3GPP TSG RAN WG1 #103-e R1-200xxxx

e-Meeting, October 26th – November 13th, 2020

Source: OPPO

Title: Text Proposals for MT.1

Agenda Item: 7.2.6

Document for: Discussion and Decision

Text Proposal for Issue MT.1

In RAN1 #102-e meeting, we reached an agreement on the TCI state of AP CSI-RS in multi-TRP systems. Companies ZTE (R1-2007750), OPPO (R1-2008212), Apple (R1-2008436), Ericsson (R1-2008635) and vivo (R1-2008675) provided TP to capture the agreement.

Based on the proposals, a draft TP is proposed as follows:

Reason for changes:

In RAN1#102-e meeting, the following agreement was made on AP CSI-RS in multi-TRP system:

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| **Agreement**In multi-DCI based multi-TRP system, if the scheduling offset between the last symbol of the PDCCH carrying the triggering DCI and the first symbol of the aperiodic CSI-RS resources is less than threshold *beamSwitchTiming*, the UE determines the QCL assumption for AP CSI-RS resource as follows:* if there is any other DL signal with an indicated TCI state in the same symbols as the CSI-RS, the UE applies the QCL assumption of the other DL signal also when receiving the aperiodic CSI-RS.
	+ When a UE is configured with *enableDefaultTCIStatePerCoresetPoolIndex* and the UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *CORESETPoolIndex* in *ControlResourceSet* , the other DL signal refers to PDSCH  associated with the same *CORESETPoolIndex*  as the PDCCH triggering the AP CSI-RS and scheduled with offset larger than or equal to the threshold timeDurationForQCL, as defined in [13, TS 38.306], aperiodic CSI-RS associated with the same *CORESETPoolIndex*  as the PDCCH triggering the AP CSI-RS and scheduled with offset larger than or equal to the UE reported threshold *beamSwitchTiming*  when the reported value is one of the values {14,28,48} and *enableBeamSwitchTiming-r16* is not provided, aperiodic CSI-RS associated with the same CORESETPoolIndex  as the PDCCH triggering the AP CSI-RS and scheduled with offset larger than or equal to 48 when the reported value of *beamSwitchTiming*  is one of the values {224, 336} and *enableBeamSwitchTiming-r16* is not provided, periodic CSI-RS, semi-persistent CSI-RS;
* If there is no other DL signal with an indicated TCI state in the same symbols as the CSI-RS,
	+ When a UE is configured with *enableDefaultTCIStatePerCoresetPoolIndex* and the UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *CORESETPoolIndex* in *ControlResourceSet* , the UE applies the QCL parameter(s) of the CORESET associated with a monitored search space with the lowest *controlResourceSetId* among CORESETs , which are configured with the same value of *CORESETPoolIndex* as the PDCCH triggering that AP CSI-RS, in the latest slot in which one or more CORESETs associated with the same value of *CORESETPoolIndex* as the PDCCH triggering that AP CSI-RS.
* UE is not expected to receive AP CSI -RS and PDSCH /AP-CSI-RS associated with different *CORESETPoolIndex* in overlapped symbol(s).
* UE is not expected to receive AP CSI-RS and SP/P CSI-RS with different QCL type D in overlapped symbol(s)

Note: The above behavior is applied at least for the same carrier scheduling case. |

This agreement is not captured in TS 38.214 yet.

Summary of changes:

In section 5.2.1.5.1 of TS 38.214, capture the agreement on TCI state of AP CSI-RS in multi-TRP system.

**Specs/Sections impacted:**

TS 38.214 V16.3.0 /5.2.1.5.1

Consequences if not approved:

The agreement is not captured.

**The text proposal for TS 38.214 V16.3.0 is:**

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| **Text proposal for TS 38.214 V16.3.0**5.2.1.5.1 Aperiodic CSI Reporting/Aperiodic CSI-RS when the triggering PDCCH and the CSI-RS have the same numerology< Unchanged parts are omitted >- For each aperiodic CSI-RS resource in a CSI-RS resource set associated with each CSI triggering state, the UE is indicated the quasi co-location configuration of quasi co-location RS source(s) and quasi co-location type(s), as described in Clause 5.1.5, through higher layer signaling of *qcl-info* which contains a list of references to *TCI-State's* for the aperiodic CSI-RS resources associated with the CSI triggering state. If a *State* referred toin the list is configured with a reference to an RS associated with '*QCL-TypeD*', that RS may be an SS/PBCH block located in the same or different CC/DL BWP or a CSI-RS resource configured as periodic or semi-persistent located in the same or different CC/DL BWP.- If the scheduling offset between the last symbol of the PDCCH carrying the triggering DCI and the first symbol of the aperiodic CSI-RS resources in a *NZP-CSI-RS-ResourceSet* configured without higher layer parameter *trs-Info* is smaller than the UE reported threshold *beamSwitchTiming,* as defined in [13, TS 38.306], when the reported value is one of the values of {14, 28, 48} and *enableBeamSwitchTiming-r16* is not provided, or is smaller than 48 when the reported value of *beamSwitchTiming-r16* is one of the values of {224, 336} and *enableBeamSwitchTiming-r16* is provided.- If a UE is configured with *enableDefaultTCIStatePerCoresetPoolIndex* and the UE is configured by higher layer parameter *PDCCH-Config* that contains two different values of *CORESETPoolIndex* in *ControlResourceSet* - if there is any other DL signal with an indicated TCI state in the same symbols as the CSI-RS, the UE applies the QCL assumption of the other DL signal also when receiving the aperiodic CSI-RS. The other DL signal refers to PDSCH scheduled by a PDCCH associated with the same *CORESETPoolIndex*  as the PDCCH triggering the AP CSI-RS and scheduled with offset larger than or equal to the threshold *timeDurationForQCL,* as defined in [13, TS 38.306], aperiodic CSI-RS triggered by a PDCCH associated with the same *CORESETPoolIndex*  as the PDCCH triggering the AP CSI-RS and scheduled with offset larger than or equal to the UE reported threshold *beamSwitchTiming* when the reported value is one of the values {14,28,48} and *enableBeamSwitchTiming-r16* is not provided, aperiodic CSI-RS triggered by a PDCCH associated with the same *CORESETPoolIndex*  as the PDCCH triggering the AP CSI-RS and scheduled with offset larger than or equal to 48 when the reported value of *beamSwitchTiming-r16* is one of the values {224, 336} and *enableBeamSwitchTiming-r16* is provided, periodic CSI-RS, semi-persistent CSI-RS; - else, the UE applies the QCL parameter(s) of the CORESET associated with a monitored search space with the lowest *controlResourceSetId* among CORESETs , which are configured with the same value of *CORESETPoolIndex* as the PDCCH triggering that AP CSI-RS, in the latest slot in which one or more CORESETs associated with the same value of *CORESETPoolIndex* as the PDCCH triggering that AP CSI-RS- else if a UE is configured with *enableTwoDefaultTCIStates* and at least one TCI codepoint indicates two TCI states- if there is any other DL signal with an indicated TCI state in the same symbols as the CSI-RS, the UE applies the QCL assumption of the other DL signal also when receiving the aperiodic CSI-RS. The other DL signal refers to PDSCH scheduled with offset larger than or equal to the threshold *timeDurationForQCL,* as defined in [13, TS 38.306], aperiodic CSI-RS scheduled with offset larger than or equal to the UE reported threshold *beamSwitchTiming* when the reported value is one of the values {14,28,48} and *enableBeamSwitchTiming-r16* is not provided, aperiodic CSI-RS scheduled with offset larger than or equal to 48 when the reported value of *beamSwitchTiming-r16* is one of the values {224, 336} and *enableBeamSwitchTiming-r16* is provided, periodic CSI-RS, semi-persistent CSI-RS. If there is a PDSCH indicated with two TCI states in the same symbols as the CSI-RS, the UE applies the first TCI state of the two TCI states when receiving the aperiodic CSI-RS.- else, the UE applies the first one of two TCI states corresponding to the lowest DCI codepoint among those mapped to two TCI states and applicable to the PDSCH within the active BWP of the cell in which the CSI-RS is to be received when receiving the aperiodic CSI-RS.- else if there is any other DL signal with an indicated TCI state in the same symbols as the CSI-RS, the UE applies the QCL assumption of the other DL signal also when receiving the aperiodic CSI-RS. The other DL signal refers to PDSCH scheduled with offset larger than or equal to the threshold *timeDurationForQCL,* as defined in [13, TS 38.306], aperiodic CSI-RS scheduled with offset larger than or equal to the UE reported threshold *beamSwitchTiming* when the reported value is one of the values {14,28,48} and *enableBeamSwitchTiming-r16* is not provided, aperiodic CSI-RS scheduled with offset larger than or equal to 48 when the reported value of *beamSwitchTiming-r16* is one of the values {224, 336} and *enableBeamSwitchTiming-r16* is provided, periodic CSI-RS, semi-persistent CSI-RS;- else if at least one CORESET is configured for the BWP in which the aperiodic CSI-RS is received, when receiving the aperiodic CSI-RS, the UE applies the QCL assumption used for the CORESET associated with a monitored search space with the lowest *controlResourceSetId* in the latest slot in which one or more CORESETs within the active BWP of the serving cell are monitored; - else if the UE is configured with [*enableDefaultBeamForCCS*] and when receiving the aperiodic CSI-RS, the UE applies the QCL assumption of the lowest-ID activated TCI state applicable to the PDSCH within the active BWP of the cell in which the CSI-RS is to be received.- If the scheduling offset between the last symbol of the PDCCH carrying the triggering DCI and the first symbol of the aperiodic CSI-RS resources is equal to or greater than the UE reported threshold *beamSwitchTiming* when the reported value is one of the values of {14,28,48} and *enableBeamSwitchTiming-r16* is not provided, or is equal to or greater than 48 when the reported value of *beamSwitchTiming-r16* is one of the values of {224, 336} and *enableBeamSwitchTiming-r16* is provided, the UE is expected to apply the QCL assumptions in the indicated TCI states for the aperiodic CSI-RS resources in the CSI triggering state indicated by the CSI trigger field in DCI. - The UE is not expected to receive aperiodic CSI-RS and PDSCH/aperiodic CSI-RS associated with different values of *CORESETPoolIndex* in overlapped symbol(s). The UE is not expected to receive aperiodic CSI-RS and semi-persistent/periodic CSI-RS with different ‘QCL-type D’ in overlapped symbol(s).- A non-zero codepoint of the CSI request field in the DCI is mapped to a CSI triggering state according to the order of the associated positions of the up to $2^{N\_{TS}}-1$ trigger states in *CSI-AperiodicTriggerStateList* with codepoint '1' mapped to the triggering state in the first position.< Unchanged parts are omitted > |

If you have comments, please input below

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