**3GPP TSG RAN WG1 #116bis R1-2403683**

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

Title: LS on the identification of the power control parameters after LTM cell switch

Response to:

Release: Rel-18

Work Item: NR\_mob\_enh2-Core

Source: RAN1

To: RAN2

Cc:

**Contact Person:**

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Attachments: None

**1. Overall Description:**

In RAN1#116bis, an issue was discussed on how to acquire the power control parameters associated with *CandidateTCI-State*/*CandidateTCI-UL-State* applied to the UL transmission after LTM cell switch till *TCI-state*/*TCI-UL-State* is indicated at the target cell. RAN1 considers that the following two approaches can be considered to solve this issue, but no consensus has been achieved:

* Approach 1
	+ For UL transmission after cell switch and before the serving cell TCI state is indicated, UE applies power control parameter in the *ul-powerControl-r17* of the *TCI-State* or the *TCI-UL-State*, if configured, corresponding to the *CandidateTCI-State* or the *CandidateTCI-UL-State* indicated in the LTM Cell Switch Command. Otherwise, *ul-powerControl-r17* configured in *BWP-UplinkDedicated* of the target cell is applied.
* Approach 2
	+ Introduce necessary RRC parameters for power control under LTM configurations.

If approach 1 is taken, it would be necessary to capture in RAN2 specifications the linkage between *CandidateTCI-State*/*CandidateTCI-UL-State* and *TCI-state*/*TCI-UL-State* for the same cell. The linkage has been agreed in RAN1#115 as following, but it is not captured in RAN1 specifications:

**Agreement**

UE may expect that:

* For a candidate cell, the configuration of an LTM TCI state in ltm-DL-OrJointTCI-StateToAddModList-r18 and ltm-ul-TCI-ToAddModList-r18 is same as its counterpart in dl-OrJointTCI-StateList-r17 and ul-TCI-ToAddModList-r17 of the first active BWP in ServingCellConfig, at least in terms of TCI state ID, the corresponding qcl-Type1 and qcl-Type2 for the DL or joint TCI state or referenceSignal for the UL TCI state.
* The LTM TCI state(s) in ltm-DL-OrJointTCI-StateToAddModList-r18 and ltm-ul-TCI-ToAddModList-r18 of a candidate cell is a subset of serving cell TCI state(s) in dl-OrJointTCI-StateList-r17 and ul-TCI-ToAddModList-r17 of the same cell.

If approach 2 is taken, the following parameters need to be newly added: it is noted that the final check/decision is up to RAN2.

* Under Uplink-powerControl-r18
	+ Uplink-powerControlId-r18 ::= INTEGER(1.. maxNrofCandidateUL-TCI-r18)
	+ p0AlphaSetforPUSCH-r18　　　 P0AlphaSet-r17　OPTIONAL, -- Need R
	+ p0AlphaSetforPUCCH-r18　　　 P0AlphaSet-r17　OPTIONAL, -- Need R
	+ p0AlphaSetforSRS-r18　　　　 P0AlphaSet-r17　 OPTIONAL　-- Need R
* Under CandidateTCI-State-r18,
	+ ul-powerControl-r18 Uplink-powerControlId-r18 OPTIONAL,　 -- Need R
	+ Field description: Configures power control parameters for PUCCH, PUSCH and SRS of the LTM candidate that includes this CandidateTCI-State
* Under CandidateTCI-UL-State-r18,
	+ ul-powerControl-r18 Uplink-powerControlId-r18 OPTIONAL,　 -- Need R
	+ Field description: Configures power control parameters for PUCCH, PUSCH and SRS of the LTM candidate that includes this CandidateTCI-UL-State
* Under LTM-TCI-Info-r18,
	+ uplink-PowerControlToAddModList-r18　SEQUENCE (SIZE (1.. maxNrofCandidateUL-TCI-r18)) OF Uplink-powerControl-r18　　　OPTIONAL,　 -- Need N
	+ uplink-PowerControlToReleaseList-r18 SEQUENCE (SIZE (1.. maxNrofCandidateUL-TCI-r18)) OF Uplink-powerControlId-r18　　OPTIONAL,　 -- Need N
	+ Field description: Configures UL power control parameters for PUSCH, PUCCH and SRS when field unifiedTCI-StateType is configured for this serving cell.

Also, for approach 2, RAN1 sees the necessity to define a default behaviour when this *ul-powerControl-r18* under *LTM-TCI-Info-r18* for a candidate cell is not configured, e.g.

* UE is expected to be configured either *ul-powerControl-r18* under *LTM-TCI-Info-r18* in *LTM-Candidate-r18* for a candidate cell or *ul-powerControl-r18* under *BWP-UplinkDedicated* in *ServingCellConfig* for the candidate cell.

RAN1 respectfully asks RAN2 to take either option below:

**Option 1: Capture the RAN1 agreement on the linkage between TCI states for candidate cell(s) and those for target cell(s) in RAN2 specification(s) for approach 1**

**Option 2: Introduce the new RRC parameters above for approach 2**

**2. Actions:**

**To RAN2 group.**

**ACTION:** RAN1 respectfully asks RAN2 to take the above request into their work.

**3. Date of Next TSG RAN WG1 Meetings:**

TSG RAN WG1 Meeting #117 20th May – 24th May 2024 Fukuoka, JP

TSG RAN WG1 Meeting #118 19th August – 23rd August 2024 Maastricht, NE