**3GPP TSG- RAN WG1 Meeting #104b-e R1-2xxxxxx**

**e-Meeting, April 12th – 20th, 2021**

Agenda Item: 7.1

Source: Moderator (Apple Inc.)

Title: Summary on 104b-e-NR-7.1CRs-08

Document for: Discussion/Decision

# Introduction

In this contribution, we provide a summary on 104bis-e-NR-7.1CRs-08.

# Discussion

In R1-2103076, Apple proposes to clarify the scope for the UE FG 2-24, which is as follows:

| ***beamManagementSSB-CSI-RS***  Defines support of SS/PBCH and CSI-RS based RSRP measurements. The capability comprises signalling of  - *maxNumberSSB-CSI-RS-ResourceOneTx* indicates maximum total number of configured one port NZP CSI-RS resources and SS/PBCH blocks that are supported by the UE to measure L1-RSRP as specified in TS 38.215 [13] within a slot and across all serving cells (see NOTE). On FR2, it is mandatory to report >=8; On FR1, it is mandatory with capability signalling to report >=8.  - *maxNumberCSI-RS-Resource* indicates maximum total number of configured NZP-CSI-RS resources that are supported by the UE to measure L1-RSRP as specified in TS 38.215 [13] across all serving cells (see NOTE). It is mandated to report at least n8 for FR1.  - *maxNumberCSI-RS-ResourceTwoTx* indicates maximum total number of two ports NZP CSI-RS resources that are supported by the UE to measure L1-RSRP as specified in TS 38.215 [13] within a slot and across all serving cells (see NOTE).  - *supportedCSI-RS-Density* indicates density of one RE per PRB for one port NZP CSI-RS resource for RSRP reporting, if supported. On FR2, it is mandatory to report either "three" or "oneAndThree"; On FR1, it is mandatory with capability signalling to report either "three" or "oneAndThree".  - *maxNumberAperiodicCSI-RS-Resource* indicates maximum number of configured aperiodic CSI-RS resources across all serving cells (see NOTE). For FR1 and FR2, the UE is mandated to report at least n4.  NOTE: If the UE sets a value other than *n0* in an FR1 band, it shall set that same value in all FR1 bands. If the UE sets a value other than *n0* in an FR2 band, it shall set that same value in all FR2 bands. The UE supports a total number of resources equal to the maximum of the FR1 and FR2 value, but no more than the FR1 value across all FR1 serving cells and no more than the FR2 value across all FR2 serving cells. | Band | Yes | No | Yes |
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This FG defines several elements for RSRP related measurement, but currently RSRP measurement could be with the following usages:

* **U1: The RS is used for beam report, i.e. L1-RSRP is associated with a CSI-reportConfig**
* **U2: The RS is used for candidate beam detection for CFRA based BFR**
* **U3: The RS is used for candidate beam detection for CBRA based BFR**

***Proposal for discussion: Clarify the usage for each element in UE FG 2-24 with U1, U2 and/or U3***

**Companies’ views and comments**

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| --- | --- |
| Company | View |
| Apple | Our initial understanding is as follows, but we are open to see other views.  According to understanding, the mandatory value for 1 port CSI-RS was discussed based on assumption that the element is used for normal beam report only, but the 2 port CSI-RS is general for all cases, as this element includes a candidate value that UE does not support 2-port CSI-RS based RSRP measurement.   * *maxNumberSSB-CSI-RS-ResourceOneTx: U1* * *maxNumberCSI-RS-Resource: U1* * *maxNumberCSI-RS-ResourceTwoTx: U1+U2+U3* * *supportedCSI-RS-Density: U1* * *maxNumberAperiodicCSI-RS-Resource: U1* |
| vivo | Our understanding is that all the reported component refers to the following RS.  The RS for L1-RSRP measurement includes cases associated with reports with reportQuantity set to ‘ssb-Index-RSRP’, ‘cri-RSRP’ or with reportQuantity set to  'none' and CSI-RS-ResourceSet with higher layer parameter trs-Info is not configured. |
| Intel | FG 2-24 doesn’t have FG 2-31 (BFR) in pre-requisites, so U2 and U3 are not applicable and scope for the UE FG 2-24 should be clear on this aspect. |
| Ericsson | In addition to what Intel explains, the value range of maxNumberCSI-RS-SSB-CBD indicates that there can be more RSs for candidate beam detection than what is provided in beamManagementSSB-CSI-RS. Moreover, 38.133 describe the measurements separately, which indicates that U2 and U3 are not include in beamManagementSSB-CSI-RS. |
| Huawei, HiSilicon | We support Interpretation 3 in R1-2103076: UE FG beamManagementSSB-CSI-RS counts SSB/CSI-RS configured in CSI-reportConfig and SSB/CSI-RS used for candidate beam detection for both CBRA and CFRA based BFR. |
| Samsung | In 38.306 maxNumberCSI-RS-SSB-CBD is defined as maximal number of different CSI-RS and/or SSB resources across all CCs for new beam identification. So, our understanding is that U2 /U3 can be applied to maxNumberCSI-RS-SSB-CBD, and only U1 can be applied to beamManagementSSB-CSI-RS. |
| OPPO | In our understanding, all these parameters are defining the capability for the RS associated a CSI-reportConfig for beam management.  However, the following aspects should also be clarified:   1. if *maxNumberCSI-RS-ResourceTwoTx* is zero, UE will not support 2-port CSI-RS for candidate beam identification 2. If *supportedCSI-RS-Density* indicates UE doesn’t support one given density, UE will not support the CSI-RS with that given density for candidate beam identification. |
| ZTE | We share the same views with Intel, Ericsson and Samsung that the UE FG 2-24 beamManagementSSB-CSI-RS is only relevant to U1, and BFR related issues should not be considered herein. |
| MediaTek | We agree with Intel that FG 2-24 is only applicable to U1.   * FG 2-24 captures “The RS for L1-RSRP measurement includes cases associated with reports with reportQuantity set to ‘ssb-Index-RSRP’, ‘cri-RSRP’ or with reportQuantity set to  'none' and CSI-RS-ResourceSet with higher layer parameter trs-Info is not configured”. BFR RS is not included. * FG 2-31 captures BFR. |
| Nokia, NSB | We share the same views as Intel, Ericsson, Samsung and ZTE. |
| Qualcomm | In our understanding, FG-24 refers to L1-RSRP measurement, which includes candidate beam for BFR. However, this may not be a critical issue. Suppose gNB does not count candidate beam in FG-24 but UE does, UE may have to prioritize candidate beam anyway when beam failure happens. It should be fine as long as beam failure can be recovered. |