3GPP TSG-RAN WG2 #115-e Tdoc DocNumber

Electronic meeting, 16th – 27th August 2021

Agenda Item: 8.13.2.1

Source: Ericsson

Title: [AT115e][851][SON/MDT] CHO and DAPS related RLF reports (Ericsson)

Document for: Discussion, Decision

# 1 Introduction

This paper addresses the following email discussion:

* [AT115e][851][SON/MDT] CHO and DAPS related RLF reports (Ericsson)

**Scope:** Focus on the following proposals: P1, 7,8 and 9.

 **Intended outcome**: Report with Agreements

 **Deadline**: 11:00 UTC, Wednesday August 25th

Companies are invited to provide their comments by the deadline, i.e. **11:00 UTC, Wednesday August 25th**

# 2 Discussion

## 2.1 “Time D” definition

RAN2 has agreed to include in the RLF-Report, associated to CHO, the following timer:

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| C | Time elapsed between the first CHO execution and the corresponding latest CHO configuration received for the selected target cell, i.e. timeSinceCHOReconfig. | Time of received CHO configuration | Time of CHO execution | Agreed in RAN2#112 |
| D | Time elapsed between CHO execution until the first HOF/RLF  | Time of executing the first CHO | Time of first HOF/RLF | Agreed in RAN2#113 |

Related to timer D, the following proposal with three different options has been discussed during the online session at RAN2#115-e:

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| Proposal 1 Op1: For the Timer D, the TimeConnFailure is re-used with possible updates to indicate that it is started at CHO execution.Op2: Timer D is computed by the network using timer C and legacy timeConnFailure.Op3: Introduce a new Timer for Timer D “Time elapsed between CHO execution until the first HOF/RLF”. |

The above options imply the following:

**Option 1:** The “Time D” amounts to the timeConnFailure, which is supposed to start at CHO execution and stop when the HOF/RLF occurs.

**Option 2**: The timeConnFailure is supposed to start at reception of the CHO configuration and stop when the HOF/RLF occurs. The “Time D” is computed as the difference between timeConnFailure and “Time C”.

**Option 3:** A new timer (different from timeConnFailure) is used to represent the “Time D”. It starts at CHO execution and it stops when the HOF/RLF occurs.

Before selecting your preferences, Rapporteur invites companies to evaluate the following scenario already discussed during the online session and illustrated in the below Figure 1 for the various possible options:



Figure 1: Implications of the various options for the scenario discussed during the online session.

**Description of scenario in Figure 1:** The UE receives and ordinary HO command for HO from cell A to cell B. The UE moves in cell B and it receives a CHO configuration. However, before executing the CHO to cell C, the UE experiences an RLF, and as a consequence it logs the RLF-Report.

* Implications of Option 1/3 in the scenario in Figure 1: Both Option 1 and Option 3 assumes that the time D starts at CHO execution. Hence, when the UE experiences an RLF in cell B before the CHO execution, the timeConnFailure associated to the previous HO is still up and running. It will then represent the time elapsed since the HO command execution in cell A until the RLF in cell B. Once the RLF-Report is retrieved, the network can use this timeConnFailure as in legacy operations, i.e. to evaluate whether the HO from cell A to cell B was “too early” or if the cell B was “too late” with the HO.
* Implications of Option 2 in the scenario Figure 1: In Option 2, the timeConnFailure is started at reception of the CHO configuration. This implies that the previous timeConnFailure that was started at HO from cell A to cell B is overwritten. Hence, when the RLF occurs in cell B, the UE only includes the timeConnFailure started at CHO configuration. Once the RLF-Report is retrieved, the network may not know how to interpret the value of timeConnFailure and to properly use it for the “too early/too late” evaluation as it happens in legacy. For example, cell A, i.e. the previous PCell, does not know that the UE was configured with CHO at the time of RLF, hence it will think that the timeConnFailure represents the time since the HO from cell A to cell B, but in fact the UE had restarted the timeConnFailure and hence it would represent the time since the CHO configuration reception.
The above creates ambiguity in the interpretation of timeConnFailure, and consequently it may lead to erroneous HO classifications.

**Differences between Option 1 and Option 3:** Both Option 1 and Option 3 seem to behave similarly for the Scenario in Figure 1. However, related to standardization impact, if Option 3 is selected, RAN2 should discuss how to deal with the timeConnFailure if the CHO is executed. In legacy, when the RLF-Report is logged the UE shall include the timeConnFailure. However, If RAN2 selects option 3, it seems that the UE shall not include the timeConnFailure if the last HO was a CHO, and only this new Timer D should be included.

Rapporteur would like to ask companies which options are preferred.

* **Q1: Which option do you prefer to represent the Time D?**
	+ **Option 1:** The “Time D” amounts to the timeConnFailure, which is supposed to start at CHO execution and stop when the HOF/RLF occurs.
	+ **Option 2**: The timeConnFailure is supposed to start at reception of the CHO configuration and stop when the HOF/RLF occurs. The “Time D” amounts to the difference between timeConnFailure and “Time C”
	+ **Option 3:** A new timer (different from timeConnFailure) is used to represent the “Time D”. It starts at CHO execution and it stops when the HOF/RLF occurs.

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| **Company** | **Option 1/2/3** | **Comments** |
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## 2.2 DAPS-related

The following proposals were discussed during the online session:

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| Proposal 7 For the case of RLF in source cell after DAPS fallback, the RLF report includes the legacy timeConnFailure, that represents in this case the time between DAPS HO execution and RLF in source cell after fallback.Proposal 8 For the case of RLF in source cell after DAPS fallback, include in the RLF report an indication that a “DAPS fallback” occurred before the RLF.Proposal 9 For the case of RLF in target cell after successful DAPS HO, the RLF-Report includes an handover type indicator indicating that the last handover before the RLF was a DAPS HO. |

### 2.2.1 On Proposal 7

Proposal 7 is on how to represent the time elapsed since the last HO execution and the RLF in source cell after the fallback. In the email discussion [1], the following options were discussed:

* **Option 1:** Introduce a new timer, e.g. timeSinceDAPSExecution, to represent the time elapsed between the HO execution and the RLF in the source after the fallback.
* **Option-2:** Reuse timeConnFailure to represent the time elapsed between the HO execution and the RLF in the source after the fallback.

Rapporteur’s note: if Option 1 is selected, RAN2 may need to discuss how to handle the existing timeConnFailure in the procedural text. Today, the timeConnFailure is included by the UE whenever there is an RLF. On the other hand, with Option 1, it seems that the UE should be prevented from including the timeConnFailure if there is an RLF in the source cell after the fallback. Otherwise both timeConnFailure and timeSinceDAPSExecution timers will be included which does not make sense.

* **Q2: Which of the above options do you prefer to represent in the RLF report the time since the last DAPS HO execution in case the RLF occurs in source cell after fallback?**

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| **Company** | **Option 1 / Option 2** | **Comments** |
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### 2.2.1 On Proposal 8/9

Proposal 8/9 are essentially discussing the same issue. Hence, they will be treated together.

In particular, Proposal 8 is about the need of a DAPS fallback indicator, in case there is an RLF in the source cell after the DAPS fallback.

Proposal 9 is about including in the RLF-Report a DAPS handover type indicator in case an RLF occurs in the target cell after the DAPS HO.

Rapporteur´s note: Irrespective of whether the RLF occurs in the source cell after DAPS fallback, or in the target cell after DAPS HO, the current RLF report does not allow the network to figure out that this RLF occurred after a DAPS HO.
In case of RLF in source cell after DAPS fallback, the network will see that the previousPCellID and the failedPCellID in the RLF-Report are the same, but these two cell IDs may be the same also in case of intra-cell HO.
Similarly, in case of RLF in target cell, the network cannot know that the last performed HO was a DAPS HO.
This information may be beneficial because the configuration of DAPS HO parameters may be different from the configuration of the ordinary HO parameters, hence DAPS HO indicator may be used to optimize the corresponding HO parameters.

* **Q3: Do you believe that it is beneficial to include in the RLF-Report an indicator indicating that the last executed HO before the RLF was a DAPS HO?**
	+ **Option 1:** Yes, both in case of RLF in the target cell after DAPS HO, and RLF in source cell after DAPS fallback
	+ **Option 2:** Yes, but only in case of RLF in the target cell after DAPS HO
	+ **Option 3:** Yes, but only in case of RLF in source cell after DAPS fallback
	+ **Option 4:** No

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| **Company** | **Option 1/2/3/4** | **Comments** |
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# 3 Conclusion

**To be updated**

# References

1. R2-2108425, [Post114-e][850][SON MDT] Modeling of CHO and DAPS related RLF reports (Ericsson), RAN2#115-e