**3GPP TSG RAN WG1 #112bis-e R1-230xxxx**

**e-Meeting, April 17th – April 26th, 2023**

**Agenda item:** 7.2

**Source:** Moderator (ZTE)

**Title:** Moderator Summary #0 for Maintenance on Rel-17 Multi-Beam

**Document for:** Discussion and Decision

## Introduction

The following in Section 2 and Section 3 is assigned for discussion on maintenance on normal and editorial issues of Rel-17 Multi-Beam in FeMIMO. Please provide your comments in corresponding sections.

## Summary of normal issues

### Issue 1-1 Draft CR on the power control for SRS resource set for noncodebook (R1-2302733)

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| --- | --- |
| ***Reason for change:*** | When separate TCI framework is configured, only CSI-RS for beam management which only has 1 or 2 ports, SSB with single ports or SRS for beam management can be configured in the TCI state for the UE to determine the UL beam, with which the UE cannot obtain the full DL channel matrix to calculate the proper precoder for SRS transmission. In other words, the associated NZP CSI-RS may have more than 2 ports for the UE to obtain the full DL channel matrix, should be configured for the SRS resource set for non-codebook at least when separate TCI framework is configured. And in that case, the SRS shall not be configured with TCI state or be indicated to follow the indicated unified TCI state according to Rel-15 principle.  In summary, when an SRS resource set is configured with an associated NZP CSI-RS, how to determine the power control parameters including PL-RS, P0, alpha, closed loop index should be specified |
|  |  |
| ***Summary of change:*** | 1. Add the UE behavior to obtain the power control parameters for SRS resource set configured with associated NZP CSI-RS. |
|  |  |
| ***Consequences if not approved:*** | The UE does not know how to determine the power control related parameters when the SRS resource for non-codebook is configured with associated NZP CSI-RS. |

Due to above, the following draft CR is provided in R1-2302733:

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**7 Uplink Power control**

<unrelated part omitted>

In the remaining of this clause, if a UE is provided *TCI-State* in *dl-OrJoint-TCIStateList* 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 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 *followUnifiedTCIstateSRS*

- 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*

- in clause 7.3.1, if *p0AlphaSetforSRS* is provided,

- if the higher layer parameter *usage* in *SRS-ResourceSet* set to 'nonCodebook' and a higher layer parameter *associatedCSI-RS* is configured in *SRS-ResourceSet,* thevalues of , , and SRS power control adjustment state are provided by *p0AlphaSetforSRS* associated with the indicated *TCI-State* or *TCI-UL-State*

- else, if *followUnifiedTCIstateSRS* is provided for a SRS resource set, the values of , , and SRS power control adjustment state are provided by *p0AlphaSetforSRS* associated with the indicated *TCI-State* or *TCI-UL-State*

- else, if *followUnifiedTCIstateSRS* is not provided for a SRS resource set and for a SRS resource from the SRS resource set, the values of , , and SRS power control adjustment state 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 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

<unrelated part omitted>

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Please provide company’s view in the table below.

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| --- | --- |
| Company | Comment |
| Mod\_V00 | FL note: Above is to clarify UL power control of SRS transmission for NCB but which is configured with associated NZP CSI-RS.  Please provide your views for this issue, and then do you have any further views on the draft CR, if identifying the essentiality from your side. |
| Lenovo | Firstly, according to Rel-15 principle, where spatial relation and associated NZP CSI-RS are not expected to be concurrently configured for the SRS resource for non-codebook. If the same principle is followed in Rel-17 unified TCI framework, if a UE is configured with  As discussed in our contribution, with unified associated NZP CSI-RS for SRS resource for noncodebook, the UE does not expect to be configured with TCI-State(or TCI-UL\_State) or be configured to follow the indicated unified TCI state.  As discussed in our contribution, when separate TCI state mode is configured, only SSB or SRS for BM or CSI-RS for BM(which has one or two ports) configured as the RS for UL TCI state, which cannot be used to obtain the full DL channel matrix to calculate the precoders for the SRS transmission, as a result, associated NZP CSI-RS should be configured for the SRS for non-codebook, and the associated NZP CSI-RS may have more than two ports, which can not be directly used as PL-RS. Therefore, this CR is needed. |
| ZTE | Seems not needed.  According to current spec, if the higher layer parameter *usage* in *SRS-ResourceSet* set to 'nonCodebook' and a higher layer parameter *associatedCSI-RS* is configured in *SRS-ResourceSet,* whether PC parameters follow unified TCI state or not still depends on *followUnifiedTCIstateSRS* is provided or not respectively.  According to Lenovo, if an NCB SRS is configured with associated NZP CSI-RS, this SRS should not be configured with *followUnifiedTCIstateSRS*, then how to obtain PC parameters? To our understanding, it should follow the revised legacy method (i.e., with lowest *SRS-ResourceId* as in current spec), but not follow unified TCI as suggested by the CR. |
| Docomo | We are fine with the CR. |
| Ericsson | We are a little confused. Isn’t this identical to R1-2300521, which was rejected in RAN1#112? |
| QC | Agree with E/// that this one has been closed. The spec is clear on the UE behavior. To our understanding, SRS following unified TCI also has use case, i.e. both associated CSI-RS and SRS follow unified TCI. This is different from legacy where SRS cannot have spatial relation. |
| vivo | Agree with Ericsson, this CR has been rejected in RAN1#112 |
| Mod\_V07 | As mentioned by several companies, since the previous version of CR R1-2300521 has been rejected, and if non-consensus of identifying anything changed, we may have to reject that again. |
| LG | Fine with the FL assessment on this CR |
| Samsung | Agree with Moderator’s assessment. |
| OPPO | We do not think this CR is needed. Furthermore, this issue was discussed and corresponding CR was rejected. |
| Lenovo | @ZTE, according to Rel-15 principle, if a NCB SRS is configured with associated NZP CSI-RS, neither *followUnifiedTCIstateSRS* nor TCI state for each SRS resource cannot be configured. The UE cannot obtain the PC parameters with lowest *SRS-ResourceId* in this case.  If it is a common understanding that either *followUnifiedTCIstateSRS* or TCI state can be configured for NCB SRS configured with associated NZP CSI-RS, we suggest to have conclusion since it does not align with Rel-15 principle. |
| QC | Support FL’s proposal. Also, the spec is clear. No need conclusion for every difference |

### Issue 1-2 Value range mismatch of p0 for SRS/PUCCH in Rel-17 unified TCI framework (R1-2303691, R1-2303692)

In Rel-17 unified TCI framework, the following TPC parameters can be configured by p0-r17, and determined based on the indicated TCI

* for PUSCH transmit power control
* for PUCCH transmit power control
* for SRS transmit power control

**P0 for SRS**

As mentioned in R1-2303691, we have the following observation based on the current RRC for unified TCI (details can be found in the corresponding contribution)

* for PUSCH transmit power control is the differential target power in TS38.213.
  + The value range is (-16..15)
* for SRS transmit power control is the absolute target power in TS38.213.
  + The value range is (-202..24)
* The same RRC parameter of p0-r17 in P0AlphaSet-r17, whose value range is {-16..15}, is used for the indication of for PUSCH and for SRS in TS38.331.

That means that we have a serious mismatch of value range for P0 in SRS transmission, if being based on unified TCI framework.

In R1-2303061, the following candidate solution (option-1/2) are provided. Besides for that, from the Moderator’s perspective, in order to avoid the RRC signaling update, one alternative solution may be like what we did for closed loop procedure for SRS in RAN1#111, i.e., reuse the legacy P0 parameter if legacy P0 for SRS is provided in a SRS resource set. Then, we have the following candidate solution

**Proposal: Down select from the following options:**

* + **Option 1: Existing p0-r17 = {-16..15} in P0AlphaSet-r17 is not used for SRS, and introduce new RRC parameter of p0Srs-r17 = {-202..24} in P0AlphaSet-r17 to indicate the absolute target power for SRS.**
    - **Send LS to RAN2 to inform the above.**
  + **Option 2: Reuse existing p0-r17 = {-16..15} in P0AlphaSet-r17 for SRS, and discuss in RAN1 how to indicate the absolute target power for SRS.**

Please provide company’s view in the table below.

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| --- | --- |
| Company | Comment |
| Mod\_V00 | FL note: Above seems essential, otherwise we may have to experience unintended absolute target power (i.e., just from -16..15) for SRS transmission in the unified TCI framework.  Please provide your views for this issue, and then do you have any further views on above candidate solution (or any other recommendation from your side), if identifying the essentiality from your side. |
| Lenovo | Support option 1. |
| ZTE | Option 2 is not a clear solution. It may need to add a P0\_nominal of for PUSCH or for PUCCH on the current P0-r17 for SRS. But P0\_nominal of for PUSCH or for PUCCH is not designed for SRS, it is not reasonable to be reused for SRS.  So we prefer Option 1. |
| Docomo | We prefer Opt.1 because it is simpler and clearer solution to solve the problem.  For Opt.2, we have similar view as ZTE. If we reuse P0 nominal of PUCCH/PUSCH for SRS, it has large impact on TS38.213, and flexibility of indication for P0 value range would be restricted than Rel.15. To avoid it, we may need to add new RRC parameter of P0 nominal for SRS, but it impacts RRC after all. Hence, we think Opt.2 is better. |
| Ericsson | Truly an essential CR. We prefer Opt2  The intention with including the power control parameters in the TCI state is to align the power control across different channels. We prefer to continue to follow that path, and hence prefer opt2, to introduce a nominal transmit power also for SRS.  We note that opt1 would have larger impacts to RRC, and it would destroy the alignment of the signaling structure RAN2 has designed. |
| QC | Support Option 1, which is a clean solution. |
| vivo | Fine to discuss.  For SRS, is provided by p0 only, where p0 is the absolute value. And its range is [-202, 24] in R15. While in R17 unified TCI framework,   is provided by p0AlphaSetforSRS-r17 associated with the indicated TCI state, where the range of p0 is [-16,15]. Whether the range under the unified TCI framework is enough for SRS should be discussed. |
| Mod\_V07 | From the moderator perspective, if going with Option-1, we may have RRC impact that should not be good at this moment. But, if we have consensus about that, we should send the corresponding LS to RAN2 this meeting ASAP.  Then, regarding vivo’s comment, in my understanding is correct, the typical configuration of P0 is from -90 to -50. It seems that the value of [-16,15] is too high (as you see, the typical UL Tx power of a UE may be only 23/26 dBm). |
| Docomo2 | Regarding to vivo’s comment, we agree with Mod\_V07, the absolute value of [-16,15] for P0 is too high.  Regarding to Ericsson’s comment for Opt.1, we don’t need to change the principle that P0/alpha sets for PUSCH/PUCCH/SRS are configured per TCI state. Potential impact of Opt.1 is to add new RRC parameter of p0Srs-r17 = {-202..24} in P0AlphaSet-r17 as OPTIONAL parameter, in addition to the current p0-r17. Then, p0AlphaSetforSRS-r17 can use the new P0 value range of p0Srs-r17. The detail discussion can be done in RAN2, if we send LS.  Current TS38.331:  Uplink-powerControl-r17 ::= SEQUENCE {  ul-powercontrolId-r17 Uplink-powerControlId-r17,  p0AlphaSetforPUSCH-r17 P0AlphaSet-r17 OPTIONAL, -- Need R  p0AlphaSetforPUCCH-r17 P0AlphaSet-r17 OPTIONAL, -- Need R  p0AlphaSetforSRS-r17 P0AlphaSet-r17 OPTIONAL -- Need R  }  P0AlphaSet-r17 ::= SEQUENCE {  p0-r17 INTEGER (-16..15) OPTIONAL, -- Need R  alpha-r17 Alpha OPTIONAL, -- Need S  closedLoopIndex-r17 ENUMERATED { i0, i1 }  } |
| LG | It would be better to send LS on the identified issue on value range to RAN2. Depending the response on that, it could be discussed further. |
| Samsung | Slightly prefer option 2 to align power control across all uplink channels and signals. |
| OPPO | We support Option 1. It is just a mismatch of RRC parameter, Option 1 is the most easy way to resolve it.  The issue of Option 2 is it would introduce some new rule, which is not preferred. |
| QC | We are also fine to leave the solution to RAN2 if the issue is agreed |

**P0 for PUCCH**

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| ***Reason for change:*** | In Rel-17 FeMIMO WI, unified TCI framework is supported. One of the related features is to configure/indicate TPC parameters (i.e., p0, alpha, power control adjustment state) for PUSCH/PUCCH/SRS according to a RRC parameter Uplink-powerControl-r17, where the value range (-16..15) dB is considered for p0 configuration. The value range fits for the configuration of “differential target power”, e.g., for PUSCH, or for PUCCH.  In Clause 7, however, it is now described that for PUCCH, “ is provided by *p0AlphaSetforPUCCH* (configured in Uplink-powerControl-r17) associated with the indicated *TCI-State* or *TCI-UL-State”*. is nominal (absolute) target power, whose range is (-202..24) in general.  In our understanding, the intention of p0 configuration/update based on Rel-17 unified TCI is differential value. Therefore, the value range of p0-r17 in *p0AlphaSetforPUCCH* specified in 38.331 seems correct, and Clause 7 of 38.213 aims at the configuration/update of a wrong TPC parameter. |
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| ***Summary of change:*** | Change one of the TPC parameters configured/indicated for PUCCH in case Rel-17 unified TCI is configured, from to . |
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| ***Consequences if not approved:*** | Unintended transmit power is configured/indicated for PUCCH in case uTCI is configured. |

Due to above, the following draft CR is provided in R1-2303692:

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**7 UL 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 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 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 , , 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*

- in clause 7.3.1, if *p0AlphaSetforSRS* is provided,

- if *followUnifiedTCI-StateSRS* is provided for a SRS resource set, the values of , , and SRS power control adjustment state 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 , , and SRS power control adjustment state 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 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

**< Unchanged parts are omitted >**

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Please provide company’s view in the table below

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| Company | Comment |
| Mod\_V00 | FL note: Above is to clarify that the unified TCI state is just to indicate UE-specific P0 for PUCCH transmission, as PUSCH. That seems reasonable, and, if approved, we can assume that as an alignment CR.  Please provide your views for this issue, and then do you have any further views on the draft CR, if identifying the essentiality from your side. |
| Lenovo | Support |
| ZTE | Support. |
| Docomo | Support. |
| Ericsson | Support |
| QC | Support |
| vivo | Support |
| LG | Support |
| Samsung | Support |
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## Summary of editorial (E) issues

Companies are to share their inputs on the editorial CR for the following issues herein.

### Issue 2-1

* R1-2302734 Draft CR on UL-TCI-State configuration in TS38.214 Lenovo

Table 1 Companies’ inputs

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| --- | --- |
| Company | Comment |
| Lenovo | This CR is for clarification and it should be captured. |
| ZTE | Generally agree with the logic of the editorial CR, i.e., to clarify the relation between joint/UL TCI state element and joint/UL TCI state list. But we have some comments as follows:   1. The CR is not based on latest version of h05, but based on h04. e.g., the highlighted parts have been updated in h05.  |  | | --- | | 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: |  1. Besides the CR, there are some places in 38.213 and 38.214 as shown below which need to be updated accordingly based on the same logic of the CR.  |  | | --- | | **38.214:**  Section 5.1.5:  if the UE is configured with *dl-OrJointTCI-StateList* or *ul-TCI-StateList ...*  a UE configured with *dl-OrJointTCI-StateList* with activated *TCI-State* or *ul-TCI-StateList* with activated *TCI-UL-State* receives DCI format 1\_1/1\_2 providing indicated *TCI-State* and/or *TCI-UL-State* for a CC or ...  If a UE receives a higher layer configuration of *dl-OrJointTCI-StateList* with a single TCI-State or *ul-TCI-StateList* with a single *TCI-UL-State*, ...  if UE is configured with *TCI-State* in *dl-OrJointTCI-StateList* or *TCI-UL-State* in *ul-TCI-StateList* with , ...  Section 6.1 and 6.2.1:  When the UE is configured *dl-OrJointTCI-StateList* or *ul-TCI-StateList* ,  **38.213:**  sections 6 and 7  If a UE is provided *dl-OrJointTCI-StateList* or *ul-TCI-StateList* indicating a unified TCI state  if a UE is provided *TCI-State* in *dl-OrJointTCI-StateList* or *TCI-UL-State* in *ul-TCI-StateList* and for an indicated *TCI-State* or *TCI-UL-State* | |
| Docomo | Support ZTE’s version. |
| Ericsson | The current specification is fine, there is no risk for misunderstanding.: there is only one way the UE can be provided with more than one UL TCI state. If we want to change *UL-TCI-State* to *TCI-State-UL*, we can directly contact the editor. |
| QC | Fine with ZTE’s change |
| vivo | Fine with ZTE’s change |
| LG | Fine with ZTE’s version |
| Samsung | OK |
| OPPO | Ok |
| Lenovo | We are fine with ZTE’s change |
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## Conclusion

# References

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| --- | --- | --- | --- |
| 1 | [**R1-2302733**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_112b-e/Docs/R1-2302733.zip) | Draft CR on the power control for SRS resource set for noncodebook | Lenovo |
| 2 | [**R1-2302734**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_112b-e/Docs/R1-2302734.zip) | Draft CR on UL-TCI-State configuration in TS38.214 | Lenovo |
| 3 | [**R1-2303691**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_112b-e/Docs/R1-2303691.zip) | Discussion on value range mismatch of p0 for SRS/PUCCH in Rel-17 unified TCI framework | NTT DOCOMO, INC. |
| 4 | [**R1-2303692**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_112b-e/Docs/R1-2303692.zip) | Draft CR on value range mismatch of p0 for PUCCH in Rel-17 unified TCI framework | NTT DOCOMO, INC. |