**3GPP TSG-RAN WG2 Meeting #119R2-220**

**Electronic August 2022**

**Title: DRAFT**LS on further questions on feMIMO RRC parameters

**Response to: -**

**Release:** Rel-17

**Work Item:** NR\_feMIMO-Core

**Source:** ERICSSON to be replaced by 3GPP TSG-RAN WG2

**To:** 3GPP TSG-RAN WG1

**Contact Person:**

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**Attachments:** None

1. **Overall Description:**

**DL or joint TCI state configuration**

RAN2 discussed the field description of *additionalPCI* in *TCI-state* (for Rel-17 joint or DL TCI states) and *cell* in *QCL-Info* in *TCI-State*

TCI-State ::= SEQUENCE {

 tci-StateId TCI-StateId,

 qcl-Type1 QCL-Info,

 qcl-Type2 QCL-Info OPTIONAL, -- Need R

 ...,

 [[

 additionalPCI-r17 AdditionalPCIIndex-r17 OPTIONAL, -- Need R

 pathlossReferenceRS-Id-r17 PUSCH-PathlossReferenceRS-Id OPTIONAL, -- Cond JointTCI

 ul-powerControl-r17 Uplink-powerControlId-r17 OPTIONAL -- Cond JointTCI

 ]]

}

QCL-Info ::= SEQUENCE {

 cell ServCellIndex OPTIONAL, -- Need R

 bwp-Id BWP-Id OPTIONAL, -- Cond CSI-RS-Indicated

 referenceSignal CHOICE {

 csi-rs NZP-CSI-RS-ResourceId,

 ssb SSB-Index

 },

 qcl-Type ENUMERATED {typeA, typeB, typeC, typeD},

 ...

}

The current definition of TCI-state in the RRC specification is so that for each TCI-state, single *additionalPCI* and two qcl-Types (i.e., *qcl-Type*1 and *qcl-Type2*) may be configured. For a qcl-Type, parameters such as *cell*, *referenceSignal*, etc., are configured.

The current field descriptions states:

***additionalPCI***

Indicates that this TCI state refers to an additional PCI different from serving cell PCI, as configured in *ServingCellConfig*.

***cell***

The UE's serving cell in which the *referenceSignal* is configured. If the field is absent, it applies to the serving cell in which the *TCI-State* is configured. The RS can be located on a serving cell other than the serving cell in which the *TCI-State* is configured only if the *qcl-Type* is configured as *typeC* or *typeD*. See TS 38.214 [19] clause 5.1.5.

**Question 1**

RAN2 would like to ask RAN1

1. whether current field description of *additionalPCI* is correct or whether the *additionalPCI* should be also used for reference signal (i.e. QCL-Info)? That is, RAN2 assume that there may be the case whether a cell in which TCI is configured is different from cell in which reference signal is configured.
2. When a TCI-state is configured with additionalPCI, is it possible to configure “cell” information in QCL-Info because “cell” indicates only ServingCellIndex? If not, what further information is needed or can we assume that in case of additionalPCI, TCI-State and reference signal should be configured in the same cell with additionalPCI?
3. RAN2 assumes additionalPCI is per TCI-state, i.e., there is no such case where qcl-Type1 and qcl-Type2 for the same TCI-state associate with different values. Please confirm whether this is also RAN1’s understanding.
4. if b) is confirmed, would there be need to state that “*cell*” cannot be two different values for *qcl-Type1* and *qcl-Type2*?

**Question 2**

RAN2 considers the case where a serving cell uses the TCI states defined in another cell, i.e. *dl-OrJoint-TCIStateList* is set to *unifiedTCI-StateRef*. and would like to ask RAN1:

1. When is absent in QCL-info, is the *referenceSigna*l configured in the serving cell where the *TCI-state* is configured or in the serving cell where the *TCI-state* is used(in case this serving cell is not directly configured with TCI states but is configured with parameter *unifiedTCI-StateRef* )?

**UL TCI state configuration**

RAN2 also discussed the IE *TCI-UL-State* with respect to the need to update field descriptions of *additionalPCI* or the *servingCellId or ul-powerControl*

TCI-UL-State-r17 ::= SEQUENCE {

 tci-UL-State-Id-r17 TCI-UL-State-Id-r17,

 servingCellId-r17 ServCellIndex OPTIONAL, -- Need R

 bwp-Id-r17 BWP-Id OPTIONAL, -- Cond CSI-RSorSRS-Indicated

 referenceSignal-r17 CHOICE {

 ssb-Index-r17 SSB-Index,

 csi-RS-Index-r17 NZP-CSI-RS-ResourceId,

 srs-r17 SRS-ResourceId

 },

 additionalPCI-r17 AdditionalPCIIndex-r17 OPTIONAL, -- Need R

 ul-powerControl-r17 Uplink-powerControlId-r17 OPTIONAL, -- Need R

 pathlossReferenceRS-Id-r17 PUSCH-PathlossReferenceRS-Id-r17 OPTIONAL, -- Need R

 ...

}

***additionalPCI***

Indicates the physical cell IDs (PCI) of the SSBs.

***servingCellId***

The UE's serving cell in which the *referenceSignal-r17* is configured. If the field is absent, it applies to the serving cell in which the *TCI-UL-State* is configured. The RS can be located on a serving cell other than the serving cell in which the *TCI-State* is configured only if the *qcl-Type* is configured as *typeC* or *typeD*. See TS 38.214 [19] clause 5.1.5.

***ul-powerControl***

Configures power control parameters for PUCCH, PUSCH and SRS for this TCI state. The field is present here only if *ul-powerControl* is not configured in any *BWP-Uplink-Dedicated* of this serving cell.

**Question 3**

RAN2 would like to ask RAN1

1. In TCI-UL-State-r17, in case of intra-cell BM (i.e. without additionalPCI), is there any case where reference signal could be configured in different serving cell from the serving cell configured with UL TCI state?
2. In TCI-UL-State-r17, in case of inter-cell BM (i.e. with additionalPCI), is there any case where reference singal is configured in the same/different serving cell (or different additionalPCI) from the cell (associated with additionalPCI) in which UL TCI state is configured?
3. is the *additionalPCI* in IE *TCI-UL-State* associated with the serving cell indicated by the field *servingCellId*?
4. is it correct that there is no qcl-Type field in TCI-UL-State as the parameter excel R1-2202759 did not advice to include QCL Type for UL TCI state(row4)?
5. If b) is correct, it is assumed that QCL related limitations should be deleted from the field description of the *servingCellId*? That is, should. "The RS can be located on a serving cell other than the serving cell in which the *TCI-State* is configured only if the *qcl-Type* is configured as *typeC* or *typeD*. See TS 38.214 [19] clause 5.1.5." in the field description of *servingCellId* be deleted?

**Question 4**

RAN2 considers the case where a serving cell uses the UL TCI states defined in another cell, i.e. *ul-TCIStateList* is set to *unifiedTCI-StateRef*. and would like to ask RAN1:

1. When ‘*servingCellId*’ is absent in TCI-UL-State, is the *referenceSigna*l configured in the serving cell where the *TCI-UL-state* is configured or in the serving cell where the *TCI-ULstate* is used(in case this serving cell is not directly configured with UL TCI states but is configured with parameter *unifiedTCI-StateRef* )?

**Pending part on offline discussion:**

RAN2 also discussed about the configuration flexibility of the UL powercontrol.

In Rel-17 unified TCI framework, TCI-State (joint type) and TCI-UL-State-r17 (UL-only type) can be optionally configured with a set of power control parameters (ul-powerControl-r17). According to TS 38.331 V17.1.0, there are two possible configuration cases: a) ul-powerControl-r17 is present in BWP-UplinkDedicated and it is absent in all joint TCI states used together with this BWP-UplinkDedicated and UL TCI states used in this BWP-UplinkDedicated, b) ul-powerControl-r17 is absent in BWP-UplinkDedicated and it is present in all joint TCI states used together with this BWP-UplinkDedicated and UL TCI states used together with this BWP.

RAN1’s agreements do not exclude the case that ul-powerControl-r17 is present in some TCI states and is absent in other TCI states (case c)). In case c), ul-powerControl-r17 can be configured in both BWP-UplinkDedicated and joint TCI-State/TCI-UL-State-r17 and the UE uses ul-powerControl-r17 in BWP-UplinkDedicated only when the TCI state used is not configured with ul-powerControl-r17. However, this case is currently excluded by RAN2 specifications

**Question 5**

RAN2 would like to ask RAN1 whether current specification is sufficient for UL powercontrol or whether further flexibility, such as case c), should be supported

**2. Actions:**

**To RAN1 group:**

**ACTION:** RAN2 respectfully asks RAN1 to provide responses to above questions.

**3. Date of Next TSG-RAN WG2 Meetings:**

TSG-RAN WG2 Meeting #119-e October 2022 Electronic

TSG-RAN WG2 Meeting #120 November 2022 Europe