**3GPP TSG RAN WG1 Meeting #106bis-e R1-210xxxx**

**e-Meeting, October 11th-19th, 2021**

**Agenda Item: 8.13.2**

**Source: Moderator (Huawei)**

**Title: Summary#1 of efficient SCell activation/de-activation mechanism of NR CA**

**Document for: Discussion and Decision**

# Introduction

As per chairman’s guidance, two rounds with check points below are planned. This summary is for the first round and is expected to complete by October 14.

[106bis-e-NR-DSS-02] Email discussion/approval for efficient activation/de-activation mechanism – Frank (Huawei)

* 1st check point: October 14
* Final check point: October 19

According to the contribution papers under agenda item 8.13.2 for efficient activation/de-activation mechanism for NR CA SCells, and in light of the working assumption and agreements achieved the previous meetings, all identified issues are summarized in section and can be discussed in Section 3.

# Summary of issues and priorities

According to all of companies’ contribution documents, all the issues are summarized below, including 5 specific issues and 1 general issues, with more details in Section 3. Please companies provide your views in Section 3 with taking into consideration the information of check points and GTW session.

For the specific issues to activation/deactivation process:

* **Issue-1:** Contents for the triggering signaling
* **Issue-2:** Triggering signaling for SCell activation/de-activation and temporary RS
* **Issue-3:** MAC CE triggering framework
* **Issue-4:** QCL configuration of temporary RS
* **Issue-5:** Enhancement for CSI reporting

For general issues, they are mostly extracted from a proposal of one company:

* **Question G1:** For temporary RS, whether collision handling with uplink slot/symbols should be considered? [6]

According to previous discussions, companies’ top interests and focus seems to be the detailed designs of temporary RS. Therefore, the following discussion order is suggested. Besides any issue is always welcome for any comment, but the first check point and the potential GTW session could focus more on some issues as listed. If any issue reaches potential early consensus based on companies’ feedbacks, it is also surely reviewed by its earliest check point.

## Schedule

* For 1st check point: October 14, and potential GTW session on October 12

Note: The following issues have impacts on details of TRS and potential LS request to RAN4

* **Issue-1: MAC CE triggering framework**
* **Issue-2: MAC-CE signaling for SCell activation/de-activation and temporary RS**
* **Issue-3: Contents for the triggering signaling**
* **Issue-4: QCL configuration of temporary RS**
* For 2nd check point: October 19, and potential new GTW session
* **Follow-ups for all issues listed in 1st check point**
* **The remaining issues with potential consensus**

In case of different views or suggestions on the schedule, they are welcome here.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

# Discussions

In current specifications, when a UE receives a SCell activation command in a PDSCH in slot $n$, the UE shall complete SCell activation no earlier than $n+k$ and no later than slot *n*+ [*THARQ* + *Tactivation\_time* + *TCSI\_Reporting*]/$T\_{slotlength}$ as shown in Figure 1. Therefore, reducing *THARQ*, *Tactivation\_time* and *TCSI\_Reporting* is the key to achieve efficient SCell activation/de-activation mechanism. Companies’ views are summarized in the sections below. In addition to your feedback to Section 3, more detailed comments are welcome.



Figure SCell activation procedure

## THARQ reduction

### Issue-1: MAC CE triggering framework

In RAN1#106-e meeting, one remaining issue is the indication how to support temporary RS is triggered for a subset of ‘to-be-activated’ SCells. This issue was extensively discussed in the RAN1 106-e meeting. The following two alternatives were discussed at the last meeting and later email discussion:

Agreement

For triggering temporary RS, down-select based on the following alternatives, or let RAN2 be aware the status of this discussion

* Alt 1: Bitmap approach in MAC-CE
* Every Z-bit block in the bitmap corresponds to a SCell, Z>=0
* A Z-bit block indicates the temporary RS [configuration index], and a value zero indicated by the bit block means no RS resource transmitted.
* The to-be-activated SCell is indicated via the C values in the legacy SCell activation/de-activation MAC CE or in the new MAC-CE
* Alt 2: Reuse A-TRS triggering framework
* A trigger state is indicated by the MAC-CE explicitly
* The association between a trigger state and temporary RS for one or multiple SCells is configured by RRC according Rel-16 A-TRS triggering framework
* FFS: The value zero of the MAC-CE indication means no temporary RS is triggered by the MAC-CE for all to-be-activated SCells

Companies’ views are summarized as follows:

* Opt. 3.1: Bitmap approach in MAC-CE. [1][2][5][6][10][12][17]
* Opt. 3.2: Reuse A-TRS triggering framework.[3][7][8][9][13][15][16]
* Opt. 3.3: Depend on RAN2’ decision. [4]

|  |  |  |
| --- | --- | --- |
|  | Pros | Cons |
| Alt 1 | * For simple and flexible triggering of temporary RS per each of SCells individually, Alt 1 with bitmap approach in MAC-CE is preferable which is similar to the legacy MAC CE signalling structure for SCell activation. [6][12]
* Alt 1 can be considered as a generalization of the existing SCell activation MAC CE, and can provide full flexibility of controlling the triggering RS for each SCell without additional RRC signaling overhead [5]
* Alt 1 as it seems to be more aligned with the traditional MAC CE design and requiring less RRC configurations [5]
 |  |
| Alt 2 | * Lower MAC-CE signaling overhead
* Rel-16 A-CSI triggering framework has been proved to provide sufficient flexibility [13]
* Maximizes reusing existing procedure [9][13][15]
 | * If a gNB wants to indicate triggering temporary RS for all to-be-activated SCells indicated via legacy SCell activation MAC-CE or new MAC-CE, Alt 2 based approach cannot achieve it at least in some cases due to less flexibility.[10]
* The RRC configured scenarios of temp RS and SCell combinations could impose a high overhead and limit the combination of SCells which could be fastly activated. [5] [17]
* The gap between two bursts of temporary RSs is indicated implicitly by two separate triggering offsets for each burst, which is supported by current A-TRS triggering framework yet. [18]
* Redundant IEs cannot be optionally muted out, e.g. *bwp-Id* and *resourceType* under CSI-ResourceConfig. [18]
 |

**Question 3: Any issue/Cons missing for Alt 1? How to address the identified Cons for Alt 2?**

This discussion has impacts on both MAC-CE signaling and the RRC parameters. It is very helpful for the discussion of detailed RRC parameters in the RRC email thread if a down-selection between Alt 1 and Alt 2 is made here. Therefore, **companies are encouraged to address the concerns of the other side**.

To have an overview of the RRC parameters for both Alt. 1 and Alt. 2, two diagrams in Sect 1.1. in [18] could be a reference, as well as the latest version of excel file of RRC parameters in [18].

Companies’ views are very welcome.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

### Issue-2: MAC-CE signaling for SCell activation/de-activation and temporary RS

Detailed signalling structure of the triggering MAC-CE(s) including the down-selection between the following example options and whether the decision should be made in RAN1 or RAN2, companies’ views are summarized as follows:

* Opt. 2.1: One new MAC CE for both SCell activation triggering and corresponding temporary RS triggering. [1][3][10]
* Opt. 2.2: One R15/16 SCell activation MAC CE for SCell activation triggering and one new MAC CE (in the same PDSCH) for corresponding temporary RS triggering [12]
* Opt. 2.3: Depend on RAN2’ decision. [5][8][11]

***FL Proposal****: For detailed signaling structure of the triggering MAC-CE(s) including the down-selection between the following options is left to RAN2 to decide:*

* *Opt. 1: One new MAC CE for both SCell activation triggering and corresponding temporary RS triggering*
* *Opt. 2: One R15/16 SCell activation MAC CE for SCell activation triggering and one new MAC CE (in the same PDSCH) for corresponding temporary RS triggering*

**Question 2: whether the above proposal is ok?**

Companies’ views are very welcome.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

### Issue-3: Contents for the triggering signaling

**Issue 3-1: What contents should be indicated in MAC CE**

Multiple contents should be explicitly or implicitly indicated in new MAC CE. For example, the triggering offset of temporary RS can be either explicitly indicated in the new MAC CE or implicitly derived from a pre-configured list of RS resources and a RS resource ID indicated in the new MAC CE. **It would be very helpful for RAN2 signaling implementation if RAN1 could provide a list of contents that are recommended to be explicitly indicated by the new MAC CE.** Therefore, regarding what fields are explicitly indicated in MAC CE, companies’ views are summarized as follows:

* Opt 2.3.1: triggering information (e.g. trigger state ID/trigger RS ID) [1][15][16][17]
* Opt 2.3.2: Whether or not temporary RS is triggered [1][10]
* Opt 2.3.3: The number of RS bursts and the gap length between the RS bursts [17]
* Opt 2.3.4: Triggering offset of temporary RS [17]
* Opt 2.3.5: QCL information [17]

**Since this issue is coupled with the comparison between Alt 1 and Alt 2 in Sect 3.1.1, we may postpone this discussion until more outcomes from the other discussions, unless a majority of companies prefer to discuss this first.**

**Question 3.1: what fields are explicitly indicated in MAC CE?**

Companies’ views are very welcome.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Issue 3-2: Other issues**

Some issues for temporary RS configuration are proposed by some companies, it is appreciate for your views.

**Question 3.2:** If two temporary RS bursts are transmitted, both bursts employ the same temporary RS configuration, including time domain and frequency domain? Or two separate configuration for each temporary RS burst? [6]

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Question 3.3:** Whether the N-bit for temporary RS ID can be omitted in the bitmap for deactivated SCell. [12]

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

## Tactivation reduction

### Temporary-RS based

#### Issue-4: QCL configuration of temporary RS

In the previous meeting, a working assumption has achieved as follows:

|  |
| --- |
| **Working Assumption**For efficient SCell activation with assistance of temporary RS, a SSB of the to-be-activated SCell can be indicated as a QCL source for the temporary RS in case of known SCell* FFS: QCL type
* FFS: the case of unknown SCell
* FFS: other QCL source, e.g. the SSB/P-TRS of another active cell
 |

For the working assumption, 4 sub-issues are to be discussed, and corresponding companies’ views are summarized.

**Issue-4.1: whether the working assumption “For efficient SCell activation with assistance of temporary RS, a SSB of the to-be-activated SCell can be indicated as a QCL source for the temporary RS in case of known SCell” should be confirmed?**

* **Opt 4.1.1:** The P/SP TRS associated with the temporary AP TRS is the QCL source with Type A for the temporary AP TRS in case of known SCell, same as the legacy behavior. The temporary AP TRS and associated P/SP TRS jointly serve as the QCL source for other RS following it, same as the legacy behavior. [2]



* **Opt 4.1.2:** A-TRS can be a QCL source for SSB and CSI-RS to assist SSB detection and CSI measurement. Rel-15 QCL type for P-TRS and SSB/CSI-RS can be applied to QCL relation between A-TRS and SSB/CSI-RS. [6]
* **Opt 4.1.3:** Confirm. [1][11]

**Question 4.1-1: Whether the temporary RS can be QCL source for the operations after SCell activation? Whether it can be QCL source for the CSI-RS during the SCell activation, as the figure shown in Opt 4.1.1?**

Companies’ views are very welcome.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Question 4.1-2: Whether the temporary RS can be QCL source for the CSI-RS during the SCell activation, as the figure shown in Opt 4.1.1?**

Companies’ views are very welcome.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Question 4.1-3: Whether the working assumption above can be confirmed?**

Companies’ views are very welcome.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Issue-4.2: if the working assumption is confirmed, which QCL types are expected?**

* **Opt 4.2.1:** 'typeC' with an SS/PBCH block and, when applicable, 'typeD' with the same SS/PBCH block. [1][3][5][7][17]

**Question 4.2: which QCL types are expected if the working assumption “For efficient SCell activation with assistance of temporary RS, a SSB of the to-be-activated SCell can be indicated as a QCL source for the temporary RS in case of known SCell” is confirmed?**

Companies’ views are very welcome.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Issue-4.3: For the case of unknown SCell, whether SSB of one of the active cells can be indicated as a QCL source for temporary RS?**

* **Opt 4.3.1:** Yes, at least for intra-band CA. [3][17]
* **Opt 4.3.2:** Yes. [1][11]
* **Opt 4.3.2:** No

**Question 4.3: For the case of unknown SCell, whether SSB of one of the active cells can be indicated as a QCL source for temporary RS?**

Companies’ views are very welcome.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

**Question 4.4: Whether the temporary RS can be used as a QCL source for any other RS or Channels?**

* **Opt 5.3.1:** Yes,
* **Opt 5.3.2:** No. [1][17]

Companies’ views are very welcome.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

## TCSI\_reporting reduction

### Issue-5: Enhancement for CSI reporting

TCSI\_reporting reduction may be beneficial to achieve efficient SCell activation. Companies’ views are summarized as follows:

* **Opt 5.1** New MAC-CE command that triggers the SCell activation and A-TRS transmission is used to additionally trigger A-CSI-RS transmission. [13]
* **Opt 5.2** The new MAC CE introduced for temporary RS triggering can additionally indicate CSI reporting based on temporary RS for activated Scells [12]

*“CSI reporting based on temporary RS could be triggered simultaneously in the NEW MAC CE which will be introduced to trigger temporary RS of to-be-activated SCells. Since it is redundant to introduce additional MAC CE exclusively for CSI reporting based on temporary RS, it would be better to design so that temporary RS triggering and CSI reporting can be instructed simultaneously through the same MAC CE. Furthermore, it is worth to note that CSI reporting is not always triggered automatically when the MAC CE indicates temporary RS reception. So, through this MAC CE, temporary RS triggering and CSI reporting can be indicated separately. For example, both of temporary RS triggering and CSI reporting are indicated for some SCells, while only TRS triggering is indicated but CSI reporting is not indicated for other SCells.”*

* **Opt 5.3** The UE should consider the MAC-CE activation of a SCell as a trigger for a preconfigured SP-CSI reporting for that cell. [17]
* **Opt 5.4** short interval P/SP- CSI-RS report. [1]

“*The specific P/SP-CSI-RS/reporting for SCell activation can be received during the required period. This short interval P/SP-CSI-RS/reporting for fast SCell activation is beneficial with little specification impacts.*”

* **Opt 5.5** remove TCSI\_reporting for the case of FR2 unknown cell. [1]

“*During the procedure of SCell activation, when gNB receives the beam reporting, i.e. the L1-RSRP report, it implies that UE has completed beam selection and timing synchronization which are necessary conditions for downlink transmission. It means that gNB can start downlink transmission with a conservative or rough MCS on the SCell, and UE can start to monitor PDCCH on the SCell, even the valid CSI report is not yet reported. Thus the gNB and UE can assume the SCell is activated after the Tactivation\_time.*”

**Question 5: which options above of CSI reporting enhancement should be supported?**

Companies’ views are very welcome.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

## General Issues

**Question G1:** For temporary RS, whether collision handling with uplink slot/symbols should be considered? [6]

Referring to [6], it was motivated by the following text in TS 38.214 “*If no two consecutive slots are indicated as downlink slots by tdd-UL-DL-ConfigurationCommon or tdd-UL-DL-ConfigDedicated, then the UE may be configured with one or more NZP CSI-RS set(s), where a NZP-CSI-RS-ResourceSet consists of two periodic NZP CSI-RS resources in one slot.*”

In [6], a proposal is “***Proposal 6****: Collision handling with uplink slot/symbol should be considered and the following potential solutions can be further discussed: scheduling restriction to avoid collision, cancellation and delay.*”

Companies’ views are very welcome.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |

## Other Issues

Issues or comments that do not fit in any of the previous sections of this document can be provided in this section.

|  |  |
| --- | --- |
| *Company* | *View* |
|  |  |
|  |  |
|  |  |
|  |  |

# Conclusions

# References

1. R1-2108774 Discussion on efficient activation/de-activation mechanism for SCells Huawei, HiSilicon
2. [R1-2108797](file:///D%3A%5C2021%5CDocs%5CR1-2108797.zip) Support efficient activation/de-activation mechanism for Scells FUTUREWEI
3. [R1-2108856](file:///D%3A%5C2021%5CDocs%5CR1-2108856.zip) Discussion on Support Efficient Activation De-activation Mechanism for SCells in NR CA ZTE
4. [R1-2108930](file:///D%3A%5C2021%5CDocs%5CR1-2108930.zip) Discussion on efficient activationde-activation mechanism for SCells in NR CA Spreadtrum Communications
5. [R1-2109006](file:///D%3A%5C2021%5CDocs%5CR1-2109006.zip) Discussion on efficient activation/de-activation mechanism for Scells vivo
6. [R1-2109099](file:///D%3A%5C2021%5CDocs%5CR1-2109099.zip) Discussion on efficient activation/de-activation for Scell OPPO
7. [R1-2109391](file:///D%3A%5C2021%5CDocs%5CR1-2109391.zip) Discussion on efficient activation and de-activation mechanism for SCell in NR CA Xiaomi
8. [R1-2109519](file:///D%3A%5C2021%5CDocs%5CR1-2109519.zip) Remaining Issues on Scell Activation/Deactivation Samsung
9. [R1-2109637](file:///D%3A%5C2021%5CDocs%5CR1-2109637.zip) On efficient activation/de-activation for SCells Intel Corporation
10. [R1-2109705](file:///D%3A%5C2021%5CDocs%5CR1-2109705.zip) Discussion on efficient activation deactivation mechanism for Scells NTT DOCOMO, INC.
11. [R1-2109896](file:///D%3A%5C2021%5CDocs%5CR1-2109896.zip) Discussion on fast SCell activation/deactivation InterDigital, Inc.
12. [R1-2109988](file:///D%3A%5C2021%5CDocs%5CR1-2109988.zip) Discussion on fast and efficient SCell activation in NR CA LG Electronics
13. [R1-2110060](file:///D%3A%5C2021%5CDocs%5CR1-2110060.zip) On efficient SCell Activation/Deactivation Apple
14. [R1-2110129](file:///D%3A%5C2021%5CDocs%5CR1-2110129.zip) Efficient activation/deactivation of SCell ASUSTeK
15. [R1-2110142](file:///D%3A%5C2021%5CDocs%5CR1-2110142.zip) Reduced Latency SCell Activation Ericsson
16. [R1-2110214](file:///D%3A%5C2021%5CDocs%5CR1-2110214.zip) Efficient activation/de-activation mechanism for SCells in NR CA Qualcomm Incorporated
17. [R1-2110295](file:///D%3A%5C2021%5CDocs%5CR1-2110295.zip) On low latency Scell activation Nokia, Nokia Shanghai Bell
18. R1-2108674 Summary of email discussion [Post-106-e-Rel17-RRC-14] on efficient SCell activation/de-activation mechanism of NR CA, Moderator (Huawei)

# Appendix: Agreements

|  |
| --- |
| Agreements:As working assumption, with respect to efficient SCell activation, reuse existing Rel-15/16 TRS structure for temporary RS* FFS: how many burst/symbols are required for both AGC settling and Time/Frequency tracking for different cases, e.g. FR1 and FR2, known and unknown SCell
	+ A burst of temporary RS is notated as in S5.1.6.1.1 of TS 38.214
		- “2-slot with four CSI-RSs resources (4 samples)” for FR1
		- either “1-slot with two CSI-RSs resources (2 samples)” or “2-slot with four CSI-RSs resources (4 samples)” for FR2
* The working assumption can be confirmed after RAN4 check. (A LS for such request is planned).

Agreements:For efficient SCell activation, discuss and agree from the following alternatives at RAN1#104-e* Alt 1: the trigger of temporary RS is integrated into a single triggering signaling with the trigger of SCell activation transmitted on an activated cell.
	+ FFS detailed design of this integrated triggering signaling.
	+ Potential examples of single triggering signaling for further discussions
	+ A PDSCH TB, e.g. containing two respective MAC-CEs for both triggers, one MAC-CE for both triggers
	+ A DCI for both triggers
	+ A PDSCH TB and its scheduling DL grant, e.g. MAC-CE for activation and DL grant for temporary RS
	+ A DL grant and a UL grant received in the same slot/OFDM symbols of PDCCH where the DL grant is scheduling a MAC-CE for SCell activation and the UL grant is triggering the RS.
	+ Rel-15/16 SCell activation MAC-CE and a specific configuration of temporary RS being implicitly triggered as well
* Alt2: Triggering of temporary RS separately from SCell activation command is not precluded and both ‘separate’ triggers (examples below) and ‘integrated’ triggers (examples in Alt 1) are considered for SCell activation
	+ FFS detailed design of separate triggering signaling.
	+ Potential examples of separate triggering signaling for further discussions
	+ Rel-15/16 SCell activation MAC-CE and Rel 15/16 DCI triggering
	+ Rel-15/16 SCell activation MAC-CE and new DCI triggering for temporary RS
* Note: temporary RS should be triggered by DCI or MAC-CE.
* Note: the final mechanism of trigger signaling targets at applicability to one or more SCell activation.
* FFS handling of  SCell activation by existing Rel15/16 CA activation command when temporary RS is configured and triggered/not triggered

**Working Assumption**At least for the case of known cell, temporary RS is supported to expedite the activation process 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 during SCell activation procedure.
* FFS potential functionalities of CSI measurement/acquisition and cell search

Agreements:TRS is selected as temporary RS for Scell activation         If more functionalities are confirmed to be supported by temporary RS, other RS candidates, e.g. aperiodic CSI-RS, P/SP-CSI RS, SRS and RS based on SSS/PSS, are not precluded.         The TRS should be triggered by DCI or MAC-CE. FFS which exact triggering command.  Agreements:UEs measure the triggered temporary RS during Scell activation procedure no earlier than a slot m:         FFS timeline values m which may need coordination with RAN4.         FFS if the triggered temporary RS can be associated with a BWP, then the measurement above is independent of the activation state of the BWP.Agreements:Companies are encouraged to provide design details of temporary RS next meeting, at least including:* TRS structure, e.g. whether to fully reuse existing Rel-15/16 TRS structure and configuration restriction (refer to S5.1.6.1.1 of TS 38.214), or any modification
* QCL information, if any
* Triggering command: DCI format/fields or MAC-CE fields
* Triggering timeline/scheduling offset

**Working Assumption**For efficient SCell activation with assistance of temporary RS, a SSB of the to-be-activated SCell can be indicated as a QCL source for the temporary RS in case of known SCell* FFS: QCL type
* FFS: the case of unknown SCell
* FFS: other QCL source, e.g. the SSB/P-TRS of another active cell

**Agreement**For efficient activation of SCells,down select at least one option from below:* Option 1a: MAC CE(s) contained in a single PDSCH to trigger both SCell activation and corresponding temporary RS(s)
	+ Details FFS including timeline design for receiving temporary RS
* Option 1b: A single DCI to trigger both SCell activation and corresponding temporary RS(s)
	+ Details FFS including potential impact on SCell activation related procedures and, e.g. timeline design for SCell activation and for receiving temporary RS
	+ FFS: The same DCI for SCell deactivation
* Option 2: A Rel-15/16 SCell activation MAC-CE to trigger SCell activation and a Rel-15/16 DCI to trigger corresponding temporary RS(s) with enhancement of timeline
	+ Details FFS including timeline design for receiving a DCI trigger of temporary RS, and for receiving temporary RS
* Note: Companies are encouraged to provide complete solutions for fast SCell activation.
* Note: the previous agreement on the definitions of Alt 1 and Alt 2 is still effective

**Agreement**For efficient activation of SCells* Option 1a: MAC CE(s) contained in a single PDSCH to trigger both SCell activation and corresponding temporary RS(s)
	+ Details FFS including timeline design for receiving temporary RS

Note: Separate from the support of Option 1a, it is up to RAN4 whether or not to consider an activation time enhancement for Option 2 without requiring further RAN1 work* Option 2: A Rel-15/16 SCell activation MAC-CE to trigger SCell activation and a Rel-15/16 DCI to trigger corresponding Rel-15/16 A-TRS(s)

Send an LS to RAN4. The LS is endorsed in R1-2104110.AgreementFor efficient activation of Scells, the triggered temporary RS is aperiodic.AgreementFor efficient activation of a Scell (in known Scell case), at least the number of temporary RS bursts is indicated by a field in new MAC-CE* The number of temporary RS bursts is RRC configurable.
* FFS: which field in MAC-CE is used and how this field is associated with the number of bursts
* For the purpose of designing temporary RS Scell activation, there is no RAN1 specification impact for the case where the number of indicated temporary RS bursts is smaller than what is expected by the UE

AgreementTo trigger temporary RS for efficient activation of SCells, the contents of the triggering MAC-CE(s) in a single PDSCH provide at least the following information (explicitly or implicitly):* Whether or not temporary RS is triggered
* FFS detailed Information of temporary RS, e.g.:
	+ Resources used for triggered Temporary RS
	+ Triggering time offset of triggered Temporary RS
	+ QCL source for triggered Temporary RS
* FFS: Detailed signalling structure of the triggering MAC-CE(s) including the down-selection between the following example options and whether the decision should be made in RAN1 or RAN2
	+ Opt. 1.1: One new MAC CE for both SCell activation triggering and corresponding temporary RS triggering
	+ Opt. 1.2: One R15/16 SCell activation MAC CE for SCell activation triggering and one new MAC CE (in the same PDSCH) for corresponding temporary RS triggering

AgreementFor efficient activation of a Scell (in known Scell case), the triggering offset of temporary RS is indicated by a field in new MAC-CE* The candidate value(s) of triggering offset(s) is RRC configurable
* FFS: which field in MAC-CE is used and how this field is associated with the value of triggering offset

AgreementFor the reference slot for triggering offset of temporary RS* Option 2: the last DL slot of the to-be-activated Scell overlapping with slot n+k as defined in 38.213 sub-clause 4.3
* FFS: the earliest slot no earlier than the reference slot for a UE to receive a triggered temporary RS

AgreementIf a UE measures a temporary RS triggered by a MAC-CE during SCell activation procedure, the measurement is performed within the BWP bandwidth of BWP indicated by *firstActiveDownlinkBWP-Id*Agreement For efficient SCell activation, the earliest slot for a UE to receive a triggered temporary RS is the reference slot (i.e., the last DL slot of the to-be-activated Scell overlapping with slot n+k as defined in 38.213 sub-clause 4.3).ConclusionFor the purpose of designing temporary RS for Scell activation, RAN1 will not discuss for the case where a gNB may assume the to-be-activated SCell with assistance of temporary RS is a known SCell for a UE but it is actually unknown SCell from the UE side during the SCell activation duration.AgreementFor to-be-activated SCell, if any BWP ID is configured as part of temporary RS(s) configuration, the value of the BWP ID is expected to be equal to *firstActiveDownlinkBWP*-Id;Agreement To trigger temporary RS, * MAC-CE at least provides the following information:
	+ temporary RSs are to be triggered on X out of Y (Y≥X) to-be-activated SCells, respectively, while no temporary RS is to be triggered on the other to-be-activated SCells.
* The following information can be provided by RRC for temporary RS for each SCell
	+ The number of RS bursts and the gap length between the RS bursts (Opt 2.3.3)
	+ Triggering offset of temporary RS (Opt 2.3.4)
		- ~~Triggering offset can be provided, e.g., by reusing existing CSI-RS framework~~
	+ QCL information (Opt 2.3.5)
		- ~~Triggering QCL information can be provided, e.g., by reusing existing CSI-RS framework~~
	+ ~~A unique temporary RS configuration index~~
	+ FFS: the maximum number of temporary RS per cell/per UE

Note: Reusing A-TRS triggering framework is not precluded.* Information for 0, 1, or more temporary RS can be provided for each configured SCell

Agreement* For triggering temporary RS, down-select based on the following alternatives, or let RAN2 be aware the status of this discussion
	+ Alt 1: Bitmap approach in MAC-CE ~~similar to SCell activation~~
		- Every Z-bit block in the bitmap corresponds to a SCell, Z>=0
		- A Z-bit block indicates the temporary RS [configuration index], and a value zero indicated by the bit block means no RS resource transmitted.
		- The to-be-activated SCell is indicated via the C values in the legacy SCell activation/de-activation MAC CE or in the new MAC-CE
	+ Alt 2: Reuse A-TRS triggering framework
		- A trigger state is indicated by the MAC-CE explicitly
		- The association between a trigger state and ~~aperiodic~~ temporary RS for one or multiple SCells is configured by RRC according Rel-16 A-TRS triggering framework
			* ~~SCell ID is configured as a part of the temporary RS configuration. Some SCell IDs derived from the trigger state triggered by the new MAC-CE may not refer to to-be-activated SCells that are indicated by the new MAC-CE or the legacy SCell activation/de-activation MAC-CE~~
		- FFS: The value zero of the MAC-CE indication means no temporary RS is triggered by the MAC-CE for all to-be-activated SCells
	+ Note: The down-selection targets at a RAN1 consensus on MAC-CE functionality and the list of RRC parameters for this feature. Any MAC-CE signaling design above are reference concept, its final MAC-CE signaling design is up to RAN2.
 |