**3GPP TSG-RAN WG2 Meeting #116is electronic R2-2xxxxxx**

**Online Meeting, Jan 17th – 25th 2022**

**Agenda item: 8.2.2.3**

**Source: Apple Inc**

**Title: Report of [AT116bis-e][223][DCCA] MCG failure recovery (Apple)**

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

**Document for: Discussion and Agreement**

1 Introduction

This document is for summary of the following discussions:

* [AT116bis-e][223][DCCA] MCG failure recovery (Apple)

Scope: Discuss whether it's possible to support MCG failure recovery via deactivated SCG (based on contributions to this meeting).

        Intended outcome: Discussion summary in R2-2201703.

        Deadline: Deadline 3

The participants are invited to leave their contact information in the following table.

|  |  |
| --- | --- |
| Company | Contact: Name (E-mail) |
| A Apple | N naveen.palle@apple.com |
| ZTE | liu.jing30@zte.com.cn |
| Nokia | jarkko.t.koskela@nokia.com |
| Ericsson | Stefan.wager@ericsson.com |
| Lenovo,  Motorola Mobility | Zhangcc16@lenovo.com |
| vivo | wenjuan.pu@vivo.com |
| OPPO | Wangshukun@oppo.com |
| MTK | Chun-fan.tsai@mediatek.com |
| CATT | Erlin.zeng@catt.cn |
| NEC | hisashi.futaki @ nec.com |
| Spreadtrum | Ellen.Xu@unisoc.com |
| Futurewei | Jialinzou88@yahoo.com |
| LGE | hassium.kim@lge.com |
| Samsung | s\_dg.kim@samsung.com |
| Fujitsu | sanda. takako @ fujitsu. com |
| DOCOMO | riki.ookawa.rp@nttdocomo.com |
| Sharp | [kawano.takuma@sharp.co.jp](mailto:kawano.takuma@sharp.co.jp) |
| Qualcomm | punyaslo@qti.qualcomm.com |
| CMCC | tangxiaoxuan@chinamobile.com |

2 MCG Failure recovery in deactivated SCG

2.1 Any objections?

All the papers submitted by the companies to RAN2-116bis-e meeting have proposal on ways to support MCG link recovery using the deactivated SCG, and the rapporteur do not see papers objecting to support this. However, the rapporteur would like to see if there are companies actually intending to object to this with the below question.

**Question 1: Companies are requested to list below, if they intend to object the MCG failure recovery using deactivated SCG procedure.**

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| **Company** | **Reason for objection** |
| Huawei, HiSilicon | I don't see how we can do that because:  1) There is only one meeting left  2) We have not finished the design of SCG deactivation/activation for normal cases  3) This MCG failure recovery raises fundamental questions, e.g. some of the TPs say the SCG is activated, others only SRB3, and this is not covered in this discussion |
| Ericsson | Same reasons as mentioned by Huawei |
| MediaTek | Same view as Huawei. |
| CATT | Same view as Huawei.  In addition, MCG failure recovery using deactivated SCG has no obvious delay reduction than triggering RRC re-establishment, which is simpler. |
| NEC | Same view as Huawei.  We input one tdoc in R2-2200612, which has some reasons, e.g.:  As RAN2 agreed that for SCG bearer, the UE indicates the UL data arrival via MCG, i.e. no RACH-based activation request to the SN. Why do we need direct activation to SN only for MCG link recovery?  We do not believe this will reduce the latency in recovery from MCG link failure considering the RACH may fail in SCG.  Also, there is no description in the WID for this function. |
| Spreadtrum | Same view as Huawei.  SCG activation shall be controlled by the network and UE will activate it after receiving activation indication from MN. |
| Futurewei | Same view as Huawei. |
| Samsung | Same view as Huawei. It would be simper to trigger RRC Reestablishment upon MCG failure with deactivated SCG. |
| Fujitsu | Same view as Huawei and CATT |

**Summary:**

**TBD**

2.2 Approaches to solving MCG failure recovery in deactivated SCG

### 2.2.1 Self activation of SN by the UE

The basic approach to allowing the UE report the MCG failure information to the MN using the deactivated SCG is with one of the below options. Note that some companies have provided views for the top two approaches below.

* UE activated the SCG by itself (proponents of this approach claim that the main reason is that the UE needs to monitor PDCCH on the PSCell as part of this procedure). There are details on the UE specifics after UE activated the SCG by itself [3][8][10][11]
* UE does not activate the SCG by itself and waits for a RRC message from the NW to activate, but this raised the question of UE monitoring the PDCCH (atleast for RAR if RACH is triggered for eg) [4][5]
* UE uses UAI based approach [2]

The rapporteur thinks that this is one of the main discussion points to resolve with designing this.

**Question 2: For the MCG failure recovery with deactivated SCG, which option do you prefer?**

* **Option 1 The UE activates the SCG by itself**
* **Option 2 The UE informs the SN of the MCG failure information, but only activates the SCG if the NW provides a configuration (message) activating the SCG**
* **Option 2.a The UE informs the MN of the MCG failure information via SN and request for SN activation. UAI message could be reused to send the information about the reason of the SN activation request (e.g., UL data arrival, MCG failure recovery etc).**

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| **Company** | **Which option** | **Reasons/comments on your views** |
| Apple | Option 2 | We do not prefer UE self activation, as it violates the principles we agreed earlier. But we do acknowledge that the UE needs to monitor PDCCH for RAR (if the UE RACHes) for MSG3. But we think that MAC spec can be changed (if needed) to allow the UE to monitor PDCCH, while the UE is still SCG deactivated state. |
| ZTE | Either Option 1 or Option 2 | For Option 1, we think the UE activates the SCG autonomously only because the UE has to monitor PDCCH for RAR and subsequent MN RRC message via SCG. The UE is not expected to transmit UL data during the MCG Failure Recovery procedure. After the MN receives the *MCGFailureInformation* message, if the MN wants to keep the SCG as deactivated state, the MN can response a MN *RRCReconfiguration* message with SCG-state set to “deactivated”.  Option 2 is also acceptable to us. As commented by Apple, we can formulate UE behaviour to allow the UE to monitor PDCCH when MCG Failure Recovery is triggered. Then whether the SCG is activated or deactivated can based on the explicit indication in the RRC response message sent by the MN. |
| Nokia | Option | Agree with Apple |
| Lenovo, Motorola Mobility | Option 1 or Option 2 | Similar understanding as ZTE, we are ok with Option 2 considering the progress so far. |
| vivo | Prefer Option 2, Option 3 may be discussed later | **For Option 1:**  We share the same view as Apple. Generally, the network based SCG activation/deactivation principle should be baseline for the MCG RLF case. Therefore, Option 1 is also not preferred by us.  **For Option 2 and Option 3:**  - We suggest that the common parts are considered and agreed first:  1) Whether RACH is always initiated while SCG is deactivated;  2) Whether UE activates the SCG always based on NW configuration (message) activating the SCG.  And for both options we think this doesn’t mean UE would activate SCG by itself. Monitoring PDCCH is just a subsequent consequence following RACH.  - As for the difference between Option 2 and Option 3, it is mainly about whether to use legacy MCG failure information message specific for MCG RLF case or introduce new UAI message so that the solution can be applicable for both MCG RLF case and other cases (e.g.,UL data arrival). we think it is not urgent issue and can be discussed in the stage 3 only if the common parts are agreeable as above. |
| OPPO |  | I am sorry I am confused about the options. The UE need perform RACH anyway, I do not know how to define SCG activation and whether the SCG is considered activated after RACH procedure or before? After RACH, the UE can perform normal UL transmission and DL reception, and you still consider the SCG is deactivated?  In option 2, we do not understand how does network know that the activation command is required or not? |
| LGE | Option 1 | Since the UE self activation can proceed only when the network permits the UE's request, the network can control the UE. Also, since it will be requested to the network through the RACH or SR, it means that the UE does not stay in the SCG deactivation state anymore. |
| DOCOMO | Option 1 or Option 2 | Our preference is Option 1, but we agree that some agreements have to be revisited (e.g. don’t allow SCG activation by the SN without MN's response). Option 2 is ok to us. |
| Sharp | Option 1 | At first, UE behaviour is same whichever RAN2 selects (i.e. when MCG failure occurs, UE performs RA/SR, then UE monitors PDCCH and continues even after the completion of RA/SR procedure). The difference is definition of activation/deactivation. Therefore, We think it is better to select option which has less spec change.  We assume option 1 does not needs a lot of spec change if RAN2 agrees with UE self-activation for this purpose. If UE self-activates SCG, SCG MAC can trigger RACH/SR itself via SCG RLC based on submission of RRC message (no need MAC spec change).  If option 2 is agreed, UE needs to monitor PDCCH and transmit failure information while SCG is deactivated. It may be new MAC state other than activated and deactivated. |
| Qualcomm | Option 1 or Option 2 | Though we prefer Option 1, Option 2 is also acceptable to us to make progress. |
| CMCC | Option 3 | SCG activation should be in control of NW as RAN2 discussed before, so we don’t prefer Option 1.  For the case that UE does not activate the SCG by itself, Option 2 and 3 have the same the general thinking, i.e., UE should send the SCG re-activation request to NW via SCG and wait for NW’s decision. Therefore, we agree with vivo and think that we can go for the general thinking first.  UL data arrival is already agreed to be as one of the reasons for activation request from UE, MCG failure recovery could be included in the content of request as shown in Option 3. This indication could be sent during the procedure of RACH/SR to offer a more detailed information to NW for deciding whether to activate the SCG and prepare the recovery in advance. The details could be discussed in stage 3. |

**Summary:**

**TBD**

### 2.2.2 Only RACH based or SR

Companies in [3][4][5][1][9][11] propose that the UE trigger SR (if valid) and use RACH in case SR is not available or TAT expired earlier. We already agreed that there would NOT be any data to be transmitted on the DRBs during SCG deactivated state, but SRB might need to be transmitted. It would be good to confirm if SR is valid for the UE at SCG deactivated state.

**Question 3: If configured for SCG in SCG activated state, is the SR configuration valid to the UE while the SCG is deactivated, to be used for the purpose of transferring the SRB?**

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| **Company** | **Yes/No** | **Additional comments** |
| Apple | Yes | If the NW has provided SR configuration, the UE is allowed to use it. However, we do understand that NW might intend to have the SR resources used for other UEs. For this reason, a dedicated SCG deactivated config can be given to the UE (answer to Q5 below).  Anyway NW is allowed to release all SR configurations in the same RRC message that is used to deactivate the SCG. So the signaling means is there, and so, if NW does NOT remove, the UE is allowed to use the resources in SCG deactivated state. |
| ZTE | Yes with comment | It is possible to use SR when TAT is running, beam failure does not happen and the SR resource is not released for this UE. In our understanding, if network intends to allocate the same SR resource for other UEs, the network can first explicitly release the SR resource by sending RRC message during SCG deactivation state.  If majority companies have strong concern on triggering SR, we are also fine with RACH-based approach. |
| Nokia | No strong view | We think use of SR would imply that UE would then monitor PDCCH and therefore would activate SCG by itself, contrary to our response to the previous question.  Since monitoring of PDCCH is an explicit part of RACH procedure, we think the specification impacts would be simpler if only RACH is used. |
| Lenovo, Motorola Mobility | Yes |  |
| vivo | No strong view | Since there is only one meeting left, to simplify the solution, we prefer always initiate RACH for the MCG failure recovery with deactivated SCG. |
| OPPO | No | We prefer always relay on RACH procedure. |
| LGE | Yes | Same view as Apple |
| DOCOMO | No strong view | Same view as Nokia. In terms of remaining time to discuss, we prefer always RACH. |
| Sharp | Yes | NW should consider that the UE can use SR resources until TAT expiry. If NW wants to use the resources for other UE, NW can indicate the UE to release the resources. Therefore UE can use SR resources under the NW control. If configured SR is made not used for this purpose, RAN2 needs to change the spec to achieve this behaviour. Therefore, we prefer both of RACH based and SR. |
| Qualcomm | Yes | Our view is similar as Apple. We think that the network can configure for a UE dedicated SR PUCCH resources while the UE is in SCG deactivated or upon SCG deactivation, using RRC reconfiguration.  If companies prefer only to use RACH for the procedure that is fine with us. |
| CMCC | No strong view |  |

**Summary:**

**TBD**

### 2.2.3 Validity of the SR

**Question 4: If the answer to Q3 is yes, would you agree that the SR resource would not be considered valid, if the TAT expires in SCG deactivated state (similar to legacy operation)?**

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| **Company** | **Yes/No** | **Additional comments** |
| Apple | Yes, the UE would release the resources. |  |
| ZTE | Yes |  |
| Lenovo, Motorola Mobility | Yes |  |
| LGE | Yes |  |
| Sharp | Yes |  |
| Qualcomm | Yes |  |
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**Summary:**

**TBD**

### 2.2.4 Dedicated configuration to the UE at SCG deactivation

Companies in [11][3] propose that the UE can be use the dedicated configuration provided to it for the purpose of faster MCG failure recovery. Rapporteur thinks an explicit agreement related to this also can help with progressing this procedure.

**Question 5 Can the NW be allowed to provide the UE with a dedicated configuration at the time of SCG deactivation, to be used during the SCG deactivated state (for eg., with the purpose that the UE can use this for informing the SCG about MCG failure information)?**

* **The dedicated configuration includes dedicated RACH resources or SR configuration**
* **Any other config?**

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| **Company** | **Yes/No** | **Additional comments** |
| Apple | Yes | The flexibility should be given to the NW. |
| ZTE | Yes | We have the following RAN2 agreement:  **9 While the SCG is deactivated, the MN RRC reconfiguration message and the embedded SN RRC reconfiguration message can reconfigure any parameter (any restriction requires an explicit decision).**  We see no benefit to limit network reconfiguration. So the network should be allowed to reconfigure parameters not only in the message that is used to deactivate SCG, but also the RRC message that sent while the SCG is deactivated. |
| Nokia | Yes |  |
| Lenovo, Motorola Mobility | Yes |  |
| vivo | Yes | As commented in Question 3, we prefer the dedicated configuration includes only dedicated RACH resources. |
| OPPO | Yes |  |
| LGE | Yes | This is helpful to support fast SCG activation for the case that the UE cannot perform the RACH-less activation. |
| DOCOMO | Yes |  |
| Sharp | Yes | If CFRA is configured, UE can use CFRA resource and complete RA in 2 steps. However, it is still FFS whether CFRA resource can be provided in SCG deactivation command or via *RRCReconfiguration* during SCG deactivation state. Therefore, using CFRA resource for fast MCG link recovery is also FFS. |
| Qualcomm | Yes |  |
| CMCC | Yes | We already agreed that NW can reconfigure any parameter. It is up to NW and the limitation is not necessary. |

**Summary:**

**TBD**

### 2.2.5 PDCCH monitoring after SR

There is one open item in case the UE does NOT activate the SCG after triggering SR (in case RAN2 agrees to this approach). The rapporteur thinks it’s worth raising this to see where RAN2 stands.

**Question 6: In case the UE does NOT activate the SCG by itself, but is allowed to trigger SR for the SRB (for MCG failure information), should the UE monitor PDCCH on the PSCell?**

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| **Company** | **Yes/No** | **Additional comments** |
| Apple | Yes | To us, this is an alternative to full-fledged self-activation of the SCG by the UE. Since the MCG link has gone bad, the UE might not be able to receive the SN activation RRC message from MN, and it would have to be from the MN via the SN, which requires the UE to monitor PDCCH. But we do not want any additional UE actions that the UE is expected to do in SCG activated state (for eg., actions with the SCells of SCG etc). |
| ZTE | Yes | Same view as Apple. |
| Nokia | Yes | We see no other way in such a case. |
| Lenovo, Motorola Mobility | Yes |  |
| vivo | Yes with comments | We don’t prefer the SR based solution for MCG failure recovery with deactivated SCG. However, if the majority view is to support SR-based solution, then our answer to this question is yes. |
| OPPO | - | We do not support SR based notification. |
| LGE | Yes | We think the UE can monitor PDCCH on PSCell when triggering SR for the SRB. As we answered in Q2, since the network can control the UE when the UE performs RACH or SR triggering, there is no case that the UE activates SCG without the network permission. But, in this case, the UE is just on the way to trying to activate SCG as like RRC establishment procedure. |
| Sharp |  | We propose UE self-activation. |
| Qualcomm | Yes | Agree with Apple and Nokia. |
| CMCC | Yes |  |

**Summary:**

**TBD**

2.3 T316 and other aspects

Companies in [3][11][1][2] propose that the legacy timer T-316 and T310 [2] might need to be re-visited for MCG failure recovery while the SCG is deactivated (due to for eg., increased time needed for MN-SN co-ordination etc).

Rapporteur likes to collect feedback on this aspect for making progress.

**Question 7: Companies are requested to provide views on the below:**

**7.1 – A new timer similar to T-316 is needed for MCG failure recovery in SCG deactivated state.**

**7.2 – The existing T-316 needs to be extended.**

**7.3 – The current 2000ms should be enough and the NW can choose the needed configuration**

**7.4 – Related to T310, e.g., 1) A new timer similar to T-310; 2) The current range should be enough and the NW can choose the short one.**

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| **Company** | **Which among 7.1,7.2,7.3?** | **Additional comments** |
| Apple | 7.3 | We think the NW can decide the time of T-316 and 2000ms should be enough to resolve this. |
| ZTE | 7.3 | If SR can be used to trigger MCG failure recovery, there is no difference in delay compared with legacy procedure.  If RACH is used to trigger MCG failure recovery, then there is additional delay caused by RACH procedure, however, from network perspective, it is not a big deal for RRC timers, so we think it is feasible to use current T316 to cover both cases. |
| Nokia | 7.3 |  |
| Lenovo, Motorola Mobility | 7.3 |  |
| vivo | 7.3 | We believe the Uu RRC and potential Xn procedures are similar for legacy MCG failure recovery case and the new MCG failure recovery with deactivated SCG case. We don’t think new value for T-316 is needed. |
| OPPO | 7.2 | We believe the T316 length should be different in SCG activation and SCG deactivation cases. |
| LGE | 7.1 | The current value will not always be enough since the RACH procedure is not taken into account at the current fast MCG recovery. Thus, the timer value for deactivation should not be used the same as the timer value for activation. |
| Sharp | 7.3 | The current timer should be enough. |
| Qualcomm | 7.2 | We are not entirely sure that 7.3 would work since the RACH procedure delay needs to be taken into account. However, this is not a critical issue for the feature at present, and we can take a closer look at this issue once the basic procedure and CR is agreed by the companies.  We don’t think a new timer is needed. |
| CMCC | 7.2, 7.4 | The SCG needs to be re-activated first to receive UE’s reporting, the MCG link may experience more time to recover from the potential RLF than traditional dual-connectivity scenarios. Thus, T316 should be modified accordingly. To solve the same issue, the potential RLF in MCG should be detected earlier with deactivated SCG. Similar to T316 in this case, T310 should also be modified in this case. |

**Summary:**

**TBD**

2.4 Comments on the TPs

Companies in [1][5][9][10][11][12] have provided TPs for their intended way of implementing this feature. While the content might need changes based on the RAN2 progress, it is worth collecting input on the company views on the TPs in parallel.

**Question 8: Companies are requested to provide views on the below:**

**8.1 – Any comments on the TP from [1].**

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| **Company** | **Additional comments** |
| Nokia | Just added another alternative in [12] |
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**Summary:**

**TBD**

**8.2 – Any comments on the TP from [5].**

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| **Company** | **Additional comments** |
| Sharp | This TP is still not enough (i.e. PDCCH monitoring, etc.). Additional change is needed. |
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**Summary:**

**TBD**

**8.3 – Any comments on the TP from [9].**

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| **Company** | **Additional comments** |
| Sharp | Regarding 5.3.5.3, additional condition is not needed (i.e. current condition does not exclude additional condition).  If UE initiates RA procedure based on 38.321-5.X in this TP, UE cannot always transmit *MCGFailureInformation*. And if NW can decide MCG failure based on RACH, UE needs to monitor PDCCH while SCG is deactivated state. |
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**Summary:**

**TBD**

**8.4 – Any comments on the TP from [10].**

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| **Company** | **Additional comments** |
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**Summary:**

**TBD**

**8.5 – Any comments on the TP from [11].**

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| **Company** | **Additional comments** |
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**Summary:**

**TBD**

2.5 Any additional comments

**Question 9: Companies are requested to provide views on any additional aspects as part of this discussion.**

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| **Company** | **Additional comments** |
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4 Conclusion

TBD

5 References

[1] R2-2200388 Fast MCG recovery based on SCG deactivation OPPO discussion Rel-17 LTE\_NR\_DC\_enh2-Core

[2] R2-2200896 Considerations for Fast MCG link recovery with deactivated SCG CMCC discussion Rel-17 LTE\_NR\_DC\_enh2-Core

[3] R2-2201073 Other aspects of SCG activation/deactivation Qualcomm Incorporated discussion Rel-17

[4] R2-2201115 Simple MCG recovery procedure using deactivated SCG for Rel-17 Apple discussion LTE\_NR\_DC\_enh2-Core R2-2110092

[5] R2-2201116 CR TP for MCG recovery procedure using deactivated SCG for Rel-17 Apple discussion LTE\_NR\_DC\_enh2-Core

[6] R2-2201295 Further discussion on TCI State indication in RRC MediaTek Inc. discussion R2-2111192

[7] R2-2201317 Deactivation of SCG LG Electronics Finland discussion Rel-17 LTE\_NR\_DC\_enh2-Core

[8] R2-2201333 Discussion on SCG (de)activation NTT DOCOMO, INC. discussion Rel-17

[9] R2-2201394 Fast MCG recovery via deactivated SCG vivo discussion LTE\_NR\_DC\_enh2-Core

[10] R2-2201432 Fast MCG link recovery via deactevated SCG Sharp discussion Rel-17 LTE\_NR\_DC\_enh2-Core

[11] R2-2201575 Rest issues of SCG Activation LG Electronics discussion Rel-17 LTE\_NR\_DC\_enh2-Core R2-2111018

[12] [R2-2200882](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200882.zip) Open issues in activation of SCG Nokia, Nokia Shanghai Bell discussion Rel-17 LTE\_NR\_DC\_enh2-Core