**3GPP TSG RAN WG1#116bis R1-24xxxxx**

**Changsha, China, April 15th – 29th, 2024**

Source: Moderator (Nokia)

Title: [116bis-Pre-R18-NR] Summary on SCell A-CSI reporting UE capabilities

Agenda Item: 7

Release: Release 15, Release 16, Release 17

WI code: NR\_newRAT-Core, LTE\_NR\_DC\_CA\_enh-Core, NR\_DSS-Core

Document for: Discussion and Decision

# Introduction

A contribution [1] submitted to the RAN1#116bis raised questions on the needed UE capabilities for a number of different A-CSI reporting cases with DL carrier aggregation.

|  |  |
| --- | --- |
| A diagram of a curve  Description automatically generated  **Case 1a (same SCS):**   * PUSCH carrying A-CSI report is self-scheduled * A-CSI-RS is cross-carrier triggered | A diagram of a normal curve  Description automatically generated with medium confidence  **Case 1b/1c (same SCS):**   * PUSCH carrying A-CSI report is self-scheduled * **1b:** A-CSI report is derived from P-CSI-RS * **1c:** A-CSI report is derived from SP-CSI-RS |
| A graph with a blue line  Description automatically generated  **Case 2a (same SCS):**   * PUSCH carrying A-CSI report is cross-cc-scheduled * A-CSI-RS is same-carrier triggered | **Case 2b/2c (same SCS):**   * PUSCH carrying A-CSI report is cross-cc-scheduled * **2b:** A-CSI report is derived from P-CSI-RS * **2c:** A-CSI report is derived from SP-CSI-RS |
| A diagram of a line  Description automatically generated with medium confidence  **Case 3a (different SCS):**   * PUSCH carrying A-CSI report is self-scheduled * A-CSI-RS is cross-carrier triggered | **Case 3b/3c:**   * PUSCH carrying A-CSI report is self-scheduled * **3b:** A-CSI report is derived from P-CSI-RS * **3c:** A-CSI report is derived from SP-CSI-RS |
| A graph with a blue line  Description automatically generated  **Case 4a (different SCS):**   * PUSCH carrying A-CSI report is cross-cc-scheduled * A-CSI-RS is same-carrier triggered | A graph with a line  Description automatically generated  **Case 4b/4c (different SCS):**   * PUSCH carrying A-CSI report is cross-cc-scheduled * **4b:** A-CSI report is derived from P-CSI-RS * **4c:** A-CSI report is derived from SP-CSI-RS |

The following proposals were made:

**Proposal 1: RAN1 to conclude the following:**

**For the case where an SCell A-CSI report is**

* **Triggered by a DCI on PCell, and**
* **The A-CSI report is transmitted on a PUSCH on the PCell**

**the following optional UE capabilities are needed for the following cases:**

|  |  |  |
| --- | --- | --- |
| **SCell CSI-RS** | **PCell/SCell SCS** | **Optional UE capabilities needed** |
| A-CSI-RS | Same | None (mandatory features only) |
| P-CSI-RS | Same | None (mandatory features only) |
| SP-CSI-RS | Same | UE support of SP-CSI-RS configuration |
| A-CSI-RS | Different | *crossCarrierA-CSI-trigDiffSCS* |
| P-CSI-RS | Different | None (mandatory features only) |
| SP-CSI-RS | Different | UE support of SP-CSI-RS configuration |

**Proposal 2: RAN1 to conclude the following:**

**For the case where a an SCell A-CSI report is**

* **Triggered by a DCI on SCell, and**
* **The A-CSI report is transmitted on a PUSCH on the PCell**

**the following optional UE capabilities are needed for the following cases:**

|  |  |  |
| --- | --- | --- |
| **SCell CSI-RS** | **PCell/SCell SCS** | **Optional UE capabilities needed** |
| A-CSI-RS | Same | *crossCarrierSchedulingSCell-SpCellTypeA*, or *crossCarrierSchedulingSCell-SpCellTypeB* |
| A-CSI-RS | Same |
| SP-CSI-RS | Same | One of the above and support for SP-CSI-RS configuration |
| A-CSI-RS | Different | *crossCarrierSchedulingSCell-SpCellTypeA*, or *crossCarrierSchedulingSCell-SpCellTypeB* |
| P-CSI-RS | Different |
| SP-CSI-RS | Different | One of the above and support for SP-CSI-RS configuration |

# References

1. R1-2403312 Ambiguities in SCell A-CSI reporting UE capabilities Nokia

# Discussion

**Question 1:** Do you have a concern with the following interpretation of the needed UE capabilities for the case where the triggering DCI and the PUSCH with the A-CSI report are both on the PCell:

|  |  |  |
| --- | --- | --- |
| **SCell CSI-RS** | **PCell/SCell SCS** | **Optional UE capabilities needed** |
| A-CSI-RS | Same | None (mandatory features only) |
| P-CSI-RS | Same | None (mandatory features only) |
| SP-CSI-RS | Same | UE support of SP-CSI-RS configuration |
| A-CSI-RS | Different | *crossCarrierA-CSI-trigDiffSCS* |
| P-CSI-RS | Different | None (mandatory features only) |
| SP-CSI-RS | Different | UE support of SP-CSI-RS configuration |

Please provide your comment on the question to the table below

|  |  |
| --- | --- |
| Company | Comments |
| Apple | Our comments are in Red   |  |  |  | | --- | --- | --- | | **SCell CSI-RS** | **PCell/SCell SCS** | **Optional UE capabilities needed** | | A-CSI-RS | Same | None (mandatory features only)  Agree | | P-CSI-RS | Same | None (mandatory features only)  Agree | | SP-CSI-RS | Same | UE support of SP-CSI-RS configuration  sp-CSI-RS, sp-CSI-IM | | A-CSI-RS | Different | crossCarrierA-CSI-trigDiffSCS  Agree | | P-CSI-RS | Different | None (mandatory features only)  Agree | | SP-CSI-RS | Different | UE support of SP-CSI-RS configuration  sp-CSI-RS, sp-CSI-IM | |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Question 2:** Do you have a concern with the following interpretation of the needed UE capabilities for the case where the triggering DCI is on the SCell and the PUSCH with the A-CSI report is on the PCell:

|  |  |  |
| --- | --- | --- |
| **SCell CSI-RS** | **PCell/SCell SCS** | **Optional UE capabilities needed** |
| A-CSI-RS | Same | *crossCarrierSchedulingSCell-SpCellTypeA*, or *crossCarrierSchedulingSCell-SpCellTypeB* |
| A-CSI-RS | Same |
| SP-CSI-RS | Same | One of the above and support for SP-CSI-RS configuration |
| A-CSI-RS | Different | *crossCarrierSchedulingSCell-SpCellTypeA*, or *crossCarrierSchedulingSCell-SpCellTypeB* |
| P-CSI-RS | Different |
| SP-CSI-RS | Different | One of the above and support for SP-CSI-RS configuration |

Please provide your comment on the question to the table below

|  |  |
| --- | --- |
| Company | Comments |
| Apple | Our comments are in Red  First, we need to clarify that this is the case where CSI-RS and DCI are on the same SCell and have the same SCS, specification also allows the CSI-RS to be on PCell or a different SCell   |  |  |  | | --- | --- | --- | | **SCell CSI-RS** | **PCell/SCell SCS** | **Optional UE capabilities needed** | | A-CSI-RS | Same | crossCarrierSchedulingSCell-SpCellTypeA, or crossCarrierSchedulingSCell-SpCellTypeB  Agree | | ~~A~~P-CSI-RS | Same | | SP-CSI-RS | Same | One of the above and support for SP-CSI-RS configuration  sp-CSI-RS, sp-CSI-IM | | A-CSI-RS | Different | crossCarrierSchedulingSCell-SpCellTypeA, or crossCarrierSchedulingSCell-SpCellTypeB  and crossCarrierSchedulingUL-DiffSCS-r16 | | P-CSI-RS | Different | | SP-CSI-RS | Different | One of the above and support for SP-CSI-RS configuration  and crossCarrierSchedulingUL-DiffSCS-r16, sp-CSI-RS, sp-CSI-IM | |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Question 3:** Would you be able to agree to one of the two RAN1 conclusion:

**Alt 1:** [The two conclusion proposals of R1-2403312]

**Alt 2: No concerns were seen with the interpretation of UE capabilities for the indicates A-CSI reporting cases of R1-2403312**

Please provide your comment on the question to the table below

|  |  |
| --- | --- |
| Company | Comments |
| Apple | We are fine to draw conclusion for both cases |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |