**3GPP TSG RAN WG1#104e R1-2nnnnnn**

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

**Agenda Item: 7.2.2**

**Source: Moderator (Lenovo)**

**Title: Email discussion/approval [104-e-NR-NRU-05] on reply LS to R1-2100008**

**Document for: Discussion, Decision**

This document summarises the discussion on the following topics:

[104-e-NR-NRU-05] Email discussion/approval of the reply LS to R1-2100008 **until Jan-29** – Alex (Lenovo)

First, the corresponding behaviour should be clarified within RAN1. The detailed reply LS will be discussed as a second step.

# Incoming LS from RAN4 (R1-2100008)

|  |
| --- |
| 1. **Overall Description:**

RAN4 would like to inform RAN1 that in Rel-16 RAN4 is working on the SCell activation delay requirements under the following assumption regarding CSI reporting during the SCell activation:* When P/SP-CSI-RS is configured for CSI reporting during the SCell activation, it is assumed that at least one of the RRC parameters CO-DurationPerCell-r16, SlotFormatIndicator, and CSI-RS-ValidationWith-DCI-r16 is configured for a UE and the UE supports the corresponding capability, so that the UE measures the configured P/SP-CSI-RS and transmits CSI reports during the SCell activation period, except for the cases when the UE cancels the reception of CSI-RS according to TS 38.213.

RAN4 would also like to ask about the UE behavior with respect to CSI reports during the SCell activation procedure in case none or some of these three RRC parameters are configured with or without corresponding DCIs for the SCell being activated. For example:(1)   When none of the RRC parameters CO-DurationPerCell-r16, SlotFormatIndicator, and CSI-RS-ValidationWith-DCI-r16 is configured for a UE on the being-activated SCell, a.      What is the expected UE behavior for this P/SP CSI-RS measurement and report on the being-activated SCell? (2)   When RRC parameters CSI-RS-ValidationWith-DCI-r16 is configured, but SlotFormatIndicator and CO-DurationPerCell-r16 are not configured for the being-activated SCell, a.      What is the expected UE behavior for this P/SP CSI-RS measurement and report on the being-activated SCell? Does UE need to decode a DCI format from other active serving cell (indicating an aperiodic CSI-RS reception or scheduling a PDSCH reception in the set of symbols of the slot) for this being-activated SCell to validate this P/SP CSI-RS?(3)   When RRC parameters CO-DurationPerCell-r16 is configured but SlotFormatIndicator is not configured for the being-activated SCell, a.      What is the expected UE behavior for this P/SP CSI-RS measurement and report on the being-activated SCell? Does UE need to decode a DCI format 2\_0 (indicating remaining channel occupancy duration) from other active serving cell for this being-activated SCell to validate the CSI-RS?(4)   When RRC parameters CO-DurationPerCell-r16 is not configured but SlotFormatIndicator is configured for the being-activated SCell, a.      What is the expected UE behavior for this P/SP CSI-RS measurement and report on the being-activated SCell? Does UE need to detect a DCI format 2\_0 (indicating the starting point of CO duration and the slot format) from other active serving cell for this being-activated SCell to validate the CSI-RS?**2. Actions:****To RAN1 group:****ACTION:** RAN4 kindly asks RAN1 to take the above information into account in their work and provide the feedback on the UE behavior. |

# Discussion for cases identified by RAN4

## Case (1)

|  |
| --- |
| (1)   When none of the RRC parameters CO-DurationPerCell-r16, SlotFormatIndicator, and CSI-RS-ValidationWith-DCI-r16 is configured for a UE on the being-activated SCell, a.      What is the expected UE behavior for this P/SP CSI-RS measurement and report on the being-activated SCell? |

Ericsson (R1-2001305):

As in Rel-15, the UE is expected to receive the p/sp-CSI-RS, except if the UE receives a DCI that schedules/triggers an UL signal/channel in one or more of the symbols occupied by p/sp-CSI-RS.

LG (R1-2100888):

When none of the RRC parameters of *CO-DurationsPerCell*, *SlotFormatCombinations PerCell*, and *csi-RS-ValidationWithDCI-r16* is configured for a UE on the being-activated SCell, the UE behaviour for P/SP CSI-RS measurement and report on the being-activated SCell is the same with that on the activated SCell.

vivo (R1-2101156):

UE will proceed with the P/SP CSI-RS measurement and report on the being-activated SCell.

Samsung (R1-2101164):

Therefore, when none of the RRC parameters are not configured for the UE, the UE cancels/receives the higher-layer configured periodic and semi-persistent CSI-RS reception according to current Clause 11.1 of TS38.213.

Nokia (R1-2101287):

According to TS 38.321, the UE is not expected to monitor PDCCH on or for the to-be-activated SCell until the time given by the minimum time requirement defined in in TS 38.133 has passed. Therefore, the UE has no certainty on the presence of CSI-RS on unlicensed spectrum. Hence, it is safest if the UE omits CSI reporting in this case, until the SCell has been activated according to the minimum time requirement.

Apple (R1-2101336):

According to section 5 of TS 38.321, for SCell activation, a UE is not required to monitor PDCCH for the SCell being activated before the minimum timing requirement defined in TS 38.133. Consequently, DCI-based P/SP-CSI-RS validation mechanism defined by RAN1 for NR-U operation cannot be used to validate P/SP-CSI-RS on the SCell being activated. RAN1 therefore recommends RAN4 to define SCell activation latency requirement for NR-U based on the assumption that a UE always assumes the presence of configured P/SP-CSI-RS on the SCell being activated for CSI report during SCell activation procedure without validation, including all of the four examples listed in R1-2100008.

Huawei (R1-2101747):

It was agreed that the UE cancels/receives the higher-layer configured periodic and semi-persistent CSI-RS reception according to current Clause 11.1 of TS 38.213 when none of *CO-DurationPerCell-r16*, *SlotFormatIndicator*, and *CSI-RS-ValidationWith-DCI-r16* is configured for all cases. So on the being-activated SCell, UE should follow the same rules as Clause 11.1 without exception.

**Q1: Can we agree on the following for Case (1)?**

As in Rel-15, the UE is expected to receive the p/sp-CSI-RS, except if the UE receives a DCI that schedules/triggers an UL signal/channel in one or more of the symbols occupied by p/sp-CSI-RS.

|  |  |
| --- | --- |
| Company  | Comments |
| Apple | As pointed out in our paper [R1-2101336], Rel-15/16 UE is not required to monitor DCI ‘**for’** the SCell being activated before minimum timing requirement in accordance with TS 38.213 and TS 38.321. As also emphasized in paper, revisiting this behavior to request UE monitor DCI for NR-U is not only impact on Rel-16 but also Rel-15 UE behavior such as DCI 2\_0 SFI monitoring on other active CCs for the SCell being activated. It should be avoided at this last minute in maintenance phase; otherwise, different UE behaviors have to be implemented for unlicensed SCell activation. Assuming the Rel-15/16 specification is maintained, and UE does not require to monitor DCI ‘for’ the SCell being activated, we suggest to rephase the proposal as follows: As in Rel-15, the UE is expected to receive the p/sp-CSI-RS~~, except if the UE receives a DCI that schedules/triggers an UL signal/channel in one or more of the symbols occupied by p/sp-CSI-RS~~ |
| Ericsson | Our view is that the answer to Q1 is "Yes," and no change to 38.213 is needed.There is no reason to modify the existing specification text in 38.213 Section 11.1, as there is no contradiction for the SCell activation case. According to currently specified behavior, the UE is expected to receive the p/sp-CSI-RS if it does not receive a DCI scheduling/triggering an UL signal/channel. Clearly, if the UE is not monitoring for the DCI, then it will not detect it and thus will not cancel the p/sp-CSI-RS reception. |
| LG Electronics | Agree with Apple’s modification. For case (1), UE does not have to rely on any DCI detection. UE just receives P/SP-CSI-RS as configured, which is the same behavior with Rel-15. |
| Qualcomm | Agree with Apple’s modification. UE will receive p/sp-CSI-RS as is and gNB is responsible to make sure the p/sp-CSI-RS is transmitted. |
| ZTE, Sanechips | Agree with Apple’s modification. During the SCell activation, we think that UE does not require to monitor DCI, so it just needs to follow same rule as specified in Rel-15, that is, the UE is expected to receive the p/sp-CSI-RS. |
| vivo | Agree with Apple’s modification in this case which is also aligned with our proposal in R1-2101156. |
| Nokia, NSB | We can be ok with the proposal by Apple. |
| Samsung | Agree with Apple’s modification. |
| Huawei, HiSilicon | RAN1 already have agreement on this issue. We are also fine with Appple’s modification. |

## Case (2)

|  |
| --- |
| (2)   When RRC parameters CSI-RS-ValidationWith-DCI-r16 is configured, but SlotFormatIndicator and CO-DurationPerCell-r16 are not configured for the being-activated SCell, a.      What is the expected UE behavior for this P/SP CSI-RS measurement and report on the being-activated Scell? Does UE need to decode a DCI format from other active serving cell (indicating an aperiodic CSI-RS reception or scheduling a PDSCH reception in the set of symbols of the slot) for this being-activated Scell to validate this P/SP CSI-RS? |

Ericsson (R1-2001305):

The UE is expected to receive the p/sp-CSI-RS in a slot only if it decodes a DCI format indicating ap-CSI-RS or scheduling a PDSCH reception in the set of symbols in the slot occupied by the p/sp-CSI-RS.

LG (R1-2100888):

When RRC parameter *csi-RS-ValidationWithDCI-r16* is configured, but *CO-DurationsPerCell* and *SlotFormatCombinationsPerCell* are not configured for a UE on a being-activated Scell, adopt one of the following two alternatives.

* Alt 1: The UE behaviour for P/SP CSI-RS reception on the being-activated Scell is the same with that on activated Scell, i.e., the UE can determine the validity of P/SP CSI-RS on being-activated Scell based on DCI detected on the being-activated Scell or on the other serving cell (if cross-carrier scheduling is configured).
* Alt 2: The UE behaviour for P/SP CSI-RS reception on the being-activated Scell is that the UE shall not cancel P/SP CSI-RS reception based on information of detected UE-specific DCI, if any, for the being-activated Scell, i.e., the UE assumes P/SP CSI-RS is always present and is not required to blindly detect its presence or absence.

Vivo (R1-2101156):

Yes, UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE detects a DCI format indicating an aperiodic CSI-RS reception or scheduling a PDSCH reception in the set of symbols of the slot; otherwise, UE cancels the CSI-RS reception.

Samsung (R1-2101164):

As specified in Clause 11.1 of TS38.213, *for operation with shared spectrum channel access, if a UE is provided CSI-RS-ValidationWith-DCI-r16, is not provided CO-DurationPerCell-r16, and is not provided SlotFormatCombinationsPerCell, and if the UE is configured by higher layers to receive a CSI-RS in a set of symbols of a slot, the UE cancels the CSI-RS reception in the set of symbols of the slot if the UE does not detect a DCI format indicating an aperiodic CSI-RS reception or scheduling a PDSCH reception in the set of symbols of the slot.* Therefore, it is our understanding that the UE needs to decode a DCI format from other active serving cell for this activated Scell to validate P/SP-CSI-RS.

Nokia (R1-2101287):

Since the UE is not expected to monitor PDCCH during Scell activation, the UE behavior is the same as in case (1), i.e. the UE may omit CSI reporting until the Scell has been activated.

Apple (R1-2101336):

According to section 5 of TS 38.321, for Scell activation, a UE is not required to monitor PDCCH for the Scell being activated before the minimum timing requirement defined in TS 38.133. Consequently, DCI-based P/SP-CSI-RS validation mechanism defined by RAN1 for NR-U operation cannot be used to validate P/SP-CSI-RS on the Scell being activated. RAN1 therefore recommends RAN4 to define Scell activation latency requirement for NR-U based on the assumption that a UE always assumes the presence of configured P/SP-CSI-RS on the Scell being activated for CSI report during Scell activation procedure without validation, including all of the four examples listed in R1-2100008.

Huawei (R1-2101747):

The motivation to introduce the feature of *CSI-RS-ValidationWith-DCI* is to help UE determine whether gNB transmit the P/SP-CSI-RS after LBT. Considering there is no differentiation between serving cell or being-activated Scell during the discussion, we think the feature of *CSI-RS-ValidationWith-DCI* should be applied to both being-activated Scell and active serving cell. If UE receive DCI in an activated cell indicating AP-CSI-RS in the being-activated Scell in the set of symbols of the slot overlapping with the configured P/SP-CSI-RS, UE should receive and measure on the P/SP-CSI-RS. Otherwise, UE should cancel the P/SP-CSI-RS reception.

**Q2: Can we agree on the following for Case (2)?**

UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE detects a DCI format indicating an aperiodic CSI-RS reception or scheduling a PDSCH reception in the set of symbols of the slot; otherwise, UE cancels the CSI-RS reception.

|  |  |
| --- | --- |
| Company  | Comments |
| Apple  | As commented for Q1, assuming the current specification is kept avoiding impact on Rel-15 UE behavior, a unified UE behavior needs to be defined since any DCI on other activated Cell is not monitored by UE. Hence, the following was suggested: UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot ~~if the UE detects a DCI format indicating an aperiodic CSI-RS reception or scheduling a PDSCH reception in the set of symbols of the slot; otherwise, UE cancels the CSI-RS reception~~. |
| Ericsson | Our view is that the answer to Q2 is “Yes”, and no change to 38.213 is needed.There is no reason to modify the existing specification text in 38.213 Section 11.1, as there is no contradiction for the Scell activation case. According to currently specified behavior, the UE will cancel the p/sp-CSI-RS reception if it does not receive a DCI scheduling/triggering a PDSCH/ap-CSI-RS. Clearly, if the UE is not monitoring for the DCI, then it will not detect it, and thus it will cancel the p/sp-CSI-RS reception. |
| LG Electronics | As proposed in our Tdoc R1-2100888, we prefer to apply the rule already specified in 38.213, regardless of activated cell or being-activated Scell. However, we can accept Apple’s suggestion if the majority agree. |
| Qualcomm | Believe the reason for Apple’s modification is the UE is not monitoring DCI to trigger ap-CSI-RS or PDSCH for Scell before it is activated. May want to clarify that point. Recommend to say:UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot. Even though *CSI-RS-ValidationWith-DCI* is configured, before the Scell is activated, the UE is not monitoring any DCI carries aperiodic CSI-RS trigger or PDSCH grant that can be used to validate the p/sp-CSI-RS transmitted in the same set of symbols of the slot. ~~If the UE detects a DCI format indicating an aperiodic CSI-RS reception or scheduling a PDSCH reception in the set of symbols of the slot; otherwise, UE cancels the CSI-RS reception.~~ |
| ZTE, Sanechips | During the Scell activation, we think that UE does not require to monitor DCI, so it seems the current proposal is not feasible. Specifically, we think it is fine that “UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot”.But for the UE behavior after the Scell is activated, we think the same rule that had been specified in 38.213 can be supported for activated Scell. |
| Vivo | Prefer no change to current 38.213. As proposed in our Tdoc R1-2101156, UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE detects a DCI format indicating an aperiodic CSI-RS reception or scheduling a PDSCH reception in the set of symbols of the slot; otherwise, UE cancels the CSI-RS reception. |
| Nokia, NSB | We also see no nee to change 38.213. We are fine qith QCOM’s suggested reply. |
| Samsung | Fine with Apple’s suggestion |
| Huawei, HiSilicon | We do not see the need to change 38.213.  |

## Case (3)

|  |
| --- |
| (3)   When RRC parameters CO-DurationPerCell-r16 is configured but SlotFormatIndicator is not configured for the being-activated SCell, a.      What is the expected UE behavior for this P/SP CSI-RS measurement and report on the being-activated Scell? Does UE need to decode a DCI format 2\_0 (indicating remaining channel occupancy duration) from other active serving cell for this being-activated Scell to validate the CSI-RS? |

Ericsson (R1-2001305):

The UE behaviour is slightly different depending on whether or not the DCI 2\_0 indicating the remaing CO duration is detected

Case 1: (DCI 2\_0 detected)

The UE is expected to receive the p/sp-CSI-RS as long as the set of symbols occupied by the CSI-RS are within remaining channel occupancy duration indicated by the CO duration field the detected DCI 2\_0. Ottherwise the CSI-RS reception is cancelled. The applicable rule in 38.213 Section 11.1.1 is as follows:

Case 2: (DCI 2\_0 not detected):

The UE is expected to receive the the p/sp-CSI-RS as long as the set of symbols occupied by the CSI-RS are within remaining channel occupancy duration indicated by the CO duration field of a *previously* detected DCI 2\_0. Otherwise the CSI-RS reception is cancelled.

LG (R1-2100888):

When one of *CO-DurationsPerCell* and *SlotFormatCombinationsPerCell* is configured for a UE on a being-activated Scell, adopt one of the following two alternatives.

* Alt 1: The UE behaviour for P/SP CSI-RS reception on the being-activated Scell is the same with that on activated Scell, i.e., the UE can determine the validity of P/SP CSI-RS on being-activated Scell based on DCI format 2\_0 detected on the being-activated Scell or on the other serving cell (if *CO-DurationsPerCell* or *SlotFormatCombinationsPerCell* corresponding to the being-activated Scell is provided with DCI format 2\_0 on the other serving cell).
* Alt 2: The UE behaviour for P/SP CSI-RS reception on the being-activated Scell is that the UE shall not cancel P/SP CSI-RS reception based on information of detected DCI format 2\_0, if any, for the being-activated Scell, i.e., the UE assumes P/SP CSI-RS is always present and is not required to blindly detect its presence or absence.

Vivo (R1-2101156):

Yes, UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE decodes a DCI format 2\_0 indicating the set of symbols are within remaining channel occupancy duration; otherwise, UE cancels the CSI-RS reception.

Samsung (R1-2101164):

Therefore, it is our understanding that if CO-DurationPerCell-r16 is configured but SlotFormatIndicator is not configured for the being-activated Scell, the UE needs to decode a DCI format 2\_0 from other active serving cell for this being-activated Scell to validate the CSI-RS.

Nokia (R1-2101287):

Similarly as above, since the UE is not expected to monitor PDCCH during Scell activation, the UE behavior is the same as in case (1), i.e. the UE may omit CSI reporting until the Scell has been activated.

Apple (R1-2101336):

According to section 5 of TS 38.321, for Scell activation, a UE is not required to monitor PDCCH for the Scell being activated before the minimum timing requirement defined in TS 38.133. Consequently, DCI-based P/SP-CSI-RS validation mechanism defined by RAN1 for NR-U operation cannot be used to validate P/SP-CSI-RS on the Scell being activated. RAN1 therefore recommends RAN4 to define Scell activation latency requirement for NR-U based on the assumption that a UE always assumes the presence of configured P/SP-CSI-RS on the Scell being activated for CSI report during Scell activation procedure without validation, including all of the four examples listed in R1-2100008.

Huawei (R1-2101747):

According to RAN1 agreement, UE will cancel the P/SP-CSI-RS reception if the configured resource is outside of the COT indication. It helps UE to determine whether the P/SP-CSI-RS is transmitted by gNB after LBT. As the COT duration of a being-activated Scell can be carried in a DCI 2\_0 in another active serving cell, the cross carrier indication of COT duration can still help UE to determine whether the configured CSI-RS is in the COT. So UE could decode a DCI format 2\_0 (indicating remaining channel occupancy duration) from other active serving cell for this being-activated Scell to validate the CSI-RS

**Q3: Can we agree on the following for Case (3)?**

UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE decodes a DCI format 2\_0 indicating the set of symbols are within remaining channel occupancy duration; otherwise, UE cancels the CSI-RS reception.

|  |  |
| --- | --- |
| Company  | Comments |
| Apple  | Same comments as for Q1, the following modification is suggested to avoid changes on current specification and UE behaviors: UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot ~~if the UE decodes a DCI format 2\_0 indicating the set of symbols are within remaining channel occupancy duration; otherwise, UE cancels the CSI-RS reception.~~ |
| Ericsson | Our view is that the answer to Q3 is “Yes,” with the understanding that “otherwise” applies to the case when DCI 2\_0 is not detected. No change to 38.213 is needed.There is no reason to modify the existing specification text in 38.213 Section 11.1.1, as there is no contradiction for the Scell activation case. According to currently specified behavior, the UE will cancel the p/sp-CSI-RS reception if it is not indicated by DCI 2\_0 that the p/sp-CSI-RS is within a channel occupancy. Clearly, if the UE is not monitoring for DCI 2\_0, then it will not detect it, and the currently specified cancellation rule for the case when DCI 2\_0 is not detected applies. |
| LG Electronics | As proposed in our Tdoc R1-2100888, we prefer to apply the rule already specified in 38.213, regardless of activated cell or being-activated Scell. However, we can accept Apple’s suggestion if the majority agree. |
| Qualcomm | Before the Scell is activated, the UE will not monitor DCI 2\_0 on the Scell. To use DCI 2\_0 to validate p/sp-CSI-RS, it is only possible if the DCI 2\_0 carries the *CO-DurationPerCell-r16* is on an already activated cell. Recommend to modify the answer toUE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE decodes a DCI format 2\_0 on an activated cell indicating the set of symbols on the Scell to be activated are within remaining channel occupancy duration; otherwise, UE cancels the CSI-RS reception. |
| ZTE, Sanechips | During the Scell activation, we think that UE does not require to monitor DCI, so from this point of view, the current proposal seems unreasonable. But we think it is fine that “UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot”.But for the UE behavior after the Scell is activated, we think the same rule that had been specified in 38.213 can be supported for activated Scell. |
| Vivo | Prefer no change to current 38.213. As proposed in our Tdoc R1-2101156, UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE decodes a DCI format 2\_0 indicating the set of symbols are within remaining channel occupancy duration; otherwise, UE cancels the CSI-RS reception. |
| Nokia, NSB | A spec change does not seem necessary. Apple’s suggested wording is fine.  |
| Samsung | Fine with Apple’s suggestion |
| Huawei,HiSilicon | We do not see the need to change the current spec. The UE can still detect DCI 2-0 from other activated serving cell in which the COT duration for a number of cells are indicated, including the being activated scell. Qualcomm’s modifications are fine. |

## Case (4)

|  |
| --- |
| (4)   When RRC parameters CO-DurationPerCell-r16 is not configured but SlotFormatIndicator is configured for the being-activated SCell, a.      What is the expected UE behavior for this P/SP CSI-RS measurement and report on the being-activated Scell? Does UE need to detect a DCI format 2\_0 (indicating the starting point of CO duration and the slot format) from other active serving cell for this being-activated Scell to validate the CSI-RS? |

Ericsson (R1-2001305):

The UE behaviour depends on whether or not the DCI 2\_0 containing the SFI is detected.

Case 1: (DCI 2\_0 detected):

The UE is expected to receive the p/sp-CSI-RS only if the set of symbols in the slot occupied by the p/sp-CSI-RS are indicated as ‘D’ by the SFI field in the detected DCI 2\_0. Since CO-DurationPerCell-r16 is not provided, the UE assumes that the symbols indicated by SFI are within the remaining channel occupancy

Case 2: (DCI 2\_0 not detected):

The UE cancels reception of the the p/sp-CSI-RS since CO-DurationPerCell-r16 is not provided.

LG (R1-2100888):

When one of *CO-DurationsPerCell* and *SlotFormatCombinationsPerCell* is configured for a UE on a being-activated Scell, adopt one of the following two alternatives.

* Alt 1: The UE behaviour for P/SP CSI-RS reception on the being-activated Scell is the same with that on activated Scell, i.e., the UE can determine the validity of P/SP CSI-RS on being-activated Scell based on DCI format 2\_0 detected on the being-activated Scell or on the other serving cell (if *CO-DurationsPerCell* or *SlotFormatCombinationsPerCell* corresponding to the being-activated Scell is provided with DCI format 2\_0 on the other serving cell).
* Alt 2: The UE behaviour for P/SP CSI-RS reception on the being-activated Scell is that the UE shall not cancel P/SP CSI-RS reception based on information of detected DCI format 2\_0, if any, for the being-activated Scell, i.e., the UE assumes P/SP CSI-RS is always present and is not required to blindly detect its presence or absence.

Vivo (R1-2101156):

Yes, UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE decodes a DCI format 2\_0 indicating the set of symbols are downlink symbols; otherwise, UE cancels the CSI-RS reception.

Samsung (R1-2101164):

Therefore, if SlotFormatIndicator is configured but CO-DurationPerCell-r16 is not configured for the being-activated Scell, it is RAN1 understanding that the UE follows existing Rel-15 specification (e.g., Section 11.1.1 of TS38.213).

Nokia (R1-2101287):

Again, since the UE is not expected to monitor PDCCH during Scell activation, the UE behavior is the same as in case (1), i.e. the UE may omit CSI reporting until the Scell has been activated.

Apple (R1-2101336):

According to section 5 of TS 38.321, for Scell activation, a UE is not required to monitor PDCCH for the Scell being activated before the minimum timing requirement defined in TS 38.133. Consequently, DCI-based P/SP-CSI-RS validation mechanism defined by RAN1 for NR-U operation cannot be used to validate P/SP-CSI-RS on the Scell being activated. RAN1 therefore recommends RAN4 to define Scell activation latency requirement for NR-U based on the assumption that a UE always assumes the presence of configured P/SP-CSI-RS on the Scell being activated for CSI report during Scell activation procedure without validation, including all of the four examples listed in R1-2100008.

Huawei (R1-2101747):

There is a conclusion in RAN1 that Rel-15 mechanism should be applied when only SFI is configured. So the validation rule in section 11.1.1 with only SFI configured should be applied no matter it is an active serving cell or being activated Scell.

**Q4: Can we agree on the following for Case (4)?**

UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE decodes a DCI format 2\_0 indicating the set of symbols are downlink symbols; otherwise, UE cancels the CSI-RS reception.

|  |  |
| --- | --- |
| Company  | Comments |
| Apple  | As commented in earlier question, UE is not required to monitor DCI ‘for’ the being activated Scell until now and this should be maintained to avoid change on UE implementation at this late stage. Hence, the following was suggested: UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot ~~if the UE decodes a DCI format 2\_0 indicating the set of symbols are downlink symbols; otherwise, UE cancels the CSI-RS reception.~~ |
| Ericsson | Our view is that the answer to Q4 is “Yes,” with the understanding that “otherwise” applies to the case when DCI 2\_0 is not detected. No change to 38.213 is needed.There is no reason to modify the existing specification text in 38.213 Section 11.1.1, as there is no contradiction for the Scell activation case. According to currently specified behavior, the UE will cancel the p/sp-CSI-RS reception if it is not indicated by DCI 2\_0 that the p/sp-CSI-RS is within a channel occupancy. Clearly, if the UE is not monitoring for DCI 2\_0, then it will not detect it, and the currently specified cancellation rule for the case when DCI 2\_0 is not detected applies. |
| LG Electronics | As proposed in our Tdoc R1-2100888, we prefer to apply the rule already specified in 38.213, regardless of activated cell or being-activated Scell. However, we can accept Apple’s suggestion if the majority agree. |
| Qualcomm | Before the Scell is activated, the UE will not monitor DCI 2\_0 on the Scell. To use DCI 2\_0 to validate p/sp-CSI-RS, it is only possible if the DCI 2\_0 carries the *CO-DurationPerCell-r16* is on an already activated cell. Recommend to modify the answer toUE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE decodes a DCI format 2\_0 on an activated cell indicating the set of symbols on the Scell to be activated are downlink symbols; otherwise, UE cancels the CSI-RS reception. |
| ZTE, Sanechips | During the Scell activation, we think that UE does not require to monitor DCI, so from this point of view, the current proposal seems unreasonable. But we think it is fine that “UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot”.But for the UE behavior after the Scell is activated, we think the same rule that had been specified in 38.213 can be supported for activated Scell. |
| Vivo | Prefer no change to current 38.213. As proposed in our Tdoc R1-2101156, UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE decodes a DCI format 2\_0 indicating the set of symbols are downlink symbols; otherwise, UE cancels the CSI-RS reception. |
| Nokia, NSB | Similarly as for the provious question, a spec change is not needed. Apple’s proposed wording is ok. |
| Samsung | Fine with Apple’s suggestion |
| Huawei, HiSilicon | We do not see the need to change the current spec. The UE can still detect DCI 2-0 from other activated serving cell in which the SFI for a number of cells are indicated, including the being activated scell. Qualcomm’s modifications are fine. |

## General

**Q5: Is there any additional information RAN1 should provide to RAN4?**

|  |  |
| --- | --- |
| Company  | Comments |
| Apple | It is good to point out the relevant specification to RAN4 as evidence that UE is not required to monitor DCI ‘on’ and ‘for’ the SCell being activated. Hence, the validation rule defined in RAN1 for active NR-U SCell is not applicable during SCell activation process.  |
| Ericsson | No other information is needed.We disagree with Apple's suggestion. As clearly explained in our responses to Q1-Q4, if the UE is not monitoring for a DCI, clearly it will not detect one, and the currently specified rules in 38.213 Sections 11.1 and 11.1.1 work, and are unambiguous. |

FL Summary:

A majority prefers no changes to 38.213 for the issue identified by RAN4. Several companies support or are fine with the following as RAN1's reply to Cases (1)-(4)

Case (1): "As in Rel-15, the UE is expected to receive the p/sp-CSI-RS"

Case (2): "UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot" **or** "UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot. Even though *CSI-RS-ValidationWith-DCI* is configured, before the SCell is activated, the UE is not monitoring any DCI carries aperiodic CSI-RS trigger or PDSCH grant that can be used to validate the p/sp-CSI-RS transmitted in the same set of symbols of the slot."

Case (3): "UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot" **or** "UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE decodes a DCI format 2\_0 on an activated cell indicating the set of symbols on the SCell to be activated are within remaining channel occupancy duration; otherwise, UE cancels the CSI-RS reception."

Case (4): "UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot" **or** "UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE decodes a DCI format 2\_0 on an activated cell indicating the set of symbols on the SCell to be activated are downlink symbols; otherwise, UE cancels the CSI-RS reception."

|  |
| --- |
| Proposal FL1:Conclude that no change of 38.213 is necessary for the issues identified in R1-2100008.Continue with draft reply LS discussion in section 3, including decision how exactly to reply to Cases (2)-(4) (with some editorial suggestions by the FL) |

|  |  |
| --- | --- |
| Company  | Comments |
| Ericsson | We are okay with the FL1 Proposal as long as it is explicitly captured in the chairman notes that "No change of 38.213 is necessary for the issues identified in R1-2100008."Our strong preference on the alternative responses is as follows:Case (2): Alt 2-1; no further clarification is neededCase (3): Alt 3-2; "if they" should be removedCase (4): Alt 4-2: "if they" should be removed |
| LG | Need further clarifications for all alternatives.Alt 2-1, 3-1, and 4-1: From my understanding on those alternatives, UE shall perform p/sp-CSI-RS reception even though some of RRC parameters are configured. If this is the case, doesn’t it have a specification impact?Alt 2-2: I assume UE during SCell activation is not required to monitor PDCCH on/for the being-activated SCell but some UE implementation can do that if implemented. With this understanding, we can modify as follows:UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot, as defined in TS 38.213. Even though *CSI-RS-ValidationWith-DCI* is configured, before the SCell is activated, the UE is not required to monitor any DCI that carries aperiodic CSI-RS trigger or PDSCH grant that can be used to validate the p/sp-CSI-RS transmitted in the same set of symbols of the slot.Alt 3-2 and 4-2: There could be the case where CO-DurationPerCell-r16, SlotFormatIndicator for the being-activated SCell is not configured on the activated SCell but only configured on the being-activated SCell. Will “otherwise” include that case as well? |
| Apple  | @LG, Thanks a lot for the comments and valid point. It really depends on how to interpret the TS 38.213 section 11 behavior. In earlier RAN1 discussions on validation, it was assumed for active SCell when we defined the UE behaviors. So, we can capture the following in chairman notes explicitly as clarification to avoid specification impacts. "No change of 38.213 is necessary for the issues identified in R1-2100008 with the common understanding that the section 11 in TS 38.213 is applied for active cell" Otherwise, indeed we need to add sentence in section 11 to explicitly mention it for ‘active’ SCell and it has specification impacts. In addition, our view is that a same clarification is needed for Alt.2\_2 as well. In addition, we are not so sure to add ‘as defined in TS 38.213’. Note that if assuming section 11 in TS 38.213 applies for both active and being active SCell, the UE behavior would be ‘otherwise’ as UE does not monitor DCI for the SCell being activated and hence ‘does not detect a DCI format …’, i.e., UE would cancel the P/SP-CSI-RS, instead of proceeding. Long in short, for both Alt.2-1 and Alt.2-2, we need to capture something in chairman note or modify the specification. To make the proposal clear, we propose to revise the Alt.3-1 and Alt.4-1, similarly as Alt.2-2: Modified Alt 3-1: UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot. Even though DCI 2\_0 is configured, before the SCell is activated, the UE is not required to monitor any PDCCH (including DCI 2\_0) on and for the SCell being activated to validate the p/sp-CSI-RS transmitted in the same set of symbols of the slot.Modified Alt 4-1: UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot. Even though DCI 2\_0 is configured, before the SCell is activated, the UE is not required to monitor any PDCCH (including DCI 2\_0) on and for the SCell being activated to validate the p/sp-CSI-RS transmitted in the same set of symbols of the slot.On Alt.3-2 and Alt.4-2, our view is that: for the case where CO-DurationPerCell-r16, SlotFormatIndicator for the being-activated SCell is not configured on the activated SCell but only configured on the being-activated SCell, UE behavior is ‘otherwise’. Regarding the preference on the Alternatives. Our views are as follows: Case 2: Alt.2-2. Case 3: Modified Alt.3-1. Case 4: Modified Alt.4-1. We also want to clarify the assumption of Alt. 3-2 and Alt.4-2.For the proponents of Alt.3-2/Alt.4-2, we would like to clarify whether it is assumed that the UE would monitor DCI 2\_0 transmitted on other active CCs for the CC being activated? If yes, is it contradict with section 4.3 in TS 38.213 as a UE is not required to monitor PDCCH on/for the SCell being activated before it becomes active? If yes, it does have specification impact.  |
| Qualcomm | For Alt 2-2, on a second thought, since UE is not monitoring DCI used for validation, the no spec change behavior seems to be the UE cancels all p/sp-CSI-RS reception. In that case, we suggest the change the alternative to **Reply by RAN1:** Alt 2-2: UE cancels the P/SP CSI-RS measurement in the set of symbols of the slot. Even though *CSI-RS-ValidationWith-DCI* is configured, before the SCell is activated, the UE is not monitoring any DCI that carries aperiodic CSI-RS trigger or PDSCH grant that can be used to validate the p/sp-CSI-RS transmitted in the same set of symbols of the slot.For case 3 and case 4, if we follow similar logic, if a DCI 2\_0 for the SCell to be activated is not monitored, the current spec behavior seems to be cancellation of measurement as well. Then in Alt 3-1 and Alt 4-1, shall we change “proceeds with” to “cancels”? |
| Apple2 | @Qualcomm, yes, as explained above, for Alt.3-1 and Alt.4-1, we need to change the specification or capture some clarification in chairman notes; otherwise, the UE behavior is ‘cancels’. On the other hand, we would like to clarify whether Alt.3-2/4-2 assumes that DCI 2\_0 on other active SCell is monitored by UE for the SCell being activated. If it does, whether it is contradicted with section 4.3 that UE is not required to monitor PDCCH for the SCell being activated.  |
| Ericsson 2 | Regarding Example 2 in the reply LS, we think there is a fundamental point that needs to be clarified before we can proceed:The p/sp-CSI-RS validation mechanism in 38.213 Section 11.1 is based on detecting a DCI that schedules a PDSCH or triggers an ap-CSI-RS that overlaps with the p/sp-CSI-RS. Companies have quoted the line from the MAC spec (38.321 Section 5.9) that says2>  not monitor the PDCCH for the SCell;and companies have said that this means that the UE cannot be scheduled with PDSCH for the SCell to be activated or triggered to receive ap-CSI-RS on the SCell to be activated. The critical point is that this line in the MAC spec refers only to cross carrier scheduling with CIF (i.e., cross carrier scheduling of PDSCH). It does not apply to cross carrier triggering of ap-CSI-RS. For ap-CSI-RS, the UE can be monitoring PDCCH on and for the PCell (or another activated SCell), and in the detected DCI, the CSI request field triggers ap-CSI reporting based on an ap-CSI-RS configured for the SCell to be activated. The above line from the MAC spec is irrelevant for PDCCH triggering ap-CSI-RS.Hence for Example 2 in the RAN4 LS the following text from 38.213 Section 11.1 is still valid, even for the case of the SCell to be activated. So, the UE can be monitoring PDCCH for the PCell and still be triggered to receive ap-CSI-RS on the SCell. If it is triggered, then the UE will proceed with p/sp-CSI-RS reception. If not, then the UE will cancel p/sp-CSI-RS reception.For operation with shared spectrum channel access, if a UE is provided *csi-RS-ValidationWith-DCI*, is not provided *CO-DurationsPerCell*, and is not provided *SlotFormatCombinationsPerCell*, and if the UE is configured by higher layers to receive a CSI-RS in a set of symbols of a slot, the UE cancels the CSI-RS reception in the set of symbols of the slot if the UE does not detect a DCI format indicating an aperiodic CSI-RS reception or scheduling a PDSCH reception in the set of symbols of the slot. With this observation, the proposed replies to RAN4 in Alt 2-1 and Alt 2-2 need to be revisited. Our view is that we should answer RAN4 with the behaviour currently specified in 38.213 (as above). |
| Moderator (Lenovo) | I agree that the corresponding line in the MAC spec (2> not monitor the PDCCH for the SCell;) is introduced for monitoring scheduling DCIs. As Ericsson pointed out, it would be stretching this line too far if it was interpreted such that any DCI that includes one or more fields for a deactivated SCell would be completely ruled out from monitoring.But is that line in the MAC spec really applicable? It is listed under "1> if the SCell is deactivated:". Isn't the following section (highlighted by me) ook at w.r.t. the RAN4 cases, as it talks about an SCell being activated?

|  |
| --- |
| The MAC entity shall for each configured SCell:1> if an SCell is configured with *sCellState* set to *activated* upon SCell configuration, or an SCell Activation/Deactivation MAC CE is received activating the SCell:2> if the SCell was deactivated prior to receiving this SCell Activation/Deactivation MAC CE; or2> if the SCell is configured with *sCellState* set to *activated* upon SCell configuration:3> if *firstActiveDownlinkBWP-Id* is not set to dormant BWP:4> activate the SCell according to the timing defined in TS 38.213 [6]; i.e. apply normal SCell operation including:5> SRS transmissions on the SCell;5> CSI reporting for the SCell;5> PDCCH monitoring on the SCell;5> PDCCH monitoring for the SCell;5> PUCCH transmissions on the SCell, if configured. |

In 4.3 of 38.213 we have defined the timing only "with reference to slots for PUCCH transmission", so it appears to me that the PDCCH monitoring should apply with the timing given by 38.133, which specifies an upper bound on the time after the slot carrying the MAC CE. In my reading, it means that the UE behaviour up to that time can be seen as being unspecified.So re-reading the LS from RAN4, if the understanding of "being-activated SCell" is that the UE has not yet applied the "normal SCell operation" as stated by the MAC spec section quoted above, then I think without spec change the UE behaviour would be unspecified. Should that be our reply then for all 4 cases? It almost appears too simple 😉 |

# Reply LS Discussion

|  |
| --- |
| RAN1 would like to thank RAN4 for their LS in R1-2100008 (R4-2017381) on measuring CSI-RS during SCell activation. RAN1 discussed the questions about the UE behavior with respect to CSI reports during the SCell activation procedure in case none or some of RRC parameters CO-DurationPerCell-r16, SlotFormatIndicator, and CSI-RS-ValidationWith-DCI-r16 are configured with or without corresponding DCIs for the SCell being activated:**Question by RAN4** (1)   When none of the RRC parameters CO-DurationPerCell-r16, SlotFormatIndicator, and CSI-RS-ValidationWith-DCI-r16 is configured for a UE on the being-activated SCell, a.      What is the expected UE behavior for this P/SP CSI-RS measurement and report on the being-activated SCell? **Reply by RAN1:** As in Rel-15, the UE is expected to receive the P/SP CSI-RS**Question by RAN4** (2)   When RRC parameters CSI-RS-ValidationWith-DCI-r16 is configured, but SlotFormatIndicator and CO-DurationPerCell-r16 are not configured for the being-activated SCell, a.      What is the expected UE behavior for this P/SP CSI-RS measurement and report on the being-activated SCell? Does UE need to decode a DCI format from other active serving cell (indicating an aperiodic CSI-RS reception or scheduling a PDSCH reception in the set of symbols of the slot) for this being-activated SCell to validate this P/SP CSI-RS?**Reply by RAN1:** Alt 2-1: UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot**-or-****Reply by RAN1:** Alt 2-2: UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot. Even though *CSI-RS-ValidationWith-DCI* is configured, before the SCell is activated, the UE is not monitoring any DCI that carries aperiodic CSI-RS trigger or PDSCH grant that can be used to validate the p/sp-CSI-RS transmitted in the same set of symbols of the slot.**Question by RAN4** (3)   When RRC parameters CO-DurationPerCell-r16 is configured but SlotFormatIndicator is not configured for the being-activated SCell, a.      What is the expected UE behavior for this P/SP CSI-RS measurement and report on the being-activated SCell? Does UE need to decode a DCI format 2\_0 (indicating remaining channel occupancy duration) from other active serving cell for this being-activated SCell to validate the CSI-RS?**Reply by RAN1:** Alt 3-1: UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot**-or-****Reply by RAN1:** Alt 3-2: UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE decodes a DCI format 2\_0 on an activated cell indicating the set of symbols on the SCell to be activated, if they are within the remaining channel occupancy duration; otherwise, UE cancels the CSI-RS reception.**Question by RAN4** (4)   When RRC parameters CO-DurationPerCell-r16 is not configured but SlotFormatIndicator is configured for the being-activated SCell, a.      What is the expected UE behavior for this P/SP CSI-RS measurement and report on the being-activated SCell? Does UE need to detect a DCI format 2\_0 (indicating the starting point of CO duration and the slot format) from other active serving cell for this being-activated SCell to validate the CSI-RS?**Reply by RAN1:** Alt 4-1: UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot**-or-****Reply by RAN1:** Alt 4-2: UE proceeds with the P/SP CSI-RS measurement in the set of symbols of the slot if the UE decodes a DCI format 2\_0 on an activated cell indicating the set of symbols on the SCell to be activated, if they are downlink symbols; otherwise, UE cancels the CSI-RS reception**To RAN WG4:** RAN1 respectfully asks RAN4 to consider the above reply. |