3GPP TSG-RAN WG2 Meeting #109-e R2-200xxxx

Electronic Meeting, 24th February – 6th March 2020

Agenda: 6.10.5

Source: Ericsson

Title: Fast MCG recovery

Document for: Discussion, Decision

# 1 Introduction

This document presents an overview of the topics discussed in contributions to AI 6.10.5. Wherever some consensus was observed, a proposal for agreement was made. Similarly, wherever a controversial issue was identified, whenever possible a proposal for discussion was made. Further, is also clarified if the suggestion is to have no proposal.

# 2 Summary of remaining issues

## Issue 2.1 Value of timer T316

According to the values that should be part of the timer T316, two contributions are provided with the following proposals made by Ericsson and Nokia:

* The guard timer has value range {ms50, ms100, ms200, ms300, ms400, ms500, ms600, ms1000}.[3] (Nokia)
* Value 0 is not used for T316 as it effectively disables the fast MCG recovery.[5] (Ericsson)
* The values for T316 are: ms100, ms200, ms300, ms400, ms600, ms1000, ms1500, ms2000.[5] (Ericsson)

Looking at the proposal, there is some commonality and most of the values proposed seems to be common between Nokia and Ericsson. According to this, the simplest solution would be to align the values of timer T316 (or part of them) to those ones already present for timer T310. Therefore, our proposal is:

1. The values for T316 are: ms50, ms100, ms200, ms300, ms400, ms500, m600, ms1000, ms1500, ms2000

Further, LG provided a contribution where it is argued that the values part of timer T316 should be larger than the values of the inactivity timer.

* RAN2 needs to specify that configured guard timer value should be longer than configured data inactivity timer value.[9]

According to this, it would be good to clarify that when the UE starts timer T316, it is aware that a failure has happened and that a response by the network to the *MCGFailureInformation* is expected. On top of this, when the *MCGFailureInformation* is sent, the MCG transmissions are suspended and thus the data inactivity timer becomes meaningless. Our understanding is that this issue (if there is any) may be handled by UE implementation. However, we believe this can be further discussed in the online meeting.

For this reason, our suggestion is:

1. RAN2 to discuss whether the configured guard timer value should be longer than configured data inactivity timer value.

## Issue 2.2 RRC re-establishment during fast MCG recovery procedure

Two submitted contributions aim at specifying the UE and network actions in case the fast MCG recovery procedure fails. In particular, the following proposals have been formulated:

* After fast recovery triggering, if the UE receives fast recovery RRC reconfiguration message before guard timer expires, the fast recovery is considered successful. Otherwise, the fast recovery is considered as failure.[1] (Vivo)
* If fast recovery failure occurs, after re-establishment UE should send a fast recovery failure message to network. The fast recovery failure message may include:[1] (Vivo)
	+ MCGFailureInformation
	+ SCGFailureInformation
	+ Re-establishment node related information, e.g., radio condition at re-establishment.
* After re/establishment from fast recovery failure, the node to which UE re/establishes should send a fast recovery failure indication to source MN (where MCG failure occurs) and/or source SN (where fast recovery failure occurs). If this is agreed, a LS to RAN3 should be sent. [1] (Vivo)

According to the three proposals formulated by Vivo, it would be good to clarify that, indeed, if the *MCGFailureinformation* does not reach the MN, or if an SCG failure happen during the fast MCG recovery procedure, the UE triggers RRC re-establishment procedure. However, when triggering the RRC re-establishment there no reason to inform the MN that also the SCG has failure. This is because, according to 38.331 clause 5.3.7.2, the UE needs to release MR-DC and, therefore, there is no SN anymore.

Our view is that is already clear when the UE needs to trigger re-establishment and what actions to perform. Further, given the lack of time, we should avoid introducing any optimization that have a standardization impact.

According to this, our suggestion is:

1. After fast recovery triggering, if the UE receives fast recovery RRC reconfiguration message before guard timer expires, the fast recovery is considered successful. Otherwise, the fast recovery is considered as failed.
2. If fast recovery failure occurs, after re-establishment the UE should not send a fast recovery failure message to network by including the *MCGFailureInformation*, and/or the *SCGFailureInformation*, and/or the re-establishment node related information.

In the contribution submitted by ZTE, the following proposal are elaborated:

* In case MCG RLF is detected upon the execution of SN addition or SN change procedure, the UE shall trigger RRC re-establishment procedure.[6] (ZTE)
* RAN2 is requested to confirm that if MCG failure happens during PSCell change, UE performs re-establishment. [12] (Samsung)
* RAN2 considers which option can be adopted to handle with the pending SCG RLC failure report upon the triggering of MCG fast recovery.[6] (ZTE)
	+ Option 1: The UE indicates the SCG RLC failure with the MCG failure information message upon triggering of MCG fast recovery.
	+ Option 2: It’s up to UE implementation.

As also highlighted in the contribution from ZTE, we think that, indeed, when the fast MCG recovery is triggered and the UE is in the middle of the SN addition or SN change procedure, it is not clear what the UE actions are. Given the lack of time we have to conclude the release, our preference would be to have the simplest solution that has also minimum impact on the specification. Our understating on this is that what is proposed by ZTE is already implemented in the RRC running CR and no further standardization impact is needed. Therefore, we suggest:

1. RAN2 to confirm that in case MCG RLF is detected upon the execution of SN addition or SN change procedures, the UE shall trigger RRC re-establishment procedure (as currently implemented in the RRC Running CR).

The second proposal made in ZTE’s paper deals with the already discussed outstanding issue on the UL/DL RRC deadlock message situation upon triggering the fast MCG recovery procedure. As also mentioned in the contribution, this topic was already discussed in the RAN2#107bis meeting and there, the agreement made was:

* No further mechanisms are introduced to resolve outstanding UL/DL RRC deadlock messages situation upon the triggering of MCG failure recovery

Since one of the options highlighted by ZTE is to leave it to UE implementation, given the lack of time we have to finish the release we think no further discussion is needed on this topic. Therefore, our suggestion is:

1. RAN2 confirms that the option can be adopted to handle the pending SCG RLC failure report upon the triggering of MCG fast recovery is left to UE implementation.

A further contribution on the RRC re-establishment procedure related to the fast MCG recovery, has been submitted by Google. There, the following proposal has been made:

* Upon detecting radio link failure, we do not need to specify the detail in 5.3.7 (perform RRC re-establishment procedure or not). The details are already specified in section 5.3.11.3. In section 5.3.7 we only need to specify “upon detecting radio link failure, in accordance with 5.3.1.3”. [10] (Google)

In our opinion, this looks more like an implementation choice rather than a proper problem of the feature. Therefore, our suggestion is not to have any proposal on this, and Google may bring this aspect up in during the RRC running CR discussion.

1. Implementation of agreements related to fast MCG recovery should be discussed in the RRC running CR email discussion.

## Issue 2.3 SN change as result of fast MCG recovery procedure

One contribution from Ericsson proposes to discuss the scenario when the fast MCG recovery is triggered and the MN, as a result, decides to trigger an SN change. This means that the MN-initiated SN change (less probable) or the inter-Master Node handover with Secondary Node change (high probable) procedure can be triggered. The following proposals have been made in the contribution:

* During the fast MCG recovery procedure, when the source MN triggers the release of the source SN, the source SN releases the resources associated to the UE only after sending the *RRCReconfiguration* message to the UE (via SCG leg of the split SRB or via SRB3). [4] (Ericsson)
* A note is added in 3GPP TS 37.340 for clarify that, during fast MCG recovery procedure, the source SN releases the resource associated to the UE only after sending the *RRCReconfiguration* message to the UE. [4] (Ericsson)

According to what is described in 37.340 clause 10.5 and 10.7, the release of the SN happens before the sending of the *RRCReconfiguration* message to the UE. Now, even if this is fine for the normal MR-DC operations (i.e., since is the MN that sends the *RRCReconfiguration* to the UE), in case of the fast MCG recovery procedure this represents a problem since is the SN that is responsible to send the reconfiguration, either via the SCG leg of the Split SRB or via the SRB3. According to this, we believe the issue is valid and need to be solved in order to make the fast MCG recovery feature to work properly.

Among the option described in the contribution, the more simple and the one that has less impact on the standardization is to add a note in 3GPP TS 37.340 for clarify that, during fast MCG recovery procedure, the source SN releases the resource associated to the UE only after sending the RRCReconfiguration message. Therefore, we would like to suggest:

1. RAN2 to discuss what option to pursue in order to avoid the SN to release the resources associated to the UE upon triggering of the fast MCG recovery procedure.

We note that a similar issue was brought up by Samsung in [12] where they propose a TP for clause 5.3.5.3 of 38.331, for handling of the *RRCReconfiguration* and *RRCReconfigurationComplete* message in case the fast MCG recovery is triggered. A further option would be that the MN releases the SN after the reconfiguration message is received by the UE (i.e., this is confirmed by the target MN to the source MN via the X2 signaling).

* Within 5.3.5.3, correctly capture all new cases introduced by fast MCG recovery as shown in table by adopting the corresponding TP

This topic was also partially addressed during the RRC running CR email discussion for 38.331. However, since this issue is related to the fast MCG recovery procedure, our suggestion it to discuss this separately together with the other related issue.

1. RAN2 to discuss how to capture in clause 5.3.5.3 of 38.331 all new cases regarding the handling of the *RRCReconfiguration* and *RRCReconfigurationComplete* introduced by fast MCG recovery

In another contribution, CATT is questioning whether the inter-RAT handover is supported for the fast MCG recovery and whether the E-UTRA measurements are needed to be forwarded by the UE to the MN. According to this, the following proposals are made:

* RAN2 should discuss whether inter-RAT handover can be supported for MCG fast recovery.[7] (CATT)
* If the inter-RAT handover is not supported for MCG fast recovery, the UE shouldn’t include the EUTRAN measurement results in the *MCGFailureInformation* if NR-DC is configured.[7] (CATT)

In our opinion, we did not agree on any restriction regarding the supported MR-DC handover scenarios that are supported during the fast MCG recovery procedure. For this reason, we think that all the MR-DC handover scenario illustrated in table B-1 of 37.340 should be supported (i.e., with no standardization impact). On the other side, it is worth highlighting that not supporting the MR-DC scenario in Table B-1 of 37.340 will require a standardization impact that is not desirable at this stage. Therefore, we propose:

1. The MR-DC scenarios illustrated in Table B-1 of TS 37.340 are supported for the fast MCG recovery procedure (i.e., the intention is to not support additional cases than the one illustrated in Table B-1 of TS 37.340).

## Issues 2.4 Other unsorted issues for fast MCG recovery

The following additional proposals have been submitted to RAN2#109-e regarding the fast MCG recovery procedure:

* On SRB3 in NR-DC, MCGFailureInformation and the response to it may be sent without encapsulation in *ULInformationTransferMRDC* or *DLInformationTransferMRDC*.[3] (Nokia)
* After the MCG resume, the UE switch the primary path from SCG to MCG. [10] (Google)

Regarding the proposal made by Nokia, in RAN2#107 this option was discussed (even if not captured in the chairman notes) when the sending of the *MCGFailureInformation* over SRB3 was agreed. However, the outcome was a single solution for all the MR-DC options. This makes sense since the approach has been applied also for other topics e.g., encapsulation of the NR RRCReconfiguration within another NR RRCReconfiguration. On top of this, this will require a separate handling of the feature for NR-DC and the rest of the MR-DC options thus producing additional standardization efforts that are not desirable at this stage.

Therefore, our suggestion is:

1. RAN2 to confirm that, in case of SRB3, the *MCGFailureInformation* and the response to it are sent encapsulated within the *ULInformationTransferMRDC* and the *DLInformationTransferMRDC*.

According to the proposal made in Google’s paper [10], in the RAN2#107 meeting the following agreement was made:

If PDCP duplication is not activated, upon detection of MCG failure the primaryPath for split SRB1 is implicitly reconfigured to the SCG. The UE expects the network to explicitly reconfigure the primaryPath back to MCG in the MCG recovery or in a Re-establishment

Therefore, no further agreements are expected on this issue since is already clear that is the network that needs to explicitly reconfigure the *primaryPath* to MCG (in the RRCReconfiguration or the RRCReestablishment). Nevertheless, there were concerns expressed on how the target MN understand that the primaryPath should be again switch to SCG during MN handover. For this reason, our suggest is to further discuss this issue to identify whether something is needed for this use case or not.

1. RAN2 to discuss whether some solution is needed to switch the *primaryPath* back to MCG by the target MN during the MN handover.

## Issue 2.5 RRC reestablishment initiated by failure of MCG failure recovery

Another issue described in a contribution from Sharp, is which reestablishment cause should be set when the UE trigger RRC re-establishment due to the fast MCG failure recovery. In particular, they propose the following:

* RAN2 to discuss how to set the *reestablishmentCause* when reestablishment is initiated by T316 expiry and failure detection for SCG while MCG is suspended and down select one of the options below,[11] (Sharp)
1. Set *reestablishmentCause* as *otherfailure* in a case of T316 expiry or failure detection for SCG while MCG is suspended.
2. Set *reestablishmentCause* as a new cause value to identify a failure of MCG failure recovery in a case of T316 expiry or failure detection for SCG while MCG is suspended.

This topic has not been discussed so far during the meeting. Nevertheless, in the current RRC running CR, when the UE trigger RRC re-establishment due to a failure on the MCG, the current cause that is set is *otherFailure*. For this reason, we suggest RAN2 to confirm this approach or whether something else is needed on this.

1. RAN2 to confirm that, upon triggering RRC re-establishment due to the T316 expiry, the UE shall set the *reestablishmentCause* to *otherFailure*.

# 3 Conclusion

According to the discussion in section 2, here is an attempt to divide the following proposal based on whether they are possible candidates for (i) an easy agreement, (ii) if further discussion is needed during the meeting, or (iii) if better to postpone the topic to the next meeting.

According to this, the following proposals are proposed to be candidate for an **EASY AGREEMENT**:

Proposal 1 The values for T316 are: ms50, ms100, ms200, ms300, ms400, ms500, m600, ms1000, ms1500, ms2000

Proposal 3 After fast recovery triggering, if the UE receives fast recovery RRC reconfiguration message before guard timer expires, the fast recovery is considered successful. Otherwise, the fast recovery is considered as failed.

Proposal 4 If fast recovery failure occurs, after re-establishment the UE should not send a fast recovery failure message to network by including the MCGFailureInformation, and/or the SCGFailureInformation, and/or the re-establishment node related information.

Proposal 5 RAN2 to confirm that in case MCG RLF is detected upon the execution of SN addition or SN change procedures, the UE shall trigger RRC re-establishment procedure (as currently implemented in the RRC Running CR).

Proposal 7 Implementation of agreements related to fast MCG recovery should be discussed in the RRC running CR email discussion.

Proposal 10 The MR-DC scenarios illustrated in Table B-1 of TS 37.340 are supported for the fast MCG recovery procedure (i.e., the intention is to not support additional cases than the one illustrated in Table B-1 of TS 37.340).

**Proposal 11 RAN2 to confirm that, in case of SRB3, the *MCGFailureInformation* and the response to it are sent encapsulated within the *ULInformationTransferMRDC* and the *DLInformationTransferMRDC*.**

In the following instead, the following proposals are candidates for a **FURTHER DISCUSSION DURING THE MEETING**:

Proposal 2 RAN2 to discuss whether the configured guard timer value should be longer than configured data inactivity timer value.

**Proposal 6 RAN2 confirms that the option can be adopted to handle the pending SCG RLC failure report upon the triggering of MCG fast recovery is left to UE implementation.**

**Proposal 8 RAN2 to discuss what option to pursue in order to avoid the SN to release the resources associated to the UE upon triggering of the fast MCG recovery procedure.**

**Proposal 9 RAN2 to discuss how to capture in clause 5.3.5.3 of 38.331 all new cases regarding the handling of the *RRCReconfiguration* and *RRCReconfigurationComplete* introduced by fast MCG recovery.**

**Proposal 12 RAN2 to discuss whether some solution is needed to switch the *primaryPath* back to MCG by the target MN during the MN handover**

**Proposal 13 RAN2 to confirm that, upon triggering RRC re-establishment due to the T316 expiry, the UE shall set the *reestablishmentCause* to *otherFailure*.**

# 4 References

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