3GPP TSG-RAN WG2 Meeting #115-e R2-210xxxx

Elbonia, Online, 16 – 27th of August 2021

**Agenda item: 6.1.4.1.1**

**Source: Nokia, Nokia Shanghai Bell**

**Title: Report from [AT115-e][024][NR16] DAPS & CHO (Nokia)**

**WID/SID: 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 following CHO and DAPS related CRs:

* [AT115-e][024][NR16] DAPS & CHO (Nokia)

 Scope: Await on-line, take into account online outcomes. Determine agreeable parts and agree CRs, Treat R2-2108090, R2-2107775, R2-2107085, R2-2107086, R2-2107087, R2-2107776, R2-2108817, R2-2106933, R2-2108164, R2-2107526, R2-2107527, R2-2108102, R2-2108103, R2-2108776, R2-2108777

 Intended outcome: Report, Agreed CRs.

 Deadline: on-line first, Schedule 1

The following sections elaborate on the topics listed in the scope above.

# 2 DAPS

## 2.1 On bearer release handling for DAPS

The authors of [1] discuss the issue of bearer releasing in DAPS HO. It is mentioned that the specification does not describe how the bearers which are released at DAPS HO command are handled when the DAPS fallback occurs. [1] proposes two options how to address the problem: either to postpone the release of RLC bearers until random access success (Option 1) or to define how RLC bearers are restored on DAPS fallback (Option 2). Companies are asked to provide their views regarding the problem and which option shall be used for addressing it.

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| **Question 1: Do you agree with the problem stated in [1]? Which option should be adopted to address it?** |
| **Company** | **Yes/No** | **Comment** |
| ZTE | No | **We have discussed the similar issue on bearer release (R2-2102821/2822) at RAN2#113bis-e meeting. And it’s agreed that the intent is correct (UE only does fallback to non-DAPS bearers configured by source) but CR is not needed.** |
| MediaTek | Clarification is needed | It is not so clear to us whether it is still a DAPS bearer if the source RLC bearer is released and target RLC bearer are added. This bearer could not receive DL data from source during DAPS handover.Anyway, in our understanding, for the RLC bearers which the NW releases in *RRCReconfiguration* which commands DAPS handover, the correct UE behavior should be* When DAPS handover is initiated, the RLC bearer is suspended (No transmit or receive). The RLC bearer configuration is kept.
* When DAPS handover succeeds, the RLC bearer is released.
* When DAPS handover fails, the original RLC bearer configuration is restored/resumed

We can discuss how to clarify the SPEC once we have common understanding. |
| Ericsson | No | We would support the intent in principle, but this type of change has already been concluded as not essential. This issue was discussed at RAN2#1113bis, based on E/// CRs to both LTE and NR:Addition/release of bearers during DAPS: [R2-2102821](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113bis-e/Docs/R2-2102821.zip) Addition and release of DRBs in DAPS HO Command Ericsson CR Rel-16 36.331 16.4.0 4607 - F LTE\_feMob-Core- Rapporteur thinks we can either go with the CRs or have clarification on non-DAPS bearer.- Ericsson clarifies this is to handle what happens if UE falls back to source while target added non-DAPS bearers. QC thinks Ericsson is correct but likely UEs will not implement it this way. Could just add a NOTE. Huawei thinks the CR is not needed and we would have 3 types of non-DAPS DRBs with this. There's no real risk of errors.- Ericsson wonders why we wouldn't capture this in specification.* **The intent is correct (UE only does fallback to non-DAPS bearers configured by source) but CR is not needed.**

[R2-2102822](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_113bis-e/Docs/R2-2102822.zip) Addition and release of DRBs in DAPS HO Command Ericsson CR Rel-16 38.331 16.4.0 2478 - F NR\_Mob\_enh-Core* **The intent is correct (UE only does fallback to non-DAPS bearers configured by source) but CR is not needed.**
 |
| QCOM | Yes Option-1 | Agree with the intention, clarification is needed. Option-1 where UE delays the release of the bearer(s) till DAPS is successful seems the simplest approach to resolve this issue.  |
| Huawei, HiSilicon | No | No need to update the spec. Current wording “revert back to the UE configuration used for the DRB in the source PCell” has covered all aspects. |
| NEC | No | We agree with ZTE and Ericsson that we have discussed similar issue before, and concluded that CR is not needed. |
| Sharp | No | Agree that current wording “revert back to the UE configuration used for the DRB in the source PCell” has covered this. |
| Samsung  | No | **We already discussed this issue several meetings ago and concluded no change.** |
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## 2.2 Source SDAP configuration fallback

In [2] it is suggested to remove the part on reverting back to the SDAP configuration used in the source PCell in section 5.3.5.8.3 of NR RRC. It is claimed that there is nothing to revert, as the target SDAP configuration is not applied until UL switching. Do you agree with the changes proposed in [2]?

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| **Question 2: Do you agree with the change proposed in [2]?** |
| **Company** | **Yes/No** | **Comment** |
| ZTE | Yes | **The target SDAP configuration is not applied until indication of successful completion of random access towards target cell is received (i.e. only source SDAP configuration is applied), so no need to revert back to the source SDAP configuration.** |
| MediaTek | No strong view | Agree that the SDAP configuration is not applied so not necessary to revert upon handover failure. We however also think that keeping this clause is also fine. |
| Ericsson | No | Not an essential change. The line removed in the CR does not have any effect and is not necessary. So with that logic, removing it does not have effect either. |
| QCOM | No strong view | The source configuration is still there if DAPS fails, so the clause is useless … leaning toward removing it, but will go with majority.  |
| Huawei, HiSilicon | No | The reasoning given in cover sheet is only for DAPS bears, but the UE behaviour “revert back to the SDAP configuration used in the source PCell;” is common for both DAPS bears and non-DAPS bears. For non-DAPS bears, it is still necessary to make it clear. |
| NEC | Yes | The sentence will mislead the readers that the UE has already applied target SDAP configuration. And keeping this useless and maybe even misleading sentence is no good to the specification. |
| Sharp | No | Agree that current wording “revert back to the UE configuration used for the DRB in the source PCell” has covered this. |
| Samsung  | Yes  | **We are fine with this.**  |
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## 2.3 T301 for DAPS

The authors of [3][4][5] discuss the issue concerning T301 handling in DAPS HO. It has been noticed that UE in DAPS is configured with various timers for the target cell, provided in *RLF-TimersAndConstants*. However, there is no value for T301 which may negatively impact the potential re-establishment performance. Two options how to address the problem are provided in [4] and [5].

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| **Question 3: Do you agree with the problem found in [3]? Which alternative to resolve it do you prefer?**  |
| **Company** | **Yes/No** | **Answer (Alt-1, Alt-2, other)** |
| ZTE | No | **Since the UE will acquire SIB1 of the target cell after completion of RA to the target cell, the UE can use the T301 value included in ue-TimersAndConstants received in SIB1, as the legacy HO. So the change is not needed.**1. if *reconfigurationWithSync* was included in *spCellConfig* of an MCG or SCG, and when MAC of an NR cell group successfully completes a Random Access procedure triggered above:

\*/omit unrelated part/\*3> if the active downlink BWP, which is indicated by the *firstActiveDownlinkBWP-Id* for the target SpCell of the MCG, has a common search space configured by *searchSpaceSIB1*:4> acquire the *SIB1*, which is scheduled as specified in TS 38.213 [13], of the target SpCell of the MCG;4> upon acquiring *SIB1*, perform the actions specified in clause 5.2.2.4.2; |
| MediaTek | No | There is no need to have T301 value in *RLF-TimersAndConstants* IE, because T301 is started only during RRC connection re-establishment when SIB1 from that cell (in which *RRCRestablishmentRequest* is to be sent) has always been received, i.e. the UE has *ue-TimersAndConstants*. |
| Ericsson | Maybe | We are not sure there is an issue here - it depends on how the spec is interpreted. The DAPS and non-DAPS case is written in a similar way:*2> if any DAPS bearer is configured:**3> configure the value of timers and constants for the target cell group in accordance with received rlf-TimersAndConstants;**2> else:**3> (re-)configure the value of timers and constants in accordance with received rlf-TimersAndConstants;*So, for the non-DAPS case, since *rlf-TimersAndConstants* does not include T301 there is an implicit assumption that the value in *UE-TimersAndConstants* in SIB1 is used for T301.It is unclear if anything is needed.If there is consensus around doing anything here, we prefer alternative 1 as it has a lot less impact. |
| QCOM | Yes | **We support Alt-2**, i.e. extending the IE RLF-TimersAndConstants to include T301, as we don’t see the need to change the UE behaviour when obtaining this info, i.e. some info from the dedicated message and other info from broadcast messages.  |
| Huawei, HiSilicon | No | No need to make any change. If T301 is not configured in HO command, it can still maintain the length value used in source cell. |
| NEC | Maybe | This T301 handling is the same for DAPS handover and legacy handover. The legacy handover case can be discussed first, and DAPS applies the same way. |
| Sharp | Maybe | In LTE, T301 is included in *RLF-**TimersAndConstants*, so maybe it’s better to align also in NR(i.e. Alt-2 ). |
| Samsung  | No  |  **Same view with ZTE.** |
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## 2.4 Other DAPS corrections

[6] and [7] propose various corrections to DAPS HO. In [6] some modifications to the procedural text concerning how to handle PDCP configuration and SRBs when security key is (not) changed during DAPS. [7] clarifies that the UE shall not resume SRBs for source cell when applying the target cell configuration during DAPS HO. Companies are kindly asked to express their views if changes in [6] and [7] are needed.

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| **Question 4: Do you support the changes proposed in [6]? Please comment especially if you think not all changes are relevant.**  |
| **Company** | **Yes/No** | **Comment** |
| ZTE | Yes | **Since all changes are editorial changes, we prefer to merge them into the rapporteur CR** |
| MediaTek | Yes | Also suggest to put this in rapporteur CR |
| Ericsson | No | 1st change (adding "for target cell group"): Not essential.The "target cell group" clarification has been discussed several times before (at RAN2#112 and RAN2#113bis) and RAN2 agreed that configuration during DAPS handover applies to target cell group and no further RRC clarifications are needed.2nd and 3rd change: Not essential.It is proposed to remove text which is not needed as it is claimed it does not have any effect. So the change would not have any effect either and there is no risk of misunderstanding. Potentially this can go into a rapporteur CR.Editorials can be sent to the spec rapporteur. |
| QCOM | No strong view |  Editorial changes, good to have.  |
| Huawei, HiSilicon | No | Only the first change, i.e. “1) Add “for the target cell group” for the case of DAPS with security key change in 5.3.5.6.3;”, is acceptable and can be merged to Rapp RRC CR. The other changes are editorial and unnecessary. |
| NEC | Yes | We are also fine to merge the corrections into rapporteur CR. |
| Sharp | No strong view. |  |
| Samsung  | See comments | **The first change is not needed since it is already clear:** 1> If any DAPS bearer is configured, for each SRB:2> establish a PDCP entity for the target cell group as specified in TS 38.323 [5], with the same configuration as the PDCP entity for the source cell group;2> if the *masterKeyUpdate* is received:3> configure the PDCP entity with the security algorithms according to securityConfig and apply the keys (KRRCenc and KRRCint) associated with the master key (KgNB);**It seems OK with other editorial changes but not essential.** |
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And a separate question for CR in [7].

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| **Question 5: Do you support the changes proposed in [7]?** |
| **Company** | **Yes/No** | **Comment** |
| ZTE | Yes |  |
| MediaTek | No strong view | Seems okay but not critical |
| Ericsson | Yes | This correction seems correct and essential. |
| QCOM | Yes |  |
| Huawei, HiSilicon | Yes |  |
| NEC | Yes |  |
| Samsung  | Yes  |  **It would be better to include this in Rapp CR.** |
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# 3 Conditional Reconfiguration

## 3.1 SCG with CHO configuration

Papers [8][9][10][11] have been discussed during the online session at RAN2#115. It has been decided RAN2 will not ask RAN3 to specify the support of CHO with SCG configuration for Rel-16. However, several open issues remain:

1. How to capture in RAN2 specifications that CHO with SCG configuration is not supported as per Rel-16
2. Whether to ask RAN3 to define a related support in Rel-17
3. What exactly to respond to RAN3

Regarding a) there are multiple ways how to capture this restriction in RAN2 specification. E.g. a Stage-2 modification (37.340 or 38.300) can be pursued. Alternatively, NR RRC may be updated with a restriction that RRC Reconfiguration comprising *conditionalReconfiguration* IE cannot contain a target node SCG configuration. Companies are kindly asked to express their preference:

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| **Question 6: How to capture in RAN2 specification the restriction CHO with SCG configuration is not supported in Rel-16?** |
| **Company** | **TS number** | **Comment** |
| ZTE | TS 38.331 and TS36.331 for stage-3 description;TS 37.340 and TS 36.300 for stage-2 description | **We think it’s better to clearly capture the restriction for CHO with SCG configuration in both stage-2 and stage-3 specs, similar to the restriction for other non-coexistence features, e.g. CHO and DAPS. And we also provide the corresponding TPs in our discussion paper (R2-2108164), which can be considered as one solution (the change below is highlighted by yellow).****TS 38.331*****condRRCReconfig***The *RRCReconfiguration* message to be applied when the condition(s) are fulfilled. The *RRCReconfiguration* message contained in *condRRCReconfig* cannot contain the field *conditionalReconfiguration*, the field *daps-Config* or the SCG configuration.**TS 36.331*****condReconfigurationToApply***The RRCConnectionReconfiguration message to be applied when the condition(s) are fulfilled. The RRCConnectionReconfiguration message contained in condReconfigurationToApply can not contain the SCG configuration.**TS 37.340**In case MR-DC is configured, CHO is only supported in Master Node to eNB/gNB Change procedure in this release.CHO is not supported in eNB/gNB to Master Node Change procedure in this release.NOTE 3: CHO is only supported from E-UTRA with EPC/EN-DC to E-UTRA with EPC and from NR/NE-DC/NR-DC to NR.**TS 36.300**NOTE 2: In case LTE-DC is configured, CHO is only supported in MeNB to eNB change procedure in this release of the specification.NOTE 3: CHO is not supported in eNB to MeNB change procedure in this release of the specification. |
| MediaTek | No strong view  | The proposal from ZTE is in general okay to us. We prefer to have this clarification in stage 3 but also fine to clarify both stage 2 and stage 3. |
| Ericsson | - | We think we can do nothing for now. RAN2 has more important things to focus on than removing this from the rel-16 specs. We don’t think there is a problem if this is introduced on the UE side in one release and on the network side in another release. |
| QCOM | Stage-2 is enough | The CHO feature in DC becomes almost useless, as network needs to ensure before configure the CHO that the **SCG cell can still be the same after CHO is executed**, otherwise, the network can’t trigger the CHO. No need to do many changes in the spec, at the end of the day, this is controlled by the network, and no interoperability issue will rise if network stick to the agreement. In the future release (e.g. Rel-17), the restriction can be simply removed from the stage-2 spec only with no further changes to other specs.  |
| Huawei, HiSilicon | 38.331 and 36.331 | Suggest to add a clarification in the field description of the *conditionalReconfiguration* IE. |
| NEC | Stage 2 (37.340) at least,fine with Stage 3 as well |  |
| Sharp | 38.331, 36.331 | Ok to add stage3 clarification. |
| Samsung  | 38.331, 36.331 | **It seems to be effective and also easy to find that capturing the restriction in NR RRC, such as field description of (mrdc-)*SecondaryCellGroup* in RRCReconfiguration message.**  |
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Regarding b), we understand RAN2 is fine to support CHO with SCG configuration from Rel-17 onwards. This would align the CHO with HO behaviour. If there is no objection to support it in Rel-17, RAN2 shall indicate that in our response LS.

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| **Question 7: Do you support CHO with SCG configuration in Rel-17? If the answer is yes, should we include this request in the response LS to RAN3?** |
| **Company** | **Yes/No** | **Comment** |
| ZTE | Yes | **We are fine to include the willing in the response LS to RAN3, e.g. R2 assumes this will be supported in Rel-17..** |
| MediaTek | Yes  | We could inform RAN3 our agreements. |
| Ericsson | Yes | Yes |
| QCOM | Yes |  |
| Huawei, HiSilicon | Yes |  |
| NEC | Yes | fine to add this in the LS |
| Sharp | Yes  |  |
| Samsung  | Yes  | **It needs to inform RAN3 on the support in R17, and good to include this in the LS to R3.** |
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Regarding c), what else should be included in the response LS, besides the decision not to support CHO with SCG configuration in Rel-16 and (potential) willingness to specify it for Rel-17?

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| **Question 8: What should be included in the response LS, besides the decision not to support CHO with SCG configuration in Rel-16 and (potential) willingness to specify it for Rel-17?** |
| **Company** | **Comment** |
| ZTE | **No. Including RAN2 agreement is enough.** |
| MediaTek | R2 agreement seems enough |
| Ericsson | RAN2 agreements.  |
| Huawei, HiSilicon | RAN2 agreements. |
| NEC | RAN2 agreements |
| Samsung  | **Nothing special for now.** |
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The draft response LS will be prepared based on the view expressed above.

## 3.2 RRC connection re-establishment with CPC configuration

The authors of [12][13] notice that a UE that is configured with conditional reconfiguration and initiates the connection re-establishment procedure will skip a substantial part of the procedure in 5.3.7.2 (Initiation of RRC Connection Re-establishment). It is proposed to make certain parts of the procedure conditional to whether the *attemptCondReconfig* is available, not to whether *conditionalReconfiguration* is provided. Do you think the problem is valid and the solution proposed is agreeable?

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| **Question 9: Do you find the problem found in [12][13] valid and agree to correct as proposed in those CRs?** |
| **Company** | **Yes/No** | **Comment** |
| ZTE | Yes | **Based on the current spec, it is possible that the UE may trigger CPC execution during cell re-selection in RRC re-establishment procedure. So we think the change is needed.** |
| MediaTek | Yes |  |
| Ericsson (proponent) | Yes | This is an error that needs to be corrected. |
| QCOM | Yes |  |
| Huawei, HiSilicon | Yes |  |
| NEC | Yes |  |
| Sharp | No | We agree with the intention,it is possible that CPC execution is triggered during cell re-selection, but anyway the UE will do MR-DC release action when the selected cell is not for CHO recovery, so no problem is found.  |
| Samsung  | Yes  |  |
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## 3.3 On HO Request Acknowledge in CHO

Finally, the authors of [14][15] underline the HO Request ACK needs to always convey an RRC container with the target cell configuration, even if the procedure did not change the previously provided configuration (for CHO which was prepared earlier and then source node triggered a reconfiguration not impacting the target cell config). We see some value in what is discussed in [14][15], but perhaps this should be discussed in RAN3 directly. Do you think the problem is valid and should be highlighted to RAN3?

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| **Question 10: Do you agree with what is proposed in [14][15] and see the need to inform RAN3?** |
| **Company** | **Yes/No** | **Comment** |
| ZTE | No | **This issue has been discussed at RAN2#111e (i.e. R2-2007229). And it’s agreed no support to do this in Rel-16. So we think no need to discuss this again for R16 and no need to inform RAN3.** |
| MediaTek | Maybe | We tend to agree with this concern and it seems reasonable for RAN3 to look at it. However, maybe companies could trigger this discussion directly in RAN3.  |
| Ericsson | Maybe | We think this should be raised directly in RAN3 as it only impacts RAN3. No need for RAN2 to spend time on it. |
| Huawei, HiSilicon | No | We share similar views as ZTE. Inter-node signalling was discussed in RAN2#111-e and RAN2 agreed to not do it in Rel-16. |
| NEC | No | same view as ZTE |
| Sharp | No | Agree with ZTE. RAN agreed not to support this in Rel-16. |
| Samsung (proponent) | Yes  | **Even though the problem happens at UE side, the solution can be discussed in RAN3, so it is necessary to inform them on the request for the discussion and solution.****@ZTE, Huawei: We are not proposing the RAN2 solution as in R2-2007229, but just send the LS to RAN3 to identify the problem and request for the solution from them.** |
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# 4 Conclusion

Based on the views expressed in the previous sections, we propose the following:

# 5 List of referenced documents

1. R2-2108090 On bearer release handling for DAPS HO Nokia, Nokia Shanghai Bell
2. R2-2107775 Correction on fallback to source SDAP configuration in case of DAPS failure NEC
3. R2-2107085 Discussion on T301 issue for DAPS HO OPPO
4. R2-2107086 Correction on T301 for DAPS HO (alternative 1) OPPO
5. R2-2107087 Correction on T301 for DAPS HO (alternative 2) OPPO
6. R2-2107776 Correction on SRB handling for DAPS NEC
7. R2-2108817 Correction to DAPS handover Google Inc.
8. R2-2106933 Response LS on Conditional Handover with SCG configuration scenarios (R3-212848; contact: Nokia)
9. R2-2108164 Discussion on CHO with SCG configuration ZTE Corporation, Sanechips
10. R2-2107526 On supporting CHO with SCG configuration Nokia, Nokia Shanghai Bell
11. R2-2107527 Response LS on CHO with SCG configuration Nokia, Nokia Shanghai Bell
12. R2-2108102 RRC connection re-establishment with CPC configuration Ericsson
13. R2-2108103 RRC connection re-establishment with CPC configuration Ericsson
14. R2-2108776 Signalling of HOReqACK msg upon serving cell configuration update
15. R2-2108777 [Draft] LS on reflecting source cell configuration update in Conditional Handover

# Contact information

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| Company | Delegate contact |
| ZTE | zhang.mengjie@zte.com.cn  |
| MediaTek | chun-fan.tsai@mediatek.com |
| Ericsson | cecilia.eklof@ericsson.com |
| Qualcomm | Mouaffac (mambriss@qti.qualcomm.com)  |
| Huawei, HiSilicon | jun.chen@huawei.com |
| NEC | Wang\_da@nec.cn |
| Samsung  | June77.hwang@samsung.com |
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