**3GPP TSG RAN WG1 #117 R1-24xxxxx**

**Fukuoka, Japan, May 20th – 24th, 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 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

[R1-2404199](Docs%5CR1-2404199.zip) LS on LTM L1 intra and inter-frequency measurements RAN2, Intel

Relevant tdoc(s)

[R1-2404145](Docs%5CR1-2404145.zip) Draft reply LS on LTM L1 intra and inter-frequency measurements vivo

[R1-2404247](Docs%5CR1-2404247.zip) Discussion on LTM L1 intra and inter-frequency measurements ZTE

[R1-2404248](Docs%5CR1-2404248.zip) Draft reply LS on on LTM L1 intra and inter-frequency measurements ZTE

[R1-2404265](Docs%5CR1-2404265.zip) Draft reply LS on LTM L1 intra and inter-frequency measurements Samsung

[R1-2404342](Docs%5CR1-2404342.zip) Reply LS on LTM L1 intra and inter-frequency measurements Lenovo

[R1-2404349](Docs%5CR1-2404349.zip) Draft reply LS on LTM L1 intra and inter-frequency measurements Spreadtrum Communications

[R1-2404677](Docs%5CR1-2404677.zip) Draft reply to LS on LTM L1 intra and inter-frequency measurements NEC

[R1-2404753](Docs%5CR1-2404753.zip) Discussion of LS on LTM L1 intra and inter-frequency measurements Ericsson

[R1-2404829](Docs%5CR1-2404829.zip) Discussion on RAN2 LS on LTM L1 intra and inter-frequency measurements OPPO

[R1-2404830](Docs%5CR1-2404830.zip) Draft reply LS on LTM L1 intra and inter-frequency measurements OPPO

[R1-2404930](Docs%5CR1-2404930.zip) Discussion on LS on LTM L1 intra and inter-frequency measurements Nokia

[R1-2405007](Docs%5CR1-2405007.zip) Draft reply LS on LTM L1 intra and inter-frequency measurements CATT

[R1-2405323](Docs%5CR1-2405323.zip) Discussion on the RAN2 LS on the LTM UE capability Huawei, HiSilicon

## Contributions under AI 8.1 for mobility issues

[R1-2403927](Docs%5CR1-2403927.zip) Discussion on the pathloss RS in LTM TCI state Huawei, HiSilicon

[R1-2403928](Docs%5CR1-2403928.zip) Discussion on the CFRA triggered by cell switch command Huawei, HiSilicon

[R1-2404162](Docs%5CR1-2404162.zip) Draft CR on timing assumption between source and target cells for R18 LTM cell switch vivo

[R1-2404255](Docs%5CR1-2404255.zip) Discussion on CFRA triggered by LTM Cell Switch Command MAC CE ZTE

[R1-2404256](Docs%5CR1-2404256.zip) Draft CR on CFRA triggered by LTM Cell Switch Command MAC CE applied for NTN ZTE

[R1-2404257](Docs%5CR1-2404257.zip) Draft CR on timeline for PRACH transmission triggered by LTM Cell Switch Command MAC CE ZTE

[R1-2404258](Docs%5CR1-2404258.zip) Discussion on consistency between SSB index and TCI state in LTM Cell Switch Command MAC CE ZTE

[R1-2404259](Docs%5CR1-2404259.zip) Draft CR on consistency between SSB index and TCI state in LTM Cell Switch Command MAC CE ZTE

[R1-2404260](Docs%5CR1-2404260.zip) Discussion on applying TCI state indicated in LTM Cell Switch Command MAC CE to a list of CCs ZTE

[R1-2404343](Docs%5CR1-2404343.zip) Draft CR on 38213 on RACH procedure triggered by LTM cell switch command MAC CE Lenovo

[R1-2404380](Docs%5CR1-2404380.zip) Correction on RRC parameters for NR mobility enhancements in TS 38.213 CATT

[R1-2404581](Docs%5CR1-2404581.zip) Correction on TA offset information for UE-based TA acquisition Fujitsu

[R1-2404718](Docs%5CR1-2404718.zip) Draft CR on priority for Legacy CSI report and LTM CSI report in TS 38.213 ZTE

[R1-2404719](Docs%5CR1-2404719.zip) Draft CR on clarifying the unit of BWPswitchDelay ZTE

[R1-2404720](Docs%5CR1-2404720.zip) Discussion on BWPswitchDelay ZTE

[R1-2404729](Docs%5CR1-2404729.zip) Correction on Further NR Mobility Enhancements Langbo

[R1-2404747](Docs%5CR1-2404747.zip) Draft CR for 38.213 on deactivation of candidate TCI states Ericsson

[R1-2404748](Docs%5CR1-2404748.zip) Draft CR for 38.213 on RACH procedure triggred by LTM cell switch Ericsson

[R1-2404749](Docs%5CR1-2404749.zip) Draft CR for 38.213 on signaling of TCI state in LTM cell switch command Ericsson

[R1-2404750](Docs%5CR1-2404750.zip) Draft CR for 38.213 on TCI state applied for CORESETs other than CORESET 0 Ericsson

[R1-2404751](Docs%5CR1-2404751.zip) Draft CR for 38.214 on spCellInclusion Ericsson

[R1-2404927](Docs%5CR1-2404927.zip) Draft CR for CFRA procedure triggered by LTM cell switch command Nokia

[R1-2404928](Docs%5CR1-2404928.zip) Draft CR for TCI state applied for CORESETs other than CORESET 0 in LTM Nokia

[R1-2404929](Docs%5CR1-2404929.zip) Draft CR for 38.214 on QCL assumption after LTM cell switch command Nokia

[R1-2405225](Docs%5CR1-2405225.zip) Draft CR for 38.214 on CSI report priority Ericsson, Huawei, HiSilicon

[R1-2405305](Docs%5CR1-2405305.zip) Corrections to the Pathloss RS in LTM TCI state in TS38.213 Huawei, HiSilicon

[R1-2405306](Docs%5CR1-2405306.zip) Corrections to the timeline of CFRA triggered by cell switch command in TS38.213 Huawei, HiSilicon

[R1-2405307](Docs%5CR1-2405307.zip) Corrections to the beam of CFRA triggered by cell switch command in TS38.213 Huawei, HiSilicon

[R1-2405324](Docs%5CR1-2405324.zip) Corrections to the UL/SUL indication for CFRA in TS38.213 Huawei, HiSilicon

[R1-2405325](Docs%5CR1-2405325.zip) Corrections to the default beam determination after cell switch in TS38.214 Huawei, HiSilicon, Ericsson

[R1-2405332](Docs%5CR1-2405332.zip) Corrections to the first UL transmission after LTM cell switch in TS38.213 Huawei, HiSilicon

# Void

## [Closed] LS on LTM L1 intra and inter-frequency measurements

### Summary of Proposal

[R1-2404199](https://fujitsu-my.sharepoint.com/personal/akimoto_yosuke_jp_fujitsu_com/Documents/%E3%83%89%E3%82%AD%E3%83%A5%E3%83%A1%E3%83%B3%E3%83%88/Internal/1.work/1.3GPP%E6%8A%80%E8%A1%93%E8%A7%A3%E8%AA%AC/L1L2mob-BM/117-L1L2mob-contrib/FL-Summary/Docs/R1-2404199.zip) LS on LTM L1 intra and inter-frequency measurements RAN2, Intel

1 Overall description

RAN2 discussed RAN1 and RAN4 feature lists associated with Rel-18 NR\_Mob\_enh2. RAN2 discussed wither the following L1 measurement and reporting features are mandatory to support LTM or whether L3 measurement could be used.

|  |  |
| --- | --- |
| 45-1 | Intra-frequency L1 measurement and reports for L1-L2 Triggered Mobility (LTM) procedure |
| 45-1a | Inter-frequency L1 measurement and reports for L1-L2 Triggered Mobility (LTM) procedure |

RAN2 made the following agreement:

* RAN2 makes no further assumptions whether L3 measurements can be used or not to trigger LTM.

RAN2 would like to check the following with RAN1 and RAN4:

**Question 1 :** Are the above intra-frequency and inter-frequency L1 measurement and reporting features (45-1 and 45-1a) prerequisites to support intra-frequency and inter-frequency LTM, respectively?

**Question 2:** The above features, 45-1 and 45-1a, from RAN1 and related RAN4 features (39-1, 39-2, 39-3-1, 39-3-2, 39-3-3, 39-3-4, 39-3-5, 39-3-6) are defined per BC for both intra-frequency and inter-frequency measurements. RAN2 would like check with RAN1/4 for which BC (e.g. BC of current serving cells, BC including current serving cells and cell to be measured or something else) these capabilities are to be considered for L1 intra-frequency and inter-frequency LTM measurements?

2 Actions

To RAN1 and RAN4:

**ACTION:** RAN2 respectfully asks RAN1 and RAN4 to provide feedback on the above Question 1 and Question 2.

Summary of Companies’ views:

* Question 1:
	+ Option 1-1: Not a prerequisite: Network can also make an LTM cell switch decision based on other information, e.g. reported L3 measurement
		- Vivo, ZTE, Ericsson, OPPO
	+ Option 1-2: A prerequisite: L1 measurement is essential for latency reduction and beam determination.
		- Samsung, Lenovo, Spreadtrum, NEC, CATT, Huawei
	+ Option 1-3: there are no concerns either way
		- Nokia
* Question 2:
	+ Option 2-1: BC includes current serving cells and the candidate cells or cells to be measured.
		- Spreadtrum, NEC, OPPO, Lenovo, Huawei
	+ Option 2-2: BC includes the current serving cells.
		- Vivo, ZTE, Samsung, Ericsson, Nokia, CATT

### FL observation and proposal

As summarized in the previous subclause (4.1.1), the companies view is equally split for both question 1 and 2 and no clear majority has been found.

For question 1, FL thinks the pros for option 1-1 and 1-2 are valid, and hence it is not easy to down-select one option. FL suggestion is to consider the following approach to move forward at this meeting:

* Approach 1-1: Conclude that companies in RAN1 have different views on prerequisite/non-prerequisite. Ask RAN2 or RAN4 to decide which one to take.
* Approach 1-2: Continue the discussion at RAN1#118.

For question 2, the companies’ positions are described but the reason is not clearly mentioned, which makes FL difficult to suggest the down-selection. Given this situation, FL considers the following approach:

* Approach 2-1: Conclude that companies in RAN1 have different views on which cell to be included in the band combination as below. Ask RAN2 or RAN4 to decide which one to take.
	+ BC includes current serving cells and the candidate cells or cells to be measured.
	+ BC includes the current serving cells.
	+ Approach 2-2: RAN1 to discuss which option (2-1 or 2-2) to take. If discussion cannot be concluded in this meeting, continue the discussion at RAN1#118.

### Companies’ views

|  |  |
| --- | --- |
| Company | Comment |
| Ericsson | We agree that this is better to handle this in UE feature discussion.  |
| CATT | We prefer RAN4 to decide both question 1 and question 2. |
| Nokia | For question 1, we also prefer RAN4 to make final decision as they can check the need of L1 measurement and reporting for different procedures, e.g., TCI activation, PDCCH ordered RACH, cell switch based on the pre-requisite conditions defined in RAN4. From RAN1 perspective, we can clarify what we mean by “per BC” in 45-1 and 45-1a.  |
| FL  | Now the discussion of the LS reply has been moved to AI 8.2.2. Thus, you don’t need to provide your comments here.  |

# High priority issues in RAN1#117

## [Open/Tue off] Issue 1-1: Power control

### Summary of Proposal

[R1-2403927](Docs%5CR1-2403927.zip) Discussion on the pathloss RS in LTM TCI state Huawei, HiSilicon
[R1-2405305](https://fujitsu-my.sharepoint.com/personal/akimoto_yosuke_jp_fujitsu_com/Documents/%E3%83%87%E3%82%B9%E3%82%AF%E3%83%88%E3%83%83%E3%83%97/Docs/R1-2405305.zip) Corrections to the Pathloss RS in LTM TCI state in TS38.213 Huawei, HiSilicon

* The following proposals were made, and the corresponding CR is also provided

Proposal 1: Capture the procedure of pathloss estimation for candidate cells and define the maximum number simultaneous pathloss estimation across all candidate cells before LTM cell switch in TS 38.213.

Proposal 2: The rrc-P0-PUSCH-r18 and rrc-Alpha-r18 in CG-RRC-Configuration-r18 are not applicable for the CG RACH-less LTM. Send LS to RAN2 about the conclusion.

CR to 38.213

7 Uplink Power control

< Unchanged parts are omitted >

In the remaining of this clause, if a UE is provided *TCI-State* in *dl-OrJointTCI-StateList* or *TCI-UL-State,* and for each indicated one or two *TCI-State* or *TCI-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 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-r18* 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 , , and the PUSCH power control adjustment state are provided by *p0AlphaSetforPUSCH* associated with the indicated *TCI-State* or *TCI-UL-State*

- in clause 7.2.1, if *p0AlphaSetforPUCCH* is provided, the values of and the PUCCH power control adjustment state are provided by *p0AlphaSetforPUCCH* associated with the indicated *TCI-State* or *TCI-UL-State*

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-r18 in the *CandidateTCI-State* or/and *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 | Discussion needed | **P1**: FL suggestion is to spend some time to discuss the following questions:**Question 1: whether UE needs to perform/maintain pathloss estimation before CSC or not**:- for PRACH transmission to candidate cells, when does the UE start calculating the pathloss? Is it possible to perform it after receiving PDCCH order?- for the UL transmission after CSC, is it necessary to perform/maintain pathloss calculation before CSC?Question 2: if the answer to question 1 is yes, how does the UE choose the candidate cell(s) to maintain the pathloss ? - one possible solution follow the PDCCH order for the candidate cell RACHAfter clarifying these questions, we can start the discussion on the exact UE capability under UE capability session. FL suggestion is to take offline time to discuss this issue, if majority of the companies see the necessity. **P2**:The proposal sounds reasonable while RAN1 needs discussion on this aspect as we haven’t discussed this issue yet. Companies’ views are appreciated. The necessity of LS is also needed.  |
| Ericsson |  | P1: The draft CR contains three parts:1. The inclusion of additional text in clause 7. Here we note that once the UE is in the target, it uses the pathloss RS in the target configuration. Therefore, the addition would be unnecessary.
2. The explanation in clause 21 that the pathloss RS is provided in the candidate TCI state: this change is fine.
3. The addition “max [four] pathloss RS”. The number “4” in legacy was introduced in Rel-15, and how to align this with the Rel-17 framework, where the PL RS is associated with a TCI state, was discussed in R1-2208354. The main issue is that there is a conflict introduced, since the UE is expected to maintain the PL RSs in the activated TCI states, and the reasonable configuration is that the PL RSs in the TCI states are different, and up to 8 TCI states can be activated. Also, there is no UE feature associated with “4”. Would it be impossible to activate more than 4 TCI states if the TCI states contain different PL RS? In the end, RAN1 decided that it is not an error case to activate more than 4 PL RS (per serving cell), and if more than 4 are activated, the UE “maintains” the four that are used for transmission. It is not stated what it means to “maintain” a PL RS, alhtough the RAN1 specs state that the PL is based on L3 filtered RSRP measurements.Based on this, we do not think it’s relevant to include a restriction, at least not before we discuss what it means to maintain a PL RS, and how many PL RSs in candidate TCI states the UE is required to maintain.

P2: This should be fixed. LS is needed.  |
| CATT | Yes | **Q1**： a. UE starts to calculate the pathloss of PRACH only after receiving PDCCH order because the PL RS(SSB) used for the calculation of pathloss of PRACH is indicated in the PDCCH order. b. Yes, it is necessary to perform/maintain pathloss calculation before CSC. The pathloss can be maintained based on the PL RS in the activated TCI state.**Q2:** As mentioned in Q1, UE can choose the PL RS of the candidate cell with the activated TCI state. |
| Nokia |  | P1: We think the discussion on number of PL-RS for candidate cells to be maintained is needed. Also agree with Ericsson that we should clarify what we mean by “maintaining a PL-RS”.P2: Support  |
| ZTE |  | **P1:** we are fine to capture the procedure of PL estimation for candidate cells but for whether the maximum number of PL-RS is per candidate cell or across candidate cells, we tend to discuss it on UE feature session.**P2:** Fine and agree to send LS to RAN2 for confirming RAN1’s conclusion or consideration. |
| NTT DOCOMO |  | We are generally fine with the draft CR. On the other hand, for the max. number of PL RS, we’d like to confirm whether the number of activated candidate TCI states is restricted or not. If this follows legacy spec., we do not think it should restrict it |
| vivo |  | **P1:**For Q1, we agree with FL that UE starts to perform pathloss estimation after receiving the PDCCH order based on the indicated SSB, or after receiving Candidate TCI state activation command based on the PL-RS(s) included in the Candidate TCI state(s) indicated in the command.For Q2, UE should maintain pathloss estimation based on the PL-RS included in the activated Candidate TCI state(s) before CSC.**P2:** Support to discuss whether the maximum number of PL-RS that UE can maintain needs to be larger than 4.  |
| Huawei, HiSilicon | Yes | **P1:**For Q1, the pathloss RS for PRACH is provided by SSB index in the DCI. Although it seems not relevant to the pathloss RS in the LTM TCI state, we think it should be measured after PDCCH order if it is not measured before. For the pathloss RS in LTM TCI state, we think it should be measured before CSC if it is pre-activated. This the reason to include it in the LTM TCI state configuration.**P2:**Support as proponent.  |
| Lenovo | Yes | **P1:**Q1: We agree with FL that the UE should perform the PL estimation for the RACH transmission triggered before receiving the CSC. Q2: We understand that the UE needs to maintain the PL-RS associated with the activated TCI state for the serving cell but we are not sure whether the PL-RS for the activated TCI state for the candidate cells should be maintained or not before CSC.**P2**:RAN1 should have a conclusion and inform RAN2.  |
|  |  |  |

### FL proposal 1-1-1-v1

Send an LS to RAN2 to inform the following:

* RAN1 discussed the necessity of power control parameters defined for CG-PUSCH, which is defined in TS38.331 v18.1.0. The consensus in RAN1 is that the following parameters highlighted with yellow shadow are not necessary for LTM from RAN1 perspective.
* RAN2 is respectfully asked to update the ASN.1, if necessary.

cg-LTM-Configuration-r18 CG-RRC-Configuration-r18 OPTIONAL, -- Cond LTM

cg-RRC-Configuration-r18 CG-RRC-Configuration-r18 OPTIONAL, -- Cond RACH-LessHO

CG-RRC-Configuration-r18 ::= SEQUENCE {

 cg-RRC-RetransmissionTimer-r18 INTEGER (1..64) OPTIONAL, -- Need R

 cg-RRC-RSRP-ThresholdSSB-r18 RSRP-Range OPTIONAL, -- Need R

 rrc-SSB-Subset-r18 CHOICE {

 shortBitmap-r18 BIT STRING (SIZE (4)),

 mediumBitmap-r18 BIT STRING (SIZE (8)),

 longBitmap-r18 BIT STRING (SIZE (64))

 } OPTIONAL, -- Need S

 rrc-SSB-PerCG-PUSCH-r18 ENUMERATED {oneEighth, oneFourth, half, one, two, four, eight, sixteen} OPTIONAL, -- Need M

 rrc-P0-PUSCH-r18 INTEGER (-16..15) OPTIONAL, -- Need M

 rrc-Alpha-r18 ENUMERATED {alpha0, alpha04, alpha05, alpha06, alpha07, alpha08, alpha09, alpha1} OPTIONAL, -- Need M

 rrc-DMRS-Ports-r18 CHOICE {

 dmrsType1-r18 BIT STRING (SIZE (8)),

 dmrsType2-r18 BIT STRING (SIZE (12))

 } OPTIONAL, -- Need M

 rrc-NrofDMRS-Sequences-r18 INTEGER (1..2) OPTIONAL, -- Need M

 ...

}

## [Open/Tue off] Issue 1-2: CFRA triggered by cell switch command

### Summary of Proposal

[R1-2403928](Docs%5CR1-2403928.zip) Discussion on the CFRA triggered by cell switch command Huawei, HiSilicon
[R1-2405306](https://fujitsu.sharepoint.com/teams/JP-b819fcf3/Shared%20Documents/Rel-18-19_Mobility%20Enhancement/Docs/R1-2405306.zip) Corrections to the timeline of CFRA triggered by cell switch command in TS38.213 Huawei, HiSilicon

Proposal 1: The gap between the last symbol of the PUCCH or the PUSCH with HARQ-ACK information for the PDSCH providing the LTM Cell Switch MAC-CE and the first symbol of the PRACH transmission is larger than or equal to msec, where , , and are defined in TS 38.133.

Proposal 2: Capture the UE behaviour in TS 38.213 for the case when CFRA triggered by Cell Switch Command MAC CE and when there are two UL carriers configured for the candidate cell.

8.1 Random access preamble

< Unchanged parts are omitted >

If a random access procedure is initiated by a PDCCH order, the UE, if requested by higher layers, transmits a PRACH in the selected PRACH occasion, as described in [11, TS 38.321], for which a time between the last symbol of the PDCCH order reception and the first symbol of the PRACH transmission is larger than or equal to msec, where

- is a time duration of symbols corresponding to a PUSCH preparation time for UE processing capability 1 [6, TS 38.214] assuming corresponds to the smallest SCS configuration between the SCS configuration of the PDCCH order and the SCS configuration of the corresponding PRACH transmission

- if the active UL BWP does not change, or if a cell indicator field in the PDCCH order indicates a non-serving cell [5, TS 38.212], and is defined in [10, TS 38.133] otherwise

- msec for FR1 and msec for FR2

- is a switching gap duration as defined in [6, TS 38.214]

- if a cell indicator field in the PDCCH order indicates a serving cell or if cell indicator field is not present, and is defined in [10, TS 38.133] otherwise

- if a cell indicator field in the PDCCH order indicates a serving cell or if cell indicator field is not present, and is defined in [10, TS 38.133] otherwise

If a random access procedure is initiated by an LTM Cell Switch Command MAC CE, the UE, if requested by higher layers, transmits a PRACH in the selected PRACH occasion, as described in [11, TS 38.321], for which a time between the last symbol of the PUCCH or the PUSCH with HARQ-ACK information for the PDSCH providing the MAC CE and the first symbol of the PRACH transmission is larger than or equal to msec, where , , and are defined in [10, TS 38.133].

< Unchanged parts are omitted >

[R1-2404255](Docs%5CR1-2404255.zip) Discussion on CFRA triggered by LTM Cell Switch Command MAC CE ZTE
[R1-2404256](Docs%5CR1-2404256.zip) Draft CR on CFRA triggered by LTM Cell Switch Command MAC CE applied for NTN ZTE
[R1-2404257](https://fujitsu.sharepoint.com/teams/JP-b819fcf3/Shared%20Documents/Rel-18-19_Mobility%20Enhancement/Docs/R1-2404257.zip) Draft CR on timeline for PRACH transmission triggered by LTM Cell Switch Command MAC CE ZTE

**Proposal 1:** CFRA triggered by LTM Cell Switch Command MAC CE is extended to timing relationship, as specified for PDCCH ordered PRACH for NTN and the proposed spec change in Clause 8.1 of TS 38.213 is as follows:

**Proposal 2:** Regarding the timeline of PRACH transmission triggered LTM Cell Switch Command MAC CE, a time gap between the last symbol of a PUCCH or PUSCH transmission with HARQ-ACK information for the PDSCH providing the LTM Cell Switch Command MAC CE and the first symbol of the PRACH transmission is larger than or equal to TLTM-RRC-processing + TLTM-processing + Tfirst-RS + TRS-proc + 3 msec, where TLTM-RRC-processing, TLTM-processing, Tfirst-RS and TRS-proc are defined in [10, TS 38.133].

8.1 Random access preamble

For a PRACH transmission by a UE triggered by a PDCCH order or a LTM Cell Switch Command MAC CE, the PRACH mask index field, if the value of the random access preamble index field is not zero, indicates the PRACH occasion for the PRACH transmission where the PRACH occasions are associated with the SS/PBCH block index indicated by the SS/PBCH block index field of the PDCCH order or the LTM Cell Switch Command MAC CE and, if any, a cell indicator field indicates a cell for the PRACH transmission [5, TS 38.212]. If the UE is provided by *cellSpecificKoffset*, the PRACH occasion is after slot where is the slot of the UL BWP for the PRACH transmission that overlaps with the end of the PDCCH order reception or is the slot of the UL BWP for the PRACH transmission that is after slot where is the slot where the UE would transmit a PUCCH with HARQ-ACK information for the PDSCH providing the LTM Cell Switch Command MAC CE and is the SCS configuration for the PUCCH,assuming , and is the SCS configuration for the PRACH transmission. If the PDCCH reception for the PDCCH order includes two PDCCH candidates from two linked search space sets based on *searchSpaceLinkingId*, as described in clause 10.1, the last symbol of the PDCCH reception is the last symbol of the PDCCH candidate that ends later. The PDCCH reception includes the two PDCCH candidates also when the UE is not required to monitor one of the two PDCCH candidates as described in clauses 10 (except clause 10.4), 11.1, 11.1.1 and 17.2.

If a random access procedure is initiated by a PDCCH order, the UE, if requested by higher layers, transmits a PRACH in the selected PRACH occasion, as described in [11, TS 38.321], for which a time between the last symbol of the PDCCH order reception and the first symbol of the PRACH transmission is larger than or equal to msec, where

- is a time duration of symbols corresponding to a PUSCH preparation time for UE processing capability 1 [6, TS 38.214] assuming corresponds to the smallest SCS configuration between the SCS configuration of the PDCCH order and the SCS configuration of the corresponding PRACH transmission

- if the active UL BWP does not change, or if a cell indicator field in the PDCCH order indicates a non-serving cell [5, TS 38.212], and is defined in [10, TS 38.133] otherwise

- msec for FR1 and msec for FR2

- is a switching gap duration as defined in [6, TS 38.214]

- if a cell indicator field in the PDCCH order indicates a serving cell or if cell indicator field is not present, and is defined in [10, TS 38.133] otherwise

- if a cell indicator field in the PDCCH order indicates a serving cell or if cell indicator field is not present, and is defined in [10, TS 38.133] otherwise

If a random access procedure is initiated by a LTM Cell Switch Command MAC CE, the UE transmits a PRACH in the selected PRACH occasion provided by PRACH Mask index field in the LTM Cell Switch Command MAC CE, for which a time between the last symbol of a PUCCH or PUSCH transmission with HARQ-ACK information for the PDSCH providing the LTM Cell Switch Command MAC CE and the first symbol of the PRACH transmission is larger than or equal to TLTM-RRC-processing *+* TLTM-processing + Tfirst-RS + TRS-proc *+* 3msec, where TLTM-RRC-processing, TLTM-processing, Tfirst-RS and TRS-proc are defined in [10, TS 38.133].

[R1-2404343](Docs%5CR1-2404343.zip) Draft CR on 38213 on RACH procedure triggered by LTM cell switch command MAC CE Lenovo

8.1 Random access preamble

<Unchanged parts are omitted>

If a random access procedure is initiated by a PDCCH order or an LTM cell switch command MAC CE, the UE, if requested by higher layers, transmits a PRACH in the selected PRACH occasion, as described in [11, TS 38.321], for which a time between the last symbol of the PDCCH order and the first symbol of the PRACH transmission or the last symbol of the of the PUCCH or PUSCH carrying the HARQ-ACK for the PDSCH which carries cell switch command MAC CE and the first symbol of the PRACH transmission plus is larger than or equal to msec, where

- is a time duration of symbols corresponding to a PUSCH preparation time for UE processing capability 1 [6, TS 38.214] assuming corresponds to the smallest SCS configuration between the SCS configuration of the PDCCH order or the PUSCH carrying the LTM cell switch command MAC CE and the SCS configuration of the corresponding PRACH transmission

[R1-2404927](Docs%5CR1-2404927.zip) Draft CR for CFRA procedure triggered by LTM cell switch command Nokia

8.1 Random access preamble

<Unchanged part is omitted>

For a PRACH transmission by a UE triggered by a PDCCH order or an LTM cell switch command MAC CE, the PRACH mask index field, if the value of the random access preamble index field is not zero, indicates the PRACH occasion for the PRACH transmission where the PRACH occasions are associated with the SS/PBCH block index indicated by the SS/PBCH block index field of the PDCCH order or an LTM cell switch command MAC CE and, if any, a cell indicator field in PDCCH order [5, TS 38.212] or a Target Configuration ID field in LTM cell switch command MAC CE [11, TS 38.321] indicates a cell for the PRACH transmission. If the UE is provided by *cellSpecificKoffset*, the PRACH occasion is after slot where is the slot of the UL BWP for the PRACH transmission that overlaps with the end of the PDCCH order reception assuming , and is the SCS configuration for the PRACH transmission. If the PDCCH reception for the PDCCH order includes two PDCCH candidates from two linked search space sets based on *searchSpaceLinkingId*, as described in clause 10.1, the last symbol of the PDCCH reception is the last symbol of the PDCCH candidate that ends later. The PDCCH reception includes the two PDCCH candidates also when the UE is not required to monitor one of the two PDCCH candidates as described in clauses 10 (except clause 10.4), 11.1, 11.1.1 and 17.2.

<Unchanged part is omitted>

If a random access procedure is initiated by a PDCCH order, the UE, if requested by higher layers, transmits a PRACH in the selected PRACH occasion, as described in [11, TS 38.321], for which a time between the last symbol of the PDCCH order and the first symbol of the PRACH transmission is larger than or equal to msec. In case of a random access procedure is initiated by an LTM cell switch command MAC CE, the UE would transmit a PUCCH with HARQ-ACK information corresponding to the PDSCH carrying the LTM cell switch command, and a time between the last symbol of the HARQ-ACK transmission and the first symbol of the PRACH transmission is larger than or equal to msec. Where

- is a time duration of symbols corresponding to a PUSCH preparation time for UE processing capability 1 [6, TS 38.214] assuming corresponds to the smallest SCS configuration between the SCS configuration of the PDCCH order or the PUSCH carrying the LTM cell switch command MAC CE and the SCS configuration of the corresponding PRACH transmission

- if the active UL BWP does not change, or if a cell indicator field in the PDCCH order indicates a non-serving cell [5, TS 38.212], and is defined in [10, TS 38.133] otherwise

- msec for FR1 and msec for FR2

- is a switching gap duration as defined in [6, TS 38.214]

- if a cell indicator field in the PDCCH order indicates a serving cell or if cell indicator field is not present, and is defined in [10, TS 38.133] otherwise

- if a cell indicator field in the PDCCH order indicates a serving cell or if cell indicator field is not present, and is defined in [10, TS 38.133] otherwise

[R1-2404748](Docs%5CR1-2404748.zip) Draft CR for 38.213 on RACH procedure triggred by LTM cell switch Ericsson

If a random access procedure is initiated by a PDCCH order or an LTM cell switch command MAC CE, the UE, if requested by higher layers, transmits a PRACH in the selected PRACH occasion, as described in [11, TS 38.321], for which a time between the last symbol of the reception of the PDCCH order or the last symbol of a PUCCH or PUSCH with HARQ-ACK information for the PDSCH providing the LTM cell switch command MAC CE and the first symbol of the PRACH transmission is larger than or equal to msec, where

- is a time duration of symbols corresponding to a PUSCH preparation time for UE processing capability 1 [6, TS 38.214] assuming corresponds to the smallest SCS configuration between the SCS configuration of the PDCCH order or the PDSCH carrying the LTM cell switch command MAC CE and the SCS configuration of the corresponding PRACH transmission

- if the active UL BWP does not change, or if a cell indicator field in the PDCCH order indicates a non-serving cell [5, TS 38.212], and is defined in [10, TS 38.133] otherwise

- msec for FR1 and msec for FR2

- is a switching gap duration as defined in [6, TS 38.214]

- if a cell indicator field in the PDCCH order indicates a serving cell or if cell indicator field is not present, and is defined in [10, TS 38.133] otherwise

- if a cell indicator field in the PDCCH order indicates a serving cell or if cell indicator field is not present, and is defined in [10, TS 38.133] otherwise

- if the PRACH transmission is initiated by an LTM cell switch command MAC CE and otherwise

### FL observation and proposal

The proposal from companies are incorporated below: 3 issues are identified by the contributions.

* Issue A: Adding description how the PRACH transmission is indicated by LTM Cell Switch Command MAC CE
	+ Nokia
* Issue B: Support of LTM for NTN
	+ ZTE
* Issue C: Timeline of PRACH transmission for candidate cell(s)
	+ Alt.1: based on LTM beam application time: TLTM-RRC-processing *+* TLTM-processing + Tfirst-RS + TRS-proc *+* 3 (ms): , Huawei, ZTE
	+ Alt.2: legacy timeline: : Ericsson, Lenovo,Nokia

### Companies’ views

|  |  |  |
| --- | --- | --- |
| Company | Essential or Not(Yes or No) | Comment |
| FL | Issue A: YesIssue B: NoIssue C: Yes | **Issue A:** FL is fine with this change to clarify the condition where the PRACH transmission is indicated**Issue B:** FL’s understanding is the coexistence of LTM and NTN has not been agreed in RAN2. **Issue C:**FL believes something is needed to be clarified in the specification. FL’s question is if the UE can obtain RRC parameters for PRACH transmission before CSC (i.e. from LTM-Candidate configuration). If no, Alt 1 based approach is reasonable and Alt.2 otherwise. FL plan is to prepare a combined CR based on the conclusion on Issues A(binary decision), B(binary decision) and C(choice of alternatives) |
| Ericsson | Issue A: Essential to get the timing right – this is issue C. Issue B: Essential: If RAN1 has not excluded the combination LTM+NTN, it should be supportedIssue C: Essential | Issue A: OK for the first change. The timing options are discussed under issue CIssue B: SupportIssue C: The main issue is if the RAN4 requirements for the RRC reconfiguration should be included or not. Here we note that the statement for the cell switch command is a maximum value (“no later than”), whereas the statement for the PRACH transmission is a minimum value (“is larger than or equal to”). For the LTM cell switch command, it is important that the UE can act earlier if the RRC reconfiguration is complete, and that is why we agreed “no later than”. For the PRACH transmission timeline, the situation is different: this is essentially to state the earliest possible time to transmit. We should not forbid the UE to transmit the PRACH earlier. Therefore, we propose to aim for a value that does not include the RRC reconfiguration delay: note that the UE is free to transmit PRACH later.  |
| CATT | Issue A: YesIssue B: NoIssue C: Yes | Issue A: Agree with FL’s proposalIssue B: Agree with FL’s proposalIssue C: Regarding to FL’s question, the answer is yes. So Alt.2 seems reasonable.  |
| Nokia | Issue A: YesIssue B: NoIssue C: Yes | Issue A, Issue B: Agree with FL’s suggestions. For issue C, we are now fine with Alt1, but open to discuss.  |
| ZTE | Issue A: YesIssue B: YesIssue C: Yes | Issue B: regarding coexistence between LTM and NTN, RAN2 has not discussed this case and there is also no any explicitly state, which means that this case is supported by default. If there is no any consensus on this issue, we also support to send an LS to ask RAN2 if coexistence between LTM and NTN is supported. Issue C: according to the definition of LTM cell switch delay, if UE supports the capability of [*earlyDecodingAndValidityCheck*], then UE can early obtain candidate cell (corresponding to target cell in LTM CSC MAC CE) configuration before LTM CSC MAC CE, which means TLTM-RRC-processing is set to 0 after reception of LTM CSC MAC CE, otherwise, the time of decoding and validity/compliance check of target cell configuration is still needed. However, for the case that PRACH is triggered by LTM CSC MAC CE, even if RO configuration of target cell can be early obtained before LTM CSC MAC CE when UE has a capability of [*earlyDecodingAndValidityCheck*], UE still need to have some times for 1) UE processing including applying the target cell parameters and L1/L2 change, 2) fine time tracking and acquiring full timing information of the target cell and SSB processing if the indicated TCI state is not in activated TCI state list wherein as we assumed before that SSB index for CFRA in LTM CSC MAC CE is same as or associated with RS in indicated TCI state in LTM CSC MAC CE. Thus, we think that it is more reasonable to define the timeline of PRACH transmission triggered by LTM CSC MAC CE based on the definition of LTM cell switch delay. Besides, we can also tend to send an LS to RAN4 for confirming RAN1’s consideration or which one is reasonable from RAN4 point of view.  |
| NTT DOCOMO | Issue A: YesIssue B: YesIssue C: Yes | **Issue A:** OK for clarification of RACH procedure for candidate cell triggered by PDCCH order and Cell Switch Command MAC CE.**Issue B:** Support**Issue C:**We prefer Alt2. |
| vivo | Issue A: YesIssue B: NoIssue C: Yes | For issue A and B, we agree with FL’s suggestions.For issue C, we prefer Alt.1 |
| Huawei, HiSilicon | Issue A: YesIssue B: YesIssue C: Yes | For issue B, we think LTM can be used to NTN without spec impact.For issue C, we prefer Alt 1. The RO configuration for CFRA triggered by MAC CE is in the container. It requires additional time for RRC decoding if UE do not have such capability. In addition, the PRACH is the first UL in RACH based LTM. The timeline between MAC CE and PRACH should align with the cell switch delay in RAN4. |
| Langbo | Issue A: YesIssue B: YesIssue C: Yes | **Issue A:** Agree with FL’s proposal**Issue B:** No need to exclude the combination LTM+NTN**Issue C:**Prefer Alt2. |
| NEC | Issue A: YesIssue B: NoIssue C: Yes | Issue A and B: Agree with FL.Issue C: We prefer Alt.1. |
| Lenovo | Issue A: YesIssue B: NoIssue C: Yes | For Issue A: We are fine with the CRFor Issue B: Seems should be discussed by RAN2For Issue C: We support Alt2. |
|  |  |  |

## [Open/Tue off] Issue 1-3: Priority for legacy and LTM CSI report

### Summary of Proposal

[R1-2404718](Docs%5CR1-2404718.zip) Draft CR on priority for Legacy CSI report and LTM CSI report in TS 38.213 ZTE

9.2.5.2 UE procedure for multiplexing HARQ-ACK/SR/CSI in a PUCCH

<Unchanged part is omitted>

If a UE has one or more CSI reports and zero or more HARQ-ACK/SR information bits to transmit in a PUCCH where the HARQ-ACK, if any, is in response to a PDSCH reception without a corresponding PDCCH

- if any of the CSI reports are overlapping and the UE is provided by *multi-CSI-PUCCH-ResourceList* with  PUCCH resources in a slot, for PUCCH format 2 and/or PUCCH format 3 and/or PUCCH format 4, as described in clause 9.2.1, where the resources are indexed according to an ascending order for the product of a number of corresponding Res, modulation order , and configured code rate ;

- if , the UE uses PUCCH format 2 resource , or the PUCCH format 3 resource , or the PUCCH format 4 resource 

- else if  and , , the UE transmits a PUCCH conveying HARQ-ACK information, SR and CSI report(s) in a respective PUCCH where the UE uses the PUCCH format 2 resource , or the PUCCH format 3 resource , or the PUCCH format 4 resource 

- else the UE uses the PUCCH format 2 resource , or the PUCCH format 3 resource , or the PUCCH format 4 resource  and the UE selects  CSI report(s) for transmission together with HARQ-ACK information and SR, when any, in descending priority as described in [6, TS 38.214]

[R1-2405225](Docs%5CR1-2405225.zip) Draft CR for 38.214 on CSI report priority Ericsson, Huawei, HiSilicon

5.2.5 Priority rules for CSI reports

For two overlapping PUSCHs, the priority rules in this clause are applied for physical channels with same priority index according to clause 9 in [6, TS 38.213] if a UE is not configured with *enableSTx2PofmDCI* or a UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *coresetPoolIndex* in *ControlResourceSet* and the UE is configured with *enableSTx2PofmDCI* and the two overlapping PUSCHs are associated with same value of *coresetPoolIndex*.

CSI reports are associated with a priority value where

-  for aperiodic CSI reports to be carried on PUSCH  for semi-persistent CSI reports to be carried on PUSCH,  for semi-persistent CSI reports to be carried on PUCCH and  for periodic CSI reports to be carried on PUCCH;

-  for CSI reports carrying L1-RSRP or L1-SINR and  for CSI reports not carrying L1-RSRP or L1-SINR;

- *c* is the serving cell index and is the value of the higher layer parameter *maxNrofServingCells*;

-

- *s* is the *reportConfigID* andis the value of the higher layer parameter *maxNrofCSI-ReportConfigurations.*

-

If a UE is configured with both csi-ReportConfigToAddModList and ltm-CSI-ReportConfigToAddModList, the CSI reports are associated with a priority value where

- for a CSI report configured with *LTM-CSI-ReportConfig* and for a CSI report configured with *CSI-ReportConfig*

-  for aperiodic CSI reports to be carried on PUSCH  for semi-persistent CSI reports to be carried on PUSCH,  for semi-persistent CSI reports to be carried on PUCCH and  for periodic CSI reports to be carried on PUCCH;

-  for CSI reports carrying L1-RSRP or L1-SINR and  for CSI reports not carrying L1-RSRP or L1-SINR;

- *c* is the serving cell index and is the value of the higher layer parameter *maxNrofServingCells*;

- for a CSI report configured with *LTM-CSI-ReportConfig*, *c* is the serving cell index value where the report configuration is configured.

- s is the reportConfigID and , where is the value of the higher layer parameter maxNrofCSI-ReportConfigurations and is the value of the higher layer parameter maxNrofLTM-CSI-ReportConfigurations.

A first CSI report is said to have priority over second CSI report if the associated value is lower for the first report than for the second report.

Two CSI reports are said to collide if the time occupancy of the physical channels scheduled to carry the CSI reports overlap in at least one OFDM symbol and are transmitted on the same carrier. When a UE is configured to transmit two colliding CSI reports,

- if *y* values are different between the two CSI reports, the following rules apply except for the case when one of the *y* value is 2 and the other *y* value is 3 (for CSI reports transmitted on PUSCH, as described in Clause 5.2.3; for CSI reports transmitted on PUCCH, as described in Clause 5.2.4):

- The CSI report with higher value shall not be sent by the UE.

- otherwise, the two CSI reports are multiplexed or either is dropped based on the priority values, as described in Clause 9.2.5.2 in [6, TS 38.213].

### Companies’ views

|  |  |  |
| --- | --- | --- |
| Company | Essential or Not(Yes or No) | Comment |
| FL | Yes | It is understood that this issue has been discussed at RAN1#116. However, it would be good to solve the potential issue for the better readability to the readers who are not so familiar with 3GPP discussions. If Ericsson/Huawei version is taken. *Z=0* should be defined for legacy CSI report (i.e. without LTM report)If ZTE version is taken, the same change should be applied to 3 parts in 38.213:To reuse our discussions/outcomes in the last meetings, ZTE version looks better, except that the proposed change looks as if the legacy behaviour is impacted. FL plan is to take some official offline time to decide which solution to take (including “doing nothing”) |
| Ericsson | Yes | Fine to include z=0, although we do not think it’s necessary: it is clear that z does not affect the prio for the legacy report.  |
| CATT | Yes | We support to include z=0. |
| Nokia | Yes | We have discussed this in RAN1 115 and decided to not change the formula. We can use ZTE’s version.  |
| ZTE | Yes | Firstly, we support adjusting the text in TS 38.213 to handle this issue. Besides, regarding why we don’t change other related two parts of TS 38.213 in our CR, it is because that other two parts are related to the variable size for CSI report, while in LTM, we only report RSRI and corresponding to RSRP, which is a relatively fixed size for CSI report. So we don’t think that it is necessary to change other two parts. |
| NTT DOCOMO | Yes | We are fine to include z=0. |
| Vivo | Yes | Either one is fine to us. For the version from Ericsson and HW, we don’t think “z=0” needs to be included, as it is clear that the prerequisite of the new formula is “If a UE is configured with both csi-ReportConfigToAddModList and ltm-CSI-ReportConfigToAddModList”.  |
| Huawei, HiSilicon | Yes | Fine to include z=0. |
| NEC | Yes | OK to include z=0. |
| Lenovo | Yes | We agree with Nokia that we had mode a conclusion in RAN1#115 that to reus the legacy formula.ZTE’s CR is fine for us. |
|  |  |  |

## [Open] Issue 1-4: TCI state assumption for Msg.2

### Summary of Proposal

[R1-2405307](Docs%5CR1-2405307.zip) Corrections to the beam of CFRA triggered by cell switch command in TS38.213 Huawei, HiSilicon

🡪 The proponent tries to clarify which beam to use to receive Msg.2 PDCCH.

8.2 Random access response – Type-1 random access procedure

 < Unchanged parts are omitted >

If the UE detects a DCI format 1\_0 with CRC scrambled by the corresponding RA-RNTI and LSBs of a SFN field in the DCI format 1\_0, if included and applicable, are same as corresponding LSBs of the SFN where the UE transmitted the PRACH, and the UE receives a transport block in a corresponding PDSCH, the UE may assume same DM-RS antenna port quasi co-location properties, as described in [6, TS 38.214], as for a SS/PBCH block or a CSI-RS resource the UE used for PRACH association, as described in clause 8.1, regardless of whether or not the UE is provided *TCI-State* or *CandidateTCI-State* for the CORESET where the UE receives the PDCCH with the DCI format 1\_0.

### Companies’ views

|  |  |  |
| --- | --- | --- |
| Company | Essential or Not(Yes or No) | Comment |
| FL | Yes | FL understands that the proposal is aligned with RAN2 assumption: the UE follows legacy behaviour during LTM RACH. |
| CATT | Yes | Support. |
| Nokia | Yes | OK with the proposed change. |
| ZTE | NO | The change of this CR is based on the assumption that MSG 2 is received on target cell, but whether MSG 2 and even PDCCH scheduling MSG2 to be received on target cell is still under discussion in RAN2. So we think whether this CR is needed should be up to RAN2’s progress on clarifying PRACH procedure after LTM CSC MAC CE.  |
| NTT DOCOMO |  | OK for clarification. |
| Vivo | Yes | Fine with the proposed change. |
| Huawei, HiSilicon | Yes | It is try to clarify the UE behaviour when the type 2 CSS is associated with a COREST where the indicated LTM TCI state is configured. |
| NEC | Yes | Agree with FL. |
| Lenovo | Yes | Fine with the CR |
|  |  |  |

## [Open] Issue 1-5: TA offset acquisition for UE based TA

### Summary of Proposal

[R1-2404581](Docs%5CR1-2404581.zip) Correction on TA offset information for UE-based TA acquisition Fujitsu

* The necessity of this CR is described as by refering the RAN2 agreements below:
* If UE is configured by RRC to perform UE based TA measurement, UE applies the measured TA value and performs RACH-less LTM, upon LTM cell switch. (RAN2#123bis)
* The UE performs TA measurements for candidate cell(s) after configured by RRC. R2 assumes that the exact time the UE performs TA measurement is up to UE impl. (RAN2#124)

Based on these agreements, the UE may perform TA measurement before the LTM cell switch.

**4.2. Transmission timing adjustments**
A UE can be provided a value of a timing advance offset for a candidate cell by *n-TimingAdvanceOffset* in *EarlyUL-SyncConfig* for the UE-based TA measurement. If the UE is not provided *n-TimingAdvanceOffset* in *EarlyUL-SyncConfig* for the UE-based TA measurement, the UE determines a default value of the timing advance offset for the candidate cell as described in [10, TS 38.133].

If a UE is configured with two UL carriers for a serving cell, a same timing advance offset value applies to both carriers for transmissions on the serving cell that are associated with a same TAG. The UE does not expect to apply two values for transmissions on the SUL carrier.

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If *ltm-UE-MeasuredTA-ID* of a candidate cell and *ltm-ServingCellUE-MeasuredTA-ID* of the serving cell are provided to a UE and have same value, the UE estimates based on the UE implementation and the *n-TimingAdvanceOffset* in *EarlyUL-SyncConfig* for the UE-based TA measurement a timing advance to apply together with the *n-TimingAdvanceOffset* in *ServingCellConfigCommon* or *ServingCellConfigCommonSIB* of the candidate cell from a first transmission on the candidate cell that is after the reception of a cell switch command for the candidate cell when the condition defined in clause 5.18.35 of [11, TS 38.321] is satisfied.

### Companies’ views

|  |  |  |
| --- | --- | --- |
| Company | Essential or Not(Yes or No) | Comment |
| FL | Discussion needed | This CR has been input for 3 meetings. According to the input at RAN1#116bis, the companies view can be categorized as the following options:* Option 1: Additional clarification in the specification needed
	+ Option 1-1: the UE can use *n-TimingAdvanceOffset in EarlyUL-SyncConfig* before SCS for UE based TA measurement (i.e. proposal in this CR)
	+ Option 1-2: the UE can assume *n-TimingAdvanceOffset* for the target cell is the same as that for current serving cell.
* Option 2: Additional clarification in the specification is not needed
	+ Option 2-1: Handled by UE implementation, i.e. this implies that the gNB implementation needs to ensure that *n-TimingAdvanceOffset* in *EarlyUL-SyncConfig*, that in *ServingCellConfig* under candidate cell configuration and that in *ServingCellConfig* under the current serving cell configuration are aligned.
	+ Option 2-2: the UE shall use the *n-TimingAdvanceOffset* in *ServingCellConfig* of the target cell after CSC.

According to the opinion by the proponent, i.e. RAN2 agreements say a UE has to be able to calculate TA offset before CSC, Option 1-1, 1-2 or 2-1 should be taken. On the other hand, the current specification can be interpreted as Option 2-2.If Option 1-1 is taken, RAN1 needs to discuss the necessity of an LS to RAN2 as the proponent sees the necessity of a CR to RS38.331. FL plan is to decide the direction based on the companies’ view. Companies’ inputs are welcome.  |
| Ericsson |  | Once in the target cell, the UE must use the *n-TimingAdvanceOffset* in *ServingCellConfig:* if another value is used, the UL transmission will collide with other UEs. We do not see why the UE should calculate the TA offset (including the *n-TimingAdvanceOffset*) before the cell-switch command. |
| CATT | Discussion needed | Support option 1-1 |
| Nokia | Yes/No | The UE is not supposed to apply TA before the cell switch. Therefore, Option 2-2 should work.  |
| ZTE |  | Support option 2-2 |
| NTT DOCOMO | No | *n-TimingAdvanceOffset* intarget cell configuration should be used. We are not sure why that value is needed before reception of CSC. |
| vivo |  | Support option 2-2 |
| Huawei, HiSilicon |  | It depends on when the UE based TA acquisition is performed which is up to UE implementation from RAN2. If UE acquire TA after CSC, then the serving cell TA offset can be reused. To us, the TA offset configuration in early UL sync is just for PRACH transmission before CSC.  |
| Lenovo |  | Support option 2-2 |
|  |  |  |

## [Open] Issue 1-6: BWP switch delay

### Summary of Proposal

The following proposals are trying to address the inconsistency of BWPswitchDelay in RAN1 and RAN4:

[R1-2404719](Docs%5CR1-2404719.zip) Draft CR on clarifying the unit of BWPswitchDelay ZTE
[R1-2404720](Docs%5CR1-2404720.zip) Discussion on BWPswitchDelay ZTE

TP for section 8.1 of 38.213

If a random access procedure is initiated by a PDCCH order, the UE, if requested by higher layers, transmits a PRACH in the selected PRACH occasion, as described in [11, TS 38.321], for which a time between the last symbol of the PDCCH order reception and the first symbol of the PRACH transmission is larger than or equal to msec, where

- is a time duration of symbols corresponding to a PUSCH preparation time for UE processing capability 1 [6, TS 38.214] assuming corresponds to the smallest SCS configuration between the SCS configuration of the PDCCH order and the SCS configuration of the corresponding PRACH transmission

- if the active UL BWP does not change, or if a cell indicator field in the PDCCH order indicates a non-serving cell [5, TS 38.212], and is the time duration corresponding to TBWPswitchDelay  as defined in [10, TS 38.133] otherwise

[R1-2404729](Docs%5CR1-2404729.zip) Correction on Further NR Mobility Enhancements Langbo

If a random access procedure is initiated by a PDCCH order, the UE, if requested by higher layers, transmits a PRACH in the selected PRACH occasion, as described in [11, TS 38.321], for which a time between the last symbol of the PDCCH order reception and the first symbol of the PRACH transmission is larger than or equal to msec, where

- is a time duration of symbols corresponding to a PUSCH preparation time for UE processing capability 1 [6, TS 38.214] assuming corresponds to the smallest SCS configuration between the SCS configuration of the PDCCH order and the SCS configuration of the corresponding PRACH transmission

- if the active UL BWP does not change, or if a cell indicator field in the PDCCH order indicates a non-serving cell [5, TS 38.212], and is a time duration of slots defined in [10, TS 38.133] otherwise

### Companies’ views

|  |  |  |
| --- | --- | --- |
| Company | Essential or Not(Yes or No) | Comment |
| FL | Yes | FL suggestion is to take R1-2404729 as the proposal by Langbo is available for 3 meetings, which allowed companies to have a careful check.  |
| Ericsson | Yes | Agree with FL |
| CATT | Yes | OK to discuss. |
| Nokia | Yes | Fine with the FL proposal.  |
| ZTE | Yes | Although we think that RAN1 spec needs to be clarified, according to the relevant description on this parameter in TS 38.133, TBWPswitchDelay can be understood as the number of slots or time duration corresponding to the number of slots. So in order to cover these two understandings that is aligned with RAN4 spec and resolve this issue, we tend to clarify “ “ as the time duration corresponding to TBWPswitchDelay” in RAN1 spec, not limit TBWPswitchDelay as the number of slots. |
| NTT DOCOMO | Yes | Support |
| vivo | Yes | Fine with the FL proposal. |
| Huawei, HiSilicon | Yes | support |
| Langbo | Yes | Support, either version above is fine for us. We don’t think there is fundamental difference.  |
| NEC | Yes | Agree with FL |
| Lenovo | Yes | Agree with FL |
|  |  |  |

### FL proposal 1-6-v1

Adopt the following TP to section 8.1, TS38.213 in principle.

If a random access procedure is initiated by a PDCCH order, the UE, if requested by higher layers, transmits a PRACH in the selected PRACH occasion, as described in [11, TS 38.321], for which a time between the last symbol of the PDCCH order reception and the first symbol of the PRACH transmission is larger than or equal to msec, where

- is a time duration of symbols corresponding to a PUSCH preparation time for UE processing capability 1 [6, TS 38.214] assuming corresponds to the smallest SCS configuration between the SCS configuration of the PDCCH order and the SCS configuration of the corresponding PRACH transmission

- if the active UL BWP does not change, or if a cell indicator field in the PDCCH order indicates a non-serving cell [5, TS 38.212], and is a time duration of slots (*FL note: is ZTE fine if this “slot” is deleted?*) defined in [10, TS 38.133] otherwise

## [Open] Issue 1-7: TCI state applied for CORESETs other than CORESET 0

### Summary of Proposal

The following proposals from two companies address the issue on the TCI state for CORESET other than CORESET0, which needs to define the exception for LTM

[R1-2404750](Docs%5CR1-2404750.zip) Draft CR for 38.213 on TCI state applied for CORESETs other than CORESET 0 Ericsson

10.1 UE procedure for determining physical downlink control channel assignment

<unchanged part omitted>

For a CORESET other than a CORESET with index 0,

- if a UE has not been provided a configuration of TCI state(s) by *tci-StatesPDCCH-ToAddList* and *tci-StatesPDCCH-ToReleaseList* for the CORESET, or has been provided initial configuration of more than one TCI states for the CORESET by *tci-StatesPDCCH-ToAddList* and *tci-StatesPDCCH-ToReleaseList* and has not received a MAC CE activation command for one of the TCI states as described in [11, TS 38.321], the UE assumes that the DM-RS antenna port associated with PDCCH receptions is quasi co-located with the SS/PBCH block the UE identified during the initial access procedure, or for a most recent configured grant PUSCH transmission as described in clause 19 for a same HARQ process, or with the one or more DL RS configured by a TCI state provided by *CandidateTCI-State*, where the TCI state is indicated by an LTM Cell Switch Command MAC CE that triggers a RACH-less or RACH-based LTM cell switch, if any;

- if a UE has been provided a configuration of more than one TCI states by *tci-StatesPDCCH-ToAddList* and *tci-StatesPDCCH-ToReleaseList* for the CORESET as part of Reconfiguration with sync procedure as described in [12, TS 38.331] and has not received a MAC CE activation command for one of the TCI states as described in [11, TS 38.321], the UE assumes that the DM-RS antenna port associated with PDCCH receptions is quasi co-located with the SS/PBCH block or the CSI-RS resource the UE identified during the random access procedure initiated by the Reconfiguration with sync procedure as described in [12, TS 38.331].

[R1-2404928](Docs%5CR1-2404928.zip) Draft CR for TCI state applied for CORESETs other than CORESET 0 in LTM Nokia

10.1 UE procedure for determining physical downlink control channel assignment

<unchanged part omitted>

For a CORESET other than a CORESET with index 0,

* if a UE has not been provided a configuration of TCI state(s) by *tci-StatesPDCCH-ToAddList* and *tci-StatesPDCCH-ToReleaseList* for the CORESET, or has been provided initial configuration of more than one TCI states for the CORESET by *tci-StatesPDCCH-ToAddList* and *tci-StatesPDCCH-ToReleaseList* and has not received a MAC CE activation command for one of the TCI states as described in [11, TS 38.321], the UE assumes that the DM-RS antenna port associated with PDCCH receptions is quasi co-located with the one or more DL RS configured by a TCI state provided by *CandidateTCI-State*, where the TCI state is indicated by an LTM Cell Switch Command MAC CE if applicable, otherwise, the SS/PBCH block the UE identified during the initial access procedure, or for a most recent configured grant PUSCH transmission as described in clause 19 for a same HARQ process;
* if a UE has been provided a configuration of more than one TCI states by *tci-StatesPDCCH-ToAddList* and *tci-StatesPDCCH-ToReleaseList* for the CORESET as part of Reconfiguration with sync procedure as described in [12, TS 38.331] and has not received a MAC CE activation command for one of the TCI states as described in [11, TS 38.321], the UE assumes that the DM-RS antenna port associated with PDCCH receptions is quasi co-located with the SS/PBCH block or the CSI-RS resource the UE identified during the random access procedure initiated by the Reconfiguration with sync procedure as described in [12, TS 38.331].

### Companies’ views

|  |  |  |
| --- | --- | --- |
| Company | Essential or Not(Yes or No) | Comment |
| FL | Yes | While Ericsson and Nokia try to address the same issue, the description is slightly different. FL think the introduction of sub-bullet based on Nokia’s version would be clearer and aligned with other part of the specifications, i.e.:* if a UE has not been provided a configuration of TCI state(s) by *tci-StatesPDCCH-ToAddList* and *tci-StatesPDCCH-ToReleaseList* for the CORESET, or has been provided initial configuration of more than one TCI states for the CORESET by *tci-StatesPDCCH-ToAddList* and *tci-StatesPDCCH-ToReleaseList* and has not received a MAC CE activation command for one of the TCI states as described in [11, TS 38.321], the UE assumes that the DM-RS antenna port associated with PDCCH receptions is quasi co-located with:
* the one or more DL RS configured by a TCI state provided by *CandidateTCI-State*, where the TCI state is indicated by an LTM Cell Switch Command MAC CE if applicable, otherwise,
* the SS/PBCH block the UE identified during the initial access procedure, or for a most recent configured grant PUSCH transmission as described in clause 19 for a same HARQ process;
 |
| Ericsson | Yes | Either version is fine |
| CATT | Yes | Agree with FL’s view. |
| Nokia | Yes | The FL proposal looks good.  |
| ZTE | Yes | Fine with FL’s version |
| NTT DOCOMO | Yes | Either draft CR is fine. |
| Vivo | Yes | Agree with FL |
| Huawei, HiSilicon | Yes | Similar as the case for CORESET0, the CORESET(can be non-zero) associated with type 2 CSS should also be excluded as it will follow SSB. |
| Langbo | Yes | Either version is fine |
| NEC | Yes | OK with Nokia’s version. |
| Lenovo | Yes | Agree with FL |
|  |  |  |

### FL proposal 1-7-v1

Adopt the following TP to section 10.1, TS38.213 in principle.

**10.1 UE procedure for determining physical downlink control channel assignment**

<unchanged part omitted>

For a CORESET other than a CORESET with index 0,

* if a UE has not been provided a configuration of TCI state(s) by *tci-StatesPDCCH-ToAddList* and *tci-StatesPDCCH-ToReleaseList* for the CORESET, or has been provided initial configuration of more than one TCI states for the CORESET by *tci-StatesPDCCH-ToAddList* and *tci-StatesPDCCH-ToReleaseList* and has not received a MAC CE activation command for one of the TCI states as described in [11, TS 38.321], the UE assumes that the DM-RS antenna port associated with PDCCH receptions is quasi co-located with
* the one or more DL RS configured by a TCI state provided by *CandidateTCI-State*, where the TCI state is indicated by an LTM Cell Switch Command MAC CE if applicable, otherwise,
* the SS/PBCH block the UE identified during the initial access procedure, or for a most recent configured grant PUSCH transmission as described in clause 19 for a same HARQ process;
* if a UE has been provided a configuration of more than one TCI states by *tci-StatesPDCCH-ToAddList* and *tci-StatesPDCCH-ToReleaseList* for the CORESET as part of Reconfiguration with sync procedure as described in [12, TS 38.331] and has not received a MAC CE activation command for one of the TCI states as described in [11, TS 38.321], the UE assumes that the DM-RS antenna port associated with PDCCH receptions is quasi co-located with the SS/PBCH block or the CSI-RS resource the UE identified during the random access procedure initiated by the Reconfiguration with sync procedure as described in [12, TS 38.331].

## [Open] Issue 1-8: Clarification of SpcellInclusion

### Summary of Proposal

[R1-2404751](Docs%5CR1-2404751.zip) Draft CR for 38.214 on spCellInclusion Ericsson

🡪 The definition of which cells entries in the *ltm-CSI-SSB-ResourceList* / *ltm-CandidateIdList* is difficult to understand, and hence the proponent tries to clarify the intention.

5.2.1.4.2 Report quantity configurations

<Unchanged parts omitted>

If a UE is configured with a *LTM-CSI-ReportConfig*,

- if the UE is configured with *spCellInclusion*, the UE shall report in a single reporting instance *nrOfReportedRS-PerCell* different SSBRIfor the current SpCell and each of the *nrOfReportedCells -1* candidate cells.Otherwise, the UE shall report in a single reporting instance *nrOfReportedRS-PerCell* different SSBRI for each of the *nrOfReportedCells* candidate cells,

- where SSBRI *k* (*k* ≥ 0) corresponds to the configured (*k*+1)-th entry of the associated *ltm-CSI-SSB-ResourceList* in the corresponding *LTM-CSI-SSB-ResourceSet*,

- if *spCellInclusion* is configured, SSB resources in *ltm-CSI-SSB-ResourceList* associated with the current SpCell are the entries where PCI (given by *ltm-CandidatePCI*) and frequency information (given by *ssbFrequency*) of the associated candidate cell (given by the corresponding entry in *ltm-CandidateIdList*) is equal to the PCI and center frequency of cell-defining SSB of the current SpCell.

### Companies’ views

|  |  |  |
| --- | --- | --- |
| Company | Essential or Not(Yes or No) | Comment |
| FL | OK if companies are fine | FL thinks the readability can be improved with this proposal. In this sense, the proposal is OK to adopt. On the other hand, it is not sure if this CR is essential or not, i.e. potential different interpretation.FL plan is to take the decision based on the majority view.  |
| Ericsson | Yes | The current text is quite difficult to understand if you don’t know what it means beforehand  |
| CATT | No | Not necessary. The current spec is clear from our point of view. |
| ZTE |  | No strong view. |
| NTT DOCOMO |  | We are fine with it. |
| Huawei, HiSilicon |  | If majority hope to change, we suggest following wordingif *spCellInclusion* is configured, SSB resources in *ltm-CSI-SSB-ResourceList* associated with the current SpCell are the entries where PCI (given by *ltm-CandidatePCI*) and frequency information (given by *ssbFrequency*) of the candidate cell associated with the *LTM-CandidateId* (given by the corresponding entry in *ltm-CandidateIdList*) is equal to the PCI and center frequency of cell-defining SSB of the current SpCell. |
| NEC | Yes | We agree with FL, as this would improve readability. |

### FL proposal 1-8-v1

Adopt the following TP to section 5.2.1.4.2, TS38.214 in principle.

**5.2.1.4.2 Report quantity configurations**

<Unchanged parts omitted>

If a UE is configured with a *LTM-CSI-ReportConfig*,

- if the UE is configured with *spCellInclusion*, the UE shall report in a single reporting instance *nrOfReportedRS-PerCell* different SSBRIfor the current SpCell and each of the *nrOfReportedCells -1* candidate cells.Otherwise, the UE shall report in a single reporting instance *nrOfReportedRS-PerCell* different SSBRI for each of the *nrOfReportedCells* candidate cells,

- where SSBRI *k* (*k* ≥ 0) corresponds to the configured (*k*+1)-th entry of the associated *ltm-CSI-SSB-ResourceList* in the corresponding *LTM-CSI-SSB-ResourceSet*,

- if *spCellInclusion* is configured, SSB resources in *ltm-CSI-SSB-ResourceList* associated with the current SpCell are the entries where PCI (given by *ltm-CandidatePCI*) and frequency information (given by *ssbFrequency*) of the candidate cell associated with the *LTM-CandidateId* (given by the corresponding entry in *ltm-CandidateIdList*) is equal to the PCI and center frequency of cell-defining SSB of the current SpCell.

If the UE is configured with a *CSI-ReportConfig* that contains a list of sub-configurations provided by *csi-ReportSubConfigList*, the UE can only be configured with NZP CSI-RS for interference measurement if each sub-configuration is configured with [*powerOffse*t] and not configured with [*port-subsetIndicator*].

## [Open] Issue 1-9: QCL assumption after LTM cell switch command

### Summary of Proposal

[R1-2404929](Docs%5CR1-2404929.zip) Draft CR for 38.214 on QCL assumption after LTM cell switch command Nokia

🡪 this was done only for unified TCI state framework in the target cell. Similar exception needs to be specified for the scenarios when tci-PresentInDCI is set to 'enabled' or tci-PresentDCI-1-2 is configured for the CORESET scheduling the PDSCH

5.1.5 Antenna ports quasi co-location

<unchanged parts omitted>

When the UE would transmit a PUCCH with HARQ-ACK information in slot *n* corresponding to the PDSCH carrying the activation command, the indicated mapping between TCI states and codepoints of the DCI field *'Transmission Configuration Indication'* should be applied starting from the first slot that is after slot where ** is the SCS configuration for the PUCCH and is the subcarrier spacing configuration for with a value of 0 for frequency range 1, and is provided by *K-Mac* or if *K-Mac* is not provided. If *tci-PresentInDCI* is set to 'enabled' or *tci-PresentDCI-1-2* is configured for the CORESET scheduling the PDSCH, and the time offset between the reception of the DL DCI and the corresponding PDSCH is equal to or greater than *timeDurationForQCL* if applicable, after a UE receives an initial higher layer configuration of TCI states and before reception of the activation command,

* the UE assumes that DM-RS of ports of PDSCH of a serving cell are quasi co-located with the reference signal(s) in the *CandidateTCI-State* indicated in the LTM Cell Switch Command MAC CE [10, 38.321] if applicable, otherwise
* the UE may assume that the DM-RS ports of PDSCH of a serving cell are quasi co-located with the SS/PBCH block determined in the initial access procedure with respect to *qcl-Type* set to 'typeA', and when applicable, also with respect to *qcl-Type* set to 'typeD'.

<Unchanged part is omitted>

### Companies’ views

|  |  |  |
| --- | --- | --- |
| Company | Essential or Not(Yes or No) | Comment |
| FL | Yes | Similar with our endorsed CR in R1-2403709, the proposed change for defining an exception should also be considered.  |
| Ericsson | Yes | Support |
| CATT | Yes | Support |
| Nokia | Yes | Support |
| ZTE | Yes | Support |
| NTT DOCOMO | Yes | Support |
| vivo | Discussion needed | According to the description, we think the corresponding use case is the target cell is under R15/16 TCI framework. However, no related agreement has been achieved yet. Furthermore, existing RRC/MAC CE signalling and procedure is based on unified TCI framework. Therefore, further discussion and clarification to determine whether additional spec impacts exist is needed before making decision. |
| Huawei, HiSilicon | No | The LTM cell switch from R17 to R15 cell was excluded from the beginning of WI. In addition, RAN1 had agreement on the linkage between LTM TCI state and serving cell TCI state.  |
| NEC | Yes | Support. We think it is necessary to introduce QCL assumption for any new TCI state, i.e., candidateTCI-state. |
| Lenovo | Yes | Support |
|  |  |  |

## [Open] Issue 1-10: UL/SUL indication

### Summary of Proposal

[R1-2405324](Docs%5CR1-2405324.zip) 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

|  |  |  |
| --- | --- | --- |
| Company | Essential or Not(Yes or No) | Comment |
| FL | No strong opinion (Tend to No but either way is fine) | 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 specifications |
| Ericsson | No | The behaviour is clear from 38.321:S/U: This field indicates which UL carrier to transmit the PRACH of the contention-free Random Access Resources. If the value of this field is set to 1, SUL is used; otherwise, NUL is used. The length of the field is 1 bit; |
| Nokia | No strong opinion |  |
| ZTE |  | TS 38.212 and TS 38.321 have reflected that two UL carriers can be configured for a candidate cell, so there does not seem to be a big issue even through no any additional information is added in clause 8 of TS 38.213.  |
| NTT DOCOMO | No |  |
| Huawei, Hisilicon | Yes | TS38.212 just define the field. The UE procedure is defined in 213. If we do not have such changes, the CFRA trigger by MAC CE and PDCCH on the candidate cell is not complete and not consistent with other specification. |
| Lenovo | No |  |
|  |  |  |

## [Open] Issue 1-11: Default beam determination after cell switch

### Summary of Proposal

[R1-2405325](Docs%5CR1-2405325.zip) Corrections to the default beam determination after cell switch in TS38.214 Huawei, HiSilicon, Ericsson

🡪 The proponents tries to clarify the indicated TCI states (and QCL relationship) do not apply during RACH procedure after CSC reception.

5.1.5 Antenna ports quasi co-location

After a UE receives an initial higher layer configuration of *dl-OrJointTCI-StateList* with more than one *TCI-State* and before application of an indicated TCI state from the configured TCI states:

- The UE assumes that DM-RS of PDSCH and DM-RS of PDCCH that are not received during the RACH procedure, and the CSI-RS applying the indicated TCI state are quasi co-located with the reference signal(s) in the *CandidateTCI-State* indicated in the LTM Cell Switch Command MAC CE [10, 38.321] if applicable, otherwise

- The UE assumes that DM-RS of PDSCH and DM-RS of PDCCH and the CSI-RS applying the indicated TCI state are quasi co-located with the SS/PBCH block the UE identified during the initial access procedure.

After a UE receives an initial higher layer configuration of *dl-OrJointTCI-StateList* with more than one *TCI-State* or *ul-TCI-StateList* with more than one *TCI-UL-State* and before application of an indicated TCI state from the configured TCI states:

- The UE determines the UL TX spatial filter, if applicable, for dynamic-grant based PUSCH that is not transmitted during the RACH procedure and configured-grant based PUSCH and PUCCH that is not transmitted during the RACH procedure, and for SRS applying the indicated TCI state, from the *CandidateTCI-State* or *CandidateTCI-UL-State* indicated in the LTM Cell Switch Command MAC CE [10, 38.321] if applicable, otherwise

- The UE assumes that the UL TX spatial filter, if applicable, for dynamic-grant and configured-grant based PUSCH and PUCCH, and for SRS applying the indicated TCI state, is the same as that for a PUSCH transmission scheduled by a RAR UL grant or a MsgA PUSCH transmission during the initial access procedure.

### Companies’ views

|  |  |  |
| --- | --- | --- |
| Company | Essential or Not(Yes or No) | Comment |
| FL | Yes | Agree with this proposal.  |
| Ericsson | Yes | Support |
| CATT | Yes | Support |
| Nokia | Yes | Agree with the proposal. |
| ZTE | Yes | Support |
| NTT DOCOMO | Yes | Support |
| vivo | Yes | Support |
| Huawei, **HiSilicon** | Yes | support |
| Langbo | Yes | support |
| NEC | Yes | Support |
| Lenovo | Yes | Support |
|  |  |  |

### FL proposal 1-11-v1

Adopt the following TP to section 5.1.5, TS38.214 in principle.

5.1.5 Antenna ports quasi co-location

After a UE receives an initial higher layer configuration of *dl-OrJointTCI-StateList* with more than one *TCI-State* and before application of an indicated TCI state from the configured TCI states:

* The UE assumes that DM-RS of PDSCH and DM-RS of PDCCH that are not received during the RACH procedure, and the CSI-RS applying the indicated TCI state are quasi co-located with the reference signal(s) in the *CandidateTCI-State* indicated in the LTM Cell Switch Command MAC CE [10, 38.321] if applicable, otherwise
* The UE assumes that DM-RS of PDSCH and DM-RS of PDCCH and the CSI-RS applying the indicated TCI state are quasi co-located with the SS/PBCH block the UE identified during the initial access procedure.
* After a UE receives an initial higher layer configuration of *dl-OrJointTCI-StateList* with more than one *TCI-State* or *ul-TCI-StateList* with more than one *TCI-UL-State* and before application of an indicated TCI state from the configured TCI states:
* The UE determines the UL TX spatial filter, if applicable, for dynamic-grant based PUSCH that is not transmitted during the RACH procedure and configured-grant based PUSCH and PUCCH that is not transmitted during the RACH procedure, and for SRS applying the indicated TCI state, from the *CandidateTCI-State* or *CandidateTCI-UL-State* indicated in the LTM Cell Switch Command MAC CE [10, 38.321] if applicable, otherwise
* The UE assumes that the UL TX spatial filter, if applicable, for dynamic-grant and configured-grant based PUSCH and PUCCH, and for SRS applying the indicated TCI state, is the same as that for a PUSCH transmission scheduled by a RAR UL grant or a MsgA PUSCH transmission during the initial access procedure.

## [Open] Issue 1-12: TCI state in LTM cell switch command

### Summary of Proposal

[R1-2404749](Docs%5CR1-2404749.zip) Draft CR for 38.213 on ignalling of TCI state in LTM cell switch command Ericsson

21 L1/L2-triggered mobility procedures

<unchanged parts omitted>

A UE can be provided by a LTM Cell Switch Command MAC CE in a PDSCH reception on the serving cell [11, TS 38.321] a TCI state ID and/or an UL TCI state ID indicating a *CandidateTCI-State* and/or *CandidateTCI-UL-State* from *ltm-DL-OrJointTCI-StateToAddModList* and/or *ltm-UL-TCI-ToAddModList* [6, TS 38.214] for applicable receptions or transmissions on a candidate cell from the number of candidate cells. The UE may assume that DM-RS antenna ports for PDCCH receptions and for PDSCH receptions are quasi co-located with the SS/PBCH block or the TRS in the TCI state with respect to quasi co-location ‘typeA’ and ‘typeD’ properties, when applicable. The UE does not expect to be indicated quasi co-location ‘typeA’ properties when a SS/PBCH block is configured as a source RS of the TCI state. The UE applies the *CandidateTCI-State* and/or *CandidateTCI-UL-State,* if indicated by the MAC CE, no later than after the last symbol of a PUCCH or PUSCH with HARQ-ACK information for the PDSCH providing the MAC CE, where , , and are defined in [10, TS 38.133]*.* For RACH-based LTM cell switch [19, TS 38.300], the UE applies the *CandidateTCI-State* for receptions on the candidate cell, and applies a spatial domain filter corresponding to the *CandidateTCI-State* or the *CandidateTCI-UL-State* for transmissions on the candidate cell, that are after the completion of the random access procedure associated with the PRACH transmission on the candidate cell and before a new TCI state is indicated for the candidate cell. For RACH-less LTM cell switch [19, TS 38.300], the UE applies the *CandidateTCI-State* for receptions on the candidate cell and applies a spatial domain filter corresponding to the *CandidateTCI-State* or the *CandidateTCI-UL-State* for transmissions on the candidate cell before a new TCI state is indicated for the candidate cell.

<unchanged parts omitted>

### Companies’ views

|  |  |  |
| --- | --- | --- |
| Company | Essential or Not(Yes or No) | Comment |
| FL | OK if companies are fine | Even though the proposed change is accurate, some companies mentioned that this change is not essential, i.e. no different interpretation will happen.In this sense, approving this as an alignment CR would be a more reasonable choice.  |
| Ericsson | Yes | Support |
| CATT | No | Not necessary. |
| Nokia | No strong view | Ok to clarify |
| ZTE |  | Fine to make spec more clearer. |
| NTT DOCOMO |  | We are fine. |
| Huawei, HiSilicon | Editorial change |  |
| NEC |  | We are open to this. On one hand, it is true that LTM cell switch command provides a TCI state ID rather than a TCI state. However, on the other hand, our concern is that the current 38.321 already adequately addresses this distinction. |
| Lenovo | No | Not necessary |
|  |  |  |

### FL proposal 1-12-v1

Draft CR in R1-2404749 is endorsed as alignment CR in principle for the 38.213.

*FL note: CATT and Lenovo think this is not necessary. HW thinks this is an editorial change. The WF would be to agree this proposal as an alignment CR.*

## [Open] Issue 1-13: UL transmission after LTM cell switch

### Summary of Proposal

[R1-2405332](Docs%5CR1-2405332.zip) Corrections to the first UL transmission after LTM cell switch in TS38.213 Huawei, HiSilicon

🡪 The proponent thinks that the current RAN1 spec describe anything about the CG-PUSCH transmission after RACH-less cell switch.

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

A UE indicated 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 initial 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.

 SS/PBCH block indexes 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

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

A 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 associated with 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-r18* included in the *CandidateTCI-State* and/or *CandidateTCI-UL-State* indicated by the LTM Cell Switch Command MAC CE.

### Companies’ views

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| --- | --- | --- |
| Company | Essential or Not(Yes or No) | Comment |
| FL | Discussion needed | This addition is based on the contents for NTN (i.e. section 22.1 of TS38.213). While FL understand the intention to use *cg-LTM-Configuration-r18* in the specification, FL is not sure whether the UE behaviour captured in the newly added section is correct (as RAN1 has had no discussion on configured grant PUSCH transmission)FL feels that step-by-step discussion may be needed: firstly discuss and decide whether and where the description on CG PUSCH for LTM is necessary. The FL proposal at this meeting will be made after checking companies’ view.  |
| Ericsson | Discussion needed | We are open to discuss this. As RAN1 had no discussion on CG (in contrast to NTN) it feels awkward to just add the description. To us, it is not clear that the NTN procedure is applicable – keep in mind that “RACH-less” means different things for NTN and LTM. As we see it, the normal CG procedure, based on the normal configuration, should work just fine for this case.  |
| CATT | No strong view | As mentioned by FL, the need of the CG PUSCH for LTM should be clarified first.  |
| Nokia | Discussion needed | As RAN1 has had no discussion on configured grant PUSCH transmission, we are open to discuss this.  |
| ZTE | Discussion needed | We support to discuss it in RAN1, but we may also need to ask RAN2 if some additional considerations or background information on mapping rule of SSB to CG-PUSCH has been done during discussing CG-PUSCH for UL transmission. |
| NTT DOCOMO |  | We are fine to discuss. |
| vivo | No strong view | Open to discuss. |
| Huawei, HiSilicon | Yes | We can discuss the TP but the behaviour should be defined. Otherwise, CG based first UL transmission can not be performed.The TP is mainly from clause 22.1 for NTN. In addition, we copied some text from clause 19. 1 of CG-SDT as LTM may operate in TDD band. The power control and beam indication scheme are also different from the NTN and we added the last two paragraphs.  |
| Lenovo | Discussion is needed | Open to discuss |
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# Second priority issue in RAN1#117 (not many supports at RAN1#116bis)

## [Open] Issue 2-1: Consistency between SSB index and TCI state in Cell Switch Command

### Summary of Proposal

[R1-2404258](Docs%5CR1-2404258.zip) Discussion on consistency between SSB index and TCI state in LTM Cell Switch Command MAC CE ZTE
[R1-2404259](Docs%5CR1-2404259.zip) Draft CR on consistency between SSB index and TCI state in LTM Cell Switch Command MAC CE ZTE

**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

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| --- | --- | --- |
| Company | Essential or Not(Yes or No) | Comment |
| FL | No | 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. This proposal can be treated when the change of the situation is confirmed.  |
| CATT | No | Agree with FL’s opinion. |
| Nokia | No | Not needed as it should be left to NW implementation. |
| ZTE |  | We think that this issue is relate to issue 1-2. for example, if we assumed that SSB index and TCI state in cell switch command MAC CE is consistent, then Tfirst-RS and TRS-proc need to be considered for the timeline of PRACH transmission triggered by LTM CSC MAC CE when indicated TCI state is not in the activated TCI state list. |
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## [Open] Issue 2-2: Deactivation of candidate TCI states

### Summary of Proposal

[R1-2404747](Docs%5CR1-2404747.zip) 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.

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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 | 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. FL suggestion is to treat this CR at RAN1#117 if the change of the situation is confirmed |
| CATT | No | Deactivation is a default behaviour for RRC based handover and no spec clarification is needed.  |
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## [Open] Issue 2-3: LTM TCI state application on target SCell

### Summary of Proposal

[R1-2404260](Docs%5CR1-2404260.zip) Discussion on applying TCI state indicated in LTM Cell Switch Command MAC CE to a list of CCs ZTE

* 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, but OK to discuss (if time allows) | Even though majority of companies sees no necessity for this change, two companies mentioned at RAN1#116bis that the current spec is unclear.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. However, FL is also OK to discuss this issue if time allows and many companies request so.  |
| CATT | OK to discuss | This has been discussed for several meetings. In our opinion, the proposal by ZTE is more efficient for the signaling point of view. |
| ZTE |  | We are fine with FL’s suggestion that we can discuss it if time allowed. |
| vivo | OK to discuss |  |
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## [Open] Issue 2-4: timing assumption between source and target cells

### Summary of Proposal

[R1-2404162](Docs%5CR1-2404162.zip) Draft CR on timing assumption between source and target cells for R18 LTM cell switch vivo

* This CRs to resolve the issue related to the LS sent by RAN4 in the previous meeting.

For RRC-triggered handover, Conditional handover and LTM cell switch purposes to a target cell in paired or unpaired spectrum where the target cell uses , the UE may assume the absolute value of the time difference between radio frame in the current cell and radio frame in the target cell is less than if the association pattern period in clause 8.1 of [5, TS 38.213] is not equal to 10 ms.

For inter frequency RRC-triggered handover, Conditional handover and LTM cell switch purposes where the source cell is either in paired or unpaired spectrum and the target cell is in unpaired spectrum and uses , the UE may assume the absolute value of the time difference between radio frame in the current cell and radio frame in the target cell is less than

### Companies’ views

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| --- | --- | --- |
| Company | Essential or Not(Yes or No) | Comment |
| FL | No, but OK to discuss (if time allows) | Given the conclusion in the last meeting, the text change, if necessary, should be “*For handover, including LTM cell switch, purpose*” or something.Conclusion* For timing assumption between source and target cells described in clause 6.3.3.2 of TS38.211, the terminology “handover” includes LTM cell switch
	+ Note: The necessity of CR can be discussed in RAN1#117
 |
| CATT | Yes | OK to discuss. LTM should be explicitly stated. |
| vivo | Yes | Support the explicit statement such that the application scenarios is clearer. |

# [Closed] Alignment CRs to be concluded in RAN1#117

[R1-2404380](Docs%5CR1-2404380.zip) Correction on RRC parameters for NR mobility enhancements in TS 38.213 CATT

* This error has been corrected in editor’s alignment CR [R1-2403808](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_116b/Inbox/R1-2403808.zip) after RAN1#116bis. Thus, FL thinks this CR is not necessary