**3GPP TSG RAN WG1 #118bis R1-240xxxx**

**Hefei, China, October 14th – 18th, 2024**

**Source: Moderator (CATT)**

**Title:** **Summary on SRS PC parameter determination**

**Agenda Item:** **7**

**Document for:** **Decision**

# Introduction

In RAN1#118bis, the following draft CR is submitted on SRS power control parameter determination in unified TCI framework [1]:

R1-2408012 Draft CR on determination of SRS power control parameters in unified TCI framework CATT

This moderator summary aims at collecting the comments from companies regarding the issue in the above draft CR.

# Discussion

In RAN1 #106 e-meeting, the following agreement was achieved on power control parameters determination for SRS not associated with UL or joint TCI state for Rel-17 unified TCI framework.

|  |
| --- |
| AgreementOn the setting of UL PC parameters except for PL-RS (P0, alpha, closed loop index) for Rel.17 unified TCI framework, the setting of (P0, alpha, closed loop index) for SRS can also be associated with UL or (if applicable) joint TCI state.* If not associated, the setting(s) of (P0, alpha, closed loop index) for SRS per BWP is independent of the UL or (if applicable) joint TCI states

This is only applicable for SRS sets using Rel-17 TCI state to determine their spatial relation. |

According to the agreement, the settings of (P0, alpha, closed loop index) for SRS is determined based on the configurations for SRS per BWP if the power control parameters are not associated with TCI state or the SRS is not followed the unified TCI framework. However, this agreement has not been captured in TS38.213 currently

Also, a few companies comment that if TCI state is not associated with the power control parameters, this should also be adopted for not only SRS, but also for PUSCH and PUCCH as well.

In this case, two questions are raised as follows:

## Q1: Do you agree that the issue raised in the draft CR is valid? If not, what are the comments?

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or Not Agree** | **Comments** |
| MediaTek |  | To our understanding, the agreement only describes the behavior when UL PC parameters are not included in the joint/UL TCI state. For the case if the SRS doesn’t follow the unified TCI state, it is not relevant to this agreement. Thus, the corresponding draft doesn’t correctly reflect the RAN1 agreement.However, we agree with that current spec doesn’t reflect that the UE shall determine UL PC parameters from ***ul-PowerControl*** configured in the UL BWP if UL PC parameters are not included in the joint/UL TCI state. Note that this behavior is applicable to PUCCH/PUSCH/SRS.One potential CR could be:

|  |
| --- |
| In the remaining of this clause, if a UE is provided *TCI-State* in *dl-OrJointTCI-StateList* or *TCI-UL-State* and for an indicated *TCI-State* or *TCI-UL-State* as described in [6, TS 38.214] - in clauses 7.1.1, 7.2.1, and 7.3.1, the RS index $q\_{d}$ for obtaining the downlink pathloss estimate for PUSCH, PUCCH, and SRS transmission is provided by pathlossReferenceRS-Id-r17 associated with or included in the indicated *TCI-State* or *TCI-UL-State* except for SRS transmission that is not provided *followUnifiedTCI-StateSRS*- in clause 7.1.1, if *p0AlphaSetforPUSCH* is provided, the values of $P\_{O\\_UE\\_PUSCH,b,f,c}\left(j\right)$, $α\_{b,f,c}\left(j\right)$, and the PUSCH power control adjustment state $l$ are provided by *p0AlphaSetforPUSCH* associated with the indicated *TCI-State* or *TCI-UL-State*, or provided by *p0AlphaSetforPUSCH* in *BWP-UplinkDedicated*- in clause 7.2.1, if *p0AlphaSetforPUCCH* is provided, the values of $P\_{O\\_UE\\_PUCCH}\left(q\_{u}\right)$ and the PUCCH power control adjustment state $l$ are provided by *p0AlphaSetforPUCCH* associated with the indicated *TCI-State* or *TCI-UL-State* or provided by *p0AlphaSetforPUCCH* in *BWP-UplinkDedicated*- in clause 7.3.1, if *p0AlphaSetforSRS* is provided, - if *followUnifiedTCI-StateSRS* is provided for a SRS resource set, the values of $P\_{O\\_UE\\_SRS,b,f,c}\left(q\_{s}\right)$, $α\_{SRS,b,f,c}\left(q\_{s}\right)$, and SRS power control adjustment state $l$ are provided by *p0AlphaSetforSRS* associated with the indicated *TCI-State* or *TCI-UL-State* or provided by *p0AlphaSetforSRS* in *BWP-UplinkDedicated*- else, if *followUnifiedTCI-StateSRS* is not provided for a SRS resource set and for a SRS resource from the SRS resource set, the values of $P\_{O\\_UE\\_SRS,b,f,c}\left(q\_{s}\right)$, $α\_{SRS,b,f,c}\left(q\_{s}\right)$, and SRS power control adjustment state $l$ are provided by *p0AlphaSetforSRS* associated with *TCI-State* or *TCI-UL-State* of an SRS resource with lowest *SRS-ResourceId* in the SRS resource set or provided by *p0AlphaSetforSRS* in *BWP-UplinkDedicated*, and a RS index $q\_{d}$ for obtaining a pathloss estimate for the SRS transmission is provided by *pathlossReferenceRS-Id-r17* associated with or included in the *TCI-State* or *TCI-UL-State* of an SRS resource with lowest *SRS-ResourceId* in the SRS resource set$P\_{O\\_SRS,b,f,c}\left(q\_{s}\right)$ is the sum of the component $P\_{O\\_UE\\_SRS,b,f,c}\left(q\_{s}\right)$ and a component *p0* provided by *SRS-ResourceSet* corresponding to the SRS resource set. |

Note that in TS38.331, it is already clarified that ul-powerControl is configured either in joint/UL TCI states or in BWP-Uplink-Dedicated.***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. This field refers to an element in the list configured using *uplink-PowerControlToAddModList* in the serving cell where the *ul-TCI-ToAddModList* is configured. |
| Samsung | Agree | In the current specification, there is missing part for UL PC parameters determination based on configuration in *BWP-UplinkDedicated* if UL PC parameters are not included in UL or joint TCI state. |
| vivo | Do not agree | For the case of PC setting determination for SRS without TCI state configuration, power control parameter configured in SRS resource set are used from our understanding. Besides, the agreement cited is to clarify SRS PC setting determination when it is not associated with UL or joint TCI state, which can be inferred from current specification (TS 38.331 and TS 38.213) without any ambiguity. |
| Mod |  | Based on the comments so far, MTK and Samsung agree that the agreement mentioned is not captured while vivo argues not. Nevertheless, the update of the possible spec change is shown in the following section. |

## Q2: If the answer to Q1 is yes, do you agree that this should also be specified for PUSCH/PUCCH？

|  |  |  |
| --- | --- | --- |
| **Company** | **Agree or Not Agree** | **Comments** |
| MediaTek |  | We agree with that current spec doesn’t reflect that the UE shall determine UL PC parameters from ***ul-PowerControl*** configured in the UL BWP if UL PC parameters are not included in the joint/UL TCI state. Note that this behavior is applicable to PUCCH/PUSCH/SRS.One potential CR could be:

|  |
| --- |
| In the remaining of this clause, if a UE is provided *TCI-State* in *dl-OrJointTCI-StateList* or *TCI-UL-State* and for an indicated *TCI-State* or *TCI-UL-State* as described in [6, TS 38.214] - in clauses 7.1.1, 7.2.1, and 7.3.1, the RS index $q\_{d}$ for obtaining the downlink pathloss estimate for PUSCH, PUCCH, and SRS transmission is provided by pathlossReferenceRS-Id-r17 associated with or included in the indicated *TCI-State* or *TCI-UL-State* except for SRS transmission that is not provided *followUnifiedTCI-StateSRS*- in clause 7.1.1, if *p0AlphaSetforPUSCH* is provided, the values of $P\_{O\\_UE\\_PUSCH,b,f,c}\left(j\right)$, $α\_{b,f,c}\left(j\right)$, and the PUSCH power control adjustment state $l$ are provided by *p0AlphaSetforPUSCH* associated with the indicated *TCI-State* or *TCI-UL-State*, or provided by *p0AlphaSetforPUSCH* in *BWP-UplinkDedicated*- in clause 7.2.1, if *p0AlphaSetforPUCCH* is provided, the values of $P\_{O\\_UE\\_PUCCH}\left(q\_{u}\right)$ and the PUCCH power control adjustment state $l$ are provided by *p0AlphaSetforPUCCH* associated with the indicated *TCI-State* or *TCI-UL-State* or provided by *p0AlphaSetforPUCCH* in *BWP-UplinkDedicated*- in clause 7.3.1, if *p0AlphaSetforSRS* is provided, - if *followUnifiedTCI-StateSRS* is provided for a SRS resource set, the values of $P\_{O\\_UE\\_SRS,b,f,c}\left(q\_{s}\right)$, $α\_{SRS,b,f,c}\left(q\_{s}\right)$, and SRS power control adjustment state $l$ are provided by *p0AlphaSetforSRS* associated with the indicated *TCI-State* or *TCI-UL-State* or provided by *p0AlphaSetforSRS* in *BWP-UplinkDedicated*- else, if *followUnifiedTCI-StateSRS* is not provided for a SRS resource set and for a SRS resource from the SRS resource set, the values of $P\_{O\\_UE\\_SRS,b,f,c}\left(q\_{s}\right)$, $α\_{SRS,b,f,c}\left(q\_{s}\right)$, and SRS power control adjustment state $l$ are provided by *p0AlphaSetforSRS* associated with *TCI-State* or *TCI-UL-State* of an SRS resource with lowest *SRS-ResourceId* in the SRS resource set or provided by *p0AlphaSetforSRS* in *BWP-UplinkDedicated*, and a RS index $q\_{d}$ for obtaining a pathloss estimate for the SRS transmission is provided by *pathlossReferenceRS-Id-r17* associated with or included in the *TCI-State* or *TCI-UL-State* of an SRS resource with lowest *SRS-ResourceId* in the SRS resource set$P\_{O\\_SRS,b,f,c}\left(q\_{s}\right)$ is the sum of the component $P\_{O\\_UE\\_SRS,b,f,c}\left(q\_{s}\right)$ and a component *p0* provided by *SRS-ResourceSet* corresponding to the SRS resource set. |

Note that in TS38.331, it is already clarified that ul-powerControl is configured either in joint/UL TCI states or in BWP-Uplink-Dedicated.***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. This field refers to an element in the list configured using *uplink-PowerControlToAddModList* in the serving cell where the *ul-TCI-ToAddModList* is configured. |
| Samsung | Agree | Based on the agreement in RAN1#105-e, PUCCH and PUSCH need to be considered as well as SRS.

|  |
| --- |
| **Agreement**On the setting of UL PC parameters except for PL-RS (P0, alpha, closed loop index) for Rel.17 unified TCI framework,* For each of PUSCH and PUCCH, the setting of (P0, alpha, closed loop index) can be associated with UL or (if applicable) joint TCI state per BWP.
	+ In this case, multiple settings are configured. Each setting can be associated with at least one TCI state, and, for a given TCI state, only one setting for PUSCH and only one setting for PUCCH can be associated at a time.
	+ (Working Assumption) In this case, for each of the PUSCH and PUCCH, each of the activated UL or (if applicable) joint TCI states is associated with one of the settings.
* If not associated, for each of the PUSCH and PUCCH, the setting(s) of (P0, alpha, closed loop index) per channel/signal per BWP is independent of the UL or (if applicable) joint TCI states
* FFS: If the setting of (P0, alpha, closed loop index) for SRS can also be associated with UL or (if applicable) joint TCI state.
* FFS: (to be decided in RAN1#106-e) whether to configure the same setting of (P0, alpha, closed loop index) per TCI state across channels and apply a channel dependent component, or configure a channel dependent setting of (P0, alpha, closed loop index) per TCI state
 |

However, the current TP in this CR is not sufficient to cover the above considerations and to distinguish the method for UL PC parameter determination. So, we would like to suggest the TP considering the configuration of IE *ul-powerControl-r17* in *BWP-UplinkDedicated* of TS38.331 as follow:

|  |
| --- |
| In the remaining of this clause, if a UE is provided *TCI-State* in *dl-OrJointTCI-StateList* or *TCI-UL-State,* and is not configured *ul-powerControl-r17 in BWP-UplinkDedicated,* and for an indicated *TCI-State* or *TCI-UL-State* as described in [6, TS 38.214] - in clauses 7.1.1, 7.2.1, and 7.3.1, the RS index $q\_{d}$ for obtaining the downlink pathloss estimate for PUSCH, PUCCH, and SRS transmission is provided by pathlossReferenceRS-Id-r17 associated with or included in the indicated *TCI-State* or *TCI-UL-State* except for SRS transmission that is not provided *followUnifiedTCI-StateSRS*- in clause 7.1.1, if *p0AlphaSetforPUSCH* is provided, the values of $P\_{O\\_UE\\_PUSCH,b,f,c}\left(j\right)$, $α\_{b,f,c}\left(j\right)$, and the PUSCH power control adjustment state $l$ are provided by *p0AlphaSetforPUSCH* associated with the indicated *TCI-State* or *TCI-UL-State*- in clause 7.2.1, if *p0AlphaSetforPUCCH* is provided, the values of $P\_{O\\_UE\\_PUCCH}\left(q\_{u}\right)$ and the PUCCH power control adjustment state $l$ are provided by *p0AlphaSetforPUCCH* associated with the indicated *TCI-State* or *TCI-UL-State*- in clause 7.3.1, if *p0AlphaSetforSRS* is provided, - if *followUnifiedTCI-StateSRS* is provided for a SRS resource set, the values of $P\_{O\\_UE\\_SRS,b,f,c}\left(q\_{s}\right)$, $α\_{SRS,b,f,c}\left(q\_{s}\right)$, and SRS power control adjustment state $l$ are provided by *p0AlphaSetforSRS* associated with the indicated *TCI-State* or *TCI-UL-State*- else, if *followUnifiedTCI-StateSRS* is not provided for a SRS resource set and for a SRS resource from the SRS resource set, the values of $P\_{O\\_UE\\_SRS,b,f,c}\left(q\_{s}\right)$, $α\_{SRS,b,f,c}\left(q\_{s}\right)$, and SRS power control adjustment state $l$ are provided by *p0AlphaSetforSRS* associated with *TCI-State* or *TCI-UL-State* of an SRS resource with lowest *SRS-ResourceId* in the SRS resource set and a RS index $q\_{d}$ for obtaining a pathloss estimate for the SRS transmission is provided by *pathlossReferenceRS-Id-r17* associated with or included in the *TCI-State* or *TCI-UL-State* of an SRS resource with lowest *SRS-ResourceId* in the SRS resource set$P\_{O\\_SRS,b,f,c}\left(q\_{s}\right)$ is the sum of the component $P\_{O\\_UE\\_SRS,b,f,c}\left(q\_{s}\right)$ and a component *p0* provided by *SRS-ResourceSet* corresponding to the SRS resource set.In the remaining of this clause, if a UE is provided *TCI-State* in *dl-OrJointTCI-StateList* or *TCI-UL-State,* and is configured *ul-powerControl-r17 in BWP-UplinkDedicated,* and for an indicated *TCI-State* or *TCI-UL-State* as described in [6, TS 38.214] * in clause 7.1.1, if *p0AlphaSetforPUSCH* is provided, the values of $P\_{O\\_UE\\_PUSCH,b,f,c}\left(j\right)$, $α\_{b,f,c}\left(j\right)$, and the PUSCH power control adjustment state $l$ are provided by *p0AlphaSetforPUSCH*in *BWP-UplinkDedicated*
* in clause 7.2.1, if *p0AlphaSetforPUCCH* is provided, the values of $P\_{O\\_UE\\_PUCCH}\left(q\_{u}\right)$ and the PUCCH power control adjustment state $l$ are provided by *p0AlphaSetforPUCCH* in *BWP-UplinkDedicated*
* in clause 7.3.1, if *p0AlphaSetforSRS* is provided, the values of $P\_{O\\_UE\\_SRS,b,f,c}\left(q\_{s}\right)$, $α\_{SRS,b,f,c}\left(q\_{s}\right)$, and SRS power control adjustment state $l$ are provided by *p0AlphaSetforSRS* in *BWP-UplinkDedicated*

$P\_{O\\_SRS,b,f,c}\left(q\_{s}\right)$ is the sum of the component $P\_{O\\_UE\\_SRS,b,f,c}\left(q\_{s}\right)$ and a component *p0* provided by *SRS-ResourceSet* corresponding to the SRS resource set.…/// |

 |
| Mod |  | So far, most companies agree that all of SRS/PUSCH/PUCCH need to be specified. Regarding the details of the potential spec changes, we have two options. One is that we add the PC parameters for all the cases on the current spec while the other is constructing a new paragraph to describe how the PC parameters are configured from BWP part.From the moderator’s point of view, either way can work. Let us check the preferences from other companies and any further comments. |

# Reference

1. R1-2408012 Draft CR on determination of SRS power control parameters in unified TCI framework CATT