3GPP TSG-RAN WG2 Meeting #109bis-e draftR2-200xxxx

Elbonia, Online, 20 – 30 April 2020

**Agenda item: 6.9.3.1**

**Source: Nokia, Nokia Shanghai Bell**

**Title: Report from [AT109bis-e][207][MOB] Open CHO issues**

**WID/SID: LTE\_feMob-Core/NR\_Mob\_enh-Core - Release 16**

**Document for: Discussion and Decision**

# 1 Brief scope of the paper

This document aims at collecting companies’ views regarding the open issues for Conditional Handover (CHO), submitted to 6.9.3.1 for RAN2#109bis-e (held in Elbonia, April 2020). Please beware that TDocs discussing the aspects handled in [3] are not included below, as the e-mail discussion report shall be handled first!

# 2 Discussion

## 2.1 T304 running when CHO condition execution is met

The authors of [1] insist on clarifying that CHO shall not be executed if there is already any other ongoing HO (e.g. legacy HO was initiated while the UE still evaluates CHO conditions and decides to execute CHO when HO is ongoing). Due to this problem, the authors of [1] suggest to associate the CHO execution with the condition which checks if the T304 is already running. This idea was already brought up and discussed briefly during RAN2#109 and not captured in the specification. While this is logical that T304 shall not be running when UE triggers CHO, it is a separate question if this behaviour needs to be explicitly captured in the specification. Thus, please respond to the following question.

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| **Question 1: Should the RRC procedure be extended with a condition checking if T304 is running before UE executes conditional reconfiguration?**  |
| **Company** | **YES/NO** | **Comment** |
| MediaTek | No | We agreed to have recovery via CHO for mobility failures, which implies that UE may continue evaluating CHO execution conditions during HO/CHO, if possible. In normal cases, when T304 is running, UE does not execute CHO to another candidate, but we may find it useful in later UE implementation, and thus we don’t want to have it explicitly banned in the specifications. |
| OPPO | Yes | We think checking T304 makes sense when initiating CHO execution. |
| Intel | No | It is related to whether the UE can continue the evaluation of execution condition during HO. We do not see the use case for it, and if the UE stops the evaluation of execution condition, then the condition will not be met when T304 is running.  |
| Lenovo | Yes | We slightly prefer to make it clear. |
| Panasonic | - | We are either fine with this T304 approach as well as the solution suggested by Ericsson in [3]. However, if no consensus is possible we prefer to not capture anything in the spec and avoid discussing the same thing again and again.  |
| Futurewei | Yes | I think the discussion was initially from the last email discussion. The question is when a first CHO execution is triggered, should the UE initiate another CHO execution. The answer from most companies is No. Therefore, After CHO execution is triggered and the T304 like is started, the UE shall **check if T304 like for CHO is running before UE applies or executes conditional reconfiguration, and stop any other execution request or attempt.**In R2-2002748, we suggest RAN2 to discuss a general principle: when a mobility or failure recovery execution has been initiated, it is normally shall not be stopped – first come first serve, unless a new attempt has higher priority which can be specifically specified if any. Therefore, in stage 3, if the principle applies to a first executed HO:If a HO execution is initiated first before a CHO execution is triggered, the UE shall check the T304 for this HO execution and stop any other execution attempt. The principle can be also applied to MCG fast recovery. |
| Qualcomm | No | Once UE process HO command and starts T304, it removes all entries for CHO as follows. There is nothing else to specify.2> if the *reconfigurationWithSync* was included in *spCellConfig* of an SCG and the CPC was configured3> remove all the entries within *VarConditionalConfig*, if any; |
| Ericsson | No | This has been discussed N times in previous email discussions and it seems we always conclude to not have anything captured for T304. |
| NEC | No | we also think when the legacy HO is initiated, the CHO evaluation is stopped. Then no CHO is triggered during T304 is running anyway. |
| ZTE | - | If something needs to be captured, we slightly prefer to capture that checking whether the related timer (e.g. T304, T316) is running before executing the CHO, for simplify. Otherwise, we may need to capture that the UE stops the evaluation of execution condition upon triggering the execution of CHO/HO or initiation of fast MCG recovery in the corresponding sections. But if majority prefer not to capture anything, we are also fine for it. |
| BT | Yes | We agree with MediaTek to have recovery via CHO for mobility failures, which implies that UE may continue evaluating CHO execution conditions during HO/CHO, if possible. But at this point, we don’t consider necessary to have the option to trigger a CHO meanwhile a HO is being executed. |
| LG | Yes | We think this is the simplest way to resolve this issue. To be aligned, we are also fine the proposal by Ericsson in [3] if the solution is updated that the UE stops evaluating the CHO execution not only when the CHO is executed but also the legacy HO is executed. This is because, in the current Ericsson’s proposal, the UE stops evaluating the CHO execution only when the CHO is executed. Regarding Qualcomm’s comment, it removes all entries for CHO only after HO complete so that the referred statements has nothing to do with this issue.  |
| Huawei, HiSilicon | No | Share the same view as Intel. |
| Sharp |  | We agree with Futurewei’s view that an ongoing mobility or failure recovery should not be stopped in normal cases. But the answer may depend on the section 2.6 discussion. If it is agreed that UE stop the evaluation when a condition is met, then such T304 condition checking is not needed. |
| Samsung  | No | As already discussed previous email discussion, we think associating the CHO execution to the stage 3 timer operation is not appropriate. Based on stage 2 description is enough. |
| CATT | - | This was discussed several times. We agree with Intel comment that if the execution evaluation is stopped, execution condition cannot be met. Main point is that the UE is not trigger another CHO execution while CHO/HO execution is on-going.  |
| Nokia | No | We think it is sufficiently clear the UE shall not evaluate CHO candidates when HO is executed. Thus, no need to add such association with T304. |
| Google | No | Share the same view as Intel. |
| CMCC | No | We have discussed similar questions that if UE continues evaluating the CHO condition during the execution of HO/CHO/fast MCG recovery. Since CHO does not have priority over these ongoing procedures, the basic idea is that these procedures should not be interrupted by a new CHO attempt. The agreement here can be also applied to HO/CHO/fast MCG recovery. For the RRC spec, we slightly prefer not to associate the restriction with T304 or other timer and share the same view with Intel. |
| Apple | No | We share Intel’s view.  |
| Vivo | Yes | We think the CHO failure handling have been agreed. Then the UE may continue evaluating CHO execution conditions during HO/CHO. Thus, it is better to check if T304 is running before the execution.  |

Summary for Q1:

* 21 companies provided their views. 6 companies supported having such additional condition to check if T304 is running. Others claimed it is not essential
* Rapporteur suggests to go with the majority view, especially as those who responded ‘yes’ once again mentioned that the use case would be evaluation of CHO execution conditions for potential CHO recovery, which is not valid (see our comment in 2.6).

**Proposal 1: RRC procedure is not extended with a condition checking if T304 is running before the UE executes conditional reconfiguration.**

## 2.2 Corrections to conditional reconfiguration evaluation

The authors of [2] argue the procedure for evaluating the measurement events for triggering conditional reconfiguration (5.3.5.13.4 in TS 38.331) should be extended. It is proposed to add a statement initializing the procedure, to make sure the condition is not fulfilled when the procedure is started. In addition, it is proposed to prevent the UE from checking the leaving condition all the time even if the entry condition was not fulfilled earlier. The authors of [2] have brought the same topic to [Post109bis-e#12], report in [3]. Several companies found those changes unnecessary. However, no proper discussion happened. Thus, companies are now invited to express their opinions.

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| **Question 2: Do you think the RRC procedure in 5.3.5.13.4 should be extended with additional subclauses to make sure the condition is not fulfilled/leaving condition is not checked when unnecessary, as suggested in [2]?**  |
| **Company** | **YES/NO** | **Comment** |
| MediaTek | Yes/No | We believe that the default state of a triggering event is “not fulfilled”, and we need not to specify explicitly. Otherwise we should do this also for all measurement events?But we are fine to have “if this event is considered as being fulfilled before, and” in [2]. |
| OPPO | No | We don’t understand why this issue is specific to CHO execution conditions, given that legacy measurement event works well in the same way? |
| Intel | No | Do not see the reason why such changes are needed.  |
| Lenovo | No |  |
| Panasonic | Yes | In the measurement framework, when a triggering event is fulfilled, a measurement reporting entry will be added into *VarMeasReportList*. Here the CHO event uses a different approaching by assigning “not fulfilled” and “fulfilled” states. We simply want to avoid the situation where a new variable is declared but no value is assigned to that variable (to avoid some debugging issues).Also, it is clear in the measurement framework that the UE will not check the leaving condition of a triggering event, if this event is not fulfilled before (not being added into *VarMeasReportList* before). However, according to the current spec the UE has to always check the leaving condition of a CHO triggering event. |
| Futurewei | No | The change can lead to more ping-ponging in a fluctuated measurement scenario. |
| Qualcomm | No | This is called over-specification. No UE will consider an event which did not happen as fulfilled. |
| Ericsson | No | We see the point brought by Panasonic, is just that what they seem to point out is an obvious thing. A sensitive UE implementation will anyways assume that and going beyond that, by adding a requirement feels a bit like over-specification as Qaulcomm has highlighted. Trying to be a bit constructive, one possible compromise could be a NOTE, or something captured in the minutes “RAN understanding is that initial state is non-fulfilled, blah, blah”. |
| NEC | No | we do not see need for this specifically to CHO case. |
| ZTE | No |  |
| LG | No | Since we think the default state is as being non-fulfilled, we don’t think this is necessary. |
| Huawei, HiSilicon | No |  |
| Sharp | Yes/NO | The second change to add “if this event is considered as being fulfilled before, and” seems reasonable to us. But we also think the first change of “else” part is over-specified |
| Samsung  | Yes/No | There could be some confusion on the way the spec is written currently. In current spec, the complement of definition of the fulfilment for one event is not same as the definition of non-fulfilment, which should be normally the case. However, in legacy case, entering condition and leaving condition have different metric to be fulfilled. So, we should think current way is one of extension of that legacy case by introducing the definition of “fulfilment” and “non-fulfilment” of event. Anyhow, the second part looks valid to add “if this event is considered as being fulfilled before, and”  |
| CATT | No | We don’t see a need for such change. Also we think the proposed change in [2] may lead to some issue where the some condition check may not be performed at all. |
| Nokia | No | We think this clarification is redundant and the specification can be interpreted correctly without such statements. |
| Google | No | We think the specification is clear. |
| CMCC | Yes/No | Share the same view as MediaTek. |
| Apple | No |  |
| Vivo | No | We don’t see the motivation for this change.  |

Summary for Q2:

* 20 companies provided their views. 4 companies had no strong opinion, 1 companies clearly supported corresponding changes, the remainder (15 companies) thought the current specification is clear enough.
* Rapporteur suggests to go with the majority’s view, especially as the specification appears to be fully clear without this proposed change.

**Proposal 2: RRC procedure in 5.3.5.13.4 is not extended with additional subclauses to make sure the condition is not fulfilled/leaving condition is not checked when unnecessary.**

## 2.3 CHO and MR-DC operation

The authors of [4] describe the possible consequences of allowing CHO in MR-DC and MR-DC after CHO is configured. Such aspects need to be considered as the majority in [3] seem to favour no SCG configuration in Conditional Reconfiguration, so MR-DC needs to be released at certain point during CHO. The authors of [4] propose the UE releases MR-DC upon the execution of CHO (Proposal 1). In addition, it is suggested source MN releases source SN upon reception of Handover Success from the target MN (Proposal 3 and 4). Do companies agree with such approach?

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| **Question 3: Do you agree UE releases MR-DC upon the execution of CHO and MN releases source SN upon reception of Handover Success from the target MN?** |
| **Company** | **YES/NO** | **Comment** |
| MediaTek | Yes | This is reasonable UE behaviour if we agree to have no SCG configuration in Conditional Reconfiguration. |
| OPPO | We prefer network-based approach for releasing MR-DC | We would like to understand the proposal a bit further. 1. Does it mean UE autonomously releases MR-DC? or
2. Does CHO configuration include a MR-DC release command?

We don’t want to have UE autonomous MR-DC release and we think it would be enough to have network-based solution, i.e. including MR-DC release explicitly in CHO configuration. |
|  Intel | No | It should be released by network.  |
| Lenovo | Yes | We have agreed that CHO configuration is allowed to be configured for UE with MR-DC. In addition, CHO including SCG configuration is not supported. Therefore, it is reasonable to autonomously release SCG when UE executes CHO. |
|  Panasonic | Yes | We agree that UE can release the MR-DC upon the execution of CHO (if the conditional reconfiguration doesn’t carry the SCG configuration). The source node anyway will release all UE’s configurations (including SCG configuration) upon receiving the Hanover Success indication from target node.  |
| Futurewei | No | Agree with Intel. It should be released by the network. The UE behaviour with the source should follow CHO behaviour as specified. |
| Qualcomm | Yes | Even though we don’t see any technical reason to restrict SCG configuration in CHO command (after all CHO is just a delayed HO and HO does allow this), we agree with the arguments in [4] that the target gNB may not be able to release this so it is much simpler to do this on the UE side. |
| Ericsson | Yes | We agree with Qualcomm restricting SCG configuration in CHO was unnecessary. Under this situation, it would be a bit unfortunate to add a requirement in network implementation to handle MR-DC in its CHO functionality but because RAN2 introduced a restriction (in theory something aimed to simplify something). |
| NEC | No | The release by network is our preference. If there is any case where the network cannot do it or difficult to do, the UE autonomous release is fine. |
| ZTE | No | We think it should be explicitly released by the NW. The source node can inform the target node that the UE is being MR-DC via setting sourceSCG-Configured as TRUE in HandoverPreparationInformation. Then the target can include the mrdc-SecondaryCellGroupConfig set to release in the generated RRCReconfiguration. So we see no difficulty for the target to release it. |
| LG | No | The network can release the MR-DC configuration via reconfiguration with sync which is associated with the CHO execution. This is because the target network already know the source configuration. In addition, since MR-DC configuration can be releases by simply one bit signalling we think there is also no signalling burden to release MR-DC release. |
| Huawei, HiSilicon | No |  |
| Sharp |  | We agree the MR-DC is released in a CHO execution. It seems simper to rely on network indication, in which we does not see any spec impact. |
| Samsung  | No | Release should be based on network’s command. |
| CATT | No | MR-DC Configuration should be released by the network.As for source MN release the SN, we agree MN releases source SN upon reception of Handover Success from the target MN |
| Nokia |  | Seems after online discussion and taking the following agreement: “We will not preclude SCG configuration in RRC Reconfiguration with conditional reconfiguration. Limit to cases without RAN3 impact.” further discussion on proposals in [4] does not seem to be valid. We shall reuse the legacy principles and check RAN3 impact until next meeting. |
| Google | No | The network should release the MR-DC. |
| CMCC | No | The network should be the one to release the MR-DC. |
| Apple | No | MR-DC should be released by NW command.  |
| vivo | No | We think it is up to network control to release the SCG.  |

The authors of [4] also suggest to suspend CHO when SCG addition is received (Proposal 6). However, that seems to be a sort of enhancement and can be circumvented by cancelling CHO and configuring it again, if necessary. We suggest not to handle this or any other proposals from [4].

Summary for Q3:

* No need to conclude this discussion with a proposal, as online session on 23/04 RAN2 has made the following agreement: “We will not preclude SCG configuration in RRC Reconfiguration with conditional reconfiguration. Limit to cases without RAN3 impact.”
* Obviously, if the MR-DC is to be released, it follows the legacy principles.

## 2.4 Source reconfiguration during CHO

The authors of [5] claim that Stage 2 specification shall be updated with a NOTE, explaining that source gNB is allowed to reconfigure the UE even after CHO configuration for candidate target cells. In addition, the NOTE shall say it is up to network to update the UE stored CHO configurations so that they remain valid. Such NOTE does not seem to be critically needed, but we would like the companies to express their opinion.

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| **Question 4: Do you think TS 38.300, section 9.2.3.4.2 should be updated with a NOTE that source gNB can reconfigure the UE even after providing CHO configuration for candidate target cells and it is NW’s responsibility to ensure those configurations remain valid (as proposed in [5])?** |
| **Company** | **YES/NO** | **Comment** |
| MediaTek | Yes | This NOTE is not critically needed, but we’d like to have it as a clarification. |
| OPPO | Yes | We are ok with the NOTE since this reflects earlier RAN2 agreements on NW behaviour. |
| Intel | No | Do not see the strong need to have such NOTE in stage 2.  |
| Lenovo | No | As discussed in the email discussion, gNB may release CHO configuration and reconfigure the CHO based on the acknowledge from target cell. We don’t see the necessity to add a note since it is network implementation. |
| Panasonic | Yes | Although we also agree it is not critically needed. |
| Futurewei |  | No strong opinion. If this agreement is already captured in stage 3, it is not critical in stage 2.  |
| Qualcomm | Yes | This was agreed after long discussions so good to write it down, which will help implementation people on what to expect. |
| Ericsson | No | We don’t believe this is needed. The source can do many other tings we are not capturing in notes e.g. send a handover command while UE, remove CHO, modify CHO, etc.While we believe this is not necessary, we don’t find the Samsung proposal in [5] acceptable, in particular the second sentence, which looks like a network requirement. “NOTE: After sending CHO configuration to the UE, the source gNB is allowed to reconfigure the UE. This may require the stored CHO configurations to be updated, in which case it is up to network to take appropriate actions.” |
| NEC | Yes | we are fine to add a NOTE |
| ZTE | Yes | We slightly prefer to add the note for clarification. |
| BT | Yes | Our preference is to add a note. |
| LG | No strong view | It has been clarified in stage 3 that the source cell provides further addition or modification for CHO. |
| Huawei, HiSilicon | Yes | We see benefits of having the Note. |
| Sharp | Yes | No strong view, but can agree with other views to clarify this. |
| Samsung  | Yes  | We think that information should be anyway highlighted in the overall procedure point of view. This is the basic difference compared to the legacy HO. |
| CATT |  | We don’t see a note in Stage 2 is essential; however we are ok to it from the sake of clarification. |
| Nokia | No | Similar reasoning as provided by Ericsson. |
| Google | Yes | RAN2 agreed that the network should ensure the CHO configuration is valid so we think the note can clarify this.  |
| CMCC | Yes | We are fine to have the note. |
| Apple | Yes | It’s better to have the NOTE.  |
| Vivo | Yes | We are fine with this Note. During the previous discussion, we would like to capture such behaviour.  |

Summary for Q4:

* 21 companies expressed their views. 14 companies support having a NOTE. 3 companies have no strong view. 4 companies do not want to have the NOTE.
* Rapporteur believes such NOTE is not necessary, as the procedural behaviour describing what is allowed what is not allowed is already clear and the specification shall not be overloaded with a NOTE providing little value added. However, to reflect majority’s preference, it is suggested to capture such NOTE.

**Proposal 3: Update section 9.2.3.4.2 of TS 38.300 with a NOTE: ‘’source gNB can reconfigure the UE even after providing CHO configuration for candidate target cells’’**

## 2.5 UE configuration release in RRC Reestablishment

The authors of [6] discuss UE’s behaviour when RRC Reestablishment is performed. It is described that as per legacy, the UE releases its configuration including spCellConfig, MCG SCell and otherconfig (delayBudgetReportingConfig and overheatingAssistanceConfig). In [6] it is proposed to change this behaviour if the UE is configured with *conditionalReconfiguration*. We do not fully understand the motivation behind this proposal and wonder if the intention was perhaps to associate it with the *attemptCondReconfig*, not the *conditionalReconfiguration*? Anyway, do companies share the proposal brought by Sharp in [6]?

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| **Question 5: Do you think the UE shall not release otherconfig including delayBudgetReportingConfig and overheatingAssistanceConfig and MCG SCells if the UE was configured with conditionalReconfiguration and the selected cell is a CHO candidate cell (as proposed in [6])?** |
| **Company** | **YES/NO** | **Comment** |
| MediaTek | Yes? | We are not sure if the configuration misalignment described in [6] will happen. In the endorsed RRC CR (R2-2001767), we already identify that “release spCellConfig” and “suspend all RBs, except SRB0” should not be done in the initiation part if UE is configured with *conditionalReconfiguration*, and they will be done later if the selected cell is not CHO candidate. If the *delayBudgetReportingConfig*, *overheatingAssistanceConfig* and MCG SCells also have the same problem, we should treat them in the same way as the previous two, i.e., associated with *conditionalReconfiguration* instead of *attemptCondReconfig*, and the text proposal in [6] can be used. |
| OPPO | Yes | Since delta configuration can be used for CHO configuration, then for UE to be able to acquire the entire target configuration upon CHO execution, e.g. in case of recovery via CHO, these source configurations should not be released. |
| Intel | Yes | This is same as PSCell configuration,etc that can be used as baseline for delta signalling in CHO configuration.  |
| Lenovo | Yes | In the current running CR, UE release spCellConfig and suspend all RBs during initiating re-establishment only if UE is not configured with conditionalReconfiguration. Similarly, otherconfig(delayBudgetReportingConfig and overheatingAssistanceConfig) is released if UE is not configured with conditionalReconfiguration |
| Panasonic | Neutral | We understand the issue and remedy brought in [6]. However, as *otherconfig* is not as critical as spCellConfig and MCG SCell, we wonder whether such remedy is really necessary. Besides, the misalignment issue could be resolved if the target cell can assume that the UE has released *otherconfig*, upon receiving the RRCReestablishmentRequest.  |
| Futurewei | Yes |  |
| Qualcomm | Neutral | It is beneficial to allow delta signalling but not sure if this can cause other problems. But since this *attemptCondReconfig* is an already an optimization, it can be kept simple as it is with PCell only. |
| NEC | Neural | we can understand this may be useful for delta configuration, while these configurations seem not so ciritcal. |
| ZTE | Yes |  |
| BT | Neutral | Even thought, we consider is beneficial |
| LG | Yes except of MCG Scell handling | We see the point from SHARP, for delay budget report and overheating assistance, there might be a mismatch between the network and the UE even though it isn’t critical. However, for MCG SCells, there would be no problem if RAN2 agree that the target shouldn’t provide SCG configuration with CHO. Thus, for MCG Scell handling, we should wait for the outcome of the discussion whether the target shouldn’t provide SCG configuration with CHO. |
| Huawei, HiSilicon | Yes |  |
| Sharp | Yes | There is no reason that we allow delta configuration for spCellConfig, but not for other parts of UE configuration. |
| Samsung  | Neutral  | We are not sure if those other information is critical so that they needs to be the same way of spcellConfig. But it is reasonable to handle the MCG Scell at least as the way of spcellconfig |
| CATT | Yes | We are fine to handle MCG SCell and otherconfig in the same way as spcellconfig. This can be used for delta configuration. |
| Nokia | Yes | OK to have the same approach as to other configuration parts in order to be able to use delta config. |
| Google | Yes |  |
| CMCC | Yes |  |
| Apple | Yes |  |
| Vivo | Yes | We think it is beneficial for the delta signaling |

Summary for Q5:

* 20 companies expressed their views. 5 remained neutral while others wanted to support proposed behaviour to make sure delta signalling works as expected.
* It is proposed to agree changes from [6].

**Proposal 4: UE does not release *otherConfig* including *delayBudgetReportingConfig* and *overheatingAssistanceConfig* and does not release MCG SCells if the UE was configured with *conditionalReconfiguration* and the selected cell during reestablishment is a CHO candidate cell.**

## 2.6 Stage 2 Text (TS38.300) on CHO evaluation during execution

In RAN2 #107 meeting, companies reached an agreement on CHO evaluation handling during CHO execution: “*UE is not required to continue evaluating the triggering condition of other candidate cell(s) during CHO execution.*” The agreement is based on the majority views in the email discussion [106#41][NR and LTE CHO] – *CHO execution details*. The statement is not mandatory requirement for UE.

However, in the latest TS38.300 under the clause 9.2.3.4.1, a UE mandatory stage 2 text is suggested. This mandatory requirement goes beyond the RAN2 agreement above. In fact, evaluating the execution condition(s) is a UE internal operation, mandating to stop the UE internal operation is not a directly testable requirement. Therefore, the current stage 2 text in TS38.300 is not aligned with the related RAN2 agreements and is not a suitable requirement. It can cause misleading to the stage 3 text development.

[7] suggests modifying the stage 2 text to align with the RAN2 #107 agreement and RAN2109e agreement on CHO measurement during execution:

##### 9.2.3.4.1 General

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“The UE starts evaluating the execution condition(s) upon receiving the CHO configuration, and is not required to continue evaluating the execution condition(s) once the execution condition(s) is met.”

…

Companies are kindly asked the following question:

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| **Question 6: Do you agree to make stage2 modification in TS38.300 as proposed in [7]?** |
| **Company** | **YES/NO** | **Comment** |
| Futurewei | Yes | It is understood that the term “*evaluating the triggering condition*” in the agreement is a high level stage 2 statement of entire process of CHO evaluation which including the detailed operations of quantity measurement, data processing and comparing the final data against the threshold for all the CHO candidates. The RAN2 #107 agreement precisely represents the majority views in the email discussion [106#41] while also respects the minority opinions.The current stage 2 text in TS38.300 is not aligned with the related RAN2 agreements and is not a suitable requirement. If it is not modified it can cause misleading to current stage 3 text development and in future. |
| Qualcomm | No | This is another example of over-specification. “not required to” already means that the UE can do whatever it wants. |
| Ericsson | No | Agree with Qualcomm, this is over-specifying. We do not specify what the UE is NOT required to do. Could you even imagine if this becomes a trend in RAN2? In follow up meetings we would see “TP for actions UE is not required to do”. |
| NEC | No | this text should not be changed as proposed to avoid any further discussions behind this change. |
| ZTE | No | Agree with QCM and Ericsson. |
| LG | No | We think the current spec is clearer to understand the UE behavior. The problem is how to specify this behavior into stage 3.  |
| Huawei, HiSilicon | No |  |
| Sharp | No |  |
| Samsung  | No | We prefer to keep the text as it is. |
| CATT | No |  |
| Nokia |  | Not valid after taking the following agreement: “Rely on existing Stage-2 text that UE stops evaluating execution condition and capture nothing additional in NR/LTE RRC specification about CHO execution conditions after the CHO condition is met and CHO execution is started.”. |
| Google | No |  |
| CMCC | No |  |
| Intel | N | Agree with Nokia. It is not valid anymore based on latest agreement.  |
| Apple | No |  |
| vivo | Yes | Actually, we are OK to align the wording as previous agreement. At the meantime, it has agreed in this meeting to rely on stage-2 text and capture nothing in stage-3 specification. We are also fine with this agreement.  |

Summary for Q6:

* No proposal is made due to the following agreement taken on 23/04 (RAN2 online session): ‘’ Rely on existing Stage-2 text that UE stops evaluating execution condition and capture nothing additional in NR/LTE RRC specification about CHO execution conditions after the CHO condition is met and CHO execution is started’’

## 2.7 CHO and MCG failure coexistence

During the web conference at RAN2#109bis-e it was difficult to conclude whether the UE can be simultaneously configured with MCG failure recovery and CHO (based on Proposal 5 from [3]). Nearly all companies were eventually fine to specify in NR RRC that the UE stops evaluating the CHO execution conditions after MCG failure information is sent/T316 is started. However, one company (i.e. Samsung) stated it is unclear which functionality is more important and asked for additional consideration. As a result, the following statement is captured in the chairman notes:

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| * Discuss in [207] further on whether UE stops conditional configuration evaluation when T316 starts
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In our view, the CHO evaluation shall anyway stop after MCG Failure/T316 initiation, as the PCell is not available. If the UE can’t measure its Pcell, it cannot evaluate the A3/A5 events, used for CHO execution. Similar reasoning has been provided in [8]. In our understanding, it does not matter if we capture the corresponding statement in RRC specification or not, as UE’s behaviour would anyway be the same.

During the online discussion it was claimed RAN2 should consider which functionality is more important (i.e. CHO or MCG failure recovery). In our view, we have no time left in Rel-16 for a detailed analysis, especially as it would concern two Rel-16 functionalities (i.e. not yet set in stone). However, we kindly ask the RAN2 CHO specifiers to provide the view to the following question:

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| **Question 7: How to resolve the issue of MCG Failure and CHO coexistence in Rel-16? Choose one of the options and please provide the motivation:**1. **Specify in 5.3.10.3 (Detection of radio link failure) that the UE stops condition reconfiguration evaluation when MCG Failure Information is submitted**
2. **Specify that MCG Failure recovery and CHO cannot be configured together in Rel-16**
3. **Do nothing (i.e. no dedicated agreement, no specification impact)**
4. **Other (please describe)**
 |
| **Company** | **Option** | **Comment** |
| Nokia | a) | To make sure the behaviour is explicitly described, we are OK with inserting such statement to RRC specification. |
| Google | c) | There is no requirement for the UE for this case so we think nothing needs to be specified. If the UE is capable of continuing evolution and a condition is fulfilled, then the UE can execute CHO. Otherwise, no condition is fulfilled to execute CHO.  |
| Qualcomm | a) or d) | a) is sufficient. However, some companies seem to be too concerned about evaluation vs execution so we can also instead have a Note that: The UE does not initiate the conditional configuration execution, as specified in 5.3.5.13.5, while T316 is running.  |
| Sharp | a) | We are ok to explicitly add this simple sentence in the spec to solve the problem.For (b), MCG fast recovery and CHO are used for different purposes, we do not want such restriction in the specification. If the NW does not want both, it can just configure one of them.For ©, if do nothing, UE will trigger a CHO if the condition is met when T316 is running and the UE is waiting for a response. We think an ongoing procedure should not be stopped in this case as commented in section 2.1. |
| CMCC | a) | As stated in Question 2.1, we prefer to clarify the UE behavior for MCG Failure and CHO coexistence. |
| ZTE | a) | We are fine to add such simple statement to clarify the ehaveehaviorour for MCG fast recovery and CHO coexistence. |
| Lenovo | A or d | Firstly, I want to clarify the measurement. According to the DCCA running CR for 37.340 (R2-2002395), after MCG link recovery is initiated, UE continues continues measurements based on configuration from the MN and the SN, if possible. Therefore, even Pcell is not available, UE can still measure PCell.For a)we are fine with a, which makes UE behavior clear. But, it may not be captured in the 5.3.10.3 (Detection of radio link failure). If we agree ‘when T316 starts’ or ‘whenMCG Failure Information is submitted’, it can be captured in the 5.7.y.4 (see DCCA running CR R2-2002392), which is associated with ‘starts T316’ and ‘transmission of *MCGFailureInformation* message’.For b) As I mentioned in online discussion, CHO is designed for robust mobility purpose. And, MCG link recovery is configured for failure recovery purpose. We don’t see the necessity to restrict the configuration together since they have the different purpose.For c) Since we have specified to stop evaluating condition during CHO, why not make it clear for MCG link recovery.For d) I also agree with QC suggestion that one note can be added e.g The UE does not initiate the conditional configuration execution when T316 is running. |
| LG | a) | To specify explicitly, we are fine to take this option. |
| OPPO | a) | We can accept a) as it is simple. Network can still configure CHO and MCG failure recovery at the same time. |
| Intel  | A | But if we add the a) the UE stops condition reconfiguration evaluation when MCG Failure Information is submitted “, we may also need to add the same sentence for HO/CHO procedure, otherwise companies may have confusion why the handling is different for MCG failure case and other cases.  |
| Futurewei | d) | In fact, stopping CHO evaluation is really an implementation to achieve that UE does not initiate CHO execution during fast MCG recovery (when T316 is running). The real testable requirement is that *the UE does not initiate the conditional configuration execution when T316 is running*.So, why don’t we let UE implementation to decide how to meet the requirement of no new execution? The implementation can be stopping CHO evaluation or does not apply CHO configuration etc. as discussed before.In principle we are ok to the d) text proposed by QC. D) is enough. Based on the general principle discussed in [7]. We would prefer to set up a more generic requirement for fast MCG recovery:*The UE does not initiate any new mobility and failure recovery execution when T316 is running*.The similar sentence can be imposed to HO/CHO to address the concern from Intel:*The UE does not initiate any new mobility and failure recovery execution when T304 is running*. |
| Apple | a)  | a) is simple and clear.  |
| ITRI | c) | We share the same view as Google. |
| BT | a) | Agree with Nokia and QC but we wonder to know, in case we are in the middle of the MCG failure recovery and the PCell is not available, which are the differences between CHO evaluation and the legacy HO evaluation? |
| Vivo | a) | This the simplest approach. We are also fine to discuss other solutions further in the future release.  |
| Samsung  | b) | Regarding rapporteur’s comment on that Pcell is not valid anymore when RLF happened on it, we don’t think evaluation for Cho itself is useless, since even on RLF situation (note there could be other causes than T310 expiry, like RLF max reTx, RACH problem), UE can still have valid measurement result on Pcell by measuring DL. Our concern was that which one should be prioritized between two. Executing CHO could be fast than receiving possible HO command (after MCGFailureInformation transfer). In case of MCG failure recovery, expiry of T316 still can happen, then total latency (transmission of MCGFailureInformation + T316 timer expiry (2sec as I know)) could be longer than just execution of CHO. In our view, still network can control which one is better from its own data on deployment and can configure one of two. So prefer option b). |
| Panasonic | a) | a) should be sufficient to clarify the UE behavior when both MCG failure recovery and CHO are configured; b) is too restricted. |
| CATT | a)  | We are fine to go with a). |
| Huawei, HiSilicon | a) or d) | Firstly, we think it should be possible that both mechanism should be configured at the UE simultaneously. Secondly, we think that UE behaviours should be clear if both are configured.In our paper R2-2003577, we also provided another option (i.e. option d)) that the network can explicitly indicate the UE to choose one of two, and we think the option is flexible enough. It seems that a) has lots of supports and it is simple, so a) is also acceptable for us. |
| Ericsson | a) | The co-existence of these two features is not the highest priority. But a) seems acceptable as there is no impact on network side. Someone argued this leads to some prioritization of MCG report over CHO. Well, perhaps it makes some sense, since a CONNECTED UE is still under network controlled mobility and in that case network would have a change to act on reported measurements. |

Summary for Q7:

* 19 companies provided their views. Out of these, 15 companies were OK with option a (Specify in 5.3.10.3 (Detection of radio link failure) that the UE stops condition reconfiguration evaluation when MCG Failure Information is submitted).
* Two companies supported having a NOTE instead of the procedural text, capturing the same that is suggested in a).
* One company suggested the network can explicitly indicate the UE to choose one of two.
* Two companies wanted to do nothing and not to address this topic anyhow, while one company wanted to make an explicit agreement that the configuration of fast MCG recovery and CHO is forbidden in Rel-16.
* We believe this behaviour should be clarified, with a procedural update (instead of a NOTE), so we suggest to agree option a).

**Proposal 5: Section 5.3.10.3 (Detection of radio link failure) of TS 38.331 is updated with the subclause “the UE stops condition reconfiguration evaluation when MCG Failure Information is submitted”.**

# 3 Summary

Summary for Q1:

* 21 companies provided their views. 6 companies supported having such additional condition to check if T304 is running. Others claimed it is not essential
* Rapporteur suggests to go with the majority view, especially as those who responded ‘yes’ once again mentioned that the use case would be evaluation of CHO execution conditions for potential CHO recovery, which is not valid (see our comment in 2.6).

**Proposal 1: RRC procedure is not extended with a condition checking if T304 is running before the UE executes conditional reconfiguration.**

Summary for Q2:

* 20 companies provided their views. 4 companies had no strong opinion, 1 companies clearly supported corresponding changes, the remainder (15 companies) thought the current specification is clear enough.
* Rapporteur suggests to go with the majority’s view, especially as the specification appears to be fully clear without this proposed change.

**Proposal 2: RRC procedure in 5.3.5.13.4 is not extended with additional subclauses to make sure the condition is not fulfilled/leaving condition is not checked when unnecessary.**

Summary for Q3:

* No need to conclude this discussion with a proposal, as online session on 23/04 RAN2 has made the following agreement: “We will not preclude SCG configuration in RRC Reconfiguration with conditional reconfiguration. Limit to cases without RAN3 impact.”
* Obviously, if the MR-DC is to be released, it follows the legacy principles.

Summary for Q4:

* 21 companies expressed their views. 14 companies support having a NOTE. 3 companies have no strong view. 4 companies do not want to have the NOTE.
* Rapporteur believes such NOTE is not necessary, as the procedural behaviour describing what is allowed what is not allowed is already clear and the specification shall not be overloaded with a NOTE providing little value added. However, to reflect majority’s preference, it is suggested to capture such NOTE.

**Proposal 3: Update section 9.2.3.4.2 of TS 38.300 with a NOTE: ‘’source gNB can reconfigure the UE even after providing CHO configuration for candidate target cells’’ .**

Summary for Q5:

* 20 companies expressed their views. 5 remained neutral while others wanted to support proposed behaviour to make sure delta signalling works as expected.
* It is proposed to agree changes from [6].

**Proposal 4: UE does not release *otherConfig* including *delayBudgetReportingConfig* and *overheatingAssistanceConfig* and does not release MCG SCells if the UE was configured with *conditionalReconfiguration* and the selected cell during reestablishment is a CHO candidate cell.**

Summary for Q6:

* No proposal is made due to the following agreement taken on 23/04 (RAN2 online session): ‘’ Rely on existing Stage-2 text that UE stops evaluating execution condition and capture nothing additional in NR/LTE RRC specification about CHO execution conditions after the CHO condition is met and CHO execution is started’’

Summary for Q7:

* 19 companies provided their views. Out of these, 15 companies were OK with option a (Specify in 5.3.10.3 (Detection of radio link failure) that the UE stops condition reconfiguration evaluation when MCG Failure Information is submitted).
* Two companies supported having a NOTE instead of the procedural text, capturing the same that is suggested in a).
* One company suggested the network can explicitly indicate the UE to choose one of two.
* Two companies wanted to do nothing and not to address this topic anyhow, while one company wanted to make an explicit agreement that the configuration of fast MCG recovery and CHO is forbidden in Rel-16.
* We believe this behaviour should be clarified, with a procedural update (instead of a NOTE), so we suggest to agree option a).

**Proposal 5: Section 5.3.10.3 (Detection of radio link failure) of TS 38.331 is updated with the subclause “the UE stops condition reconfiguration evaluation when MCG Failure Information is submitted”.**

# 4 Conclusions

# 5 List of referenced documents

[1] R2-2002900 *T304 running issue when CHO Execution,* LG Electronics, 3GPP TSG-RAN WG2 Meeting #109bis-e Elbonia, Online, 20 – 30 April 2020

[2] R2-2002996 *Corrections to conditional configuration evaluation,* Panasonic, 3GPP TSG-RAN WG2 Meeting #109bis-e Elbonia, Online, 20 – 30 April 2020

[3] R2-2003105 *E-mail discussion report [Post109bis-e#12][MOB] Resolving open issues for CHO* Nokia, Nokia Shanghai Bell, 3GPP TSG-RAN WG2 Meeting #109bis-e Elbonia, Online, 20 – 30 April 2020

[4] R2-2003035 *CHO and MR-DC operation*, Ericsson, 3GPP TSG-RAN WG2 Meeting #109bis-e Elbonia, Online, 20 – 30 April 2020

[5] R2-2003333 *Clarification on source reconfiguration during CHO*, Samsung, 3GPP TSG-RAN WG2 Meeting #109bis-e Elbonia, Online, 20 – 30 April 2020

[6] R2-2003609 *UE configuration release in RRC reestablishment*, Sharp, 3GPP TSG-RAN WG2 Meeting #109bis-e Elbonia, Online, 20 – 30 April 2020

[7] R2-2002748 On measurement and evaluation during CHO execution, Futurewei, 3GPP TSG-RAN WG2 Meeting #109bis-e Elbonia, Online, 20 – 30 April 2020

[8] R2-2002901 *Failure handling of both CHO and MR-DC*, LG Electronics Inc., 3GPP TSG-RAN WG2 Meeting #109bis-e Elbonia, Online, 20 – 30 April 2020