**3GPP TSG-RAN WG2#117-e Draft R2-2203639**

**Online, 21 February - 3 March 2022**

**Source:** Huawei, HiSilicon

**Title:** [AT117-e][222][DCCA] Actions at SCG activation and deactivation (Huawei)

**Agenda Item:** 8.2.2.2

**Document for:** Discussion and decision

# 1 Introduction

This document is a summary of:

* [AT117-e][222][DCCA] Actions at SCG activation and deactivation (Huawei)

Scope: Discuss remaining critical open issues (MAC aspects, SCG deactivation UE preference) for actions at SCG de/activation that were not yet handled as part of [Pre117-e][220].

Intended outcome: Discussion report in [R2-2203639](file:///C:\Users\terhentt\Documents\Tdocs\RAN2\RAN2_117-e\R2-2203638.zip).

Deadline: Deadline 2

Company contact persons for this discussion are invited to fill one entry in the table below:

|  |  |
| --- | --- |
| Company | Contact details |
| Samsung | Jaehyuk Jang (jack.jang@samsung.com) |
| ZTE | LiuJing (liu.jing30@zte.com.cn) |
| Nokia | Jarkko Koskela ([jarkko.t.koskela@nokia.com](mailto:jarkko.t.koskela@nokia.com)) |
| Lenovo, Motorola Mobility | Congchi Zhang (zhangcc16@lenovo.com) |
| OPPO | [wangshukun@oppo.com](mailto:wangshukun@oppo.com) |
| Ericsson | stefan.wager@ericsson.com |
| Apple | [naveen.palle@apple.com](mailto:naveen.palle@apple.com) |
| Qualcomm | punyaslo@qti.qualcomm.com |
| vivo | [wenjuan.pu@vivo.com](mailto:wenjuan.pu@vivo.com) |
| LGE | [hanul.lee@lge.com](mailto:hanul.lee@lge.com) |
| CATT | Erlin.zeng@catt.cn |
| Intel | [xun.tang@intel.com](mailto:xun.tang@intel.com) |
| NEC | hisashi.futaki @ nec.com |
| Spreadtrum | Ellen.xu@unisoc.com |

# 2 Discussion

## 2.1 MAC actions at SCG deactivation / activation

### 2.1.1 Handling of Bj

This is about:

FFS if UE initializes Bj for each logical channel to zero upon SCG deactivation as a part of partial MAC reset. Should consider e.g. what to do with possible Bj increase while SCG is deactivated.

[23] [32][33] propose the Bj are initialized to zero upon SCG deactivation as part of partial MAC reset and are not increased while the SCG is deactivated.

[29] thinks LCP is not done when the SCG is deactivated, so the Bj are never incremented and if set to 0 at SCG deactivation they will remain to zero, while [39][40] think Bj will increase.

[39][40] propose initializing the Bj to zero upon SCG activation. [40] further considers that it is better not to initialize Bj to zero at SCG deactivation even if they are not initialized to zero at SCG activation.

So the possible options are:

1) Bj are initialized to zero and remain to zero while the SCG is deactivated

2) Bj are initialized to zero at SCG activation

3) Bj are not initialized to zero, neither at SCG deactivation nor at SCG deactivation

**Q1: Which option(s) do companies prefer?**

|  |  |  |
| --- | --- | --- |
| Company | Preference(s) | Comments |
| Samsung | 2) or 1) | We are also fine to initialize Bj at SCG deactivation to avoid any possible impacts. |
| ZTE | 1) |  |
| Nokia | 2) and no need to change current MAC reset | Easiest is to keep MAC reset as is and just reset at activation – easy to capture in LCP section (see [39] TP). Trying to capture „remain zero“ while deactivated seems bit of a hack solution. |
| Lenovo, Motorola Mobility | 1) | In our understanding, the problem is essential about the operation about Bj value update should be stopped when SCG is deactivated.  If UE keeps updating Bj value when SCG is in deactivated, it is purely a waste of processing and does not add any value, no matter if Bj value is initialized upon SCG deactivation or SCG reactivation.  If UE stops any operation about Bj value update when SCG is deactivated and stops tracking the elapsed time since last increment, there is no real difference if initializing Bj upon SCG deactivation or SCG reactivation, since Bj will start from 0 at the moment of SCG activation. |
| OPPO | 2) | I wonder whether the Bj will also increase when UE enters RRC\_INACTIVE state after MAC is reset?  If yes, I think we can follow legacy behaviour as RRC\_INACTIVE, i.e. the BJ is set to 0 in patial MAC reset. |
| Ericsson | 2 or 3 | For option 1), [29] claims that since 38.321 states that “T is the time elapsed since Bj was last incremented”, it means that “T is not counted yet after the Bj initialization, if the LCP procedure is not done, i.e. Bj is never incremented while the SCG is deactivated.” However, 38.321 also includes the following note: “The exact moment(s) when the UE updates Bj between LCP procedures is up to UE implementation, as long as Bj is up to date at the time when a grant is processed by LCP.”. In other words, for option 1), even if the Bj may remain zero while the SCG is deactivated, the value will be changed upon LCP when SCG is activated.  So, we think it is still safer to do the initialization of Bj at SCG activation, i.e., option 2. Otherwise Bj may have another value than 0 at activation, and then we could as well not initialize Bj at all, i.e. option 3. |
| Apple | 1 or 2 |  |
| Qualcomm | 1) | It seems to us that the LCP procedure should not be applied when SCG is deactivated and so Bj can remain at zero if initialized at zero upon SCG deactivation. |
| vivo | 1) | As specified in MAC spec, LCP procedure is applied whenever a new transmission is performed. And SCG transmission is stopped during SCG deactivation, so LCP procedure will not be performed at SCG MAC entity during this period. Thus, Bj will not increase while the SCG is deactivated. |
| LGE | 1) | As the partial MAC reset is to stop/disable all the unnecessary MAC procedure upon SCG deactivation, it is reasonable to initialize Bj upon SCG deactivation and not to increment Bj during SCG deactivation. |
| CATT | 1 or 2 | Either is fine with us.  With 2) we understand it is for the case when SCG transits from deactivated to activated state, i.e., maybe this should somhow be made clear in stage 3 it is not for the case when SCG is already activated when rececing the RRC reconfigration without deactivation indication. |
| Intel | 1 | agree with vivo that LCP is triggered when a new transmission is performed, and it’s not possible to have a new transmission while SCG is deactivated. |
| NEC | 1 | We do not see a problem with option 1 |
| Spreadtrum | 1 | LCP will not be performed when SCG is deactivated. |

### 2.1.2 Explicitly signalled contention-free Random Access Resources

This is about

FFS if UE discards explicitly signalled contention-free Random Access Resources for 4-step RA type and 2-step RA type, if any, upon SCG deactivation as a part of partial MAC reset.

[39] thinks the “explicitly signalled contention-free Random Access Resources for 4-step RA type and 2-step RA type” is rach-ConfigBFR in BeamFailureRecoveryConfig.

Several other companies think that this refers to resources configured in rach-ConfigDedicated in reconfigurationWithSync.

In Rel-16, rach-ConfigDedicated is optional “Need N”, i.e. this field is not stored and upon reception of a subsequent RRC message in which reconfigurationWithSync is included but this field is absent, the UE performs contention-based RACH.

The rapporteur would like to remind that RAN2 discussed the possibility to store, while the SCG is deactivated, dedicated RACH resources to be used for random access (when needed) at SCG activation and this was not agreed, so the rapporteur assumes this is not supported.

What is perhaps not sufficiently clear is that, if RACH is triggered by an SCG activation command that does not include an SN RRC message with reconfigurationWithSync, the UE shall perform contention-based random access.

This could be clarified e.g.

1) in the initiation of the random access procedure due to SCG activation while reconfigurationWithSync is not included (could be in 38.321 or in 38.331)

2) in 38.331 by indicating to discard the contents of rach-ConfigDedicated, if it was included, in the completion of a reconfiguration procedure in which the SCG is deactivated

The rapporteur thinks 2) might be simpler from specification perspective.

**Q2: Would companies like to clarify that if RACH is triggered by an SCG activation command that does not include an SN RRC message with reconfigurationWithSync, the UE shall perform contention-based random access? If yes, please indicate preference between 1) and 2) or other.**

|  |  |  |
| --- | --- | --- |
| Company | Yes (and choice) or No | Comments |
| Samsung | Yes – 2) | It can be done as a part of partial MAC reset. |
| ZTE | No | Based on RAN2 agreements in RAN2#116bis-e, if RACH is triggered, then SCG activation command will include SN RRC message together with reconfigurationWithSync. If reconfigurationWithSync is not included, then the UE is requested to perform RACH-less SCG activation. So it is unclear to us why SCG activation command without SN reconfigurationWithSync results in CBRA?  [Rapporteur]: The agreement is:   * 5: Upon reception of a network SCG activation command, the UE shall perform RACH towards the SCG if any of the following condition is true:   - reconfigurationWithSync is included in the SCG activation command  - TA timer for the PSCell is expired  - RLF is declared  - BF is declared  This means that if TA timer is expired or if BF is declared and the network sends an SCG activation command, the UE shall perform RACH even if the network does not include reconfigurationWithSync.  This could be a rare case but it can happen that the network sends an SCG activation command at the same time that the UE indicates beam failure. In such case, what can the UE do else than CBRA?  Regarding whether network can provide dedicated RACH resource prior to SCG activation, it is a FFS in RAN2 agreements, so no conclusion has been made so far. Based on previous agreement, the network is allowed to reconfigure any RRC parameters during SCG deactivation, so asking UE to must discard dedicated RACH resources seems do not bring any benefit? Like BFR, dedicated RACH resource can also be pre-configured for SCG activation.  We understand the rapporteur has concern on “Need N“ , but we think it is easy to clarify in spec that UE can store the configuration if SCG is deactivated. (like the way proposed in 2), just opposite view)  [Rapporteur] The agreement at RAN2 115 was:  **Support all of the following for RACH resources used in network-initiated SCG activation (at least using RRC):**  **1) common RACH resources;**  **3) dedicated RACH resources indicated in the SCG activation indication.**  **FFS if we support also 2) (proponents are requested to provide CRs next time to illustrate how this can be done)**  This is the last meeting for this WI and still no CR.  Reverse question: what is the benefit for the network to send dedicated RACH resources for SCG activation in advance, while the network can include that in the SCG activation command?  Unless MAC CE can be used for activation, of course ☺ (but it seems we may not have time for that). |
| Nokia | No | We agree with ZTE |
| Lenovo, Motorola Mobility | No | Agree with ZTE and Nokia |
| OPPO | Yes -2) |  |
| Ericsson | No | We don’t see a need for the clarifications in 1) or 2). Instead we think the line in the partial MAC reset as proposed in Q3 is sufficient. |
| Apple | No | Same view as ZTE. And in case the UE has to perform RACH (inspite of NW not requiring, i.e., TAT expiry, UE would do CBRA) |
| vivo | No | Agree with ZTE on the below points.   1. “dedicated RACH resources indicated before SCG activation indication (when going to the SCG deactivated state or while the SCG is deactivated).“ has not been precluded yet. We support this as it provides more flexibility for the network, and since SCG activation command is always sent by the network, the network anyway can use the CFRA resources of this UE to other UEs during SCG deactivation,. Thus, we think there is no resource will be wasted. 2. It is easy to clarify in spec (maybe in the field description) that UE can store the rach-ConfigDedicated configuration if SCG is deactivated.   Besides, according to the below agreement, it is possible BF is declared at SCG activation.  5: Upon reception of a network SCG activation command, the UE shall perform RACH towards the SCG if any of the following condition is true:  - reconfigurationWithSync is included in the SCG activation command  - TA timer for the PSCell is expired  - RLF is declared  - BF is declared  It is reasonable to allow the network to preconfig the BFR CFRA resource during SCG deactivation, and enable UE use CFRA resource configured for BFR when performing SCG activation, not must perform CBRA at that time. And in previous agreement, the network is allowed to reconfigure any RRC parameters during SCG deactivation. That means, during SCG deactivation, the network can reconfigure CFRA resources for BFR. Thus, we would like to suggest the below:  **Proposal: If RACH is triggered at SCG activation, and if there is no available CFRA resource, the UE shall perform CBRA.** |
| LGE | comment | Whether to support MCG failure recovery indication on the deactivated SCG is still under discussion. If MCG failure recovery indication on the deactivated SCG is supported, the dedicated RACH resource is needed and the new IE would be introduced in Rel-17.  Therefore, whether to discard the dedicated RACH resource or not should be discussed after deciding whether to support the MCG failure recovery indication.  If MCG failure recovery indication on the deactivated SCG is not supported, the RACH resource can be discareded according to 2). |
| CATT | No | We think the specification should allow the possibility that network provides dedicated RACH resource prior to SCG activation, which is up to network implementation. |
| Intel | No |  |
| NEC | Yes | Firstly we have the same understanding as Rapporteur regarding the option using dedicated RACH resources stored/configured at SCG deactivation (i.e. that is not supported). For how to capture, we prefer 2).  Regarding comment above for RACH-less, we understand the intention of this questions is not about it. If necessary, probably can add e.g. „unless RACH-less activation is configured and triggered“.? |
| Spreadtrum | Yes | We prefer 2) |

**Q3: Assuming a clarification such as 1) and 2) is captured, do companies see the need to indicate in the partial MAC reset at SCG deactivation that the UE “discards explicitly signalled contention-free Random Access Resources for 4-step RA type and 2-step RA type, if any”?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No | Comments |
| Samsung | Yes | It would be the simplest approach. |
| ZTE | No | See our response to Q2. |
| Nokia | No |  |
| Lenovo, Motorola Mobility | no |  |
| OPPO | Yes |  |
| Ericsson | Yes |  |
| Apple | No |  |
| vivo | No | See our response to Q2. |
| LGE | Yes | As metioned in Q2, we prefer 2) if MCG failure recovery indication on the deactivated SCG is not supported. In this case, "discards explicitly signalled contention-free Random Access Resources for 4-step RA type and 2-step RA type" needs to be captured in the partial MAC reset. |
| CATT | Yes |  |
| NEC | Yes |  |
| Spreadtrum | Yes |  |

## 2.2 SCG deactivation UE preference

RAN2 agreed previously to support an indication that the UE prefers the SCG is deactivated but did not agree any detail. There are a few proposals in this meeting for this, but they are not aligned.

[10] proposes something reusing the principles of UE preferences indicated in UE assistance information:

- the network configures the UE to provide a preference for SCG deactivation

- if this is configured, the UE can report a "preference for the SCG to be deactivated" or no such preference

- the UE can only report a preference if it has changed (i.e. change from "preference for the SCG to be deactivated" to no such preference, or vice-versa)

- the UE cannot report a preference before a certain time after its last report

- the UE preference is valid as long as the RRC connection is not release

- the reporting does not depend whether an SCG is configured or not, and, if configured, it is activated or deactivated

[40] proposes the same except that:

- the preference is either "SCG activated" or "SCG deactivated"

- there is a cause value

- "SCG activated" with cause "uplinkData" is used instead of current uplink data indication for SCG bearer while the SCG is deactivated

However, that proposal does not consider the following scenario:

- the UE indicates a preference of "SCG activation" because there are uplink data for an SCG DRB

- the network activates the SCG and uplink data are transmitted

- as there is no more activity on SCG DRBs, the network deactivates the SCG

- there are uplink data but, since the UE preference is already "SCG activation", the UE cannot report it again

So this proposal is not feasible as it is.

[35] proposes:

- the network configures the UE to provide a preference for SCG deactivation

- if this is configured, the UE can report a preference "deactivated", "activated" or "released"

- the UE can report the preference even if it has not changed

- no prohibit timer

Since there is no time for any further study, the rapporteur suggests that the choice is limited between [10] and [35].

**Q4: Do companies want to specify in Rel-17 a new UE assistance information as summarized above for [10] or [35]?**

|  |  |  |
| --- | --- | --- |
| Company | Yes/No  Preference between [10] and [35] | Comments |
| Samsung | Yes – [35] | It is simpler and has less impact. |
| ZTE | Yes – [10] with comments | [35] without prohibit timer should not be considerred.  For only SCG deactivation preference, we prefer [10]. But we prefer to discuss the details during CR reviewing, the listed bullets are a bit vague.  However, we don’t think the absence of SCG deactivation preference indication can be used to indicate “SCG activation request due to UL data arrival on SCG DRB”. In our view, we should treat “SCG deactivation preference” and “SCG activation request” separately.  For “SCG activation request“ triggered by UL data on SCG bearer, it should not be restricted by the prohibit timer set for SCG deactivation reference indication. |
| Nokia | No – we have already agreed UL data arrival report on SCG to the NW which is the UE preference indication. no need for further indications. | If we have no rule why would UE indicate preference then it is impossible for NW to use this information. NW would not know why SCG should be activated based on the UE internal preference. And in fact we already agreed to introduce UE preference in a way by UE indicating UL data arrival on SCG via RRC (details are being discussed in this meeting). |
| Lenovo, Motorola Mobility | Yes [10] with comment | We assume this is only about SCG deactivation preference, since we agreed on the indication of UL data arrival for SCG activation as Nokia commented. A prohibit timer could be benefitial. |
| OPPO | No | UE can only request SCG activation due to UL data arrival. For SCG deactivation decision, the network can make the decision based on BSR. |
| Ericsson | Yes [10], but with cause field | We support [10], but only if a cause field is added to inform the network of the reason for the preference for SCG deactivation, e.g. battery drain or low traffic. SCG deactivation is just one of the actions that the network can take, and due to other circumstances known only to the network and not the UE (e.g., network load, operator preference, etc), the network may choose another comparable action to address the UE situation.  We agree with ZTE and rapporteur that the indication for SCG activation and SCG deactivation should be handled separately. If we can’t agree on the SCG deactivation solution, it may be sufficient to include the UE assistance information for SCG activation only. |
| Apple | Yes to [10] | Similar to ZTE and Ericsson, we prefer the UE providing preference to activation and deactivation seperately. |
| Qualcomm | Yes,  Prefer [35] | We prefer [35] for simplicity reasons. A prohibit timer should be added to the scheme in [35] to prevent frequent reporting.  We think [40] can also work if we include the possibility that UE can report a preference even if it has not changed.  We also prefer that the UE provides preference for activation and deactivation separately. |
| vivo | Yes | Similar view with ZTE, the UE providing preference to activation and deactivation seperately. |
| LGE | Yes based on [10] | As the proponent, we don‘t think that various types of state preferences need to be indicated to the network.  In the cases of SCG release and SCG deactivation, the UE only needs to indicate a single preference to deactivate SCG to the network because both cases are required to be transferred due to the same reasons, e.g. UE power saving or UE overheating problems.  But if the UE transmits the UAI to the network for the UE-initiated SCG activation, we think additional preference to activate SCG is also okay.  For prohibit timer, we do not think RAN2 needs to have a different design from the current handling of the UAI. Obviously, frequently indicating the SCG preference would make a lot of the network process unnecessarily, thus, for this case, the prohibit timer should be used as in the legacy behavior. |
| CATT | Yes to [35] | We are proponent. And if majority wants a prohibit timer we are also fine. |
| Intel | No | NW can decide whether to deactivate SCG without any assistance information. |
| NEC | Yes, [10] with modification | We prefer [10] with following modifications:  - the network configures the UE to provide a preference for SCG deactivation  - if this is configured, the UE can report a "preference for the SCG to be deactivated" or no such preference  - the UE can only report a preference if it has changed (i.e. change from "preference for the SCG to be deactivated" to no such preference, or vice-versa), except for the first report indicating "preference for the SCG to be deactivated"  - the UE cannot report a preference before a certain time after its last report  - the UE preference is valid as long as the RRC connection is not release  ~~- the reporting does not depend whether an SCG is configured or not, and, if configured, it is activated or deactivated~~ |
| Spreadtrum | Yes to [35] | It is simple and we prefer to have UE preference for SCG deactivation and activation seperately. If SCG deactivation is not agreed, we prefer to have activation only. |

# 3 Conclusion

# 4 References

[1] R2-2202248, How to model the PSCell in SCG deactivation?, OPPO

[2] R2-2202250, SCG deactivation indication when resuming from RRC\_INACTIVE due to MO data, OPPO

[3] R2-2202280 QoS flow remapping during SCG deactivation Fujitsu

[4] R2-2202575 Discussion on UE behavior with SCG deactivated Lenovo, Motorola Mobility

[5] R2-2202649 Discussion on UE behaviour when SCG is deactivated ZTE Corporation, Sanechips

[6] R2-2202679 Views on several issues Samsung Electronics

[7] R2-2202680 DC power sharing for deactivated SCG Samsung Electronics

[8] R2-2202705 UE behaviour while SCG is deactivated Qualcomm Incorporated

[9] R2-2202756 UE behavior while the SCG is deactivated InterDigital, Inc.

[10] R2-2202767 Deactivation of SCG LG Electronics Finland

[11] R2-2202795 Discussion on UE behaviour while SCG is deactivated vivo

[12] R2-2202919 TA timer and RLM/BFD while the SCG is deactivated MediaTek Inc.

[13] R2-2203097 Discussions on UE Behavior in Deactivated SCG CATT

[14] R2-2203176 Open Issues on UE Behavior NTT DOCOMO INC.

[15] R2-2203184 UE behaviour while SCG is deactivated Nokia, Nokia Shanghai Bell

[16] R2-2203375 Open issues on UE behaviours while the SCG is deactivated Huawei, HiSilicon

[17] R2-2203390 UE behaviour while SCG is deactivated Ericsson

[18] R2-2202247 L2 based SCG activation and SCG RRM OPPO

[19] R2-2202281 Proposal for releasing statusReportRequired for SCG bearers at SCG deactivation Fujitsu

[20] R2-2202282 Remaining issues on UL data arrival for SCG Fujitsu

[21] R2-2202351 Futher discussion on actions at SCG activation or deactivation Transsion Holdings

[22] R2-2202413 Discussion on activation and deactivation of SCG Spreadtrum Communications

[23] R2-2202576 MAC related issues upon SCG activation and deactivation Lenovo, Motorola Mobility

[24] R2-2202650 Activation of deactivated SCG ZTE Corporation, Sanechips

[25] R2-2202701 Actions at SCG activation and deactivation Qualcomm Incorporated

[26] R2-2202757 Deactivation of SCG InterDigital, Inc.

[27] R2-2202758 Activation of SCG InterDigital, Inc.

[28] R2-2202796 Discussion on actions at SCG activation and deactivation vivo

[29] R2-2202809 Remaining issues on SCG deactivation NEC

[30] R2-2203039 Remaining issues for MAC procedure in deactivated SCG SHARP Corporation

[31] R2-2203061 split bearer handling upon SCG deactivation Sharp

[32] R2-2203087 Open issues on SCG deactivation DENSO CORPORATION

[33] R2-2203092 Discussion on partial MAC reset upon SCG deactivation LG Electronics Inc.

[34] R2-2203098 Remaining Issues on Actions at SCG Activation and Deactivation CATT

[35] R2-2203099 Discussion on RRC Aspects of SCG Deactivation CATT

[36] R2-2203166 Discussion on data transmission to MN for split bearer LG Electronics Inc.

[37] R2-2203177 Open Issues on SCG Activation and Deactivation NTT DOCOMO INC.

[38] R2-2203185 UL data handling at SCG deactivation Nokia, Nokia Shanghai Bell

[39] R2-2203186 Actions at SCG activation and deactivation Nokia, Nokia Shanghai Bell

[40] R2-2203391 Actions at SCG activation and deactivation Ericsson

[41] R2-2203376 Handling of uplink split bearers and BWP when the SCG deactivated Huawei, HiSilicon