3GPP TSG-RAN WG2 #116bis-e R2-2201701

Electronic Meeting, 17 – 25 January, 2022

Agenda Item: 8.2.2.1

Source: Samsung

Title: [AT116bis-e][221][DCCA] MAC aspects (Samsung)

WID/SID: LTE\_NR\_DC\_enh2-Core

Release: Rel-17

Document for: Discussion and Decision

# 1 Introduction

This document is to handle the following email discussion:

* [AT116bis-e][221][DCCA] MAC aspects (Samsung)

Scope: Discuss the following topics: 1) How to define the "partial MAC reset" for SCG deactivation? 2) What are the MAC actions SCG activation (e.g. is PHR triggered, are some variables reset, etc.)? 3) Other MAC aspects related to SCG deactivated state (e.g. CSI-RS reporting)

Intended outcome: Discussion summary in R2-2201701.

Deadline: Deadline 3

Deadline 3 (discussions for 2nd week Mon/Tue online):

* Comment deadline: Thursday W1, 1600 UTC (for collecting views)
* Rapporteur proposals: Friday W1, 0900 UTC (proposed resolution of issues)
* Document deadline: Monday W2, 1200 UTC (report or agreed CRs)
* No extensions to this deadline for regular discussions. Discussions handling CRs may continue to 1-week email (based on chair decision).

The following documents are to be treated in this email discussion:

#### 8.2.2.1 Deactivation of SCG and UE behaviour in deactivated SCG

By Email [221] (4+1)

Partial MAC reset for SCG deactivation:

[R2-2200601](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2200601.zip) Partial MAC reset upon SCG deactivation Samsung Electronics Polska discussion LTE\_NR\_DC\_enh2-Core

[R2-2201416](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201416.zip) Partial MAC reset upon SCG deactivation DENSO CORPORATION discussion Rel-17 LTE\_NR\_DC\_enh2-Core

[R2-2201075](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201075.zip) UE behavior in deactivated SCG and SCG deactivation Qualcomm Incorporated discussion Rel-17

*(only P10-P14 relevant for MAC)*

[R2-2201319](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201319.zip) Remaining issues for MAC procedure in deactivated SCG SHARP Corporation discussion Rel-17 LTE\_NR\_DC\_enh2-Core

Does MAC allow CSI-RS reporting when SCG is deactivated?:

[R2-2201296](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201296.zip) CSI-RS reporting for deactivated SCG MediaTek Inc. discussion

#### 8.2.2.2 Activation of deactivated SCG

[R2-2201562](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201562.zip) Efficient SCG activation Ericsson discussion LTE\_NR\_DC\_enh2-Core

* Only P11 is discussed online (P4-8 can be discussed under by [222] and P1,2,12,13 can be discussed under [221])

By Email [221] (1)

PHR reporting for deactivated SCG and triggering upon SCG activation:

[R2-2200584](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2200584.zip) PHR issues for SCG activation Samsung Electronics Polska discussion LTE\_NR\_DC\_enh2-Core

By Email ([221] and [222], depending on proposals)

UE-initiated SCG activation:

[R2-2200542](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2200542.zip) Futher discussion on UE initiated SCG fast activation Futurewei discussion Rel-17 LTE\_NR\_DC\_enh2-Core R2-2110909

[R2-2200605](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2200605.zip) Activation of deactivated SCG ZTE Corporation, Sanechips discussion Rel-17 LTE\_NR\_DC\_enh2-Core

[R2-2200637](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2200637.zip) Discussion on activation of deactivated SCG Spreadtrum Communications discussion Rel-17

[R2-2200649](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2200649.zip) UP details of deactivated SCG activation Transsion Holdings discussion Rel-17

[R2-2200772](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2200772.zip) Discussion on SCG activation Lenovo, Motorola Mobility discussion Rel-17

[R2-2200882](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2200882.zip) Open issues in activation of SCG Nokia, Nokia Shanghai Bell discussion Rel-17 LTE\_NR\_DC\_enh2-Core

[R2-2200895](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2200895.zip) Remaining issues on SCG (de)activation CMCC discussion Rel-17 LTE\_NR\_DC\_enh2-Core

[R2-2201060](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201060.zip) Activation of deactivated SCG Qualcomm Incorporated discussion Rel-17

[R2-2201249](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201249.zip) Considerations on Activation of Deactivated SCG CATT discussion Rel-17 LTE\_NR\_DC\_enh2-Core

[R2-2201362](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201362.zip) Discussion on SCG activation and deacitvation LG Electronics Inc. discussion LTE\_NR\_DC\_enh2-Core

[R2-2201393](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201393.zip) Activation of deactivated SCG vivo discussion LTE\_NR\_DC\_enh2-Core

[R2-2201431](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201431.zip) SCG/split bearer handling upon SCG deactivation and SCell state upon SCG activation Sharp discussion Rel-17 LTE\_NR\_DC\_enh2-Core

[R2-2201538](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201538.zip) Conditional reconfiguration execution while SCG is deactivated Sharp discussion Rel-17 LTE\_NR\_DC\_enh2-Core

[R2-2201641](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201641.zip) Activation of SCG InterDigital discussion Rel-17 LTE\_NR\_DC\_enh2-Core Late

#### 8.2.2.3 Other aspects of SCG activation/deactivation

By Email ([221], [222] or [223], depending on proposals) (4)

Other aspects of SCG (de)activation:

[R2-2201073](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201073.zip) Other aspects of SCG activation/deactivation Qualcomm Incorporated discussion Rel-17

[R2-2201317](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201317.zip) Deactivation of SCG LG Electronics Finland discussion Rel-17 LTE\_NR\_DC\_enh2-Core

[R2-2201333](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201333.zip) Discussion on SCG (de)activation NTT DOCOMO, INC. discussion Rel-17

[R2-2201575](file:///D:\01_RAN2%20meeting\2022%200117%20RAN2-116bis\내부%20준비%20회의%20관련\Docs\R2-2201575.zip) Rest issues of SCG Activation LG Electronics discussion Rel-17 LTE\_NR\_DC\_enh2-Core R2-2111018

2 Contact Information

The rapporteur encourages the delegates who provide input to fill their contact information in the below table:

|  |  |
| --- | --- |
| Company | Contact: Name (E-mail) |
| Samsung (Donggun Kim) | s\_dg.kim@samsung.com |
| Wenjuan Pu | wenjuan.pu@vivo.com |
| Apple | naveen.palle@apple.com |
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# 3 Discussion

## 3.1 MAC aspects

Firstly, we can discuss the details of partial MAC reset.

The first action to be discussed is

1> initialize *Bj* for each logical channel to zero;

This action can be done upon SCG activation for fairness among logical channels. On the other hand, given that the network can release and add logical channel configuration (e.g. RLC bearer configuration) to initialize *Bj* values according to LCP procedure, it can be up to network implementation upon SCG activation, i.e. the network can initialize them by using RRCReconfiguration including SCG activation indication, if needed. In this regard, the action can be done as a part of partial MAC reset upon SCG deactivation since no critical problem would be foreseen.

* Option 1. Initialize Bj for each logical channel to zero upon SCG activation as a separate procedure.
* Option 2. Initialize Bj for each logical channel to zero upon SCG deactivation as a part of partial MAC reset.

**Q1. Which option do you prefer if you agree that UE should do this action related to MAC reset for SCG activation/deactivation? or do you have any other suggestion?**

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| Company | Preferred option | Comments |
| vivo | Option 2 | In the last RAN2 meeting, RAN2 has agreed that upon SCG deactivation, instruct the SCG MAC entity to perform partial MAC reset. It is reasonable to initialize Bj as a part of MAC reset. And since there is no SCG transmission during SCG deactivation, no need to initialize Bj again upon SCG activation. So, we prefer option 2. |
| Apple | Ok with Op2 |  |
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The second actions to be discussed is

1> stop (if running) all timers;

1> consider all *timeAlignmentTimer*s as expired and perform the corresponding actions in clause 5.2;

As RAN2 agreed, the only timer to be kept would be *timeAlignmentTimers.* So it seems straightforward to have the following action as a part of partial MAC reset upon SCG deactivation.

1> stop (if running) all timers except *timeAlignmentTimer*s;

**Q2. Do you agree that UE should do this action as a part of partial MAC reset upon SCG deactivation? or do you have any other suggestion?**

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| Company | Yes or No | Comments |
| vivo | Yes | Actually, stopping some specific timers does not bring clear benefit, but there is no harm to do this. For simplicity, the UE can just stop all timers except TAT. |
| Apple | Yes |  |
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The third action to be discussed is

1> discard explicitly signalled contention-free Random Access Resources for 4-step RA type and 2-step RA type, if any;

This action is related to whether to allow dedicated RACH resources indicated before SCG activation indication (when going to the SCG deactivated state or while the SCG is deactivated). If it is allowed, then UE should keep CFRA resources. Otherwise, this action can be performed as a part of partial MAC reset upon SCG deactivation.

* Option 1. discard explicitly signalled contention-free Random Access Resources for 4-step RA type and 2-step RA type, if any;
* Option 2. Do not discard explicitly signalled contention-free Random Access Resources for 4-step RA type and 2-step RA type, if any;

**Q3. Which option do you prefer if you agree that UE should do this action as a part of partial MAC reset upon SCG deactivation? or do you have any other suggestion?**

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| Company | Preferred option | Comments |
| vivo | Option 2 | First, we think there is no benefit to restrict the network flexibility on this aspect. If the NW has concern to reserve CFRA resources for SCG activation, the NW can decide not configure the dedicated RACH resource to the UE. While if the NW wants to speed up SCG activation, for example, to support MAC CE based SCG activation or allow RACH-based UE initiated SCG activation, the NW is enabled to provide CFRA resources before SCG activation. So, we prefer to allow the NW to pre-config the CFRA resources before SCG activation. And if provided, the UE should not discard it. |
| Apple | Op 2 | We also mentioned this in discussion #223. Op1 will not allow NW to configure dedicated resources to the UE if the UE discards them at deactivation of SCG. |
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The fourth action to be discussed is

1> reset all *BFI\_COUNTER*s;

RAN2 agreed to support BFD and RLM for deactivated PSCell. Therefore, the UE continues to perform BFD and RLM even after SCG deactivation, if configured. In this case, UE should not reset *BFI\_COUNTER* for deactivated PSCellsince UE still performs BFD and RLM for the same TCI state on the same BWP.However, UE should reset all BFI\_COUNTERs if BFD and RLM are not configured upon SCG deactivation.In addition to this, the UE should reset *BFI\_COUNTER* if the TCI state and BWP are changed and if BFD and RLM are configured.

Note that the legacy SCell deactivation does not reset *BFI\_COUNTER* as well as *beamFailureDetectionTimer*s, and BFD cannot be performed if SCell is deactivated. So, we can follow the legacy procedure for SCells because RAN2 already agreed to deactivate SCells of SCG for deactivated SCG.

Moreover, given that 38.321 already specified the initialization procedure for beam failure detection as shown below, UE will reset *BFI\_COUNTER* if the TCI state and BWP are changed and if BFD and RLM are configured.

1> if *beamFailureDetectionTimer*, *beamFailureInstanceMaxCount*, or any of the reference signals used for beam failure detection is reconfigured by upper layers associated with this Serving Cell:

2> set *BFI\_COUNTER* to 0.

In this regard, the following action would be enough.

1. reset all *BFI\_COUNTER*s if BFD and RLM are not configured for deactivated SCG;

**Q4. Do you agree that UE should do this action as a part of partial MAC reset upon SCG deactivation? or do you have any other suggestion?**

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| Company | Yes or No | Comments |
| vivo | Partial agree | We prefer:   1. reset all *BFI\_COUNTER*s ~~if BFD and RLM are not configured for deactivated SCG~~;   The reasons are as follows:  - If BFD is not configured for deactivated SCG, the values of BFI\_COUNTERs and beamFailureDetectionTimer will be outdated when activating the SCG, so it is reasonable to reset BFI\_COUNTERs and beamFailureDetectionTimer when deactivating the SCG.  - If BFD is configured for deactivated SCG, there is no quick beam failure detection requirement since there will be no data transmission during SCG deactivation, so it seems also fine to reset BFI\_COUNTERs and beamFailureDetectionTimer upon SCG deactivation.  So, the condition “if BFD and RLM are not configured for deactivated SCG” seems not needed. |
| Apple | Agree, but needs some critical clarifications | Our intention is that if the RRC message that deactivates SCG does not ‘change’ anything on the RLM/BFD ‘AND’ if the UE supports BFD/RLM in deactivated SCG (a UE capability that we have to discuss), then the UE does not reset. Otherwise the UE resets. |
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The next actions to be discussed are

1> set the NDIs for all uplink HARQ processes to the value 0;

1> stop, if any, ongoing Random Access procedure;

1> flush Msg3 buffer;

1> flush MSGA buffer;

1> cancel, if any, triggered Scheduling Request procedure;

1> cancel, if any, triggered Buffer Status Reporting procedure;

1> cancel, if any, triggered Power Headroom Reporting procedure;

1> cancel, if any, triggered Configured uplink grant confirmation;

1> flush the soft buffers for all DL HARQ processes;

1> for each DL HARQ process, consider the next received transmission for a TB as the very first transmission;

1> release, if any, Temporary C-RNTI.

The above actions can be performed as a part of partial MAC reset upon SCG deactivation.

**Q5. Do you agree that UE should do these actions as a part of partial MAC reset upon SCG deactivation? or do you have any other suggestion?**

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| Company | Yes or No | Comments |
| vivo | Yes | Since there will be no SCG transmission during SCG deactivation, all the above actions to be performed upon SCG deactivation seem reasonable. |
| Apple | Yes, but | We also need to keep in mind the outcome of #223 (MCG failure recovery using deactivated SCG, and if SR can be used for this). We are ok with stopping the SR (and RACH) at deactivation, the UE can start again if needed (in case RAN2 progress on #223). |
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In legacy, the common understanding is that the corresponding BWP is deactivated when a SCell is deactivated. Based on this principle, we can apply the same principle to the BWP associated with PSCell.

**Proposal. The BWP associated with PSCell is deactivated upon SCG deactivation.**

**Q6. Do you agree to this proposal? or do you have any other suggestion?**

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| Company | Yes or No | Comments |
| vivo | Maybe | **Case 1:** the PSCell BWP is activated during SCG deactivation.  If we support this case, then according to the MAC spec, the UE behavior defined for SCG deactivation in SCG activation/deactivation section will be not aligned with the UE behavior defined for active BWP in the BWP operation section. This maybe solved by adding a clarification in the SCG activation/deactivation section.  **Case 2:** the PSCell BWP is deactivated during SCG deactivation.  If we support this case, the following issues should be discussed:   * How does the UE perform BFD/RLM while the SCG is deactivated, considering the BFD/RLM RS is configured per BWP? E.g., the network indicates which BWP is used for this purpose or network can configure per UE level RLM/BFD configuration. * What is the active BWP of PSCell upon SCG activation? In our view, it can be first active BWP of PSCell or the BWP on which the UE performed BFD/RLM during SCG deactivation. * According to the current 331 spec, upon reconfiguring first active BWP ID for PSCell, the BWP indicated by this ID should be activated immediately. So, we need to discuss how to avoid this behavior. In our understanding, we can add some restriction on UE behavior or network configuration. |
| Apple | No | We think bringing deactivation/activation brings more issues, and it’s better to leave BWP as is. BWP ‘switch’ if any, can be dealt with a SCG re-activation (using RRC message). |
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Regarding CSI-RS reporting of deactivated PSCell, sending CSI-RS reporting on the deactivated PSCell would just increase power consumption given that no data transmission is ongoing. Moreover, sending CSI reporting for the deactivated PSCell via MCG would request additional inter-node message design and may not worth it considering the inter-node delay. The basic PSCell quality could be maintained by RLM/BFD mechanism.

**Proposal. CSI-RS reporting in the deactivated PSCell or for the deactivated PSCell is NOT supported.**

**Q7. Do you agree to this proposal? or do you have any other suggestion?**

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| Company | Yes or No | Comments |
| vivo | No strong view | It is beneficial for fast SCG activation that CSI-RS measurement and reporting can be performed when TAT is still running during SCG deactivation. However, if the majority do not want to support, we are also fine for progress. |
| Apple | Yes | We agree this is not essential for Rel-17. |
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In RAN2#116e it was agreed that UE indicates via the MCG that it has UL data to send for SCG DRBs, FFS indication contents and format.

The data volume calculation procedure in the PDCP specs and the RLC specs are used for the buffer status reporting triggering in the MAC spec. The same procedures can be re-used for reporting UE buffer status but rather deliver to the RRC layer due to that the message is encoded at the RRC layer. For SCG DRBs, if the total amount of PDCP data volume and RLC data volume pending for initial transmission is larger than zero, then the UE can indicate it in an RRC message.

On the other hand, one indication could be enough given that UE can send BSR MAC CE after SCG activation as in legacy, i.e. no further optimization would be needed.

* Option 1. The UE indication of uplink data and the total data volume (e.g. long BSR MAC CE) can be included in UE Assistance Information message.
* Option 2. Only the UE indication of uplink data can be included in UE Assistance Information message. BSR can follow the legacy procedure.

**Q8. Which option do you prefer? or do you have any other suggestion?**

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| Company | Preferred option | Comments |
| vivo | Option 2 | This question has been covered by the offline [222]. Better to discuss this issue in [222] since this issue is related to UL aspect not MAC aspect. |
| Apple | Op 2 | Same view as Vivo |
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PSCell can be activated and deactivated based on SCG activation and deactivation indication from network. For deactivated PSCell, the UL BWP behavior would not include any uplink transmission, i.e. the uplink power control would not be needed and thus it seems reasonable not to include the PHR report for deactivated PSCell.

**Proposal. For deactivated PSCell, PHR is not reported.**

Note that this proposal would not have any impact on the MAC specification.

**Q9. Do you agree to this proposal? or do you have any other suggestion?**

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| Company | Yes or No | Comments |
| vivo | Yes | It is obvious. |
| Apple | Yes | In the deactivated SCG state, no PHR is needed. |
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In the legacy MAC specification, PHR is triggered upon addition of the PSCell, i.e. PSCell is newly added or changed. However, given that the feature of SCG activation/deactivation is introduced, we need to note that the uplink transmission would start after SCG activation from deactivated SCG. Therefore, a new PHR trigger would be beneficial to help the network manage fast uplink power control, i.e. PHR can be triggered in case that PSCell is activated. One can argue that it would be beneficial to trigger a PHR upon SCG deactivation as well but it would be the next step.

**Proposal. PHR is triggered upon activation of the PSCell.**

**Q10. Do you agree to this proposal? or do you have any other suggestion?**

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| Company | Yes or No | Comments |
| vivo | Yes |  |
| Apple | Yes |  |
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If the proposal related to Q10 is agreeable, then the text proposal could be controversial. We need to note that RAN2 had the same discussion about whether to trigger a PHR for re-activation of SCell, several times before, i.e. whether to limit the PHR triggering to the case that SCell is activated from deactivated state. It has ended up with no such limitation. We can follow the legacy principle of SCell. On the other hand, such limitation would have no harm and thus could be acceptable based on the majority view.

* Option 1. Activation of the PSCell (the same as activation of SCell).
* Option 2. Activation of the PSCell from deactivated state.

**Q11. If you say yes for Q10, which option do you prefer? or do you have any other suggestion?**

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| Company | Preferred option | Comments |
| vivo | Option 1 | Both are ok, and fine to follow the legacy principle of SCell. |
| Apple | We do not understand Op 1, as to what does it mean: activation of PSCell other than from deactivated SCG state | PHR to be triggered when UE moves out of SCG deactivated state to activated state. |
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If the proposal related to Q10 is agreeable, then it may have an impact on the legacy procedure because RAN2 agreed that SCG can be added/changed with activated state or deactivated state. If PSCell is added/changed with deactivated state, then the PHR doesn’t have to be triggered upon addition of PSCell. Hence, the following proposal could be beneficial.

**Proposal. PHR is triggered upon addition of the PSCell (i.e. PSCell is newly added or changed with activated state).**

**Q12. If you say yes for Q10, do you agree to this proposal? or do you have any other suggestion?**

|  |  |  |
| --- | --- | --- |
| Company | Yes or No | Comments |
| vivo | Yes |  |
| Apple | PHR is triggered when the PSCell is activated (either as a new PSCell using RRC, or just using RRC for re-activation of existing deactivated PSCell). |  |
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# Conclusion

**TBD**