**3GPP TSG RAN WG1 #102-e R1-200xxxx**

**E-Meeting, August 17th – 28th, 2020**

**Agenda Item: 8.13.3**

**Source: Moderator (Huawei)**

**Title: Summary of discussions on** **efficient activation/de-activation mechanism for SCells in NR CA (1st round summary)**

**Document for: Discussion and Decision**

# Introduction

As per chairman’s guidance, three rounds with check points below are planned. This summary is for the first round and is expected to complete by Wednesday August 19th.

[102-e-NR-DSS-DC\_enh2-01] Email discussion/approval using the summary as a starting point, focusing on high-level aspects – Ravi (Ericsson) & Frank (Huawei)

* By 8/19 – Classification of high priority/medium priority items for this e-Meeting
* By 8/24 – high priority items
* By 8/27 - medium priority items

According to the contribution papers under agenda item 8.13.3 for efficient activation/de-activation mechanism for NR CA SCells, and in light of RAN1 task by WID RP-201040, all identified issues are summarized and listed in Section 3 to facilitate discussions. In section 2, discussion priority for those issues is addressed.

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| The objective of this work item is to specify enhancements to MR-DC related scenarios. At least the following topics should be considered in the work:   1. Support efficient activation/de-activation mechanism for one SCG and SCells  * Support for one SCG applies to (NG)EN-DC, and NR-DC [RAN2, RAN3, RAN4] * Support for SCells applies to NR CA, based on RAN1 leading mechanisms [RAN1, RAN2, RAN4] * This objective applies to FR1 and FR2 |

# Discussions

Based on the discussions till August 19th [16], we have the classification of high priority/medium priority items as below,

**Possible FL conclusion:**

*Classification of high priority/medium priority items for this RAN1#102 e-Meeting*

* *High priority:*
  + *Issue-2: The functionality of temporary RS during the SCell activation*
  + *Issue-3: Candidate RS for the temporary RS*
  + *Question G2: Whether or not can UE measure the triggered RS on the BWP indicated by “firstActiveDownlinkBWP-Id” although the BWP is inactive during Scell activation procedure?*
* *Medium priority:*
  + *Issue-4: Triggering command for temporary RS*
  + *Issue-1: Triggering command for SCell activation/de-activation*
  + *Issue-5: Tactivation reduction with BS assistance but no temporary RS nor SSB*
  + *Question G1: Whether or not should RAN1 consider at least the cases of FR1 unknown cell and FR2 unknown cell, if RAN1 decides to design temporary RS to assist fast SCell activation?*
  + *Question G3: Whether the accurate timing for SCell activation should be clarified or not [4], i.e. after which time points of time point#1, #2 and #3 in the Figure 1 of [4] is the to-be-activated SCell regarded as activated?*
  + *Issue-6: Enhancement for CSI reporting*

Companies’ views are very welcome.

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| *Company* | *View* |
| MTK | We (MTK) want to echo with QC and Futurewei in email reflector that enabling SRS transmissions on an SCell with dormant BWP can be discussed here.  I=In the RAN4 LS (R1-2005226), RAN4 commented that:   * RAN4 discussed the impact of not supporting CSI reporting and SRS transmission. Not supporting UL P-SRS transmissions risks performance losses on UL/DL performance in TDD systems, UL PC, BFR/Beam management and Timing Advance. RAN4 see some benefits and these performance losses can be prevented by maintaining some UL P-SRS with long periodicity while at the cost of power saving.   To us, this seems like an issue and this agenda is the only place fitted to tackle this issue. |
| Nokia, NSB | LS belongs to R16 dormancy WID, I thought we are in R17 and different WID. 😊  We are fine with the FL proposal, given that ISSUE-6 is deprioritize from this meeting. |
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## Issues with high priority

For the identified issues with high priority for this meeting, we have the following possible agreements,

**Proposal 1**:

*Temporary RS is supported for SCell activation:*

* *The temporary RS should provide at least the functionalities of AGC settling and time/frequency tracking.*
* *FFS potential functionalities of CSI measurement/acquisition and cell search*

Companies’ views are very welcome.

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| *Company* | *View* |
| MTK | We think the temporary RS should also provide assistance to cell search in addition to AGC settling and time/frequency tracking since cell search is a critical component for SCell activation of unknown cell. |
| Nokia | We support the FL proposal. I suppose unknown cell we can discuss later. Would be good to start with known cell.  **Proposal 1**:  *At least for known cell, Temporary RS is supported for SCell activation:*   * *The temporary RS should provide at least the functionalities of AGC settling and time/frequency tracking.* * *FFS potential functionalities of CSI measurement/acquisition and cell search* |
| ZTE | First of all, based on the WI, this objective applies to both FR1 and FR2. It seems companies haven’t discussed whether the temporary RS based solution can be applied to both FR1 and FR2. Our understanding is that the temporary RS based solution is common solution for both FR1 and FR2. Thus, we would like to emphasize this point in the above proposal.  Secondly, we would like to make it clear that the temporary RS is to be sent during the SCell activation procedure, otherwise it is not clear what does the temporary RS mean.  Regarding the FFS point, based on understanding, UE is required to acquire cell ID and frame/subframe index during the cell search procedure. We are not sure how can the temporary RS be used for cell search. But keeping it in FFS is fine for us.  With this, we would like to propose the Proposal as below.  *Temporary RS is supported during the SCell activation procedure for efficient SCell activation for both FR1 and FR2:*   * *The temporary RS should provide at least the functionalities of AGC settling and time/frequency tracking.* * *FFS potential functionalities of CSI measurement/acquisition and cell search* |
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**Proposal 2:**

*Aperiodic TRS is selected as temporary RS for Scell activation*

* *If more functionalities are confirmed to be supported by temporary RS, other RS candidates, i.e. aperiodic CSI RS and P/SP-CSI RS, are not precluded.*

Companies’ views are very welcome.

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| *Company* | *View* |
| MTK | For the sub-bullet, we want to add “RS based on SSS/PSS are not precluded“ due to the FFS of cell search in Proposal 1. |
| Nokia | We support the FL proposal. |
| ZTE | We are supportive of selecting TRS as temporary RS for efficient SCell activation. However, for now, we are not sure whether we need to restrict the temporary RS to only aperiodic TRS for now. As also commented by many other companies, periodic or semi-persistent temporary RS can also be considered (although it seems we don’t have semi-persistent TRS). With this, we would like to update the proposal as below.  *TRS is selected as temporary RS for Scell activation*   * *If more functionalities are confirmed to be supported by temporary RS, other RS candidates, i.e. aperiodic CSI RS and P/SP-CSI RS, are not precluded.* |
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**Proposal 3**:

*UEs measure the triggered temporary RS on an inactive BWP during Scell activation procedure:*

* *The inactive BWP can be indicated by “firstActiveDownlinkBWP-Id”.*
* *FFS whether the inactive BWP can be other BWP than the one above.*

Companies’ views are very welcome.

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| *Company* | *View* |
| MTK | We agree on the FL proposal 3. |
| Nokia, NSB | We would like to clarify the time point where UE expects CSI-RS to be triggered on inactive Scell. We understand that BWP should not be active yet, because otherwise UE would be required to receive PDSCH.  **Proposal 3**:  *UEs measure the triggered temporary RS on an inactive BWP during Scell activation procedure after point #1 in Figure 1 in [4]:*   * *The inactive BWP can be indicated by “firstActiveDownlinkBWP-Id”.*   *FFS whether the inactive BWP can be other BWP than the one above.* |
| ZTE | There are two issues to be discussed here.  First, whether triggering temporary RS on an inactive BWP is allowed or not, this has been covered by the main bullet. Second, if triggering temporary RS on inactive BWP is allowed, which BWP shall be selected? This has been covered by the first sub-bullet and second-bullet.  For now, as we are trying to finalize some high-level considerations for this topic. We didn’t see the need to discuss whether *“firstActiveDownlinkBWP-Id”* should be selected or not as this is highly depending on the companies’ detailed design. For example, if companies prefer DCI based solution, then BWP indicator is already there in the DCI and thus some more flexibility can be expected.  Thus, we would like to propose the following update.  *UEs measure the triggered temporary RS on an inactive BWP during Scell activation procedure:* |
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## Issues with medium priority

[To be updated after progress from S2.1]

# Conclusions

[TBU]

# References

1. [R1-2005411](C:\\Users\\wanshic\\OneDrive - Qualcomm\\Documents\\Standards\\3GPP Standards\\Meeting Documents\\TSGR1_102\\Docs\\R1-2005411.zip) Discussion on efficient activation/de-activation mechanism for Scells vivo
2. [R1-2005442](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2005442.zip) Discussion on Support Efficient Activation De-activation Mechanism for SCells in NR CA ZTE
3. [R1-2005629](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2005629.zip) On supporting efficient activation mechanism for SCells in NR CA MediaTek Inc.
4. [R1-2005698](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2005698.zip) Disucssion on efficient activation/de-activation mechanism for Scell in NR CA CATT
5. [R1-2005908](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2005908.zip) On low latency Scell activation Nokia, Nokia Shanghai Bell
6. [R1-2006065](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2006065.zip) Efficient activation/de-activation for Scell OPPO
7. [R1-2006178](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2006178.zip) On efficient activation/de-activation mechanism for Scells Samsung
8. [R1-2006283](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2006283.zip) Discussion on efficient activation/de-activation mechanism for SCells in NR CA Spreadtrum Communications
9. [R1-2006511](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2006511.zip) Views on Rel-17 DSS SCells efficient activation/de-activation Apple
10. [R1-2006673](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2006673.zip) Reduced Latency SCell Activation Ericsson
11. [R1-2006751](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2006751.zip) Discussion on efficient activation/deactivation mechanism for SCells NTT DOCOMO, INC.
12. [R1-2006754](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2006754.zip) Efficient activation/deactivation of SCell ASUSTEK COMPUTER (SHANGHAI)
13. [R1-2006835](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2006835.zip) Views on efficient activation/de-activation mechanism for SCells in NR CA Qualcomm Incorporated
14. [R1-2006927](file:///C:\Users\wanshic\OneDrive%20-%20Qualcomm\Documents\Standards\3GPP%20Standards\Meeting%20Documents\TSGR1_102\Docs\R1-2006927.zip) Discussion on efficient activation/de-activation mechanism for SCells Huawei, HiSilicon
15. [R1-1912730](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_99/Docs/R1-1912730.zip) On efficient and low latency low power serving cell operations Futurewei
16. Summary of discussions on Rel-17 MR-DC, <https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_102-e/Inbox/drafts/8.13.3/R1-20xxxxx%20Summary%20of%20discussions%20on%20Rel-17%20MR-DC%20V011_Moderator.docx>

# Appendix

# Summary of issues and priorities for 1st round

According to all of companies’ contribution documents, all the issues includes six specific issues and nine general issues are summarized below, with more details in Section 3. As per chairman’s guidance, the priority of issues will be discussed first, and then focus on the high priority/medium priority items for this e-Meeting. Please companies provide your views at least for this section by 18:00 PST Tuesday, August 18 (UTC 01:00, August 19).

For the specific issues to activation/deactivation process:

* **Issue-1:** Triggering command for SCell activation/de-activation
* **Issue-2:** The functionality of temporary RS during the SCell activation
* **Issue-3:** Candidate RS for the temporary RS
* **Issue-4:** Triggering command for temporary RS
* **Issue-5:** Tactivation reduction with BS assistance but no temporary RS nor SSB
* **Issue-6**: Enhancement for CSI reporting

Please feedback either “No need”, “Low”, “Medium” or “High” as priority for the following issues. Your simple justification for it is welcome with details left to Section 3.

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| --- | --- | --- | --- | --- | --- | --- |
| *Company* | *Issue-1* | *Issue-2* | *Issue-3* | *Issue-4* | *Issue-5* | *Issue-6* |
| Futurewei | Medium | High | Medium | High | High | Medium |
| MTK | Medium | High | High | High | Medium | Medium |
| ZTE | Medium | High | High | Medium | Low | Low |
| Nokia | High | High | High | Medium (triggering design is a detail to be discussed later) | Low | Low |
| Qualcomm | High | High | High | High | Medium | Medium |
| DOCOMO | High | High | High | High | Medium | Medium |
| Ericsson | Medium | High | High | Low (can be discussed after determining functionality etc. i.e., Issue 2, Issue 3) | Medium (should also check with RAN4) | Low |
| Samsung | High | High | High | High | Medium | Medium |
| CATT | High | High | Medium | Medium | Medium | Low |
| vivo | Low | High | High | Medium | Low | Low |
| Huawei, HiSilicon | High | High | High | Medium | High | Medium |
| <In Total> | 6H4M1L | 11H | 9H2M | 5H5M1L | 2H6M3L | 6M5L |

For general issues, they are translated as ‘Yes/NO’ questions for your convenience, which each is basically extracted from a proposal of one company:

* **Question G1:** Whether or not should RAN1 consider at least the cases of FR1 unknown cell and FR2 unknown cell, if RAN1 decides to design temporary RS to assist fast SCell activation? [3]
* **Question G2:** Whether or not can UE measure the triggered RS on the BWP indicated by “firstActiveDownlinkBWP-Id” although the BWP is inactive during Scell activation procedure? [1]
* **Question G3:** Whether the accurate timing for SCell activation should be clarified or not [4], i.e. after which time points of time point#1, #2 and #3 in the Figure 1 of [4] is the to-be-activated SCell regarded as activated?
* **Question G4:** Whether or not RAN1 starts the corresponding work only after RAN4 firstly estimate to what extent the delay for activation/deactivation could be reduced and potential improvement, e.g. extra information/assumption, required to reduce the delay?[12]
* **Question G5:** Whether or not in this WI RAN1 to identify and resolve any issue related to simultaneous operation of SCell dormancy and secondary DRX group? [9]
* **Question G6:** Whether or not in this WI RAN1 to consider extending the SCell dormancy mechanism to more efficiently support the SCG dormancy?[9]
* **Question G7:** Whether RAN1 should not work on an enhancement for SCell activation/de-activation for NR-CA with putting aside SCell dormancy? [13]
* **Question G8:** For SCell dormancy, whether is it unnecessary or not to re-open the discussions for the features that were not supported in Rel.16, unless other factors (e.g., SCG suspension) are to be taken into account? [13]
* **Question G9:** Whether or not RAN1 need to further study scenarios, if any, in which gNB knowledge of TCI-state or SSB index for a Scell activation may not be clear enough, such as inter-band CA? [5]

Please feedback either “No need”, “Low”, “Medium” or “High” as priority for the following questions. Your simple justification for it is welcome with details left to Section 3.

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| *Company* | *Question G1* | *Question G2* | *Question G3* | *Question G4* | *Question G5* | *Question G6* | *Question G7* | *Question G8* | *Question G9* |
| Futurewei | No need | Yes | High | No need | No need | No need | High | No need | Medium |
| MTK | High | High | Medium | Low | Low | Low | Medium | Low | Low |
| ZTE | Medium | High | Low | No need | No need | No need | No need | No need | Medium |
| Nokia | Medium | High | High | Medium | Low | Very low | FL question unclear | FL question unclear | Medium |
| Qualcomm | FFS | Yes | Clear | Clear | FFS | Yes | High | Yes | FFS |
| DOCOMO | High | High | Medium | Low | Low | Low | Medium | Low | Medium |
| Ericsson | Medium | Medium | Medium | Medium | Medium | Low (RAN2 discussion) | FL question unclear | Low | Medium |
| Samsung | Medium | Medium | Medium | No need | No need | No need | Medium | No need | No need |
| CATT | Not sure the intention. The temporary RS is applicable to all the cases or design different RS for unknown/known cell case? | High | High | No need | No need | No need | Low | Low | Low |
| vivo | Medium | High | Low | No need | No need | No need | No need | No need | No need |
| Huawei, HiSilicon | Medium | High | Medium | No need | No need | No need | No need | No need | No need |
| <In Total> | 2H6M1N | 7H2M | 3H5M2L | 2M2L6N | 1M3L6N | 4L6N | 2H3M1L3N | 4L5N | 5M2L3N |

In summary, classification of high priority/medium priority items for this e-Meeting

* High priority:
  + Issue-2: The functionality of temporary RS during the SCell activation
  + Issue-3: Candidate RS for the temporary RS
  + Question G2: Whether or not can UE measure the triggered RS on the BWP indicated by “firstActiveDownlinkBWP-Id” although the BWP is inactive during Scell activation procedure?
* Medium priority:
  + Issue-4: Triggering command for temporary RS
  + Issue-1: Triggering command for SCell activation/de-activation
  + Issue-5: Tactivation reduction with BS assistance but no temporary RS nor SSB
  + Question G1: Whether or not should RAN1 consider at least the cases of FR1 unknown cell and FR2 unknown cell, if RAN1 decides to design temporary RS to assist fast SCell activation?
  + Question G3: Whether the accurate timing for SCell activation should be clarified or not [4], i.e. after which time points of time point#1, #2 and #3 in the Figure 1 of [4] is the to-be-activated SCell regarded as activated?
  + Issue-6: Enhancement for CSI reporting
* Low priority:
  + Question G4: Whether or not RAN1 starts the corresponding work only after RAN4 firstly estimate to what extent the delay for activation/deactivation could be reduced and potential improvement, e.g. extra information/assumption, required to reduce the delay?
  + Question G5: Whether or not in this WI RAN1 to identify and resolve any issue related to simultaneous operation of SCell dormancy and secondary DRX group?
  + Question G6: Whether or not in this WI RAN1 to consider extending the SCell dormancy mechanism to more efficiently support the SCG dormancy?
  + Question G7: Whether RAN1 should not work on an enhancement for SCell activation/de-activation for NR-CA with putting aside SCell dormancy?
  + Question G8: For SCell dormancy, whether is it unnecessary or not to re-open the discussions for the features that were not supported in Rel.16, unless other factors (e.g., SCG suspension) are to be taken into account?

Question G9: Whether or not RAN1 need to further study scenarios, if any, in which gNB knowledge of TCI-state or SSB index for a Scell activation may not be clear enough, such as inter-band CA?