3GPP TSG-RAN WG3 Meeting #114e R3-215857

Online, 1 – 11 November 2021

Agenda Item: 10.2.6

Source: Lenovo, Motorola Mobility (moderator)

Title: Summary of Offline Discussion on Mobility Enhancement Optimization

Document for: Approval

# Introduction

**CB: # SONMDT8\_MobilityEnc**

**- Check company view on ambiguous CHO failure across two CHO configurations.**

**- Check company view on separate failure type detection for CHO in stage 2**

**- Check company view on UE context for CHO**

**- Separate failure type detection for CHO in stage 2?**

**- Check the user case that both a HO Success Report and an RLF report are generated for the same HO.**

**- Provide CRs, if agreeable.**

(Lenovo - moderator)

Summary of offline disc [R3-215857](Inbox\R3-215857.zip)

Phase I：Please provide your inputs before UTC time 16:00 Thursday 4th Nov.

Phase II：TBD.

# For the Chairman’s Notes

The following proposals can be agreed:

Propose the following:

R3-20xxxa, R3-20xxxc merged

R3-20xxxc rev [in xxxg] – agreed

R3-20xxxd rev [in xxxh] – agreed

R3-20xxxe rev [in xxxi] – agreed

R3-20xxxf rev [in xxxj] – endorsed

Propose to capture the following:

**Agreement text…**

**Agreement text…**

**WA: carefully crafted text…**

**Issue 1: no consensus**

**Issue 2: issue is acknowledged; need to further check the impact on xxx. May be possible to address with a pure st2 change. To be continued…**

# Discussion

## Enhancements for CHO

### Ambiguous CHO failure across two CHO configurations

In RAN3#113-e meeting, an ambiguous CHO failure case across two CHO configurations was issued in [1] as Figure 1 showed, but there is no consensus after the email discussion [2]. Here, we continue to discuss whether the use case on ambiguous CHO failure across two CHO configurations is valid.



* *For CHO2, it will be a too late handover failure type because CHO2 is configured but the CHO2 execution is not initiated prior to RLF;*
* *If UE reported timer, i.e. from CHO1 execution to RLF, is smaller than the configured threshold, it may be a too early or handover to wrong cell failure type*

**Figure 1 CHO failure across two CHO configurations**

In [3], it is proposed that no matter whether the UE only reports a timer related to the CHO2 or both a timer related to CHO2 and a timer related to CHO1, there is no ambiguous CHO failure based on network analysis. In [4], it is stated that the start time of UE report timer is start at CHO1 and end with complete of CHO1, then the timer is reset and start at CHO2 and end with the RLF occur. Thus, there is no ambiguous for CHO failure across two CHO configurations. [5] also think there is no ambiguous CHO failure.

[6] state that the two consecutive CHO procedures can be separated by CHO execution not CHO configuration, and it depends on how to define *timeConnFailure* IE, since RAN2 is discussing how to define *timeConnFailure* IE in RLF Report but no consensus yet, RAN3 may wait for RAN2 progress and then discuss how to solve ambiguous CHO failure type detection.

**Q1: Companies are invited to provide their views on whether the ambiguous CHO failure across two CHO configurations is valid.**

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| --- | --- |
| **Company** | **Comment** |
| Lenovo and Motorola Mobility | No, there is no ambiguity.  For CHO2, based on RAN2 agreements, a timer that elapsed between the CHO execution and the corresponding latest CHO configuration received for the selected target cell, i.e. timeSinceCHOReconfig would be triggered when CHO2 configuration is received, since RLF occurs before CHO2 is executed, in this case, the timer timeSinceCHOReconfig for CHO2 in the RLF report from the UE is absent, thus the network can detect CHO2 is too late. |
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### Failure type definition and detection

In [3] [4] [5] [7], four companies propose that separate failure type detection for CHO in stage 2 is not needed, since previously we agreed to reuse the legacy MRO definition with related updates for CHO, currently the captured stage 2 descriptions of MRO detection mechanism is simple and can work well for CHO.

[6] [8] propose to have separate failure type detection for CHO in stage 2 in order to make the detection clear.

**Q2: Companies are invited to provide their views on whether to have separate failure type detection for CHO in stage 2.**

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| **Company** | **Yes/No** | **Comment** |
| Lenovo and Motorola Mobility | No | It is simple and sufficient to reuse the legacy MRO detection mechanism with necessary updates for CHO. We prefer to adopt the previously captured TS38.300.  Additionally, separate description for CHO seems not necessary especially when the ambiguous CHO failure across two CHO configurations is invalid. |
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### CHO execution condition(s) and candidate cell list

In RAN3#110e meeting, it was agreed that the source node needs to know the candidate cell list and CHO execution condition(s), but how is FFS. UE-based solution and network-based solution are summarized as below.

**Option 1: UE-based solution. Include CHO execution condition(s) and candidate cell list in the RLF-report.**

**Option 2:** **Network-based solution.**

* **Option 2-1: Source node sends candidate cell list and CHO execution condition(s) to the target node after receiving Handover Success message, e.g. in a new introduced message, and then the target transmits the info back to the source node in HANDOVER REPORT message.**
* **Option 2-2: Derive candidate cell list and CHO execution condition(s) based on Mobility Information.**
* **Option 2-2-1: Source node transmits the mobility information to the target node when CHO is completed, i.e. in the SN STATUS TRANSFER message, and the target node sends the mobility information back to the source node via HANDOVER REPORT message.**
* **Option 2-2-2: Source nod transmits the mobility information to each candidate target node in the HO request message, and the target node sends the mobility information back to the source node via HANDOVER REPORT message.**
* **Option 2-3: Source node stores the CHO related configuration**

[6] support Option 1 since UE-based solution have been agreed by RAN2, it is not necessary for network to record CHO execution condition(s) and candidate cell list.

[8] support Option 2-1, they state that the receiving node may not understand Mobility Information for inter-vendor scenario, and Mobility Information is not easy to have it in standard way because handover trigger is implementation related.

[3] support Option 2-2-1, as well as support Option 2-3 for CHO to a wrong cell case.

[5] propose that network-based solution can be considered if UE-based solution is not sufficient. Option 2-2-2 is preferred compared with Option 2-1 and Option 2-2-1due to less spec impact.

**Q3: Companies are invited to provide their views on whether to have network-based solution to enable source node to get CHO execution condition(s) and candidate cell list.**

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| **Company** | **Yes/No** | **Comment** |
| Lenovo and Motorola Mobility | consider NW-based solution if UE-based solution is not sufficient | RAN2#115e meeting confirmed to include latest radio measurement results of the candidate target cells and configured CHO execution condition(s) in the RLF report. If we agree UE-based solution is sufficient, Network-based solution may be not needed. |
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**Q4: If network-based solution is needed, which option is preferred?**

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| **Company** | **Option 2-1/2-2/2-3** | **Comment** |
| Lenovo and Motorola Mobility | Option 2-2-2 | If UE-based solution can’t work well, Option 2-2-2 seems better which has less spec impact. |
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### FAILURE INDICATION and HANDOVER REPORT message

RAN3#113e agree to reuse FAILURE INDICATION message and HANDOVER REPORT message to transfer failure related information for CHO. Further discussions regarding Xn aspects are provided in [5] [6] [8].

In [5], it is proposed that “RRC Re-establishment” can be reused as the initiating condition in FAILURE INDICATION message for CHO, the existing Handover Report Type e.g. “HO too early” or “HO to wrong cell” can be reused in HANDOVER REPORT for CHO, and CHO Cell CGI can be included in the HANDVER REPORT message to represent the CHO candidate cell which is selected after CHO execution failure for CHO recovery. Additionally, the existing one UE RLF Report Container in XnAP FAILURE INDICATION message or HANDOVER REPORT message can be reused to transfer information related two successive failures in CHO.

In [6], it is proposed to enhance Failure Indication to include a new initiating condition for CHO recovery. Additionally, CHO recovery cell ID needs to be included in Failure Indication message if there is no RLF Report container in Failure Indication message.

In [8], it is proposed to add Handover Report value Too Early CHO Execution and CHO Execution to Wrong Cell in Handover Report message.

**Q5: Companies are invited to provide their views on FAILURE INDICATION message and HANDOVER REPORT message for CHO.**

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| **Company** | **Comment** |
| Lenovo and Motorola Mobility | For FAILURE INDICATION message, a new initiating condition for CHO is not needed, and the existing one UE RLF Report Container can be reused to transfer two successive failures.  For HANDOVER REPORT message, do not introduce new Handover Report Type, CHO Cell CGI can be included to represent the CHO candidate cell for CHO recovery, and the existing one UE RLF Report Container can be reused to transfer two successive failures. |
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## Enhancements for DAPS HO

### Failure scenarios

RAN3 #113-e meeting agreed that case 9, i.e. HOF@Target->report DAPS HO failure@src->RLF@src, will not be considered for failure cases in DAPS HO. However, [6] state that case 9 in RAN3 is exactly the scenario 1b agreed in RAN2 and RAN2 agreed to introduce a timer i.e. *timeConnSourceFailure* IE to detect RLF@src after fallback. [6] proposed to send an LS to RAN2 to coordinate available DAPS scenarios.

[7] think no further discussions on failure scenarios are needed, since the failure scenarios discussed in RAN3 are aligned with RAN2 and cover all possible failure cases for DAPS HO.

**Q6: Companies are invited to provide the views on whether** **to send an LS to RAN2 to align DAPS failure scenarios.**

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| **Company** | **Yes/No** | **Comment** |
| Lenovo and Motorola Mobility | Probably no | It seems that scenario 1b agreed in RAN2 is that the UE detects an RLF in source upon it wants to fallback, it is not exactly the case 9 in RAN3.  We have discussed the failure scenarios for several meetings, considering TUs left for R17 SON/MDT, as the moderator, we suggest keeping the previous agreement that case 9 will not be considered for failure cases, and we can revisit if any issue is found due to not considering case 9. |
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### Success Report with RLF report

As issued in [9], for DAPS HO, there is a possibility that both HO Success Report and RLF Report are triggered, then a MRO issue needs to be considered, i.e. the source gNB may receive the SHR and the RLF report separately at different time, and it may make MRO analysis and optimization twice if it can’t understand the SHR and RLF report are related with the same HO. To solve this issue, potential solutions are provided in [9].

[10] analyzed this issue, considering RAN2 is discussing how to deal with the case in which the UE generates both an RLF report and a HO Success Report for the same HO in [11], [10] propose that RAN3 can wait for RAN2’s progress.

**Q7: Do companies agree to wait for RAN2 progress on how to handle the case when both a HO Success Report and an RLF report are generated for the same HO?**

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| **Company** | **Yes/No** | **Comment** |
| Lenovo and Motorola Mobility | Yes | In RAN2’s email discussion “[Post115-e][899][SON/MDT] Handover related SON aspects”, based on most companies’ responses, it is proposed that it is not a problem if both the SHR and RLF-Report are generated for the same HO, and it is not a problem if the network fetches them separately.  We can wait for progress of RAN2#116e meeting. |
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### Xn aspects

RAN3#113e meeting agreed to reuse FAILURE INDICATION message and HANDOVER REPORT message to transfer failure related information for DAPS HO.

In [10], it is proposed to reuse the existing one UE RLF Report Container in XnAP FAILURE INDICATION message and XnAP HANDOVER REPORT message to transfer the information related with the two successive failures happened in one DAPS HO procedures.

**Q8: Companies are invited to provide their views on Xn aspects of MRO for DAPS HO.**

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| **Company** | **Comment** |
| Lenovo and Motorola Mobility | Reusing the existing one UE RLF Report Container in the XnAP message has no RAN3 specification impact. |
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# References

1. R3-213497, Discussion on MRO for CHO mobility enhance, CATT
2. R3-214325, Summary of Offline Discussion on Mobility Enhancement Optimization, Lenovo, Motorola Mobility
3. R3-214961, Mobility Enhancement Optimization, Huawei
4. R3-215753, Further consideratino on Mobility enhancement, ZTE
5. R3-215297, SON Enhancements for CHO, Lenovo, Motorola Mobility, ZTE
6. R3-215063, Discussion on MRO for mobility Enhancement, CATT
7. R3-215451, (TP for SON BL CR for TS 38.300) MRO for CHO and DAPS, Ericsson
8. R3-215537, Discussion on SON enhancements for CHO, Samsung
9. R3-213499, Discussion on MRO for DAPS mobility enhance, CATT
10. R3-215298, SON Enhancements for DAPS Handover, Lenovo, Motorola Mobility, ZTE
11. R2-2110889, [Post115-e][899][SON/MDT] Handover related SON aspects, Ericsson