3GPP TSG-RAN WG1 Meeting #104-e R1-21xxxxx

e-Meeting, 25th January – 5th February, 2021

Agenda Item: 5

Source: Moderator (Ericsson)

Title: Moderator summary for [104-e-AI5-LS-01] Email discussion/approval for the reply LS to R1-2100022

Document for: Discussion, Decision

# 1 Introduction

RAN1 received an LS from RAN2 on the use of simultaneous CSI-RS resources and ports [1] including the following:

**1. Overall Description:**

RAN2 has discussed the use of simultaneous CSI-RS resources and ports, and would like to ask for clarification for the following aspect:

In RAN2 understanding, the field *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC* issupposed to indicate a restriction on the number of **active** CSI-RS resources. Furthermore, the field *totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC* is supposed to indicate a restriction on the total number of ports to be used in **active** CSI-RS resources.

RAN2 would like to ask whether the fields *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC* and *totalNumberPortsSimultaneousNZP-CSI-RS* aresupposed to indicate: the number of **active** CSI-RS resources and ports, respectively; or the number of **configured** CSI-RS resources and ports (including active CSI-RS resources and ports), respectively?

The reason for the question is that the current field description for *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC* in TS 38.306 includes “This parameter limits the total number of NZP-CSI-RS resources that the **NW may configure** across all CCs, and across MCG and SCG in case of NR-DC (irrespective of the associated codebook type).”; and the current field description for *totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC*  in TS 38.306 includes “This parameter limits the total number of ports that the **NW may configure** across all NZP-CSI-RS resources across all CCs”.

**2. Actions:**

**To RAN1 group.**

**ACTION:** RAN2 respectfully asks RAN1 to answer to the above question.

This document summarizes the contributions made under AI5 with proposals on responding to the LS. The following email thread has been assigned to discuss the LS reply:

[104-e-AI5-LS-01] Email discussion/approval for the reply LS to R1-2100022 till 1/28 (Stephen, Ericsson)

# 2 Summary of Proposals

The following table provides a summary of company proposals

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| --- | --- |
| **Company** | **Company Proposals** |
| CATT [2] | Our understanding is that RAN2’s understanding is correctly aligned with RAN’1 intention when defining the UE capability as to CSI-RS resources/ports reflected in UE capability *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC* and *totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC.*  |
| Samsung [3] | RAN1 understands that the answer is the number of **active** CSI-RS resources and ports, respectively. Since the UE capabilities *maxConfigNumberNZP-CSI-RS-PerCC* and *maxNumberSimultaneousNZP-CSI-RS-PerCC* are defined separately, RAN1 understands that the maximum number of configured CSI-RS resources is denoted by *maxConfigNumberNZP-CSI-RS-PerCC*, not by *maxNumberSimultaneousNZP-CSI-RS-PerCC*, which denotes the maximum number of active CSI-RS resources. Also, in addition to the limits signalled by *maxNumberSimultaneousNZP-CSI-RS-PerCC*, the network applies a limit signalled *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC*. Hence, the UE capability *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC* also indicates the number of active CSI-RS resources. Similar understanding can be applied to the number of CSI-RS ports. |
| Ericsson [4] | In short, it is RAN1's understanding that the the two capability parameters refer to the number of **active** CSI-RS resources and ports, respectively.In more detail, it is RAN1's understanding that the key word "simultaneous" in the field description of the capability parameters refers to CSI-RS resources and ports on which the UE is currently measuring, and thus "active" refers to CSI-RS resources/ports that fufill the following:* Ports of a periodic CSI-RS resource
* Ports of a semi-persistent CSI-RS resource that has been activated by MAC-CE
* Ports of an aperiodic CSI-RS resource that has been triggered by DCI and on which the UE has not completed its measurement

Semi-persistent CSI-RS resources that have not yet been activated or have been deactivated as well as aperiodic CSI-RS resources for which the UE has completed its measurement do not count toward "active." In this sense, the UE capability parameters do not refer to the number of *configured* CSI-RS resources/ports. Hence the sentences in the the current field description for *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC* in TS 38.306 that refer to the total number of resources/ports that the *NW may configure* is not needed and could be removed by RAN2, especially since it can create confusion. One possibility approach for resolving potential ambiguity could be to make the following change to TS 38.306:-     *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC* indicates the maximum number of simultaneous CSI-RS resources (irrespective of the associated codebook type) in active BWPs across all CCs, and across MCG and SCG in case of NR-DC. ~~This parameter limits the total number of NZP-CSI-RS resources that the NW may configure across all CCs, and across MCG and SCG in case of NR-DC (irrespective of the associated codebook type)~~. The network applies this limit in addition to the limits signalled in *MIMO-ParametersPerBand-> maxNumberSimultaneousNZP-CSI-RS-PerCC* and in *Phy-ParametersFRX-Diff-> maxNumberSimultaneousNZP-CSI-RS-PerCC*;-     *totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC* indicates the total number of CSI-RS ports (irrespective of the associated codebook type) in simultaneous CSI-RS resources in active BWPs across all CCs, and across MCG and SCG in case of NR-DC. ~~This parameter limits the total number of ports that the NW may configure across all NZP-CSI-RS resources across all CCs, and across MCG and SCG in case of NR-DC (irrespective of the associated codebook type)~~. The network applies this limit in addition to the limits signalled in *MIMO-ParametersPerBand-> totalNumberPortsSimultaneousNZP-CSI-RS-PerCC* and in *Phy-ParametersFRX-Diff-> totalNumberPortsSimultaneousNZP-CSI-RS-PerCC*. |
| Huawei, HiSilicon [5] | According to RAN1 discussions on UE feature, we think RAN2 understanding is correct, i.e., the fields *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC* and *totalNumberPortsSimultaneousNZP-CSI-RS* are supposed to indicate the number of active CSI-RS resources and ports, respectively. In addition, the related descriptions in 38.306 that may lead to potential misinterpretations can be can be updated accordingly. Thus we propose:**Proposal 1: Reply RAN2 to confirm that RAN2 understanding is correct (i.e., the fields *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC* and *totalNumberPortsSimultaneousNZP-CSI-RS* are to restrict the number of active CSI-RS resources and ports, respectively) and related descriptions in 38.306 can be updated accordingly.**  |

# 3 Discussion

Based on the company proposals, there appears to be consensus that the following two capability parameters refer to the number of active CSI-RS resources/ports, not the number of configured of CSI-RS ports.

* *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC*
* *totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC*

Two companies [4], [5] suggest that the descriptions in 38.306 could be updated to avoid misinterpretation.

1. Provide at least the following response to RAN2

RAN1 has discussed the question from RAN2, and RAN1's understanding is aligned with RAN2's understanding. The UE capability parameters *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC* and *totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC* indicate a restriction on the number of active CSI-RS resources and ports, respectively.

1. In addition, provide the following response to RAN2

RAN1 respectively suggests that RAN2 could update the related descriptions in TS 38.306 in order to avoid possible misinterpretation that the UE capability parameters indicate a restriction on the number of configured CSI-RS resources and ports. One possible update could be as follows:

-     *maxNumberSimultaneousNZP-CSI-RS-ActBWP-AllCC* indicates the maximum number of simultaneous CSI-RS resources (irrespective of the associated codebook type) in active BWPs across all CCs, and across MCG and SCG in case of NR-DC. ~~This parameter limits the total number of NZP-CSI-RS resources that the NW may configure across all CCs, and across MCG and SCG in case of NR-DC (irrespective of the associated codebook type)~~. The network applies this limit in addition to the limits signalled in *MIMO-ParametersPerBand-> maxNumberSimultaneousNZP-CSI-RS-PerCC* and in *Phy-ParametersFRX-Diff-> maxNumberSimultaneousNZP-CSI-RS-PerCC*;

-     *totalNumberPortsSimultaneousNZP-CSI-RS-ActBWP-AllCC* indicates the total number of CSI-RS ports (irrespective of the associated codebook type) in simultaneous CSI-RS resources in active BWPs across all CCs, and across MCG and SCG in case of NR-DC. ~~This parameter limits the total number of ports that the NW may configure across all NZP-CSI-RS resources across all CCs, and across MCG and SCG in case of NR-DC (irrespective of the associated codebook type)~~. The network applies this limit in addition to the limits signalled in *MIMO-ParametersPerBand-> totalNumberPortsSimultaneousNZP-CSI-RS-PerCC* and in *Phy-ParametersFRX-Diff-> totalNumberPortsSimultaneousNZP-CSI-RS-PerCC*.

## 3.1 <1st Round Comments>

Please provide your company view on the above proposals. Based on the responses, the moderator will update the draft LS with a response to RAN2 (see skeleton LS response in the drafts folder).

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| **Company** | **View/Position** |
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# Conclusion

TBD

# References

1. R1-2100022 LS on the use of simultaneous CSI-RS resources and ports RAN2, Ericsson
2. R1-2100403 Draft reply LS on use of simultaneous CSI-RS resources and ports CATT
3. R1-2101170 Draft reply LS on the use of simultaneous CSI-RS resources and ports Samsung
4. R1-2101303 Draft Reply LS on the use of simultaneous CSI-RS resources and ports Ericsson
5. R1-2101742 Discussion on use of simultaneous CSI-RS resources and ports Huawei, HiSilicon