**3GPP TSG RAN WG1 Meeting #109-e R1-220xxxx**

**E-Meeting, May 9 – May 20, 2022**

**Agenda Item: 7.2.5**

**Source: Moderator (Huawei, HiSilicon)**

**Title: Summary of [109-e-R16-URLLC-03] Issue#3: Discussion on SRS configurations with usage of '*beamManagement*' in *srs-ResourceSetToAddModListDCI-0-2***

**Document for: Discussion and Decision**

# Introduction

Following email thread is dedicated to discuss the Determination of SRS resource set with usage ‘*beamManagement*’. This issue has been raised in R1-2203111 [1].

[109-e-R16-URLLC-03] Issue#5: Discussion on SRS configurations with usage of '*beamManagement*' in *srs-ResourceSetToAddModListDCI-0-2* by May 13 – Thorsten (Huawei)

**Due to the short time available for discussion, please provide you input for the first round before May 10, 17:00 pm (UTC)**

**Background**

In previous meetings the SRS configurations in srs-ResourceSetToAddModListDCI-0-2 with usage of value ‘*codebook*’, ’*nonCodebook*’ and ‘*antennaSwitching*’ were disucssed and addressed, however there is no disucssion/conclusion for the case of SRS resource set with usage set to '*beamManagement*' yet. Therefore, it seems further discussion/clarification is needed.

# Discussion

## Round 1

In Rel-15, the SRS resource set(s) configured in *srs-ResourceSetToAddModList* can be used for beam management. For SRS resource set(s) with *usage* set to ‘*beamManagement*’, FG 2-30 was introduced to let the UE report the maximum number of SRS resource sets and the maximum number of SRS resources per resource set that can be supported.

In Rel-16, independent from *srs-ResourceSetToAddModList* used for DCI format 0\_1/1\_1, *srs-ResourceSetToAddModListDCI-0-2* was introduced for DCI formats 0\_2/1\_2, and the SRS resource set(s) configured in *srs-ResourceSetToAddModListDCI-0-2* can be set to usage ‘*beamManagement*’.

In [1] it is suggested that similar to the previous discussions for the other usages of SRS resource sets, the maximum number of SRS resource sets configured with usage ‘*beamManagement*’ and the maximum number of SRS resource per set should not be increased compared to Rel-15, since this would need a new UE capability which is not reasonable for this functionality at this late stage.

To achieve that, it is proposed in [1] that the maximum value for the number of SRS resource set(s) reported in FG 2-30 shall be applicable regardless if SRS resource set(s) are configured in *srs-ResourceSetToAddModList* or in *srs-ResourceSetToAddModListDCI-0-2*. An approach similar to the agreement made last meeting for ‘*antennaSwitching*’ [2] is suggested, i.e. the SRS resource set(s) in *srs-ResourceSetToAddModListDCI-0-2* should be the same or a subset of the SRS resource set(s) in *srs-ResourceSetToAddModList*.

Additionally, it is suggested that the value reported for the maximum number of SRS resource per set shall be applicable to any SRS resource set with *usage* set to ‘*beamManagement*’, regardless is the SRS resource set is configured in *srs-ResourceSetToAddModList* or in *srs-ResourceSetToAddModListDCI-0-2*.

To reflect the above considerations, the following proposal is made.

***Proposal 1: In Rel-16, for SRS resource set(s) configured with usage ‘beamManagement’***

* ***The supported maximum number of SRS resource set(s) reported in FG 2-30 shall be applicable regardless of if SRS resource set(s) with usage set to 'beamManagement' are configured in srs-ResourceSetToAddModList or in srs-ResourceSetToAddModListDCI-0-2.***
* ***For usage ‘beamManagement’, the SRS resource set(s) in srs-ResourceSetToAddModListDCI-0-2 are the same or a subset of the SRS resource set(s) in srs-ResourceSetToAddModList.***
* ***The supported maximum number of SRS resources per set reported in FG 2-30 shall be applicable to any SRS resource set with usage set to 'beamManagement', regardless if the SRS resource set is configured in srs-ResourceSetToAddModList or in srs-ResourceSetToAddModListDCI-0-2.***

**Q1: Companies are encouraged to share their view whether they support Proposal 1. If disagree, please give also your reasons or come with comments for modification.**

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| Company | Comments |
| Nokia/NSB | **Initial input:** Our understanding here would be, that if we would agree to the 2nd bullet point there would not be any need for the 1st and 3rd bullet anymore. So would then actually the proposal for the 2nd bullet would be sufficient!?On the potential TP / CR, this should be coordinated with URLLC-04 discussions (also lead by Thorsten), as we then would not need the same description twice – i.e. the green parts could just be added on top of the TP in 04: When the higher layer parameter *usage* is set to '*antennaSwitching*' or ‘*beamManagement*’, the SRS resource set(s) configured in *srs-ResourceSetToAddModListDCI-0-2* are either equal to or are a subset of the SRS resource set(s) with the same usage configured in *srs-ResourceSetToAddModList.*[Moderator]: Thanks a lot for the comment. Please see my thinking in the moderator comment below |
| Apple | Thorsten’s proposal seems okay:The first and 3rd proposals seem necessary if it is allowed that the SRS resource set/resources are configured for 0\_2 but not for 0\_1. Klaus’ suggestion is a solution for that, so the configuration for 0\_1 should always there if the configuration for 0\_2 is present (then with the 2nd proposal it is a complete solution).[Moderator]: Thanks a lot for the comment. Please see my thinking in the moderator comment below |
| ZTE | We agree the intention that new UE capability should be avoided in this stage. Even without this proposal or the second bullet, the maximum number of SRS resource set reported shall be applicable for a cell regardless of configuration parameter of the SRS resource because FG 2-30 is per band capability. So we don’t think the first bullet or the last bullet is needed.For the second bullet, we agree the intention, which is similar as the SRS for ‘antennaswitching’ discussed in the last meeting. However, we slightly prefer to make a conclusion without spec impact.[Moderator]: Thanks a lot for the comment. Please see my thinking in the moderator comment below |
| Moderator | **@Nokia, Apple, ZTE:** I tend to agree to your thinking: if we would agree on the second bullet and apply the solution suggested by Klaus, then implicitly we could come to the conclusion that the first and third bullet are not needed. But to reach to this conclusion in an implicit manner could be a bit confusing and it would be better to directly spell it out I think. Please see below, how I am thinking:* In Rel-15, UE capability signalling is introduced for SRS resource sets with usage beam management. Both the maximum number of resource sets and the maximum number of SRS resources per set shall be reported as sequence. I copied the corresponding signalling as defined in 38.331 below:

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| uplinkBeamManagement SEQUENCE { maxNumberSRS-ResourcePerSet-BM ENUMERATED {n2, n4, n8, n16}, maxNumberSRS-ResourceSet INTEGER (1..8) } OPTIONAL, |

* Since the signalling has been introduced in Rel-15 it is applicable to *srs-ResourceSetToAddModList*. Since no further clarification is given in Rel16 for *srs-ResourceSetToAddModListDCI-0-2*, it can be assumed that the signalling only is applicable to *srs-ResourceSetToAddModList*. That is the reason why we suggest the 1st and 3rd bullet, to avoid misunderstanding and to make clear that the signalling in 38.331 applies to both SRS resource lists.
* However, given that we would agree on the second bullet (and maybe even capture it with the suggestion given by Klaus), the validity of the first and third bullet could be derived implicitly without actually agreeing on it, because
	+ If the gNB wants to configure a given SRS resource set with usage ‘*beamManagemen*t’ in *srs-ResourceSetToAddModListDCI-0-2*, the second bullet implies that the same SRS resource set also has to be configured in *srs-ResourceSetToAddModList.*
	+ For configuration of the given SRS resource set in *srs-ResourceSetToAddModList.*, the gNB has to follow the capabilities as they have been reported.
	+ Thus, indirectly, the capabilities reported for *ResourceSetToAddModList* also apply for *ResourceSetToAddModListDCI-0-2*

I think it is hard to follow these logical steps for bullet 1 and 3 and it would not harm to spell them out. Based on the comments above, would anyone have strong concern to agree on the second bullet and to capture the bullets 1 and 3 as notes for clarity?**Modified Proposal:*****Proposal 1: In Rel-16, for SRS resource set(s) configured with usage ‘beamManagement’*** * ***For usage ‘beamManagement’, the SRS resource set(s) in srs-ResourceSetToAddModListDCI-0-2 are the same or a subset of the SRS resource set(s) in srs-ResourceSetToAddModList.***

***Note, this implies that**** ***The supported maximum number of SRS resource set(s) reported in FG 2-30 shall be applicable regardless of if SRS resource set(s) with usage set to 'beamManagement' are configured in srs-ResourceSetToAddModList or in srs-ResourceSetToAddModListDCI-0-2.***
* ***~~For usage ‘beamManagement’, the SRS resource set(s) in srs-ResourceSetToAddModListDCI-0-2 are the same or a subset of the SRS resource set(s) in srs-ResourceSetToAddModList.~~***
* ***The supported maximum number of SRS resources per set reported in FG 2-30 shall be applicable to any SRS resource set with usage set to 'beamManagement', regardless if the SRS resource set is configured in srs-ResourceSetToAddModList or in srs-ResourceSetToAddModListDCI-0-2.***
 |
| Samsung | Thanks for modified proposal. We agree with Nokia’s view. That is, the first sub-bullet for the modified proposal is still sufficient (as a conclusion). Note that Rel-16 had been completed more than two years. So, we should consider only essential things.  |
| vivo | Thanks for the modified proposal. Since *srs-ResourceSetToAddModListDCI-0-2* and *srs-ResourceSetToAddModList* can be configured independently, can we update the main bullet as ‘**For usage ‘*beamManagement*’, the SRS resource set(s) in *srs-ResourceSetToAddModListDCI-0-2* are the same or a subset of the SRS resource set(s) in *srs-ResourceSetToAddModList***, if configured.’?[Moderator]: Thanks a lot for the comment. Please see my thinking in the moderator comment below. |
| Nokia/NSB 2 | Thanks Thorsten for the updates & taking our initial comments into account. Still one question: in the ‘antenna switching’ discussion of URLLC-04 it has been identified that actually there the same SRS resource set(s) – and not including any subset can reconfigured. Would then same then also apply here? i.e. ‘**For usage ‘*beamManagement*’, the SRS resource set(s) in *srs-ResourceSetToAddModListDCI-0-2* are the same as ~~or a subset of~~ the SRS resource set(s) in *srs-ResourceSetToAddModList***, if configured.’?And if we go down that route, we would prefer to have this captured in 38.213 together with the antenna switching issue in the parallel thread. [Moderator]: Thanks a lot for the comment. Please see my thinking in the moderator comment below. |
| Moderator | **@Nokia, vivo:** regarding the “*if configured*”If we want to have a handling that is aligned with Thread 4 for ‘*antennasSwitching*’, then “if configured” cannot be added here according to my understanding. The reason is that if the Resource Sets configured in *ResourceSetToAddModListDCI-0-2*shall not be different from SRS resource sets with same usage in *srs-ResourceSetToAddModList* , then as soon as a resource sets with a given usage is configured in *ResourceSetToAddModListDCI-0-2* then it also has to be configured in *srs-ResourceSetToAddModList.***@Nokia,** regarding the same resource sets or subsetThe intention here is to align the handling for usage ‘*antennaSwitching*’ and ‘*beamManagement*’. The agreement for “antennaSwitching” is: “The SRS resource set(s) with usage=”*antennaswitching*” configured in *srs-ResourceSetToAddModListDCI-0-2* shall not be different from the SRS resource set(s) configured in *srs-ResourceSetToAddModListDCI* with the same usage”My interpretation of this agreement is that if resource sets with a given usage are defined in the new list (i.e. in …*DCI-0-2*), then the very same resource sets need also to be configured in the Rel-15 list (i.e. ….*ModListDCI)*. But not limited to them, my understanding is that in the old list there could also be some other resource sets with the same usgae. My suggestion is that we discuss this issue in Thread 4 and whatever we are going to decide there will be applied here as well  |
| HW/HiSi | Agree with the updated proposal and prefer a TP. |

## Round 2

**Due to the short time available for discussion, please provide you input for the first round before May 11, 17:00 pm (UTC)**

Based in the outcome of Round 1 we have the following situation:

The 2nd sub-bullet from proposal 1 seems is agreeable in principle.

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| * ***For usage ‘beamManagement’, the SRS resource set(s) in srs-ResourceSetToAddModListDCI-0-2 are the same or a subset of the SRS resource set(s) in srs-ResourceSetToAddModList.***
 |

But there are still two discussion points on the proposal above, and these are:

1. Whether the SRS resource sets with usage ‘*beamSwitching*’ that are configured in *ResourceSetToAddModListDCI-0-2* shall be exactly the same as the resource sets with same usage in *srs-ResourceSetToAddModListDCI* , or if they can be a subset also.
2. Whether the proposal is captured as TP or as a conclusion

How to answer the two questions above depends on the answers in Thread 4, where the same issues are raised for usage ‘*antennaSwitching*’.

**Q2: Which of the 2 options below do you prefer (and please check also in Thread 4 and align your answers if you think it is helpful to do so). Please also provide your view if you want to capture the potential agreement in a conclusion or in a TP:**

Option 1: ***In Rel-16, for SRS resource set(s) configured with usage ‘beamManagement’***

* ***For usage ‘beamManagement’, the SRS resource set(s) in srs-ResourceSetToAddModListDCI-0-2 are the same or a subset of the SRS resource set(s) in srs-ResourceSetToAddModList.***

Option 2: ***In Rel-16, for SRS resource set(s) configured with usage ‘beamManagement’***

* ***For usage ‘beamManagement’, the SRS resource set(s) in srs-ResourceSetToAddModListDCI-0-2 are the same as ~~or a subset of~~ the SRS resource set(s) in srs-ResourceSetToAddModList.***

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| Company | Comments |
| HW/HiSi | Option 1 in a TP. But we are open to follow the outcome in Thread #4 to achieve a unified handling for ‘antennaSwitching’ and ‘BeamManagement’ |
| Qualcomm | Option 2. We prefer to have unified handling for “antenna switching” and “beam management”, and fine with having a TP.  |
| Nokia/NSB | Option 2Same view as QC, unified handling is preferred here.  |
| vivo | Option 2.The unified handling is suggested. |
| Samsung | Option 2 for unified handling.  |
| ZTE | Option 2 for unified handling.  |

For the other bullets, please share your view if you think they should be added as notes to a potential agreement in Q2.

**Q3: If an agreement is made of the Q2, do you think that the other two bullets from the original proposal should be included as notes?**

***Note, this implies that***

* ***The supported maximum number of SRS resource set(s) reported in FG 2-30 shall be applicable regardless of if SRS resource set(s) with usage set to 'beamManagement' are configured in srs-ResourceSetToAddModList or in srs-ResourceSetToAddModListDCI-0-2.***
* ***The supported maximum number of SRS resources per set reported in FG 2-30 shall be applicable to any SRS resource set with usage set to 'beamManagement', regardless if the SRS resource set is configured in srs-ResourceSetToAddModList or in srs-ResourceSetToAddModListDCI-0-2.***

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| Company | Comments |
| HW/HiSi | Yes, would be helpful |
| Qualcomm | This seems unnecessary if we go with Option 2 above in Q2.  |
| Nokia/NSB | Agree with QC, may not be needed.  |
| vivo | Notes seem unnecessary. |
| Samsung | Not necessary if option 2 is adopted.  |
| ZTE | Seems unnecessary. |
| Moderator | A clear majority of companies don’t think it is necessary to include the bullets. It is the moderator’s recommendation to not further discuss these two bullet. |

## Round 3

Q3 from round 2 is closed no further discussion needed.

**For Q2 the situation is the following:**

The outcome from Round 2 is the following:

1 company (Hw/HiSi) – Option 1

***In Rel-16, for SRS resource set(s) configured with usage ‘beamManagement’***

* ***For usage ‘beamManagement’, the SRS resource set(s) in srs-ResourceSetToAddModListDCI-0-2 are the same or a subset of the SRS resource set(s) in srs-ResourceSetToAddModList.***

5 companies (Qualcomm, Nokia/NSB, vivo, Samsung, ZTE)

Option 2: ***In Rel-16, for SRS resource set(s) configured with usage ‘beamManagement’***

* ***For usage ‘beamManagement’, the SRS resource set(s) in srs-ResourceSetToAddModListDCI-0-2 are the same as ~~or a subset of~~ the SRS resource set(s) in srs-ResourceSetToAddModList.***

The critical point is that proponents of Option 2 at the same time support unified handling with SRS resource sets configured to usage ‘*antennaSwitching*’. Also the proponent of Option 1 prefers a unified handling. As pointer out by Nokia the discussion here is very related to Thread #4, that discusses the handling of SRS resource sets with usage ‘*antennaSwitching*’, all companies agreed to Interpretation 1 which would mean Option 1 if a unified handling shall be adopted.

For the detailed agreement for usage ‘*antennaSwitching*’ (whether Option 1 or Option 2) it is proposed to wait until Thread#4 is agreed.

Meanwhile, I would like to try to agree on where there seems we have consensus in the group, i.e. a unified handling of SRS resource sets with usage ‘*beamManagement*” and “*antennaSwitching*” regarding their configurations in *ResourceSetToAddModListDCI-0-2 and srs-ResourceSetToAddModList.*

***Proposal: SRS resource sets with usage ‘beamManagement’ follow the rules for ‘usage’ ‘antennaSwitching’ regarding their configurations in ResourceSetToAddModListDCI-0-2 and srs-ResourceSetToAddModList.***

***If companies have a strong concern, please explain your reason below:***

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| Company | Comments |
| Nokia/NSB | Support (no concern on the proposal )If we have the same (unified) handling, then I suggest to have the following TP discussion merged with the R16-URLLC-04 thread (which started in 04 already and could be extended for usage of beamManagement) |
| ZTE | If TP is needed, this can be merged into the TP for SRS for ‘antennaswitching’ discussed in another thread. |
| Qualcomm | We are fine with the proposal. Agree with Nokia/NSB and ZTE to merge the discussion of TP in Threshold -04.  |
| HW/HiSi | Fine with the proposal. We are ok to follow the majority view that a TP discussion can merged with thread 04 for ‘antenna Switching’  |

No concerns about the proposal were raised. The proposal is stable. Also companies added that the corresponding TP discussion should be merged with the TP discussed R16-URLLC-04. Since no objections against this suggestion have been brought up, it proposed to add a note for the TP handling into the potential agreement:

Potential Agreement: ***SRS resource sets with usage ‘beamManagement’ follow the rules for ‘usage’ ‘antennaSwitching’ regarding their configurations in ResourceSetToAddModListDCI-0-2 and srs-ResourceSetToAddModList.***

***If companies have a strong concern with the Potential Agreement, please comment below:***

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| Company | Comments |
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If the above can be agreed, then for the discussion of a potential TP, all companies prefer or are ok with to extend the discussion in thread 04 for ‘*antennaSwitching*’ to the usage ‘*beamSwitching*’. It seems feasible to follow this approach, since it is a very simple addition, e.g. the yellow text can be added to the TP that is discussed in thread 4, e.g. : “When the higher layer parameter *usage* is set to '*antennaSwitching*' or ‘*beamManagement*’, the SRS resource set(s) configured”

# Outcome

TBD

# References

1. R1-2203111 “Remaining issues on SRS”, RAN1#109-e, e-Meeting, May 9-20, 2022, Huawei, HiSilicon
2. R1-2203011 “Final Report of 3GPP TSG RAN WG1 #108-e v1.0.0”, section 7.2.5 e-Meeting, MCC Support