3GPP TSG-RAN WG2 #113-e Tdoc DocNumber

Electronic meeting, January 25th – February 5th 2021

Agenda Item: 8.13.2.3

Source: Ericsson

Title: [Post112-e][853][NR R17 SON/MDT] R17 Information needed in UE report for CHO cases (Ericsson)

Document for: Discussion, Decision

# 1 Introduction

This document captures the outcome of this email discussion:

* [Post112-e][853][NR/R16 SON/MDT] R17 Information needed in UE report for CHO cases (Ericsson)

Scope: Based on agreed scenarios, figure out what information is needed in UE report and how to log and report these needed information. Based on R2-2010896.

Intended outcome: Report to next meeting.

Deadline: Long

Companies inputs to this email discussion are appreciated by the 11th January 2021.

Related to CHO, the following agreements have been reached so far in RAN2:

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| --- |
| **From RAN2#111-e agreements:**  => The following scenarios are considered:  1) Successful CHO and HO (i.e. no failure happens). FFS consideration in RAN2/3  2) Unsuccessful CHO due to late CHO execution.  3) Unsuccessful CHO after CHO execution.  4) Successful or Unsuccessful CHO after unsuccessful CHO or handover failure.  Note: other scenarios are not ruled out…  => RAN2 should study what CHO failure information can be stored in RLF report.  => RAN 2 to discuss the method for distinguishing between different handover types in RLF report. FFS the details, e.g., explicitly way or not. |

**From RAN2#112 agreements:**

The following time information is as part of the UE RLF report:

Time between the first CHO execution and the corresponding CHO command received at UE at least in the CHO failure case.

Focused scenarios:

In case of successive CHO related failures, the UE stores and reports both RLF related information in the RLF report. The successive failure referred above, includes at least the following scenarios.

a. A UE that has CHO configuration declares RLF in the source cell. The UE selects for connection re-establishment a configured candidate CHO target cell. The UE fails to re-establish to the selected CHO candidate cell.

b. A UE that has CHO configuration executes the CHO towards the target cell upon fulfilling the configured condition and experiences a HO failure. The UE selects for connection re-establishment a configured candidate CHO target cell. The UE fails to re-establish to the selected CHO candidate cell.

c. A UE that has CHO configuration executes the normal HO towards the target cell and experiences a HO failure. The UE selects for connection re-establishment a configured candidate CHO target cell. The UE fails to re-establish to the selected CHO candidate cell using CHO procedure.

Note: other scenarios still can be discussed.

FFS: Further clarification on the successful reestablishment.’

The following cells’ related cell and beam measurements are included in the RLF report associated to CHO failure:

a. Source cell of the CHO. FFS the detail on cell ID. Try our best to reuse the existing information.

b. The target cell towards which the CHO was executed, if CHO related condition was satisfied. FFS the detail on cell ID. Try our best to reuse the existing information.

c. The cell in which the re-establishment is performed after the CHO failure or source RLF. Try our best to reuse the existing information. FFS on the related measurements.

FFS: Candidate target cells as configured in the CHO configuration.

RLF-report shall contain information to differentiate an ordinary HO failure from the CHO failure and CHO recovery failure. FFS: implicit indication vs explicit indication.

In the email discussion R2-2010896, the following measurements were considered:

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| --- | --- |
| A | Timeline relationship between two consecutive RLF reports for cases of successful or unsuccessful CHO after unsuccessful CHO or handover failure |
| B | Time between the UE receiving the CHO command and RLF |
| C | UE reports the time elapsed since CHO execution until connection failure |
| D | In case of multiple failures case, UE includes the time elapsed since CHO execution until connection failure (TimeConnFailure) and time elapsed since the last radio link or handover failure (TimeSinceFailure) in each RLF-Report |
| E | The time between CHO execution and successful reestablishment to a third cell after CHO failure towards the candidate target cell selected at CHO execution |
| F | The time elapsed since CHO configuration until the immediate HO reception or execution |
| G | The related cell and beam measurements of candidate target cells as configured in the CHO configuration |

And, related to the above measurement the following agreement was reached:

=> Regarding the CHO-related timers, Option D, E, F will not be included in the RLF report and other options will continue discussion through email mail after this meeting.

# 2 Discussion

## 2.1 Timer-related measurements for RLF report

Related to CHO-timers, the only agreement taken is the following:

* Time between the first CHO execution and the corresponding CHO command received at UE at least in the CHO failure case.

The following list includes other CHO-related timers identified so far, excluding the options D, E, F discussed in R2-2010896 for which RAN2 has already agreed to do not include in the RLF report.

Companies are invited to review the start/stop conditions of the timer and include any other additional CHO-related timer if missing.

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| --- | --- | --- | --- | --- |
| **#** | **Measurement** | **Start time (for time related measurements)** | **End time (for time related measurements)** | **Comments on the definition** |
| A | Timeline relationship between two consecutive RLF reports for cases of successful or unsuccessful CHO after unsuccessful CHO or handover failure | Time of declaring first RLF / HOF | Time of declaring second RLF/HOF |  |
| B | Time between the UE receiving the CHO command and RLF | Time of receiving the CHO configuration | Time of declaring RLF in the source cell. |  |
| C | Time elapsed since CHO execution until connection failure | Time of execution of the CHO | Time of declaring HOF/RLF |  |
| D | Time elapsed between CHO failure and the next time the UE comes to RRC CONNECTED | Time of declaring first HOF | Next time the UE comes to RRC CONNECTED in an NR or EUTRA cell | [Rapporteur]: This is same as *timeUntilReconnection* |
| E | Time elapsed between CHO failure and reestablishment RLF/CEF report request | Time of declaring first HOF | Reception of RLF/CEF report request | [Rapporteur]: This is same as *timeSinceFailure* |
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| .... |  |  |  |  |

Companies are now invited to provide their support on the inclusion of the above timer-related measurements.

**Q1: Which of the above time-related measurements need to be included in the RLF report?**

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| **Company** | **Preferred option** | **Comments** |
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## 2.2 Radio-related measurements for RLF report

Related to radio-related measurements, the following has been already agreed in RAN2#112-e:

The following cells’ related cell and beam measurements are included in the RLF report associated to CHO failure:

a. Source cell of the CHO. FFS the detail on cell ID. Try our best to reuse the existing information.

b. The target cell towards which the CHO was executed, if CHO related condition was satisfied. FFS the detail on cell ID. Try our best to reuse the existing information.

c. The cell in which the re-establishment is performed after the CHO failure or source RLF. Try our best to reuse the existing information. FFS on the related measurements.

FFS: Candidate target cells as configured in the CHO configuration.

On top of what already agreed, in this section it is collected a list of possible radio-related measurements to be included in the RLF report, as proposed by different companies in RAN2#112-e.

Companies are invited to review the description of the below radio-measurements and include any other additional radio-measurement, if missing

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| --- | --- | --- |
| **#** | **Measurement** | **Comments on the definition** |
| A | Configured CHO execution condition(s), e.g. A3 and/or A5 event configuration, of the candidate target cells |  |
| B | Fulfilled CHO execution condition(s), e.g. A3 and/or A5 event configuration, for the cell(s) in which CHO execution was triggered. |  |
| C | Latest radio measurement results of the candidate target cells |  |
| .... |  |  |
| .... |  |  |

Companies are now invited to provide their support on the inclusion of the above radio-related measurements.

**Q2: Which of the above radio-related measurements need to be included in the RLF report?**

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| **Company** | **Preferred option** | **Comments** |
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## 2.3 Other CHO-related parameters for RLF report

Related to other parameters to include, the only agreement reached so far is the following:

RLF-report shall contain information to differentiate an ordinary HO failure from the CHO failure and CHO recovery failure. FFS: implicit indication vs explicit indication.

Related to the above agreement, Rapporteur believes that further progress is needed in RAN2 to figure out whether implicit or explicit indication is needed. Therefore, it is proposed for the time being to focus on whether there are any other parameters that should be considered for inclusion in the RLF report.

In this section, it is collected a list of other CHO-related parameters that can be included in the RLF report, as proposed by different companies in RAN2#112-e.   
Rapporteur notes that some of the below listed parameter may be redundant depending on the radio-related parameters agreed in Section 2.2, and viceversa.

Companies are invited to review the description of the below parameters and include any other additional parameter, if missing

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| **#** | **Parameter** | **Comments on the definition** |
| A | Indication of whether a measured neighbour cell included in the existing measResultNeighCells was a CHO candidate cell or not. |  |
| B | Indication of whether the cell in which the UE re-established after CHO failure was a CHO candidate cell |  |
| C | Indication of whether the target cell in which the UE experienced a CHO failure was a CHO candidate cell | [Rapporteur]: This is for the case in which the UE executed a normal HO, while it was configured with CHO |
| D | List of candidate cells IDs |  |
| E | List of candidate cell IDs satisfying the CHO execution trigger condition and the execution condition used |  |
| ... |  |  |
| ... |  |  |

Companies are now invited to provide their support on the inclusion of the above CHO-related parameters.

**Q3: Which other CHO-related parameters need to be included in the RLF report?**

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| **Company** | **Preferred option** | **Comments** |
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## 2.4 Signalling model for RLF report

According to the scope of this email discussion, another issue to be addressed is “how to log and report these needed information”.

This is a topic that can be investigated more thoroughly later during the WI, however it can be beneficial to discuss already now how to represent signalling-wise the potential multiple RLFs that a CHO-configured UE can experience.

The existing signalling implies that the UE can store and send at most one RLF-report. Considering that the UE can experience at most two RLFs (if configured with at least two candidate target cells), some companies propose that multiple RLF reports/entries should be introduced. However, some other companies believe that just introducing some new IEs would be enough to represent such multiple RLFs.

Below there is a list of some possible signalling models to represent the potential “multiple RLFs” that can occur to a CHO-configured UE.

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| --- | --- | --- |
| **#** | **Signalling model for CHO-related RLF** | **Comments on the definition** |
| A | Two separate entries in the RLF report are used, i.e. one entry is used to represent measurements/parameters related to the first HOF, the second one is used to represent measurements/parameters related to the second HOF. |  |
| B | Separate IEs within the existing RLF-report are used to represent the second HOF. The first HOF can be represented by reusing as much as possible existing IEs. |  |
| C | Two separate RLF reports are introduced, one containing IEs related to the first HOF, the other one containing IEs related to the second HOF |  |
| D | Too early to decide |  |
| …. |  |  |

Companies are now invited to provide their support on the above signaling model for CHO-related RLF and also to comment on the pros and cons of the various options.

**Q4: Which signaling model for CHO-related RLF report should be selected?**

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| **Company** | **Preferred option (e.g., A,B,C, etc.)** | **Comments** |
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## 2.5 CHO Parameters for the HO success report

A number of contributions submitted at RAN2#112 identified various CHO-related parameter that could be included in the HO success report.

This is also a topic that can be investigated more thoroughly later during the WI, once the HO success report framework is in place. However, it can be beneficial to discuss already now which CHO-related parameters could be included in the HO success report, when that is generated.

In the following, there is a list of possible CHO-related parameters that could be included in the HO success report. Companies are invited to review the description of the below parameters and include any other additional parameter, if missing.

|  |  |  |
| --- | --- | --- |
| **#** | **Parameter** | **Comments on the definition** |
| A | Indication of whether an HO success report is referring to a normal HO or a CHO. |  |
| B | Time between the reception of the CHO command and the corresponding CHO execution |  |
| C | List of candidate cells IDs |  |
| D | List of candidate cell IDs satisfying the CHO execution trigger condition and the execution condition used |  |
| E | Configured CHO execution condition(s), e.g. A3 and/or A5 event configuration, of the candidate target cells |  |
| F | Fullfilled CHO execution condition(s), e.g. A3 and/or A5 event configuration, for the cell(s) in which CHO execution was triggered. |  |
| G | Latest radio measurement results of the candidate target cells |  |
| E | To be discussed together with the normal HO success report |  |
| ... |  |  |

**Q5: Which CHO parameter should be included in the HO success report when it is generated?**

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| **Company** | **Preferred option (e.g., A,B,C, etc.)** | **Comments** |
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# Conclusion

To be updated