**3GPP TSG RAN WG1 #118 R1-24xxxxx**

**Maastricht, Netherlands, August 19th– 23rd, 2024**

**Source: Moderator (Fujitsu)**

**Title: FL summary 1 of Maintenance on Further NR Mobility Enhancements**

**Agenda Item: 8.1**

**Document for: Information**

# Introduction

This contribution is a Feature Lead (FL) summary for the CRs for mobility enhancements under A.I. 8.1.

# Plan for GTW/Online discussion

##### [Proposals for Monday online]

##### [Proposals for Tuesday online]

##### [Proposals for Wednesday online]

##### [Proposals for Thursday online]

##### [Proposals for Friday online]

# List of Contributions

## Contributions under AI 5

**Rel-18 NR\_Mob\_enh2**

|  |  |  |
| --- | --- | --- |
| **[R1-2405792](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2405792.zip)** | Reply LS on LTM L1 intra and inter-frequency measurements | RAN4, Ericsson |

FL view : this is a UE capability issue and RAN1 is CC.

## Contributions under AI 8.1 for mobility issues

|  |  |  |
| --- | --- | --- |
| **[R1-2406036](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2406036.zip)** | Discussion on consistency between SSB index and TCI state in LTM Cell Switch Command MAC CE | ZTE Corporation, Sanechips |
| **[R1-2406037](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2406037.zip)** | Draft CR on consistency between SSB index and TCI state in LTM Cell Switch Command MAC CE | ZTE Corporation, Sanechips |
| **[R1-2406038](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2406038.zip)** | Discussion on applying TCI state indicated in LTM Cell Switch Command MAC CE to a list of CCs | ZTE Corporation, Sanechips |
| **[R1-2406460](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2406460.zip)** | Discussion on the maximum number of PL RS maintained simultaneously for candidate cells | ZTE Corporation, Sanechips |
| **[R1-2406461](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2406461.zip)** | Draft CR on the maximum number of PL RS maintained simultaneously for candidate cells | ZTE Corporation, Sanechips |
| **[R1-2406561](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2406561.zip)** | Discussion on missing RRC parameter for LTM early UL sync | NEC |
| **[R1-2406633](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2406633.zip)** | Draft CR on CSI related operation for LTM CSI report | Samsung |
| **[R1-2406790](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2406790.zip)** | Draft CR on UE behaviour to maintain pathloss for LTM candidate cells | Nokia |
| **[R1-2406985](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2406985.zip)** | Corrections to power control parameters for the UL transmission after LTM cell swtich in TS38.213 | Huawei, HiSilicon |
| **[R1-2406994](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2406994.zip)** | Corrections to the Pathloss RS in LTM TCI state in TS38.213 | Huawei, HiSilicon |
| **[R1-2406995](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2406995.zip)** | Corrections to the UL/SUL indication for CFRA in TS38.213 | Huawei, HiSilicon |
| **[R1-2406996](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2406996.zip)** | Corrections to the first UL transmission after LTM cell switch in TS38.213 | Huawei, Ericsson, Nokia, ZTE Corporation, Sanechips, HiSilicon |
| **[R1-2407010](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2407010.zip)** | Maintenance of Rel-18 Mobility Enhancement | Qualcomm Incorporated |
| **[R1-2407011](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2407011.zip)** | Draft CR on the Rel-18 TDD configuration in the LTM candidate cell | Qualcomm Incorporated |
| **[R1-2407125](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2407125.zip)** | Correction on LTM CSI report | ASUSTeK |
| **[R1-2407147](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_118/Docs/R1-2407147.zip)** | Draft CR for 38.213 on deactivation of candidate TCI states | Ericsson |

# void

# High priority issues in RAN1#117

## [Open] Issue 1-1: Power control

### Summary of Proposal

R1-2406460 Discussion on the maximum number of PL RS maintained simultaneously for candidate cells ZTE Corporation, Sanechips
R1-2406461 Draft CR on the maximum number of PL RS maintained simultaneously for candidate cells ZTE Corporation, Sanechips
R1-2406985 Corrections to power control parameters for the UL transmission after LTM cell swtich in TS38.213 Huawei, HiSilicon

* The following proposals are to further correct the description on power control for candidate cells. FL suggestion is to discuss this issue based on Huawei’s TP as it covers the proposed change by ZTE.

**TP by Huawei for 38.213 *(FL note: the format is broken due to copy/paste problem. Please see R1-2406985 for the formal TP)***

**7 Uplink Power control**

**<unchanged part omitted>**

In the remaining of this clause, if a UE is provided TCI-State in dl-OrJointTCI-StateList or TCI-UL-State or CandidateTCI-State or CandidateTCI-UL-State indicated in the LTM Cell Switch Command MAC CE, and for each indicated one or two TCI-State or TCI-UL-State or CandidateTCI-State or CandidateTCI-UL-State of a PUSCH, PUCCH, or SRS transmission occasion as described in [6, TS 38.214]

- in clauses 7.1.1, 7.2.1, and 7.3.1, the RS index $q\_{d}$ for obtaining the downlink pathloss estimate for PUSCH, PUCCH, and SRS transmission is provided by pathlossReferenceRS-Id-r17 associated with or included in the indicated TCI-State or TCI-UL-State except for SRS transmission that is not provided followUnifiedTCI-StateSRS, or by pathlossReferenceRS-Id included in CandidateTCI-State or CandidateTCI-UL-State indicated in the LTM Cell Switch Command MAC CE

- in clause 7.1.1, if p0AlphaSetforPUSCH is provided, the values of $P\_{O\\_UE\\_PUSCH,b,f,c}\left(j\right)$, $α\_{b,f,c}\left(j\right)$, and the PUSCH power control adjustment state $l$ are provided by p0AlphaSetforPUSCH associated with the indicated TCI-State or TCI-UL-State, or by p0AlphaSetforPUSCH associated with the CandidateTCI-State or CandidateTCI-UL-State indicated in the LTM Cell Switch Command MAC CE

- in clause 7.2.1, if p0AlphaSetforPUCCH is provided, the values of $P\_{O\\_UE\\_PUCCH}\left(q\_{u}\right)$ and the PUCCH power control adjustment state $l$ are provided by p0AlphaSetforPUCCH associated with the indicated TCI-State or TCI-UL-State, or by p0AlphaSetforPUCCH associated with the CandidateTCI-State or CandidateTCI-UL-State indicated in the LTM Cell Switch Command MAC CE

- in clause 7.3.1, if p0AlphaSetforSRS is provided,

- if followUnifiedTCI-StateSRS is provided for a SRS resource set, the values of $P\_{O\\_UE\\_SRS,b,f,c}\left(q\_{s}\right)$, $α\_{SRS,b,f,c}\left(q\_{s}\right)$, and SRS power control adjustment state $l$ are provided by p0AlphaSetforSRS associated with the indicated TCI-State or TCI-UL-State, or by p0AlphaSetforSRS associated with the CandidateTCI-State or CandidateTCI-UL-State indicated in the LTM Cell Switch Command MAC CE

**<unchanged part omitted>**

**7.1.1 UE behaviour**

**<unchanged part omitted>**

- else, $P\_{O\\_UE\\_PUSCH,b,f,c}\left(1\right)$ is provided by p0 obtained from p0-PUSCH-Alpha in ConfiguredGrantConfig that provides an index P0-PUSCH-AlphaSetId to a set of P0-PUSCH-AlphaSet, or by sdt-P0-PUSCH for a PUSCH (re)transmission as described in clause 19.1, or by rrc-P0-PUSCH for a PUSCH (re)transmission as described in clause 22.1, or by p0 of p0AlphaSetforPUSCH associated with the CandidateTCI-State or CandidateTCI-UL-State indicated in the LTM Cell Switch Command MAC CE for a configured grant Type-1 PUSCH (re)transmissions as described in clause [21.1], for active UL BWP $b$ of carrier $f$ of serving cell $c$

**<unchanged part omitted>**

- else $α\_{b,f,c}(1)$ is provided by alpha obtained from p0-PUSCH-Alpha in ConfiguredGrantConfig providing an index P0-PUSCH-AlphaSetId to a set of P0-PUSCH-AlphaSet, or by sdt-Alpha for a PUSCH (re)transmission as described in clause 19.1, or by rrc-Alpha for a PUSCH (re)transmission as described in clause 22.1, or by alpha of p0AlphaSetforPUSCH associated with the CandidateTCI-State or CandidateTCI-UL-State indicated in the LTM Cell Switch Command MAC CE for a configured grant Type-1 PUSCH (re)transmissions as described in clause [21.1], for active UL BWP $b$ of carrier $f$ of serving cell $c$

### Companies’ views

|  |  |  |
| --- | --- | --- |
| **Company** | **Essential or Not**(Yes or No) | **Comment** |
| FL | Yes | FL agrees the intention. Companies’ review are appreciated as many parts are modified.  |
| Ericsson | Yes | The last two additions should not be needed: the text in section 7 states that P0, alpha and cli is taken from the TCI states. Pls make sure that RRC parameter names are in italics |
| Huawei, HiSilicon | Yes | The CR is trying to reflect the RAN2 agreement that the power control parameters are provided in the indicated LTM TCI state. According to 331 field descriptions, these parameters can be applied for PUSCH, PUCCH and SRS.The change in 7.1.1 is to align with RAN1’s agreement that the power control parameters for CG based first UL is based on the indicated LTM TCI state. Actually, the newly added paragraphs in 21.1 on issue 1-3 refers to the clause 7.1.1, similar as those for CG-SDT and NTN. |
| vivo | Yes | The CR is capturing RAN2 agreements. |
| Nokia | Yes | Agree that the CR is needed to reflect the RAN2 agreements made in the last meeting on power control parameters.  |
| ZTE | Yes | Considering that changes in clause 7.1.1 is related to the thing whether the CR corresponding to issue 1-3 will be supported, it might be better to discuss them separately. From our perspective, we understand that the changes except for those in clause 7.1.1 can be agreed first to reflect RAN2 agreement. |
| ASUSTeK | Yes | Share same view as ZTE that changes except clause 7.1.1 can be agreed first. |
| New H3C | Yes | The CR is capturing RAN2 agreements. |

## [Open] Issue 1-2: Pathloss maintenance for candidate cells

### Summary of Proposal

R1-2406460 Discussion on the maximum number of PL RS maintained simultaneously for candidate cells ZTE Corporation, Sanechips
R1-2406461 Draft CR on the maximum number of PL RS maintained simultaneously for candidate cells ZTE Corporation, Sanechips
R1-2406790 Draft CR on UE behaviour to maintain pathloss for LTM candidate cells Nokia
R1-2406994 Corrections to the Pathloss RS in LTM TCI state in TS38.213 Huawei, HiSilicon

* This is to specify how many pathloss RSs needs to be maintained. The differences of the 3 companies’ proposals are:
* The number of pathloss RSs UE maintains ([4] or 8)
* Whether to specify the pathloss RSs UE should maintain, i.e. RSs associated with activated candidate (UL) TCI states

**TP by ZTE for 38.213**

**21 L1/L2-triggered mobility procedures**

A UE can be indicated, by *LTM-Config*, candidate cells and SS/PBCH blocks per candidate cell for the UE to obtain synchronization and measure corresponding L1-RSRPs [10, TS 38.133]. A Candidate Cell TCI States Activation/Deactivation MAC CE can activate TCI states, provided by *CandidateTCI-State* or/and *CandidateTCI-UL-State*, associated with SS/PBCH blocks or TRS of corresponding candidate cells [11, TS 38.321]. The RS index for obtaining the candidate cell downlink pathloss estimate is provided by pathlossReferenceRS-Id in the *CandidateTCI-State* or *CandidateTCI-UL-State.* A UE does not expect to simultaneously maintain more than eight PL RSs associated with activated TCI states for all candidate cells before reception of the LTM Cell Switch Command MAC CE.If the Candidate Cell TCI States Activation/Deactivation MAC CE activates TCI states, an LTM Cell Switch Command MAC CE can indicate a TCI state from the activated TCI states; otherwise, the LTM Cell Switch Command MAC CE can activate and indicate a TCI state, provided by *CandidateTCI-State* or/and *CandidateTCI-UL-State*. After reception of the LTM Cell Switch Command MAC CE, activated TCI states that are not indicated by the MAC CE are deactivated and a UE does not expect to maintain PL RS(s) that are not provided by *CandidateTCI-State* or/and *CandidateTCI-UL-State* indicated in LTM Cell Switch Command MAC CE. The UE is provided configurations by *ltm-CSI-ReportConfigToAddModList* for reporting L1-RSRP measurements [6, TS 38.214] that include a number of candidate cells and a number of SS/PBCH blocks per candidate cell from the number of candidate cells.

TP by Nokia for 38.213

21 L1/L2-triggered mobility procedures

A UE can be indicated, by *LTM-Config*, candidate cells and SS/PBCH blocks per candidate cell for the UE to obtain synchronization and measure corresponding L1-RSRPs [10, TS 38.133]. A Candidate Cell TCI States Activation/Deactivation MAC CE can activate TCI states, provided by *CandidateTCI-State* or/and *CandidateTCI-UL-State*, associated with SS/PBCH blocks or TRS of corresponding candidate cells [11, TS 38.321]. The RS index for obtaining the candidate cell downlink pathloss estimate is provided by *pathlossReferenceRS-Id* in the *CandidateTCI-State* or *CandidateTCI-UL-State.* A UE is expected to simultaneously maintain up to [4] pathloss estimated across all candidate cells associated with TCI states, provided by *CandidateTCI-State* or/and *CandidateTCI-UL-State,* activated most recently. If the Candidate Cell TCI States Activation/Deactivation MAC CE activates TCI states, an LTM Cell Switch Command MAC CE can indicate a TCI state from the activated TCI states; otherwise, the LTM Cell Switch Command MAC CE can activate and indicate a TCI state, provided by *CandidateTCI-State* or/and *CandidateTCI-UL-State*. After reception of the LTM Cell Switch Command MAC CE, activated TCI states that are not indicated by the MAC CE are deactivated. The UE is provided configurations by *ltm-CSI-ReportConfigToAddModList* for reporting L1-RSRP measurements [6, TS 38.214] that include a number of candidate cells and a number of SS/PBCH blocks per candidate cell from the number of candidate cells.

**TP by Huawei for 38.213**

**21 L1/L2-triggered mobility procedures**

< Unchanged parts are omitted >

A UE can be indicated, by *LTM-Config*, candidate cells and SS/PBCH blocks per candidate cell for the UE to obtain synchronization and measure corresponding L1-RSRPs [10, TS 38.133]. A Candidate Cell TCI States Activation/Deactivation MAC CE can activate TCI states, provided by *CandidateTCI-State* or/and *CandidateTCI-UL-State*, associated with SS/PBCH blocks or TRS of corresponding candidate cells [11, TS 38.321]. The RS index for obtaining the candidate cell downlink pathloss estimate is provided by *pathlossReferenceRS-Id* in the *CandidateTCI-State* or *CandidateTCI-UL-State.* A UE does not expect to simultaneously maintain more than [four] pathloss estimates across all candidate cells. If the Candidate Cell TCI States Activation/Deactivation MAC CE activates TCI states, an LTM Cell Switch Command MAC CE can indicate a TCI state from the activated TCI states; otherwise, the LTM Cell Switch Command MAC CE can activate and indicate a TCI state, provided by *CandidateTCI-State* or/and *CandidateTCI-UL-State*. After reception of the LTM Cell Switch Command MAC CE, activated TCI states that are not indicated by the MAC CE are deactivated. The UE is provided configurations by *ltm-CSI-ReportConfigToAddModList* for reporting L1-RSRP measurements [6, TS 38.214] that include a number of candidate cells and a number of SS/PBCH blocks per candidate cell from the number of candidate cells.

### Companies’ views

|  |  |  |
| --- | --- | --- |
| **Company** | **Essential or Not**(Yes or No) | **Comment** |
| FL | Yes, but discussion needed | FL is fine with the intention, but more need more discussion on the numbers and the rule which pathloss RS to maintain. Companies’ views are highly appreciated.  |
| Ericsson | No | Prefer not do change anything: the hard limit of 4 PL RSs that was introduced in Rel-15 is just causing problems.  |
| Huawei, HiSilicon | Yes | We prefer up to 4 PL RSs across all candidate cells which can simply UE implementation. |
| vivo | Yes | Need more discussion on the number |
| Nokia | Yes, but discussion is needed.  | If we add any constraints on the number of PL-RSs that can be maintained for candidate cells, it is important to clarify which LTM TCI states this applies to. This information is crucial for the network, as it allows for the selection of an appropriate TCI state in the cell switch command. Selecting a TCI state for the cell switch command where the PL-RS is not maintained will increase the handover interruption delay. |
| ZTE | Yes, more discussion are needed | we think that we may need to first clarify that how 4 or 8 PL RSs are associated with candidate TCI states from all candidate cells. There may be the following potential understandings: * Understanding#1: all X different PL RSs are from TCI states of each candidate cell; it means that X different PL RSs are same for TCI states of each candidate cell
* Understanding#2: part of all X different PL RSs are from TCI states of a candidate cell. But the total number of different PL RSs from TCI states for all candidate cells is X. it may cause none of X PL RSs being provided by TCI states of a certain candidate cell, e.g., target cell. If so, we are not sure how UL transmission power will be determined after cell switching.

At least the understanding of the issue mentioned above can be aligned first.  |
| New H3C | Yes | more discussion are needed |

## [Open] Issue 1-3: UL transmission after LTM cell switch

### Summary of Proposal

R1-2406996 Corrections to the first UL transmission after LTM cell switch in TS38.213 Huawei, Ericsson, Nokia, ZTE Corporation, Sanechips, HiSilicon

🡪 This issue was discussed in the previous meeting briefly, but no consensus was achieved. A new section is added to define the UE behaviour for CG PUSCH transmission after cell switch.

TP to 38.213

**21.1 Configured-grant PUSCH transmission in RACH-less LTM cell switch**

A UE configured to perform PUSCH transmission in RACH-less LTM cell switch can be provided one or more configurations by respective one or more *ConfiguredGrantConfig*, for configured grant Type 1 PUSCH transmissions on the active UL BWP [12, TS 38.331]. For the remaining of this clause, PUSCH transmissions refer to configured grant Type-1 PUSCH transmissions for a configuration provided by *ConfiguredGrantConfig*.

A UE can be provided by *rrc-SSB-Subset* in *cg-LTM-Configuration* a number of SS/PBCH block indexes $\_{}^{}$ to map to a number of valid PUSCH occasions for PUSCH transmissions over an association period. If the UE is not provided *rrc-SSB-Subset* in *cg-LTM-Configuration*, the UE determines $\_{}^{}$ from the value of *ssb-PositionsInBurst* in *ServingCellConfigCommon*. A PUSCH occasion for a PUSCH transmission is defined by a time resource and a frequency resource and is associated with a DM-RS provided by *cg-DMRS-Configuration* for the configuration of PUSCH transmissions. A UE can be provided a number of repetitions for a PUSCH transmission by *repK* or *numberOfRepetitions*. If the number of repetitions is provided and larger than 1, all the PUSCH occasions of the repetitions for the PUSCH transmission are mapped to the same SS/PBCH block index(es). For the initial transmission or autonomous retransmission of an initial transport block provided for PUSCH transmission, the UE encodes the transport block using redundancy version number 0 if the UE is not provided *repK-RV*.

An association period, starting from frame with SFN 0, for mapping $\_{}^{}$ SS/PBCH block indexes, from the number of SS/PBCH block indexes, to valid PUSCH occasions and associated DM-RS resources is the smallest value in the set determined by the PUSCH configuration period provided by *periodicity* in *ConfiguredGrantConfig* according to Table 19.1-1 such that $\_{}^{}$ SS/PBCH block indexes are mapped at least once to valid PUSCH occasions and associated DM-RS resources within the association period. A UE is provided a number of SS/PBCH block indexes associated with a PUSCH occasion and a DM-RS resource by *rrc-SSB-PerCG-PUSCH* in *cg-LTM-Configuration*. If after an integer number of SS/PBCH block indexes to PUSCH occasions and associated DMRS resources mapping cycles within the association period there is a set of PUSCH occasions and associated DMRS resources that are not mapped to $\_{}^{}$ SS/PBCH block indexes, no SS/PBCH block indexes are mapped to the set of PUSCH occasions and associated DMRS resources. An association pattern period includes one or more association periods and is determined so that a pattern between PUSCH occasions with associated DMRS resources and SS/PBCH block indexes repeats at most every 640 msec. PUSCH occasions and associated DMRS resources not associated with SS/PBCH block indexes after an integer number of association periods, if any, are not used for PUSCH transmissions.

Each *N* of $\_{}^{}$ SS/PBCH block indexes in increasing order are mapped to valid PUSCH occasions and associated DMRS resources in the following order

- first, in increasing order of DMRS resource indexes within a PUSCH occasion, where a DMRS resource index $\_{}$ is determined first in an ascending order of a DMRS port index and second in an ascending order of a DMRS sequence index [4, TS 38.211]

- second, in increasing order of PUSCH configuration period indexes

where N is provided by rrc-SSB-PerCG-PUSCH in cg-LTM-Configuration.

A PUSCH occasion is valid if it does not overlap with a valid PRACH occasion as described in clause 8.1.

For unpaired spectrum and for SS/PBCH blocks with indexes provided by *ssb-PositionsInBurst* in *SIB1*

- if a UE is provided *tdd-UL-DL-ConfigurationCommon*, a PUSCH occasion is valid if the PUSCH occasion

- is within UL symbols

- starts at least $\_{}$ symbols after a last downlink symbol, and at least $\_{}$ symbols after a last SS/PBCH block symbol, where $\_{}$ is provided in Table 8.1-2

If the UE is provided *cg-LTM-Configuration,* the UE performs configured grant Type 1 PUSCH transmission on the valid PUSCH occasions associated with the SS/PBCH block indexes same as the SS/PBCH block indexes provided by or associated with QCL RS of the *CandidateTCI-State* and/or *CandidateTCI-UL-State* indicated by the LTM Cell Switch Command MAC CE.

A UE determines a power of a PUSCH transmission as described in clause 7.1.1, where the UE obtains $\_{}\_{}$ using a RS resource from *pathlossReferenceRS-Id* included in the *CandidateTCI-State* and/or *CandidateTCI-UL-State* indicated by the LTM Cell Switch Command MAC CE.

### Companies’ views

|  |  |  |
| --- | --- | --- |
| **Company** | **Essential or Not**(Yes or No) | **Comment** |
| FL | Yes | FL agrees issue is valid, i.e. RAN1 spec change is necessary to enable CG-based UL transmission after cell switch. Companies’ review is highly appreciated.  |
| Ericsson | Yes |  |
| Huawei, HiSilicon | Yes | support |
| vivo | Yes | Generally fine, we can discuss the TP in details |
| Nokia | Yes | Support |
| ZTE | Yes | Support |
| ASUSTeK | Yes | Support |
| New H3C | Yes | Support |

## [Open] Issue 1-4: Candidate cell PRACH transmission

### Summary of Proposal

R1-2406561 Discussion on missing RRC parameter for LTM early UL sync NEC
R1-2407010 Maintenance of Rel-18 Mobility Enhancement Qualcomm Incorporated
R1-2407011 Draft CR on the Rel-18 TDD configuration in the LTM candidate cell Qualcomm Incorporated

🡪 for Candidate cell PRACH, the two missing RRC parameters are pointed out

1. **TDD pattern configuration (TDD-UL-DL-Configuration) is necessary to identify the RO for candidate cell. A new RRC parameter is necessary**

|  |
| --- |
| TP for 38.213------------------------------------------Start of Text Proposal ---------------------------------- 8.1 Random access preamble< Unchanged text omitted >For unpaired spectrum, - if a UE is not provided *tdd-UL-DL-ConfigurationCommon* or *ltm-tdd-UL-DL-ConfigurationCommon*, a PRACH occasion in a PRACH slot is valid if it does not precede a SS/PBCH block in the PRACH slot and starts at least $N\_{gap}$ symbols after a last SS/PBCH block reception symbol, where $N\_{gap}$ is provided in Table 8.1-2 and, if *channelAccessMode* = "*semiStatic*" is provided, does not overlap with a set of consecutive symbols before the start of a next channel occupancy time where the UE does not transmit [15, TS 37.213].- the candidate SS/PBCH block index of the SS/PBCH block corresponds to the SS/PBCH block index provided by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon*, as described in clause 4.1, or by *ssb-PositionsInBurst-r18* in *LTM-SSB-Config* for each of the candidate cells configured by *LTM-Config*- If a UE is provided *tdd-UL-DL-ConfigurationCommon* or *ltm-tdd-UL-DL-ConfigurationCommon*, a PRACH occasion in a PRACH slot is valid if - it is within UL symbols, or - it does not precede a SS/PBCH block in the PRACH slot and starts at least $N\_{gap}$ symbols after a last downlink symbol and at least $N\_{gap}$ symbols after a last SS/PBCH block symbol, where $N\_{gap}$ is provided in Table 8.1-2, and if *channelAccessMode* = "*semiStatic*" is provided, does not overlap with a set of consecutive symbols before the start of a next channel occupancy time where there shall not be any transmissions, as described in [15, TS 37.213]- the candidate SS/PBCH block index of the SS/PBCH block corresponds to the SS/PBCH block index provided by *ssb-PositionsInBurst* in *SIB1* or in *ServingCellConfigCommon*, as described in clause 4.1, or by *ssb-PositionsInBurst-r18* in *LTM-SSB-Config* for each of the candidate cells configured by *LTM-Config*. < Unchanged text omitted >21 L1/L2-triggered mobility procedures< Unchanged text omitted >A UE can be provided configurations, by *EarlyUL-SyncConfig*, for PRACH transmission parameters for each of the candidate cells. If the UE is also provided *ltm-tdd-UL-DL-ConfigurationCommon* for each of the candidate cells, the UE determines valid PRACH occasions on the candidate cell as described in Clause 8.1. The UE can be triggered a PRACH transmission on a candidate cell by a PDCCH order that the UE receives on a serving cell and includes an indication of the candidate cell for the PRACH transmission [4, TS 38.212]. If the serving cell and the candidate cell operate in a same frequency range and the UE would have transmissions that overlap in time, or when a gap between a first or last symbol of a PRACH transmission to the candidate cell is less than 𝑁 symbols from a last or first symbol, respectively, of an UL transmission to the serving cell, where $N$ is defined in Clause 8.1, the UE < Unchanged text omitted > ------------------------------------------End of Text Proposal ---------------------------------- |

1. **restrictedSetConfig for LTM is needed to generate the preamble sequence when length 839 PRACH root sequence is configured. Without this configuration, the preamble sequence could not be generated. A new RRC parameter is necessary**

The TP hasn’t been provided by the proponent.

### Companies’ views

|  |  |  |
| --- | --- | --- |
| **Company** | **Essential or Not**(Yes or No) | **Comment** |
| FL | Need discussion | These proposals require the changes to the frozen ASN.1. FL thinks the discussion on the problem identification and solution is needed first.  |
| Ericsson | Essential | Support, and suggest that we send an LS to RAN2 asking them to add parameters. |
| Huawei, HiSilicon |  | Maybe we should wait for RAN2 and see how they design the RRC signaling at first.  |
| vivo |  | It should be discussed in RAN2 |
| Nokia |  | Support – final 38.213 CR and LS (to RAN2) details can be discussed.  |
| ZTE |  | We also tend to first ask RAN2 to clarify how they thought when defining early PRACH configuration structure, e.g., these parameters are missing or there are other intentions? |
| Qualcomm | Yes | As a proponent company, we think this is a critical issue to be resolved. We may discuss an LS to RAN2 and a final CR together. |
| NewH3C |  | It should be discussed under RAN2 |

## [Open] Issue 1-5: LTM CSI report

### Summary of Proposal

R1-2406633 Draft CR on CSI related operation for LTM CSI report Samsung
R1-2407125 Correction on LTM CSI report ASUSTeK

* These two contributions try to address the same issue, i.e. due to the introduction of LTM-CSI-ReportConfig, there are descriptions not applied to LTM CSI report for CSI processing criteria and computation time.

FL suggestion is to take Samsung’s version, which corrects all the necessary parts

#### TP to 38.214

5.2.1.6 CSI processing criteria

#### <Unchanged part omitted>

For a CSI report with *CSI-ReportConfig* with higher layer parameter *reportQuantity* not set to 'none', or a CSI report with *LTM-CSI-ReportConfig*, the CPU(s) are occupied for a number of OFDM symbols as follows:

- A periodic or semi-persistent CSI report (excluding an initial semi-persistent CSI report on PUSCH after the PDCCH triggering the report and a semi-persistent CSI report on PUSCH configured with the higher layer parameter *codebookType* set to 'typeII-Doppler-r18' or 'typeII-Doppler-PortSelection-r18') occupies CPU(s) from the first symbol of the earliest one of each CSI-RS/CSI-IM/SSB resource, or each CSI-RS/CSI-IM resource associated with all configured sub-configurations for periodic CSI report corresponding to a *CSI-ReportConfig* that contains a list of sub-configurations provided by *csi-ReportSubConfigToAddModList*, or each CSI-RS/CSI-IM resource associated with all activated/triggered sub-configurations for semi-persistent CSI report corresponding to a *CSI-ReportConfig* that contains a list of sub-configurations provided by *csi-ReportSubConfigToAddModList*, or each SSB resource associated with all candidate cells for periodic CSI report corresponding to a *LTM-CSI-ReportConfig*, or each SSB resource associated with all candidate cells for semi-persistent CSI report corresponding to a *LTM-CSI-ReportConfig*,for channel or interference measurement, respective latest CSI-RS/CSI-IM/SSB occasion no later than the corresponding CSI reference resource, until the last symbol of the configured PUSCH/PUCCH carrying the report.

#### <Unchanged part omitted>

5.4 UE CSI computation time

#### <Unchanged part omitted>

- $(Z\_{3},Z\_{3}^{'})$ of the table 5.4-2 if *reportQuantity* is set to 'cri-RSRP', 'ssb-Index-RSRP', 'cri-RSRP- Index' or 'ssb-Index-RSRP- Index ', $where Xµ $is according to UE reported capability *beamReportTiming* and *KBl* is according to UE reported capability *beamSwitchTiming* as defined in [13, TS 38.306], and if the CSI report is configured with LTM-CSI-ReportConfig for L1-RSPR measurement, or

#### <Unchanged part omitted>

### Companies’ views

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| --- | --- | --- |
| **Company** | **Essential or Not**(Yes or No) | **Comment** |
| FL | Yes | FL thinks the necessary procedure for CSI computation is missing for LTM case without this correction. Small editorial change: “LTM-CSI-ReportConfig” in section 5.4 should be italic.  |
| Ericsson | Yes | Support the intention. The addition of *LTM-CSI-ReportConfig* in two places is necessary. Then the middle change does not seem necessary: the general statement:“from the first symbol of the earliest one of each CSI-RS/CSI-IM/SSB resource”seems sufficient. Also, the added text looks a bit strange: “each SSB resource associated with all candidate cells”. Why should an SSB resource be associated with all candidate cells?There is a typo in the last change: “L1-RSPR” should be “L1-RSRP”. And RRC parameter names should be in italics |
| Huawei, HiSilicon | Yes | Agree with the first change in 5.2.1.6. As for the 2nd change in 5.2.1.6, it seems an optimization. The original text “A periodic or semi-persistent CSI report (excluding an initial semi-persistent CSI report on PUSCH after the PDCCH triggering the report and a semi-persistent CSI report on PUSCH configured with the higher layer parameter *codebookType* set to 'typeII-Doppler-r18' or 'typeII-Doppler-PortSelection-r18') occupies CPU(s) from the first symbol of the earliest one of each CSI-RS/CSI-IM/SSB resource” can be applied R17 ICBM and we think it can applied to R18 LTM as well.Agree with the intention of the change in 5.4. the wording “and if” should be “or if”. Otherwise, it will be a error configuration because there is no report quantity configuration in LTM-CSI-ReportConfig |
| vivo | Yes  | Agree with Huawei’s comment that correction in 5.4 need revision, it should be “or” |
| Nokia | Yes | Agree with above comments from other companies – we should correct the typos pointed out by Ericsson and Huawei, and the second change in 5.2.1.6 does not see necessary.  |
| ZTE | Yes | Agree with the comments raised by Erisson and HW.  |
| Qualcomm | Yes | Agree with Ericsson and Huawei’s views. |
| ASUSTeK | Yes | Agree with Ericsson and Huawei’s comments. |
| New H3C |  | Agree with Ericsson and Huawei’s views. |

## [Open] Issue 1-6: Consistency between SSB index and TCI state in Cell Switch Command

### Summary of Proposal

R1-2406036 Discussion on consistency between SSB index and TCI state in LTM Cell Switch Command MAC CE ZTE Corporation, Sanechips
R1-2406037 Draft CR on consistency between SSB index and TCI state in LTM Cell Switch Command MAC CE ZTE Corporation, Sanechips

***Proposal 1:*** *For the case that CFRA is triggered by LTM Cell Switch Command MAC CE, RAN1 confirms that both SSB index for CFRA and TCI state can be included in the MAC CE, where*

* *If SSB is configured as QCL source in indicated TCI state, SSB index for CFRA should be the same as that in indicated TCI state.*
* *Otherwise, SSB index for CFRA should be the same as that associated with TRS in indicated TCI state.*

### Companies’ view

|  |  |  |
| --- | --- | --- |
| **Company** | **Essential or Not**(Yes or No) | **Comment** |
| FL | No(due to no support at the previous meeting) | The potential mismatch between SSB index and TCI state in cell switch command MAC CE can be avoided by gNB implementation.No companies supported this proposal at RAN1#116bis and 117. The proponent claimed that this proposal is related to the PRACH transmission timeline, but it was concluded to be handled by UE implementation. FL plan is to conclude this issue at RAN1#118 not to prolong the discussion. |
| Ericsson | No | Not needed |
| Huawei, HiSilicon |  | Support the CR. a reasonable gNB should keep the consistence of configuration. |
| vivo |  | Seems not needed |
| Nokia | No | Not needed. |
| ZTE |  | We agree that the method raised by FL is a potential solution. But in order to give readers or learners a reference or guidance, we think that At least a conclusion can be left in the chairman’s notes to avoid the misunderstanding.  |
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## [Open] Issue 1-7: LTM TCI state application on target SCell

### Summary of Proposal

R1-2406038 Discussion on applying TCI state indicated in LTM Cell Switch Command MAC CE to a list of CCs ZTE Corporation, Sanechips

* This contribution tries to clarify whether the TCI states for target SCells given by RRC configuration are indicated by LTM Cell Switch Command MAC CE.

***Proposal 1:*** *If “simultaneousU-TCI-UpdateList” is configured, the TCI state for target SpCell indicated in LTM Cell Switch Command MAC CE can be applied for all CCs in the same CC list configured by “simultaneousU-TCI-UpdateList” as the target SpCell.*

### Companies’ views

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| --- | --- | --- |
| **Company** | **Essential or Not**(Yes or No) | **Comment** |
| FL | No(due to less number of support at the previous meeting) | Even though majority of companies sees no necessity for this change, two companies mentioned at RAN1#116bis that the current spec is unclear. At RAN1#117, three companies (including the proponent) were fine to discuss. FL thinks the gNB can send an MAC CE to activate the TCI state for SCells at the new serving cell immediately after the completion of cell switch. FL plan is to conclude this issue at RAN1#118 not to prolong the discussion. |
| Huawei, HiSilicon |  | Support the CR technically. Also agree with FL it may be too late. |
| vivo |  | Ok to discuss |
| Nokia |  | This will require some discussion and we agree that it may be too late for R18.  |
| ZTE |  | We also agree that it is a bit late, but still tend to leave a little time for discussing this issue. |
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## [Open] Issue 1-8: UL/SUL indication

### Summary of Proposal

R1-2406995 Corrections to the UL/SUL indication for CFRA in TS38.213 Huawei, HiSilicon

🡪 This CR tries to clarify that UL/SUL indicator in a PDCCH order can also be applied to a candidate cell and UE can determine the UL carrier based on the S/U field in LTM Cell Switch Command MAC CE when it triggers a CFRA.

**TP to 38.213
8 Random access procedure**

If a UE is configured with two UL carriers for a serving cell or a candidate cell and the UE detects a PDCCH order, the UE uses the UL/SUL indicator field value from the detected PDCCH order to determine the UL carrier for the corresponding PRACH transmission. If a UE is configured with two UL carriers for a candidate cell and the UE detects an LTM Cell Switch Command MAC CE [11, TS 38.321] that initiated a CFRA, the UE uses the S/U field value from the MAC CE to determine the UL carrier for the corresponding PRACH transmission.

### Companies’ views

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| --- | --- | --- |
| **Company** | **Essential or Not**(Yes or No) | **Comment** |
| FL | No (due to no support at the previous meeting) | Section 8 of 38.213 captures the general description of PRACH transmission with UL/SUL field. It is OK to add a description for PRACH with UL/SUL for candidate cell for more clarification. However, the spec wouldn’t be broken without this addition as - the corresponding paragraph applies to PDCCH order for serving cell- the correct behaviour is anyway described in RAN2 specificationsAt RAN1#117, no other company other than the proponent supported this proposal. FL plan is to conclude this issue at RAN1#118 not to prolong the discussion. |
| Ericsson | Yes? | At least the addition of “or a candidate cell” makes sense – otherwise the description is lacking.  |
| Huawei, HiSilicon | Yes | The first change is trying to align the 213 and 212. A PDCCH can trigger CFRA on serving cell and candidate cell. The 2nd change is trying to keep the consistence between RAN2 and RAN1 specification. If it is not captured, the RAN1 procedure on PRACH transmission on target cell’s SUL triggered by CSC is not mentioned in RAN1 specification at all. The reader lack of background may be confused whether the CFRA procedure in 213 can still be applied on SUL of target cell if it is triggered by CSC.  |
| vivo | Yes |  |
| Nokia | Yes | The CR looks good. |
| ZTE |  | Last change is more suitable to be reflected in RAN2 spec and we understand that it is already in RAN2 spec. It seems unnecessary to repeat it in RAN1.  |

## [Open] Issue 1-9: Deactivation of candidate TCI states

### Summary of Proposal

R1-2407147 Draft CR for 38.213 on deactivation of candidate TCI states Ericsson

🡪 This proposal tries to clarify that the activated candidate cell TCI states are deactivated after RRC reconfiguration with sync.

**21 L1/L2-triggered mobility procedures**

A UE can be indicated, by *LTM-Config*, candidate cells and SS/PBCH blocks per candidate cell for the UE to obtain synchronization and measure corresponding L1-RSRPs [10, TS 38.133]. A Candidate Cell TCI States Activation/Deactivation MAC CE can activate TCI states, provided by *CandidateTCI-State* or/and *CandidateTCI-UL-State*, associated with SS/PBCH blocks or TRS of corresponding candidate cells [11, TS 38.321]. If the Candidate Cell TCI States Activation/Deactivation MAC CE activates TCI states, an LTM Cell Switch Command MAC CE can indicate a TCI state from the activated TCI states; otherwise, the LTM Cell Switch Command MAC CE can activate and indicate a TCI state, provided by *CandidateTCI-State* or/and *CandidateTCI-UL-State*. After reception of the LTM Cell Switch Command MAC CE, activated TCI states that are not indicated by the MAC CE are deactivated. After the RRC reconfiguration with sync procedure, all TCI states provided by *CandidateTCI-State* or/and *CandidateTCI-UL-State* are deactivated. The UE is provided configurations by *LTM-CSI-ReportConfigToAddModList* for reporting L1-RSRP measurements [6, TS 38.214] that include a number of candidate cells and a number of SS/PBCH blocks per candidate cell from the number of candidate cells.

### Companies’ views

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| **Company** | **Essential or Not**(Yes or No) | **Comment** |
| FL | No (due to no support at the previous meeting) | According to the companies’ input at RAN1#116bis, almost all companies think deactivation is a default behaviour for RRC based handover, and no spec clarification is needed. In this sense, FL believes that there would be no misunderstanding even when we have no CR for this issue. Otherwise, it would be another solution to minute this proposal in the chair’s note. FL is fine with either approach.FL plan is to conclude this issue at RAN1#118 not to prolong the discussion. |
| Ericsson | Yes | This is a misunderstanding: there is no automatic deactivation of anything. Deactivation of serving cell TCI states are described explicitly in 38.321: 5.18.23 Unified TCI States Activation/Deactivation MAC CEThe network may activate and deactivate the configured unified TCI states of a Serving Cell or a set of Serving Cells configured in *simultaneousU-TCI-UpdateList1*, *simultaneousU-TCI-UpdateList2*, *simultaneousU-TCI-UpdateList3* or *simultaneousU-TCI-UpdateList4* by sending the Unified TCI States Activation/Deactivation MAC CE described in clause 6.1.3.47. The configured unified TCI states are initially deactivated upon (re-)configuration by upper layers and after reconfiguration with sync.There is no corresponding expression for candidate TCI states:5.18.36 Candidate Cell TCI States Activation/DeactivationThe network may activate and deactivate the TCI states of LTM candidate cell(s) configured in *CandidateTCI-State and CandidateTCI-UL-State* by sending the Candidate Cell TCI States Activation/Deactivation MAC CE described in clause 6.1.3.76. The network deactivates the TCI state(s) for one LTM candidate cell by not including the corresponding TCI state ID field(s) in the Candidate Cell TCI States Activation/Deactivation MAC CE.The MAC entity shall:1> if the MAC entity receives a Candidate Cell TCI States Activation/Deactivation MAC CE on a Serving Cell:2> indicate to lower layers the information regarding the Candidate Cell TCI States Activation/Deactivation MAC CE. |
| Huawei, HiSilicon |  | Can be it left to implementation? when the serving cell TCI is indicated in the target cell, this LTM TCI state may be not used anymore. It will be refreshed automatically when the new set of LTM TCI state are activated in the target cell.  |
| vivo |  | We can discuss, but it seems not necessary |
| Nokia |  | Perhaps we can send an LS to RAN2, as section 5.18.36 seems to be a more appropriate place for the proposed change and aligns better with section 5.18.23. |
| ZTE |  | This change has been reflected in RAN2 spec, we don’t see the need to add it in RAN1. |
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