement. | FFS | Yes |  | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | |
| Qualcomm Incorporated [10] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-1 | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on periodic CSI-RS(s) of candidate cell(s)  2. Maximum number of RRC configured candidate cells for intra-frequency L1-RSRP measurement on CSI-RS resource  3. Support of up to L candidate cells and M beams in one report where a CRI-RSRP pair is used for each beam report for intra-frequency L1-RSRP measurement  4. Maximum number of LTM CSI report configs using periodic CSI-RS as measurement resource | ~~FFS~~  2-21 or 2-22 or 2-23 or 2-23a | Yes | No | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values:  L: {1, 2,3,4}  M: {1, 2,3,4}  M × L: {1,2,3,4, 6, 8, 9, 12, 16}  Component 4 candidate values:  Aperiodic: {0,1,2,3,4}  Periodic: {1,2,3,4}  Semi-persistent: {0,1,2,3,4} | Optional with capability signaling | |
| NTT DOCOMO, INC. [11] | FG45-1 should be prerequisite FG. |

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| 63. NR\_Mob\_Ph4 | 63-2 | NW triggered intra-frequency L1-RSRP measurement based on semi-persistent CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on semi-persistent CSI-RS(s) of candidate cell(s)  4. Maximum number of LTM CSI report configs using semi-persistent CSI-RS as measurement resource | 63-1 | Yes | No | NW triggered intra-frequency L1-RSRP measurement based on semi-persistent CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | Per BC | n/a | n/a | n/a | Component 4 candidate values:  Aperiodic: {0,1,2,3,4}  Semi-persistent: {0,1,2,3,4}  Note: For component 4, the UE must support a non-zero value for at least one of aperiodic and semi-persistent | Optional with capability signaling |

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| Company | Summary |
| Nokia [2] | Editorial comment: component 4 should be numbered as component 2.   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-2 | NW triggered intra-frequency L1-RSRP measurement based on semi-persistent CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on semi-persistent CSI-RS(s) of candidate cell(s)  ~~4.~~ 2. Maximum number of LTM CSI report configs using semi-persistent CSI-RS as measurement resource | 63-1 | Yes | No | NW triggered intra-frequency L1-RSRP measurement based on semi-persistent CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | Per BC | n/a | n/a | n/a | Component ~~4~~2 candidate values:  Aperiodic: {0,1,2,3,4}  Semi-persistent: {0,1,2,3,4}  Note: For component ~~4~~2, the UE must support a non-zero value for at least one of aperiodic and semi-persistent | Optional with capability signaling | |
| ZTE Corporation/Sanechips [3] |  |
| CATT [4] |  |
| Huawei/HiSilicon [5] |  |
| Vivo [6] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-2 | NW triggered intra-frequency L1-RSRP measurement based on semi-persistent CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on semi-persistent CSI-RS(s) of candidate cell(s)  2~~4~~. Maximum number of LTM CSI report configs using semi-persistent CSI-RS as measurement resource | 63-1 | Yes | No | NW triggered intra-frequency L1-RSRP measurement based on semi-persistent CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | Per BC | n/a | n/a | n/a | Component 4 candidate values:  Aperiodic: {0,1,2,3,4}  Semi-persistent: {0,1,2,3,4}  Note: For component 4, the UE must support a non-zero value for at least one of aperiodic and semi-persistent | Optional with capability signaling | |
| Samsung [7] |  |
| Ericsson [8] | The component for the maximum number of LTM CSI report configs is component 2, not component 4.   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 63-2 | NW triggered intra-frequency L1-RSRP measurement based on semi-persistent CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on semi-persistent CSI-RS(s) of candidate cell(s)  2. Maximum number of LTM CSI report configs using semi-persistent CSI-RS as measurement resource | 63-1 | NW triggered intra-frequency L1-RSRP measurement based on semi-persistent CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | Per BC | Component 2 candidate values:  Aperiodic: {0,1,2,3,4}  Semi-persistent: {0,1,2,3,4}  Note: For component 2, the UE must support a non-zero value for at least one of aperiodic and semi-persistent | |
| OPPO [9] | For CSI-RS based beam measurement, the UE measures the CSI-RS resource for beam management of one or more candidate cells. Thus, the maximum number of CSI-RS resources for L1-RSRP measurement of each candidate cell shall be up to UE capability. And the UE is configured to measure multiple candidate cells simultaneously. Thus, the maximum number of CSI-RS resources of all candidate cells shall be UE capability too.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-2 | NW triggered intra-frequency L1-RSRP measurement based on semi-persistent CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on semi-persistent CSI-RS(s) of candidate cell(s)  2. Maximum number of LTM CSI report configs using semi-persistent CSI-RS as measurement resource  3. Maximum number of semi-persistent CSI-RS resources of one candidate cell configured for intra-frequency L1-RSRP measurement  4. Maximum total number of semi-persistent CSI-RS resources of all candidate cells configured for intra-frequency L1-RSRP measurement. | 63-1 | Yes |  | NW triggered intra-frequency L1-RSRP measurement based on semi-persistent CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | |
| Qualcomm Incorporated [10] |  |
| NTT DOCOMO, INC. [11] |  |

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| 63. NR\_Mob\_Ph4 | 63-3 | CSI-RS as Type-D QCL source RS in the indicated joint LTM TCI state | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | FFS | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling |

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| Company | Summary |
| Nokia [2] | **Proposal 2: FGs 45-3, 45-3a, 45-4, and 45-4a should be the pre-requisite for FGs 63-3, 63-3a, 63-4, and 63-4a, respectively.**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-3 | CSI-RS as Type-D QCL source RS in the indicated joint LTM TCI state | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | ~~FFS~~ 45-3 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| ZTE Corporation/Sanechips [3] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-3 | CSI-RS as Type-D QCL source RS in the indicated joint LTM TCI state | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | ~~FFS~~  45-3, 23-1-1, RAN FG for LTM | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| CATT [4] |  |
| Huawei/HiSilicon [5] | In Rel-18 LTM, SSB and/or TRS can be configured as QCL RS because CSI-RS for beam management is not supported at that time. The corresponding FGs are defined in FG45-3/3a and FG45-4/4a for joint and separate TCI states respectively. In Rel-19, CSI-RS for beam management can be additionally configured as type D QCL source RS for LTM TCI state, as in serving cell according to unified TCI framework. Thus, we have following proposals for the prerequisite of FG63-3, FG63-3a, FG63-4 and FG63-4a.  ***Proposal 2: Support FG 45-3 as the pre-requisite of FG 63-3.***   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-3 | CSI-RS as Type-D QCL source RS in the indicated joint LTM TCI state | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | 45-3 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| Vivo [6] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-3 | CSI-RS as Type-D QCL source RS in the indicated joint LTM TCI state | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | 63-1, 45-3 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| Samsung [7] |  |
| Ericsson [8] | 63-3 Prerequisite FG: 45-3   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 63-3 | CSI-RS as Type-D QCL source RS in the indicated joint LTM TCI state | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | 45-3 | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | Per band |  | |
| OPPO [9] |  |
| Qualcomm Incorporated [10] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-3 | CSI-RS as Type-D QCL source RS in the indicated joint LTM TCI state | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | ~~FFS~~  45-3 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| NTT DOCOMO, INC. [11] | FG45-3 and FG63-1 should be prerequisite FG. |

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| 63. NR\_Mob\_Ph4 | 63-3a | CSI-RS as Type-D QCL source RS for MAC-CE activated joint LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | FFS | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling |

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| Company | Summary |
| Nokia [2] | **Proposal 2: FGs 45-3, 45-3a, 45-4, and 45-4a should be the pre-requisite for FGs 63-3, 63-3a, 63-4, and 63-4a, respectively.**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-3a | CSI-RS as Type-D QCL source RS for MAC-CE activated joint LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | ~~FFS~~ 45-3a | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| ZTE Corporation/Sanechips [3] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-3a | CSI-RS as Type-D QCL source RS for MAC-CE activated joint LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | ~~FFS~~  FG 45-3, 63-3 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| CATT [4] |  |
| Huawei/HiSilicon [5] | In Rel-18 LTM, SSB and/or TRS can be configured as QCL RS because CSI-RS for beam management is not supported at that time. The corresponding FGs are defined in FG45-3/3a and FG45-4/4a for joint and separate TCI states respectively. In Rel-19, CSI-RS for beam management can be additionally configured as type D QCL source RS for LTM TCI state, as in serving cell according to unified TCI framework. Thus, we have following proposals for the prerequisite of FG63-3, FG63-3a, FG63-4 and FG63-4a.  ***Proposal 3: Support FG 45-3a and FG63-3 as the pre-requisite of FG 63-3a.***   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-3a | CSI-RS as Type-D QCL source RS for MAC-CE activated joint LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | 45-3a and 63-3 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| Vivo [6] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-3a | CSI-RS as Type-D QCL source RS for MAC-CE activated joint LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | 63-1, 45-3a | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| Samsung [7] |  |
| Ericsson [8] | 63-3a Prerequisite FG: 45-3a   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 63-3a | CSI-RS as Type-D QCL source RS for MAC-CE activated joint LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | 45-3a | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | Per band |  | |
| OPPO [9] |  |
| Qualcomm Incorporated [10] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-3a | CSI-RS as Type-D QCL source RS for MAC-CE activated joint LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | ~~FFS~~  45-3a, 63-3 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| NTT DOCOMO, INC. [11] | FG45-3a and FG63-1 should be prerequisite FG. |

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| 63. NR\_Mob\_Ph4 | 63-4 | CSI-RS as Type-D QCL source RS in the indicated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | FFS | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling |

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| Company | Summary |
| Nokia [2] | **Proposal 2: FGs 45-3, 45-3a, 45-4, and 45-4a should be the pre-requisite for FGs 63-3, 63-3a, 63-4, and 63-4a, respectively.**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-4 | CSI-RS as Type-D QCL source RS in the indicated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | ~~FFS~~ 45-4 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| ZTE Corporation/Sanechips [3] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-4 | CSI-RS as Type-D QCL source RS in the indicated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | ~~FFS~~  FG 45-4, 23-10-1, RAN FG for LTM | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| CATT [4] |  |
| Huawei/HiSilicon [5] | In Rel-18 LTM, SSB and/or TRS can be configured as QCL RS because CSI-RS for beam management is not supported at that time. The corresponding FGs are defined in FG45-3/3a and FG45-4/4a for joint and separate TCI states respectively. In Rel-19, CSI-RS for beam management can be additionally configured as type D QCL source RS for LTM TCI state, as in serving cell according to unified TCI framework. Thus, we have following proposals for the prerequisite of FG63-3, FG63-3a, FG63-4 and FG63-4a.  ***Proposal 4: Support FG 45-4 as the pre-requisite of FG 63-4.***   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-4 | CSI-RS as Type-D QCL source RS in the indicated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | 45-4 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| Vivo [6] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-4 | CSI-RS as Type-D QCL source RS in the indicated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | 63-1, 45-4 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| Samsung [7] |  |
| Ericsson [8] | 63-4 Prerequisite FG: 45-4   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 63-4 | CSI-RS as Type-D QCL source RS in the indicated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | 45-4 | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | Per band |  | |
| OPPO [9] |  |
| Qualcomm Incorporated [10] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-4 | CSI-RS as Type-D QCL source RS in the indicated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | ~~FFS~~  45-4 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| NTT DOCOMO, INC. [11] | FG45-4 and FG63-1 should be prerequisite FG. |

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| 63. NR\_Mob\_Ph4 | 63-4a | CSI-RS as Type-D QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | FFS | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling |

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| Company | Summary |
| Nokia [2] | **Proposal 2: FGs 45-3, 45-3a, 45-4, and 45-4a should be the pre-requisite for FGs 63-3, 63-3a, 63-4, and 63-4a, respectively.**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-4a | CSI-RS as Type-D QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | ~~FFS~~ 45-4a | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| ZTE Corporation/Sanechips [3] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-4a | CSI-RS as Type-D QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | ~~FFS~~  FG 45-4, 63-4 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| CATT [4] |  |
| Huawei/HiSilicon [5] | In Rel-18 LTM, SSB and/or TRS can be configured as QCL RS because CSI-RS for beam management is not supported at that time. The corresponding FGs are defined in FG45-3/3a and FG45-4/4a for joint and separate TCI states respectively. In Rel-19, CSI-RS for beam management can be additionally configured as type D QCL source RS for LTM TCI state, as in serving cell according to unified TCI framework. Thus, we have following proposals for the prerequisite of FG63-3, FG63-3a, FG63-4 and FG63-4a.  ***Proposal 5: Support FG 45-4a and FG65-4 as the pre-requisite of FG 63-4a.***   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-4a | CSI-RS as Type-D QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | 45-4a and 63-4 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| Vivo [6] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-4a | CSI-RS as Type-D QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | 63-1, 45-4a | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| Samsung [7] |  |
| Ericsson [8] | 63-4a Prerequisite FG: 45-4a   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 63-4a | CSI-RS as Type-D QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | 45-4a | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Per band |  | |
| OPPO [9] |  |
| Qualcomm Incorporated [10] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-4a | CSI-RS as Type-D QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | ~~FFS~~  45-4a, 63-4 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling | |
| NTT DOCOMO, INC. [11] | FG45-4a and FG63-1 should be prerequisite FG. |

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| 63. NR\_Mob\_Ph4 | 63-6 | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on periodic CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  [2. Maximum number of the RRC configured candidate cells]  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell | FFS | Yes | No | Intra-frequency periodic CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | FFS | 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}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: FFS | Optional with capability signaling |

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| Company | Summary |
| Nokia [2] | * + Component 2 is not needed as these FGs are related to the measurements only for one particular candidate cell.   + The prerequisite FG for FG 63-6 can be FG 2-32 (Basic CSI feedback), and the prerequisite FG for FG 63-6a should be 63-6.   + Since after the cell switch the UE is disconnected from the source cell, the FG type should be set to: Per Band.   + The candidate values for component 6 should be: 1, 2, 4, and 8.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-6 | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on periodic CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  ~~[2. Maximum number of the RRC configured candidate cells]~~  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell | ~~FFS~~  2-32 | Yes | No | Intra-frequency semi-persistent CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | ~~FFS~~  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}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: ~~FFS~~ {1,2,4,8} | Optional with capability signaling | |
| ZTE Corporation/Sanechips [3] | * For component “2. Maximum number of the RRC configured candidate cells], it should be removed because UE only needs to perform early CSI acquisition function in a candidate cell that corresponds to target cell provided by Target Configuration ID field in LTM CSC MAC CE. With this consideration, corresponding “Component 2 candidate values: {1,2,3,4,5,6,7,8}” should be also removed. * The granularity should be per BC. * Component 6 candidate values: {1,2,3,4,5,6,7,8}. * For FG-63-6, the prerequisite FG 2-36 (Type I single panel codebook) need to be added. * For FG-63-6a, the prerequisite FG 63-6 need to be added.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-6 | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on periodic CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  ~~[2. Maximum number of the RRC configured candidate cells]~~  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell | ~~FFS~~  2-36 | Yes | No | Intra-frequency periodic CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | ~~FFS~~  Per BC | 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}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: ~~FFS~~{1,2,3,4,5,6,7,8} | Optional with capability signaling | |
| CATT [4] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-6 | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on periodic CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  ~~[~~2. Maximum number of the RRC configured candidate cells ~~and CSI-RS resources]~~  ~~[Maximum number of CSI report configs]~~  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell | FFS | Yes | No | Intra-frequency periodic CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | FFS | ~~FFS~~ n/a | ~~FFS~~ n/a | ~~FFS~~ 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}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: ~~FFS~~ {1,2,4,8} | Optional with capability signaling | |
| Huawei/HiSilicon [5] | In RAN1#120b, the following agreement was reached that a single CSI report for CSI acquisition is configured for a candidate cell.   |  | | --- | | **Agreement**  Regarding CSI acquisition, for a candidate cell,   * A single CSI report configuration is configured * Multiple CSI-RS resources for CMR can be associated with the CSI report configuration   + The number of CSI-RS resources for CMR is subject to UE capability |   Hence, the maximum number of configured CSI report (s) for CSI acquisition can be implicitly determined by the maximum number of configured candidate cell(s) for CSI acquisition. Thus, we support to only keep the maximum number of configurable candidate cell(s) for CSI acquisition as component 2 of FG 63-6 and FG 63-6a.  ***Proposal 6: For FG 63-6 and FG 63-6a, support to remove the bracket on component 2.***  In FG63-6 and FG63-6a, the CSI measurement is performed after receiving LTM CSC MAC CE. Thus, UE supporting 63-6 should also report the capability of basic LTM procedure, i.e. RAN2 FG for LTM in Rel-18 (at least one of *ltm-MCG-r18* and *ltm-SCG-r18*), and FG63-6a should be the prerequisite of 63-6.  ***Proposal 7: For FG63-6, support RAN2 FG for LTM in Rel-18 (at least one of ltm-MCG-r18 and ltm-SCG-r18) as prerequisite.***  ***Proposal 9: FG 63-6 and 63-6a, support the reporting granularity as per band.***  For the report quantity in report configuration, *cri-RI-PMI-CQI* is supported. Considering that the allowed minimum Tx ports of CSI RS is 2 for PMI reporting, we think candidate value 1 should be removed from candidate value sets of components 4 and 5 in FG 63-6 and FG 63-6a.  ***Proposal 10: For FG 63-6 and FG 63-6a, support remove candidate value 1 from candidate value sets of components 4 and 5.***  For candidate values of component 6 in FG 63-6 and FG 63-6a, we think the allowed rank values for serving cell can be reused.  ***Proposal 11: For FG 63-6 and FG 63-6a, support candidate values of component 6 can be {1, 2, …, 8}.***  In RAN1#121, interference measurement resources can be configured for LTM CSI acquisition as descripted in the following agreement. Similar with CSI-RS resources for CMR, we think maximum number of CSI-IM resources for interference measurement should be as a component of FG 63-6, FG 63-6a, FG 63-7 and FG 63-7a.   |  | | --- | | **Agreement**  A list of interference measurement resources for candidate cells is supported for LTM CSI acquisition   * If this list is not configured, CMR is used for interference measurement |   ***Proposal 14: Support the following component in FG 63-6, FG 63-6a, FG 63-7 and FG 63-7a:***   * ***Maximum number of CSI-IM resources for interference measurement associated with CSI report configuration for a candidate cell.***  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-6 | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on periodic CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  ~~[~~2. Maximum number of the RRC configured candidate cells~~]~~  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell  7. Maximum number of CSI-IM resources for interference measurement associated with CSI report configuration for a candidate cell | RAN2 FG for LTM in Rel-18~~FFS~~ | Yes | No | Intra-frequency periodic CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE 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}  Component 4 candidate values: {~~1,~~2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {~~1,~~ 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: {1,2, …, 8} | Optional with capability signaling | |
| Vivo [6] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-6 | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on periodic CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  ~~[~~2. Maximum number of the RRC configured candidate cells~~]~~  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell | FFS | Yes | No | Intra-frequency periodic CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE 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}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: {1, 2} | Optional with capability signaling | |
| Samsung [7] | **Proposal 1**. Remove Component 2 from FG 63-6 and FG 63-6a.  **Proposal 2**. Incorporate FG 63-6 as a pre-requisite for FG 63-6a. |
| Ericsson [8] | * + Prerequisite FG: 45-3, Beam indication with joint DL/UL LTM TCI states or 45-4, Beam indication with separate DL/UL LTM TCI states   + Component 2 is [Maximum number of the RRC configured candidate cells]   It appears that Component 2 is not needed. The network will provide a resource and report configuration for CSI measurements for each RRC configured LTM Candidate. These configurations are “dormant” until the UE receives LTM CSC MAC CE, then the UE identifies the target cell and starts measurement operations according to the corresponding configuration. Hence, the maximum number of RRC configured candidate cells is given by prerequisite feature-groups, i.e., 45-3 component 6 or 45-4 component 9. If the UE supports early CSI acquisition, it supports early CSI acquisition for all candidate cells.   * + Type: Per band.  Since the measurements are conducted after LTM Cell Switch command, the frequency band/bands of the source serving cell/cells is no longer relevant. Only the frequency band of the target cell matters.   + Component 6 candidate value (Max rank for CSI reporting for a candidate cell):   + For component 6, we propose candidate values 1,2,4,8. For the legacy PDSCH rank, only 2, 4, 8 can be signalled, but in this case, it is OK to also support rank 1.  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 63-6 | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on periodic CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell | 45-3 or 45-4 | Intra-frequency periodic CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | Per band | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,3,4,5,6,7,8}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: 1, 2, 4, 8 | |
| OPPO [9] | For both FGs 63-6 and 63-6a, the component 2 is not needed. The UE conducts CSI measurement and reporting only for the candidate cell that is indicated by the CSC MAC CE command. For those candidate cells configured for CSI, the UE does not conduct CSI measurement. Therefore, the number of such candidate cells does not affect UE computation complexity.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-6 | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  ~~[2. Maximum number of the RRC configured candidate cells]~~  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell | FFS | Yes |  | Intra-frequency periodic CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | |
| Qualcomm Incorporated [10] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-6 | Intra-frequency CSI-RS and CSI-IM measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on periodic CSI-RS resource | 1. Support of CSI-RS and CSI-IM measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  2. Maximum number of the RRC configured candidate cells  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell  7. Maximum number of CSI-IM resources for IMR associated with CSI report configuration for a candidate cell | ~~FFS~~  2-33, RAN2 FG for LTM | Yes | No | Intra-frequency periodic CSI-RS and CSI-IM measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | FFS | 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}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: FFS  Component 7 candidate values: {1,2,4} | Optional with capability signaling | |
| NTT DOCOMO, INC. [11] | * FG45-1 should be prerequisite FG since this feature is LTM-specific. * For component 2, this should be removed since this FG is related to the measurements only for one candidate cell. * For the type, “per band” should be used. * For candidate values of component 6, {1, 2, 3, 4, 5, 6, 7, 8} should be considered. |

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| 63. NR\_Mob\_Ph4 | 63-6a | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on semi-persistent CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  [2. Maximum number of the RRC configured candidate cells]  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell | FFS | Yes | No | Intra-frequency semi-persistent CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | FFS | 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}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: FFS | Optional with capability signaling |

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| --- | --- |
| Company | Summary |
| Nokia [2] | * + Component 2 is not needed as these FGs are related to the measurements only for one particular candidate cell.   + The prerequisite FG for FG 63-6 can be FG 2-32 (Basic CSI feedback), and the prerequisite FG for FG 63-6a should be 63-6.   + Since after the cell switch the UE is disconnected from the source cell, the FG type should be set to: Per Band.   + The candidate values for component 6 should be: 1, 2, 4, and 8.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-6a | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on semi-persistent CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  ~~[2. Maximum number of the RRC configured candidate cells]~~  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell | ~~FFS~~  63-6 | Yes | No | Intra-frequency semi-persistent CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | ~~FFS~~  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}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: ~~FFS~~ {1,2,4,8} | Optional with capability signaling | |
| ZTE Corporation/Sanechips [3] | * For component “2. Maximum number of the RRC configured candidate cells], it should be removed because UE only needs to perform early CSI acquisition function in a candidate cell that corresponds to target cell provided by Target Configuration ID field in LTM CSC MAC CE. With this consideration, corresponding “Component 2 candidate values: {1,2,3,4,5,6,7,8}” should be also removed. * The granularity should be per BC. * Component 6 candidate values: {1,2,3,4,5,6,7,8}. * For FG-63-6, the prerequisite FG 2-36 (Type I single panel codebook) need to be added. * For FG-63-6a, the prerequisite FG 63-6 need to be added.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-6a | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on semi-persistent CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  ~~[2. Maximum number of the RRC configured candidate cells]~~  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell | ~~FFS~~  63-3 | Yes | No | Intra-frequency semi-persistent CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | ~~FFS~~  Per BC | 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}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: ~~FFS~~{1,2,3,4,5,6,7,8} | Optional with capability signaling | |
| CATT [4] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-6a | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on semi-persistent CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  ~~[~~2. Maximum number of the RRC configured candidate cells~~]~~  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell | FFS | Yes | No | Intra-frequency semi-persistent CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | FFS | 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}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: ~~FFS~~ {1,2,4,8} | Optional with capability signaling | |
| Huawei/HiSilicon [5] | In RAN1#120b, the following agreement was reached that a single CSI report for CSI acquisition is configured for a candidate cell.   |  | | --- | | **Agreement**  Regarding CSI acquisition, for a candidate cell,   * A single CSI report configuration is configured * Multiple CSI-RS resources for CMR can be associated with the CSI report configuration   + The number of CSI-RS resources for CMR is subject to UE capability |   Hence, the maximum number of configured CSI report (s) for CSI acquisition can be implicitly determined by the maximum number of configured candidate cell(s) for CSI acquisition. Thus, we support to only keep the maximum number of configurable candidate cell(s) for CSI acquisition as component 2 of FG 63-6 and FG 63-6a.  ***Proposal 6: For FG 63-6 and FG 63-6a, support to remove the bracket on component 2.***  In FG63-6 and FG63-6a, the CSI measurement is performed after receiving LTM CSC MAC CE. Thus, UE supporting 63-6 should also report the capability of basic LTM procedure, i.e. RAN2 FG for LTM in Rel-18 (at least one of *ltm-MCG-r18* and *ltm-SCG-r18*), and FG63-6a should be the prerequisite of 63-6.  ***Proposal 8: For FG63-6a, support FG63-6 as prerequisite.***  Considering that UE only need to perform CSI measurement on the PCell after LTM CSC MAC CE, the report granularity of FG63-6 and FG63-6a can be per band to save the reporting overhead.  ***Proposal 9: FG 63-6 and 63-6a, support the reporting granularity as per band.***  For the report quantity in report configuration, *cri-RI-PMI-CQI* is supported. Considering that the allowed minimum Tx ports of CSI RS is 2 for PMI reporting, we think candidate value 1 should be removed from candidate value sets of components 4 and 5 in FG 63-6 and FG 63-6a.  ***Proposal 10: For FG 63-6 and FG 63-6a, support remove candidate value 1 from candidate value sets of components 4 and 5.***  For candidate values of component 6 in FG 63-6 and FG 63-6a, we think the allowed rank values for serving cell can be reused.  ***Proposal 11: For FG 63-6 and FG 63-6a, support candidate values of component 6 can be {1, 2, …, 8}.***  In RAN1#121, interference measurement resources can be configured for LTM CSI acquisition as descripted in the following agreement. Similar with CSI-RS resources for CMR, we think maximum number of CSI-IM resources for interference measurement should be as a component of FG 63-6, FG 63-6a, FG 63-7 and FG 63-7a.   |  | | --- | | **Agreement**  A list of interference measurement resources for candidate cells is supported for LTM CSI acquisition   * If this list is not configured, CMR is used for interference measurement |   ***Proposal 14: Support the following component in FG 63-6, FG 63-6a, FG 63-7 and FG 63-7a:***   * ***Maximum number of CSI-IM resources for interference measurement associated with CSI report configuration for a candidate cell.***  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-6a | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on semi-persistent CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  ~~[~~2. Maximum number of the RRC configured candidate cells~~]~~  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell  7. Maximum number of CSI-IM resources for interference measurement associated with CSI report configuration for a candidate cell | 63-6~~FFS~~ | Yes | No | Intra-frequency semi-persistent CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE 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}  Component 4 candidate values: {~~1,~~2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {~~1,~~ 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: {1,2, …, 8} | Optional with capability signaling | |
| Vivo [6] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-6a | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on semi-persistent CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  ~~[~~2. Maximum number of the RRC configured candidate cells~~]~~  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell | FFS | Yes | No | Intra-frequency periodic CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE 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}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: {1, 2} | Optional with capability signaling | |
| Samsung [7] | **Proposal 1**. Remove Component 2 from FG 63-6 and FG 63-6a.  **Proposal 2**. Incorporate FG 63-6 as a pre-requisite for FG 63-6a. |
| Ericsson [8] | * + Prerequisite FG: 63-6   + Component 2 is [Maximum number of the RRC configured candidate cells]   It appears that Component 2 is not needed. The network will provide a resource and report configuration for CSI measurements for each RRC configured LTM Candidate. These configurations are “dormant” until the UE receives LTM CSC MAC CE, then the UE identifies the target cell and starts measurement operations according to the corresponding configuration. Hence, the maximum number of RRC configured candidate cells is given by prerequisite feature-groups, i.e., 45-3 component 6 or 45-4 component 9. If the UE supports early CSI acquisition, it supports early CSI acquisition for all candidate cells.   * + Type: Per band.  Since the measurements are conducted after LTM Cell Switch command, the frequency band/bands of the source serving cell/cells is no longer relevant. Only the frequency band of the target cell matters.   + Component 6 candidate value (Max rank for CSI reporting for a candidate cell):   + For component 6, we propose candidate values 1,2,4,8. For the legacy PDSCH rank, only 2, 4, 8 can be signalled, but in this case, it is OK to also support rank 1.  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 63-6a | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on semi-persistent CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell | 63-6 | Intra-frequency semi-persistent CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | Per band | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,3,4,5,6,7,8}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: 1, 2, 4, 8 | |
| OPPO [9] | For both FGs 63-6 and 63-6a, the component 2 is not needed. The UE conducts CSI measurement and reporting only for the candidate cell that is indicated by the CSC MAC CE command. For those candidate cells configured for CSI, the UE does not conduct CSI measurement. Therefore, the number of such candidate cells does not affect UE computation complexity.   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-6a | Intra-frequency CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on semi-persistent CSI-RS resource | 1. Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  ~~[2. Maximum number of the RRC configured candidate cells~~]  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell | 63-6 | Yes |  | Intra-frequency semi-persistent CSI-RS measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | |
| Qualcomm Incorporated [10] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-6a | Intra-frequency CSI-RS and CSI-IM measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on semi-persistent CSI-RS resource | 1. Support of CSI-RS and CSI-IM measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  [2. Maximum number of the RRC configured candidate cells]  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell  7. Maximum number of CSI-IM resources for IMR associated with CSI report configuration for a candidate cell | ~~FFS~~  2-33, RAN2 FG for LTM | Yes | No | Intra-frequency semi-persistent CSI-RS and CSI-IM measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | FFS | 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}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: FFS  Component 7 candidate values: {1,2,4} | Optional with capability signaling | |
| NTT DOCOMO, INC. [11] | * FG63-6a should be prerequisite FG. * For component 1, the following update should be applied to correct typo.   + Support of CSI-RS measurement and CSI reporting after reception of LTM CSC MAC CE based on semi-persistent CSI-RS(s) of cell indicated in CSC MAC CE * For component 2, this should be removed since this FG is related to the measurements only for one candidate cell. * For the type, “per band” should be used. * For candidate values of component 6, {1, 2, 3, 4, 5, 6, 7, 8} should be considered. |

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| 63. NR\_Mob\_Ph4 | 63-7 | Intra-frequency CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE based on periodic CSI-RS(s) of candidate cells | 1. Support of CSI-RS measurement before reception of CSC MAC CE based on periodic CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell  [6. Max rank for CSI reporting for a candidate cell] | 63-6 | Yes | No | Intra-frequency periodic CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  Component 4 candidate values: FFS  Component 5 candidate values: FFS | Optional with capability signaling |

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| Company | Summary |
| Nokia [2] | * + Components 4 & 5: Since 63-6/63-6a is the pre-requite FG, either these components can be removed or should have the same candidate values added for component 4 & 5 in FG 63-6/63-6a.   + Similarly, Component 6 is not needed as it’s already included in the pre-requite FG(s).  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-7 | Intra-frequency CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE based on periodic CSI-RS(s) of candidate cells | 1. Support of CSI-RS measurement before reception of CSC MAC CE based on periodic CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells  ~~4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell~~  ~~5. Maximum number of Tx ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell~~  ~~[6. Max rank for CSI reporting for a candidate cell]~~ | 63-6 | Yes | No | Intra-frequency periodic CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  ~~Component 4 candidate values: FFS~~  ~~Component 5 candidate values: FFS~~ | Optional with capability signaling | |
| ZTE Corporation/Sanechips [3] | * Fix a typo on FG 63-7a name, i.e., change “…celbefore” to “...cell before”. * Component 4 candidate values: from 2 to 256. * Component 5 candidate values: {2, 4, 8, 12, 16, 24, 32}. * Component “[6. Max rank for CSI reporting for a candidate cell]” should be removed because CSI reporting is performed after reception of LTM cell switch command MAC CE.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-7 | Intra-frequency CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE based on periodic CSI-RS(s) of candidate cells | 1. Support of CSI-RS measurement before reception of CSC MAC CE based on periodic CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell  ~~[6. Max rank for CSI reporting for a candidate cell]~~ | 63-6 | Yes | No | Intra-frequency periodic CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  Component 4 candidate values: ~~FFS~~ from 2 to 256  Component 5 candidate values: ~~FFS~~{2, 4, 8, 12, 16, 24, 32} | Optional with capability signaling | |
| CATT [4] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-7 | Intra-frequency CSI-RS measurement for candidate cell ~~[after the RRC configuration of configured CSI-RS resource(s) and]~~ before reception of LTM CSC MAC CE based on periodic CSI-RS(s) of candidate cells | 1. Support of CSI-RS measurement before reception of CSC MAC CE based on periodic CSI-RS(s) of candidate cells  ~~[~~2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE~~]~~  ~~[~~3. Maximum number of CSI-RS resources ~~of~~ ~~per~~ across candidate cell~~(~~s~~)~~ ~~for CSI measurement before LTM CSC MAC CE]~~  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell  ~~[~~6. Max rank for CSI reporting for a candidate cell~~]~~ | 63-6 | Yes | No | Intra-frequency periodic CSI-RS measurement for candidate cell ~~after the RRC configuration of configured CSI-RS resource(s) and~~ before reception of LTM CSC MAC CE is not supported | ~~FFS~~ Per BC | ~~FFS~~ n/a | ~~FFS~~ n/a | ~~FFS~~ n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  Component 4 candidate values: ~~FFS~~ {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: ~~FFS~~  {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: {1,2,4,8} | Optional with capability signaling | |
| Huawei/HiSilicon [5] | FG 63-6 and FG 63-6a are the prerequisite for FG 63-7 and FG 63-7a separately. Considering max rank for CSI reporting for a candidate cell is already one component in FG 63-6 and FG 63-6a, it is redundant in FG 63-7 and FG 63-7a.  ***Proposal 12: For FG 63-7 and FG 63-7a, remove component 6 in “Component” column.***  Candidate values of component 4 and component 5 in FG 63-7 and FG 63-7a can reuse the value ranges for components 4 and 5 in FG 63-6 and FG 63-6a.  ***Proposal 13: For FG 63-7 and FG 63-7a, support candidate values of component 4 can be {2,4,8,12,16,24,32,48,64,128}, and candidate values of component 5 can be {2, 4, 8, 12, 16, 24, 32}.***  In RAN1#121, interference measurement resources can be configured for LTM CSI acquisition as descripted in the following agreement. Similar with CSI-RS resources for CMR, we think maximum number of CSI-IM resources for interference measurement should be as a component of FG 63-6, FG 63-6a, FG 63-7 and FG 63-7a.   |  | | --- | | **Agreement**  A list of interference measurement resources for candidate cells is supported for LTM CSI acquisition   * If this list is not configured, CMR is used for interference measurement |   ***Proposal 14: Support the following component in FG 63-6, FG 63-6a, FG 63-7 and FG 63-7a:***   * ***Maximum number of CSI-IM resources for interference measurement associated with CSI report configuration for a candidate cell.***  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-7 | Intra-frequency CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE based on periodic CSI-RS(s) of candidate cells | 1. Support of CSI-RS measurement before reception of CSC MAC CE based on periodic CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell  6. Maximum number of CSI-IM resources for interference measurement associated with CSI report configuration for a candidate cell  ~~[6. Max rank for CSI reporting for a candidate cell]~~ | 63-6 | Yes | No | Intra-frequency periodic CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  Component 4 candidate values:  {2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values:  {2, 4, 8, 12, 16, 24, 32} | Optional with capability signaling | |
| Vivo [6] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-7 | Intra-frequency CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE based on periodic CSI-RS(s) of candidate cells | 1. Support of CSI-RS measurement before reception of CSC MAC CE based on periodic CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell  ~~[~~6. Max rank for CSI reporting for a candidate cell~~]~~ | 63-6 | Yes | No | Intra-frequency periodic CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32} | Optional with capability signaling | |
| Samsung [7] | Regarding FG 63-7 and FG 63-7a, it should be clarified that the candidate cells in Component 3 should correspond to those RRC configured for CSI measurement before receiving LTM CSC MAC CE. Hence, we propose the following updates highlighted in red to Component 3 in FG 63-7 and FG 63-7a.  **Proposal 3**. Adopt the following updates highlighted in red to Component 3 in FG 63-7 and FG 63-7a.  “3. Maximum number of CSI-RS resources across candidate cells RRC configured for CSI measurement before LTM CSC MAC CE” |
| Ericsson [8] | * + Component 2: Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  This component is not needed for FGs 63-7 or 63-7a. Given the prerequisite FG 63-6/63-6a, the RRC configuration can include resource and report configurations for early CSI acquisition for all RRC configured candidate cells. The UE anyway decides itself if it starts measurement operations on one or more of the RRC configured candidate cells before LTM CSC MAC CE.   + Component 6, [Max rank for CSI reporting for a candidate cell]:   This component can be removed, it is inherited by the prerequisite FGs (63-6, 63-6a). When the target cell receives the CSI report, it cannot determine if the measurements were performed before or after LTM CSC MAC CE.   * + Component 4 candidate values, Max number of ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell   The same component values as for 63-6 or 63-6a respectively can be reused   * + Component 5 candidate values, Maximum number of ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell   The same component values as for 63-6 or 63-6a respectively can be reused   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 63-7 | Intra-frequency CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE based on periodic CSI-RS(s) of candidate cells | 1. Support of CSI-RS measurement before reception of CSC MAC CE based on periodic CSI-RS(s) of candidate cells  3. Maximum number of CSI-RS resources across candidate cells  4. Max number of ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell | 63-6 | Intra-frequency periodic CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | Component 3 candidate values: {1,2,...64}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32} | |
| OPPO [9] |  |
| Qualcomm Incorporated [10] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-7 | Intra-frequency CSI-RS and CSI-IM measurement for candidate cell before reception of LTM CSC MAC CE based on periodic CSI-RS(s) of candidate cells | 1. Support of CSI-RS and CSI-IM measurement before reception of CSC MAC CE based on periodic CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell  [6. Max rank for CSI reporting for a candidate cell]  7. Maximum number of CSI-IM resources across candidate cells | 63-6 | Yes | No | Intra-frequency periodic CSI-RS and CSI-IM measurement for candidate before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  Component 4 candidate values: FFS  Component 5 candidate values: FFS  Component 7 candidate values: {1,2,4,8,16,32} | Optional with capability signaling | |
| NTT DOCOMO, INC. [11] | For component 4/5/6, these should be removed since prerequisite FG includes the value. |

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| 63. NR\_Mob\_Ph4 | 63-7a | Intra-frequency CSI-RS measurement for candidate celbefore reception of LTM CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells | 1. Support of CSI-RS measurement before reception of CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell  [6. Max rank for CSI reporting for a candidate cell] | 63-6a | Yes | No | Intra-frequency semi-persistent CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  Component 4 candidate values: FFS  Component 5 candidate values: FFS | Optional with capability signaling |

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| Company | Summary |
| Nokia [2] | * + Components 4 & 5: Since 63-6/63-6a is the pre-requite FG, either these components can be removed or should have the same candidate values added for component 4 & 5 in FG 63-6/63-6a.   + Similarly, Component 6 is not needed as it’s already included in the pre-requite FG(s).  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-7a | Intra-frequency CSI-RS measurement for candidate celbefore reception of LTM CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells | 1. Support of CSI-RS measurement before reception of CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells  ~~4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell~~  ~~5. Maximum number of Tx ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell~~  ~~[6. Max rank for CSI reporting for a candidate cell]~~ | 63-6a | Yes | No | Intra-frequency semi-persistent CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  ~~Component 4 candidate values: FFS~~  ~~Component 5 candidate values: FFS~~ | Optional with capability signaling | |
| ZTE Corporation/Sanechips [3] | * Fix a typo on FG 63-7a name, i.e., change “…celbefore” to “...cell before”. * Component 4 candidate values: from 2 to 256. * Component 5 candidate values: {2, 4, 8, 12, 16, 24, 32}. * Component “[6. Max rank for CSI reporting for a candidate cell]” should be removed because CSI reporting is performed after reception of LTM cell switch command MAC CE.  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-7a | Intra-frequency CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells | 1. Support of CSI-RS measurement before reception of CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell  ~~[6. Max rank for CSI reporting for a candidate cell]~~ | 63-6a | Yes | No | Intra-frequency semi-persistent CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  Component 4 candidate values: ~~FFS~~ from 2 to 256  Component 5 candidate values: ~~FFS~~{2, 4, 8, 12, 16, 24, 32} | Optional with capability signaling | |
| CATT [4] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-7a | Intra-frequency CSI-RS measurement for candidate celbefore reception of LTM CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells | 1. Support of CSI-RS measurement before reception of CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell  ~~[~~6. Max rank for CSI reporting for a candidate cell~~]~~ | 63-6a | Yes | No | Intra-frequency semi-persistent CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  Component 4 candidate values: ~~FFS~~ {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: ~~FFS~~  {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: {1,2,4,8} | Optional with capability signaling | |
| Huawei/HiSilicon [5] | FG 63-6 and FG 63-6a are the prerequisite for FG 63-7 and FG 63-7a separately. Considering max rank for CSI reporting for a candidate cell is already one component in FG 63-6 and FG 63-6a, it is redundant in FG 63-7 and FG 63-7a.  ***Proposal 12: For FG 63-7 and FG 63-7a, remove component 6 in “Component” column.***  Candidate values of component 4 and component 5 in FG 63-7 and FG 63-7a can reuse the value ranges for components 4 and 5 in FG 63-6 and FG 63-6a.  ***Proposal 13: For FG 63-7 and FG 63-7a, support candidate values of component 4 can be {2,4,8,12,16,24,32,48,64,128}, and candidate values of component 5 can be {2, 4, 8, 12, 16, 24, 32}.***  In RAN1#121, interference measurement resources can be configured for LTM CSI acquisition as descripted in the following agreement. Similar with CSI-RS resources for CMR, we think maximum number of CSI-IM resources for interference measurement should be as a component of FG 63-6, FG 63-6a, FG 63-7 and FG 63-7a.   |  | | --- | | **Agreement**  A list of interference measurement resources for candidate cells is supported for LTM CSI acquisition   * If this list is not configured, CMR is used for interference measurement |   ***Proposal 14: Support the following component in FG 63-6, FG 63-6a, FG 63-7 and FG 63-7a:***   * ***Maximum number of CSI-IM resources for interference measurement associated with CSI report configuration for a candidate cell.***  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-7a | Intra-frequency CSI-RS measurement for candidate celbefore reception of LTM CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells | 1. Support of CSI-RS measurement before reception of CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell  6. Maximum number of CSI-IM resources for interference measurement associated with CSI report configuration for a candidate cell  ~~[6. Max rank for CSI reporting for a candidate cell]~~ | 63-6a | Yes | No | Intra-frequency semi-persistent CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  Component 4 candidate values: {2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {2, 4, 8, 12, 16, 24, 32} | Optional with capability signaling | |
| Vivo [6] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-7a | Intra-frequency CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells | 1. Support of CSI-RS measurement before reception of CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell  ~~[~~6. Max rank for CSI reporting for a candidate cell~~]~~ | 63-6a | Yes | No | Intra-frequency semi-persistent CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32} | Optional with capability signaling | |
| Samsung [7] | Regarding FG 63-7 and FG 63-7a, it should be clarified that the candidate cells in Component 3 should correspond to those RRC configured for CSI measurement before receiving LTM CSC MAC CE. Hence, we propose the following updates highlighted in red to Component 3 in FG 63-7 and FG 63-7a.  **Proposal 3**. Adopt the following updates highlighted in red to Component 3 in FG 63-7 and FG 63-7a.  “3. Maximum number of CSI-RS resources across candidate cells RRC configured for CSI measurement before LTM CSC MAC CE” |
| Ericsson [8] | * + Component 2: Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  This component is not needed for FGs 63-7 or 63-7a. Given the prerequisite FG 63-6/63-6a, the RRC configuration can include resource and report configurations for early CSI acquisition for all RRC configured candidate cells. The UE anyway decides itself if it starts measurement operations on one or more of the RRC configured candidate cells before LTM CSC MAC CE.   + Component 6, [Max rank for CSI reporting for a candidate cell]:   This component can be removed, it is inherited by the prerequisite FGs (63-6, 63-6a). When the target cell receives the CSI report, it cannot determine if the measurements were performed before or after LTM CSC MAC CE.   * + Component 4 candidate values, Max number of ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell   The same component values as for 63-6 or 63-6a respectively can be reused   * + Component 5 candidate values, Maximum number of ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell   The same component values as for 63-6 or 63-6a respectively can be reused   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 63-7a | Intra-frequency CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells | 1. Support of CSI-RS measurement before reception of CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells  3. Maximum number of CSI-RS resources across candidate cells  4. Max number of ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell | 63-6a | Intra-frequency semi-persistent CSI-RS measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | Component 3 candidate values: {1,2,...64}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32} | |
| OPPO [9] |  |
| Qualcomm Incorporated [10] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-7a | Intra-frequency CSI-RS and CSI-IM measurement for candidate celbefore reception of LTM CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells | 1. Support of CSI-RS and CSI-IM measurement before reception of CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells  4. Max number of CSI-RS ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of Tx ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell  [6. Max rank for CSI reporting for a candidate cell]  7. Maximum number of CSI-IM resources across candidate cells | 63-6a | Yes | No | Intra-frequency semi-persistent CSI-RS and CSI-IM measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  Component 4 candidate values: FFS  Component 5 candidate values: FFS  Component 7 candidate values: {1,2,4,8,16,32} | Optional with capability signaling | |
| NTT DOCOMO, INC. [11] | For component 4/5/6, these should be removed since prerequisite FG includes the value. |

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| 63. NR\_Mob\_Ph4 | 63-8 | Inclusion of current SpCell in the L1 measurement report based on CSI-RS (s) | 1. Support of always including the current SpCell in the L1 measurement report based on CSI-RS (s) | 63-1 or 63-2 | Yes | No | UE does not always include measurement report for SpCell in the L1 measurement report based on CSI-RS (s) | Per BC | n/a | n/a | n/a |  | Optional with capability signalling |

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| Company | Summary |
| Nokia [2] |  |
| ZTE Corporation/Sanechips [3] |  |
| CATT [4] |  |
| Huawei/HiSilicon [5] |  |
| Vivo [6] |  |
| Samsung [7] | Regarding FG 63-8, the FG functionality description is inaccurate. Support of “always” inclusion is somewhat misleading, which should be removed.  **Proposal 4**. Adopt the following updates in read to FG 63-8.   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-8 | Inclusion of current SpCell in the L1 measurement report based on CSI-RS (s) | 1. Support of ~~always~~ including the current SpCell in the L1 measurement report based on CSI-RS (s) | 63-1 or 63-2 | Yes | No | UE does not ~~always~~ include measurement report for SpCell in the L1 measurement report based on CSI-RS (s) | Per BC | n/a | n/a | n/a |  | Optional with capability signalling | |
| Ericsson [8] |  |
| OPPO [9] |  |
| Qualcomm Incorporated [10] |  |
| NTT DOCOMO, INC. [11] |  |

**Other**

|  |  |
| --- | --- |
| Company | Summary |
| Nokia [2] |  |
| ZTE Corporation/Sanechips [3] | * Adding a new FG 63-X1 on “support CSI-IM measurement for candidate cell” based on the following agreement in RAN1#121 meeting, where * The prerequisite FG 63-6/6a/7/7a need to be added. * The granularity should be per BC.  |  | | --- | | **Agreement**  A list of interference measurement resources for candidate cells is supported for LTM CSI acquisition   * If this list is not configured, CMR is used for interference measurement |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-X1 | Support CSI-IM measurement for candidate cell | Support CSI-IM measurement for candidate cell | 63-6/6a/7/7a | Yes | No | CSI-IM measurement for candidate cell is not supported | Per BC | n/a | n/a | n/a |  | Optional with capability signaling | |
| CATT [4] |  |
| Huawei/HiSilicon [5] |  |
| Vivo [6] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-9 | Interference measurement for CSI acquisition on candidate cell | 1.Support of interference measurement for CSI acquisition based on CSI-RS resource as IMR of candidate cells  2. Maximum number of CSI-RS resources for IMR associated with CSI report configuration for a candidate cell | 63-6 or 63-6a or 63-7 or 63-7a | Yes | No | Interference measurement for CSI acquisition on candidate cell is not supported | FFS | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8} | Optional with capability signalling | |
| Samsung [7] |  |
| Ericsson [8] |  |
| OPPO [9] |  |
| Qualcomm Incorporated [10] | |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | 63. NR\_Mob\_Ph4 | 63-9 | Intra-frequency CSI-RS-RS measurement and CSI reporting without CSI-IM reception | 1. Support of CSI-RS measurement and CSI reporting for candidate cells without CSI-IM resource configuration | 63-6 or 63-6a | Yes | No | UE requires CSI-IM reception from candidate cells for CSI reporting | Per BC | n/a | n/a | n/a |  | Optional with capability signalling | |
| NTT DOCOMO, INC. [11] |  |

# Discussion Items during RAN1 #122

After review of contributions submitted to RAN1 #122 in this agenda item, the following topics were identified by the moderator for discussion during RAN1 #122.

**General comments**

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| Company | Comments/Questions/Suggestions |
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## FG 63-1

After review of contributions submitted to RAN1 #122 in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

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

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| 63. NR\_Mob\_Ph4 | 63-1 | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on periodic CSI-RS(s) of candidate cell(s)  2. Maximum number of RRC configured candidate cells for intra-frequency L1-RSRP measurement on CSI-RS resource  3. Support of up to L candidate cells and M beams in one report where a CRI-RSRP pair is used for each beam report for intra-frequency L1-RSRP measurement  4. Maximum number of LTM CSI report configs using periodic CSI-RS as measurement resource  5. Maximum number of periodic CSI-RS resources of one candidate cell configured for intra-frequency L1-RSRP measurement  6. Maximum total number of periodic CSI-RS resources of all candidate cells configured for intra-frequency L1-RSRP measurement | ~~FFS~~  45-1 | Yes | No | NW triggered intra-frequency L1-RSRP measurement based on periodic CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values:  L: {1, 2,3,4}  M: {1, 2,3,4}  M × L: {1,2,3,4, 6, 8, 9, 12, 16}  Component 4 candidate values:  Aperiodic: {0,1,2,3,4}  Periodic: {1,2,3,4}  Semi-persistent: {0,1,2,3,4}  Component 5 candidate values: FFS  Component 6 candidate values: FFS | Optional with capability signaling |

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| Company | Comments/Questions/Suggestions |
| Nokia | Based on our understanding, the features related to maximum numbers of RSs that could be measured by the UE are in RAN4’s scope. Therefore, component 5 and 6 are not needed. |
| Huawei, HiSilicon | Support. |
| ZTE | For component 5 and 6, we have same understanding with Nokia. In the early stage of discussing UE features in Rel-19 LTM, we have already reached a consensus that the UE features on measurement belong to RAN4’s business. This is also consistent with the design principle of Rel-18 LTM UE features on measurement.  For the prerequisition of FG 63-1, it can be FG 45-1. But for us, the relevant UE feature based on CSI-RS measurements do not necessarily require SSB based measurement as a prerequisite. In this case, we tend to add “2-21 or 2-22 or 2-23 or 2-23a” as prerequisite. |

## FG 63-2

After review of contributions submitted to RAN1 #122 in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

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

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| 63. NR\_Mob\_Ph4 | 63-2 | NW triggered intra-frequency L1-RSRP measurement based on semi-persistent CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure | 1. Support of intra-frequency L1- RSRP measurement and reporting based on semi-persistent CSI-RS(s) of candidate cell(s)  ~~4~~2. Maximum number of LTM CSI report configs using semi-persistent CSI-RS as measurement resource  3. Maximum number of semi-persistent CSI-RS resources of one candidate cell configured for intra-frequency L1-RSRP measurement  4. Maximum total number of semi-persistent CSI-RS resources of all candidate cells configured for intra-frequency L1-RSRP measurement | 63-1 | Yes | No | NW triggered intra-frequency L1-RSRP measurement based on semi-persistent CSI-RS (s) for L1-L2 Triggered Mobility (LTM) procedure is not supported | Per BC | n/a | n/a | n/a | Component ~~4~~2 candidate values:  Aperiodic: {0,1,2,3,4}  Semi-persistent: {0,1,2,3,4}  Component 3 candidate values: FFS  Component 4 candidate values: FFS  Note: For component 4, the UE must support a non-zero value for at least one of aperiodic and semi-persistent | Optional with capability signaling |

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| --- | --- |
| Company | Comments/Questions/Suggestions |
| Nokia | Same comment as in 63-1. The components 3 and 4 are not needed. |
| Huawei, HiSilicon | support |
| ZTE | For component 3 and 4, the same comment as FG 63-1. |

## FG 63-3

After review of contributions submitted to RAN1 #122 in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 63. NR\_Mob\_Ph4 | 63-3 | CSI-RS as Type-D QCL source RS in the indicated joint LTM TCI state | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | ~~FFS~~  45-3 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated joint LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Nokia | Support |
| Huawei, HiSilicon | support |
| ZTE | Similar comments as FG 63-1. I would like to confirm if the relevant FGs in Rel-19 LTM necessarily need to be supported based on similar FGs defined in Rel-18 LTM. If no, we think that 23-1-1, RAN FG for LTM also need to be added as prerequisite in addition to 45-3. |

## FG 63-3a

After review of contributions submitted to RAN1 #122 in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 63. NR\_Mob\_Ph4 | 63-3a | CSI-RS as Type-D QCL source RS for MAC-CE activated joint LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | ~~FFS~~  45-3a | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated joint LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Nokia | Support |
| Huawei, HiSilicon | 63-3 should also be the prerequiste |
| ZTE | Similar views as FG 63-1 and 63-3. |

## FG 63-4

After review of contributions submitted to RAN1 #122 in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 63. NR\_Mob\_Ph4 | 63-4 | CSI-RS as Type-D QCL source RS in the indicated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | ~~FFS~~  45-4 | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS in the indicated separate DL/UL LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Nokia | Support |
| Huawei, HiSilicon | support |
| ZTE | Similar views as FG 63-1 and 63-3. |

## FG 63-4a

After review of contributions submitted to RAN1 #122 in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 63. NR\_Mob\_Ph4 | 63-4a | CSI-RS as Type-D QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | ~~FFS~~  45-4a | Yes | No | UE does not support CSI-RS for BM as Type-D QCL source RS and TRS as Type-A QCL source RS for MAC-CE activated separate DL/UL LTM TCI states | Per band | n/a | n/a | n/a |  | Optional with capability signalling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Nokia | Support |
| Huawei, HiSilicon | 63-4 should also be the prerequisite. |
| ZTE | Similar views as FG 63-1 and 63-3. |

## FG 63-6

After review of contributions submitted to RAN1 #122 in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 63. NR\_Mob\_Ph4 | 63-6 | Intra-frequency CSI-RS and CSI-IM measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on periodic CSI-RS resource | 1. Support of CSI-RS and CSI-IM measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  ~~[2. Maximum number of the RRC configured candidate cells]~~  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of ~~CSI-RS~~ ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of ~~Tx~~ ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell  7. Maximum number of CSI-IM resources for interference measurement associated with CSI report configuration for a candidate cell | FFS | Yes | No | Intra-frequency periodic CSI-RS and CSI-IM measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | ~~FFS~~  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}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: ~~FFS~~ {1,2,3,4,5,6,7,8}  Component 7 candidate values: {1,2,4} | Optional with capability signaling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Nokia | The candidate values for component 7 is not clear. Shouldn’t it be same as as the candidate values for the component 3? |
| Huawei, HiSilicon | The value range of component 6 should start from 2 as legacy. There is no PMI with rank=1.  The value range of component 7 should be same as those for component 3. When doing the configuration, NZP-CSI-RS resource and CSI-IM resources are one to one mapping. |
| ZTE | For component 7, we think that the number of CSI-IM resource should be same as that of CSI-RS resource for CMR, which is in line with the rule in MIMO. |

## FG 63-6a

After review of contributions submitted to RAN1 #122 in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 63. NR\_Mob\_Ph4 | 63-6a | Intra-frequency CSI-RS and CSI-IM measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE based on semi-persistent CSI-RS resource | 1. Support of CSI-RS and CSI-IM measurement and CSI reporting after reception of LTM CSC MAC CE based on periodic CSI-RS(s) of cell indicated in CSC MAC CE  ~~[2. Maximum number of the RRC configured candidate cells]~~  3. Maximum number of CSI-RS resources for CMR associated with CSI report configuration for a candidate cell  4. Max number of ~~CSI-RS~~ ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of ~~Tx~~ ports in one NZP CSI-RS resource  6. Max rank for CSI reporting for a candidate cell  7. Maximum number of CSI-IM resources for interference measurement associated with CSI report configuration for a candidate cell | FFS | Yes | No | Intra-frequency semi-persistent CSI-RS and CSI-IM measurement and CSI reporting for cell indicated in CSC MAC CE after reception of LTM CSC MAC CE is not supported | ~~FFS~~  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}  Component 4 candidate values: {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: {1, 2, 4, 8, 12, 16, 24, 32}  Component 6 candidate values: ~~FFS~~ {1,2,3,4,5,6,7,8}  Component 7 candidate values: {1,2,4} | Optional with capability signaling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Nokia | Same comment as in FG 63-6: the candidate values for component 7 should be same as the candidate values for the component 3? |
| Huawei, HiSilicon | The value range of component 6 should start from 2 as legacy. There is no PMI with rank=1.  The value range of component 7 should be same as those for component 3. When doing the configuration, NZP-CSI-RS resource and CSI-IM resources are one to one mapping. |
| ZTE | Same view as FG 63-6. |

## FG 63-7

After review of contributions submitted to RAN1 #122 in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 63. NR\_Mob\_Ph4 | 63-7 | Intra-frequency CSI-RS and CSI-IM measurement for candidate cell before reception of LTM CSC MAC CE based on periodic CSI-RS(s) of candidate cells | 1. Support of CSI-RS and CSI-IM measurement before reception of CSC MAC CE based on periodic CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells RRC configured for CSI measurement before LTM CSC MAC CE  4. Max number of ~~CSI-RS~~ ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of ~~Tx~~ ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell  ~~[6. Max rank for CSI reporting for a candidate cell]~~  6. Maximum number of CSI-IM resources across candidate cells | 63-6 | Yes | No | Intra-frequency periodic CSI-RS and CSI-IM measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  Component 4 candidate values: ~~FFS~~ {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: ~~FFS~~ {1,2,4,8,12,16,24,32}  Component 6 candidate values: {1,2,4,8,16,32} | Optional with capability signaling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Nokia | * The component 3 can be updated to this:   Maximum number of RRC configured CSI-RS resources across candidate cells ~~RRC configured~~ for CSI measurement before LTM CSC MAC CE.   * Candidate values for component 6 can be same as the candidate values for component 3. |
| Huawei, HiSilicon | * The value range of component 3 and 6 should be aligned. |
| ZTE | The description of component 6 should be aligned with that of component 3. Besides, For component 6, we think that the number of CSI-IM resource should be same as that of CSI-RS resource for CMR, which is in line with the rule in MIMO. |

## FG 63-7a

After review of contributions submitted to RAN1 #122 in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 63. NR\_Mob\_Ph4 | 63-7a | Intra-frequency CSI-RS and CSI-IM measurement for candidate celbefore reception of LTM CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells | 1. Support of CSI-RS and CSI-IM measurement before reception of CSC MAC CE based on semi-persistent CSI-RS(s) of candidate cells  2. Maximum number of RRC configured candidate cells for CSI measurement before LTM CSC MAC CE  3. Maximum number of CSI-RS resources across candidate cells RRC configured for CSI measurement before LTM CSC MAC CE  4. Max number of ~~CSI-RS~~ ports of CSI-RS resource(s) associated with a CSI report configuration for CSI reporting for a candidate cell  5. Maximum number of ~~Tx~~ ports in one NZP CSI-RS resource associated with a CSI report configuration for CSI reporting for a candidate cell  ~~[6. Max rank for CSI reporting for a candidate cell]~~  6. Maximum number of CSI-IM resources across candidate cells | 63-6a | Yes | No | Intra-frequency semi-persistent CSI-RS and CSI-IM measurement for candidate cell before reception of LTM CSC MAC CE is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8}  Component 3 candidate values: {1,2,...64}  Component 4 candidate values: ~~FFS~~ {1,2,4,8,12,16,24,32,48,64,128}  Component 5 candidate values: ~~FFS~~ {1,2,4,8,12,16,24,32}  Component 6 candidate values: {1,2,4,8,16,32} | Optional with capability signaling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Nokia | Same comments as in FG 63-7. |
| Huawei, HiSilicon | The value range of component 3 and 6 should be aligned. |
| ZTE | Same comments as FG 63-7. |

## FG 63-8

After review of contributions submitted to RAN1 #122 in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

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

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 63. NR\_Mob\_Ph4 | 63-8 | Inclusion of current SpCell in the L1 measurement report based on CSI-RS (s) | 1. Support of ~~always~~ including the current SpCell in the L1 measurement report based on CSI-RS (s) | 63-1 or 63-2 | Yes | No | UE does not ~~always~~ include measurement report for SpCell in the L1 measurement report based on CSI-RS (s) | Per BC | n/a | n/a | n/a |  | Optional with capability signalling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Nokia | We are fine with this, but then we have a similar Rel-18 FG for SSB based measurements from where we have reused the wording. It may be good to have the same wording for both. |
| Huawei, HiSilicon | Not support. This feature implies UE can always include Spcell in the report. R18 FG used wording “always” . |
| ZTE | We have the same view with HW. |

## New FG: Interference measurement for CSI acquisition on candidate cell

After review of contributions submitted to RAN1 #122 in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Introduce the following Rel. 19 UE FGs (yellow highlighting, if any, shows text that’s not yet agreed)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 63. NR\_Mob\_Ph4 | 63-9 | Interference measurement for CSI acquisition on candidate cell | 1.Support of interference measurement for CSI acquisition based on CSI-RS resource as IMR of candidate cells  2. Maximum number of CSI-RS resources for IMR associated with CSI report configuration for a candidate cell | 63-6 or 63-6a or 63-7 or 63-7a | Yes | No | Interference measurement for CSI acquisition on candidate cell is not supported | Per BC | n/a | n/a | n/a | Component 2 candidate values: {1,2,3,4,5,6,7,8} | Optional with capability signaling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Nokia | If we add new FG then we can delete CSI-IM related components from 63-6, 63-6a, 63-7, 63-7a. |
| Huawei, HiSilicon | A simpler solution is to add value 0 in component 6 of 63-6/6a/7/7a instead of a separate FG. It will be difficult for UE to report component 6 if UE do not support CSI-IM. |
| ZTE | There is no need to introduce a new FG since CSI-IM feature has been reflected in 63-6, 63-6a, 63-7, 63-7a. |

## New FG: Intra-frequency CSI-RS-RS measurement and CSI reporting without CSI-IM reception

After review of contributions submitted to RAN1 #122 in this agenda item, the following is proposed by the moderator. Companies submitted the following views on the moderator’s proposals.

**Proposal: Introduce the following Rel. 19 UE FGs (yellow highlighting, if any, shows text that’s not yet agreed)**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 63. NR\_Mob\_Ph4 | 63-10 | Intra-frequency CSI-RS-RS measurement and CSI reporting without CSI-IM reception | 1. Support of CSI-RS measurement and CSI reporting for candidate cells without CSI-IM resource configuration | 63-6 or 63-6a or 63-7 or 63-7a | Yes | No | Intra-frequency CSI-RS-RS measurement and CSI reporting without CSI-IM reception is not supported | Per BC | n/a | n/a | n/a |  | Optional with capability signaling |

|  |  |
| --- | --- |
| Company | Comments/Questions/Suggestions |
| Nokia | This is not needed if we make 63-6/63-6a/63-7/63-7a without CSI-IM and add a new row as proposed in 63-9 on support for CSI-IM. |
| Huawei, HiSilicon | A simpler solution is to add value 0 in component 6 of 63-6/6a/7/7a instead of a separate FG. It will be difficult for UE to report component 6 if UE do not support CSI-IM. |
| ZTE | No need. |

# Conclusion

Agreements reached during RAN1 #122 as part of this agenda item are summarized in [ ].

# References

1. R1-2504673, Updated RAN1 UE features list for Rel-19 NR after RAN1 #121, Moderators (AT&T, NTT DOCOMO, INC.)
2. R1-2505194 NR mobility enhancements Phase 4 UE features, Nokia
3. R1-2505273 Discussion on UE features for NR mobility enhancements Phase 4, ZTE Corporation/Sanechips
4. R1-2505339 Discussions on UE features for NR mobility enhancements Phase 4, CATT
5. R1-2505351 UE features for NR mobility enhancements phase 4, Huawei/HiSilicon
6. R1-2505399 UE features for NR mobility enhancements Phase 4, vivo
7. R1-2505565 Remaining issues on UE features for Rel-19 LTM, Samsung
8. R1-2505624 UE features for NR mobility enhancements phase 4, Ericsson
9. R1-2505741 Discussion on UE features for NR mobility enhancements, OPPO
10. R1-2506200 UE features for NR mobility enhancement Phase 4, Qualcomm Incorporated
11. R1-2506288 Discussion on UE features for NR mobility enhancemens Phase4, NTT DOCOMO, INC.