3GPP TSG-RAN WG3 #116-e R3-223718

Online, 9th - 19th May 2022

Agenda Item: 9.3.7

Source: Ericsson (moderator)

Title: Summary of Offline Discussion on CB: #5\_Protocol\_Support

Document for: Approval

# Introduction

The chair summary is as follows

**CB: # 5\_ProtocolSupport**

**- For approach2, for NG and S1 interface, add a new RACS IE or other forms (e.g., a feature list) with criticality set to “reject” in the source-to-target Transparent container and the Criticality Diagnostics in the target to source node failure transparent container? Huawei, China Unicom, China Telecom**

**- Define a generic toolset for target functionality detection at source side including inclusion of the Criticality Diagnostics IE in the Target NG-RAN Node to Source NG-RAN Node Failure Transparent Container IE, and inclusion of a report on IE presence as received by the target NG-RAN node in the Target NG-RAN Node to Source NG-RAN Node Transparent Container IE? Qualcomm Incorporated, Vodafone**

**- The Source NG-RAN Node to Target NG-RAN Node Transparent Container IE contains a NGAP IE Support Information Request List IE which includes NGAP Protocol IE Ids for which the target NG-RAN node responses within a Response List in either the Target NG-RAN Node to Source NG-RAN Node Transparent Container IE or the Target NG-RAN Node to Source NG-RAN Node Transparent Failure Transparent Container IE its level of support? E///**

**- Down select the solutions, capture agreements**

**- Provide CRs if agreeable**

(E/// - moderator)

Summary of offline disc [R3-223718](file:///C:\Users\llopes\OneDrive%20-%20Qualcomm\Documents\3%20RAN3\RAN3%20116\Inbox\Drafts\CB%20%23%205_ProtocolSupport\Inbox\R3-223718.zip)

# For the Chairman’s Notes

**R3-223987 agreed** (NGAP CR0800r1, revision of R3-223376.

# Discussion first round

## Introducing the *Criticality Diagnostics* IE in a CN transparent HO container

The moderator excuses for the blunt approach in the first topic on Criticality Diagnostics, but looking into the history of the discussion, we have decided very early that we abstain from including *Criticality Diagnostics* IE into any of the CN transparent HO containers. One of the consequences was to not include in any of the CN transparent HO containers (new) IEs with criticality set to "reject".

The moderator asks to confirm the agreement to not include *Criticality Diagnostics* IE in CN transparent HO containers and to not set the criticality of an IEs in those containers to "reject".

Please explain whether you confirm this approach and, in case, explain why you can't.

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| Company | Comment |
| Ericsson | Staying with the outlined agreements is preferred. |
| Qualcomm | We are not 100% sure what the exact agreement was! But what we are proposing (as part of a package) is to let the source have visibility of the criticality diagnostics sent to the AMF in the failure message. This is independent of whether there are any items with criticality “reject” in the transparent container (we are fine to assume none), and requires no real new functionality in the target. In some cases, this could allow faster detection of issues at the target side, for example realizing that the target gNB does not support some IE that comes from the AMF, but is not explicitly asked about. |
| Huawei | To be honest, we can not recall that we had such agreement before: not include the *Criticality Diagnostics* IE in CN transparent HO containers.  Note that as indicated in this R3-223334, the *criticality* *Diagnostics* in the transparent container is not a new concept, which is already included in terms of the NG-RAN/AMF/ SMF.  But we are fine with majority views to move forward. |
| CATT | Fine with Moderator’s proposal. |
| Nokia | RAN3 did not make this agreement.  There are 3 solutions proposed, and 2 of them use the criticality Diagnostics in the container. So before the further analysis, it is premature to agree this proposal. |
| ZTE | Can not remember the agreement in our RAN3 exactly. |

## Introduce in NGAP an approach to query support of a certain IE from the target NG-RAN node based on the IE's IE-ID.

Two companies suggest to include the possibility to query support of protocol functions related to an IE based on the IE's IE ID on the interface instance via which the NGAP HANDOVER REQUEST message has been received, see R3-223374 and R3-223376.

NOTE: This implies that not only the target NG-RAN node's support is indicated, but also the functional support of the serving CN entities.

Please provided your view whether you can agree to such approach in general, and explain why in case you cannot.

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| Company | Comment |
| Ericsson | We are happy to see that another company had the same/a similar view on how to provide a general solution. |
| Qualcomm | We are also happy to explore this route, there are of course some differences of detail for further discussion. |
| Huawei | First good to see new “generic” approach(s).  We understand this approach can support RACS like feature, with defined NGAP IE ID.  But we may ask how this approach could support the RedCap like feature, i.e. without specific NGAP IE. In this case, the source node can not include the NGAP IE ID in the source-to-target container. But the approach#2 in R3-223334 can cover all cases. |
| CATT | Thanks QC for bringing the new solution.  Share the similar view with HW, even if with this approach, the source NG-RAN node may not be able to get the some capabilities of the target RAN node, as some functions may have no specific parameters over NGAP. |
| Nokia | Ok for the general approach, but not sure it can support all cases. |
| ZTE | We are fine with the general solution(s), but the potential issue related to RedCap should be clarified. |
| Qualcomm2 | I think we have to be a little careful not to bias the whole design to capture RedCap. But anyway, for RedCap type use case, perhaps we should discuss separately. This is related also to whether the query applies to general use in NGAP – because RedCap indicator is used in NGAP, just not in HANDOVER REQUIRED. |

## If the "IE ID support" approach is agreeable, is there a need to introduce an explicit support indication for RACS?

Please provide your answer to the question, if possible with some reasoning.

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| Company | Comment |
| Ericsson | we would assume that the general mechanism would serve the same purpose than an explicit indication. We would not understand why an explicit support indication would be necessary. |
| Qualcomm | As explained in our paper, we see this as a general approach for new use cases from now on. However for RACS we think that the S1AP approach can be simply copied as a one-off in order to have a unified RACS solution and not complicate the logic depending on source/target combinations. |
| Huawei | Agree with Ericsson, if the generic approach is finally selected, no need to introduce new things for RACS. |
| CATT | Agree with Ericsson and HW, if a generic mechanism is adopted, no need to introduce an explicit support indication for RACS. |
| Nokia | Agree with QC. This is needed for the HO with the eNB. |
| ZTE | Agree with Ericsson, Huawei and CATT, the general solution should avoid introducing an explicit support indication. |
| Qualcomm2 | Please consider the logic in inter-system handover. |

## Details on the "common approach" -

### Agree on R3-223376 as baseline

Would it be possible to take R3-223376 as baseline for the following details:

* The Source NG-RAN Node to Target NG-RAN Node Transparent Container IE contains the new *NGAP IE Support Information Request List* IE
* The Target NG-RAN Node to Source NG-RAN Node Transparent Container IE and the Target NG-RAN Node to Source NG-RAN Node Failure Transparent Container IE contains the new *NGAP IE Support Information Response List* IE.
* The *NGAP IE Support Information Response List* IE contains an *NGAP Protocol IE Support Information* IE.
* The maximum number of IE-IDs exchanged in the new IEs as low as 32.
* No need to include a "remote" criticality diagnostics in the "failure" transparent container as suggested in R3-223374.

Please provide your view.

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| Company | Comment |
| Ericsson | we would be happy to take the lead on the NGAP CR with the above assumptions. |
| Qualcomm | Ok to take 3376 as baseline subject to going over the detail  First four points above are ok but would like name of all IEs to be kept open, i.e. subject to content etc  Last point already discussed above: this could be part of a general solution without necessarily any impact on setting criticality to “reject” in TC. |
| Huawei | Agree to take it as baseline.  But a few questions.  For 2), why “the Target NG-RAN Node to Source NG-RAN Node **Failure** Transparent Container IE” includes the new *NGAP IE Support Information Response List* IE, reporting “supported” or “Not supported”?   * if reporting “supported”, why the failure happens? * If reporting “not supported”, how could the legacy node can report it?   For 5), agree. |
| CATT | Agree to take 3376 as baseline. |
| Nokia | agree with QC. The baseline should also include the S1AP approach to support the HO with eNB. |
| ZTE | Agree |

### "IE Presence" IE (outside/inside transparent container)

R3-223374 suggests to introduce an *IE Presence* IE to indicated whether the IE-ID refers to an IE which is received outside or inside the transparent container, or both.

Please provide your view whether the suggestion is acceptable/necessary.

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| Company | Comment |
| Ericsson | So far, TS rapporteurs tried to distinguish re-used IE type definitions by allocating different IE-IDs. We believe that with such protocol design approach the suggested *IE Presence* IE is not necessary. |
| Qualcomm | Actually, there is a subtlety. The concept in 3374 was that an IE would only be reported if present somewhere in the received message (and then the rest is detail). So the source would know if e.g. the target AMF is sending a certain IE to the target gNB. Our understanding is that 3376 is more generic, i.e. support of an IE is reported regardless of presence in the message.  It would be good first to agree / confirm that this is acceptable, i.e. that support of an IE could be given in general, and not message-specific, and that it can be provided irrespective of whether the IE is present. Our view in 3374 was that support / understanding remained linked to the context of the HANDOVER REQUIRED message. It seems strange for example for the target to report on support of an IE that is not used in that message.  In any case, even if this is agreed, it seems useful to know of the presence of the IE in the received message at the target. In other words, if the source asks for the UE Radio Cap ID IE support, it wants to know both whether it is supported and whether it is present in the message from the AMF. So we think something like this is useful.  Regarding use of different IE IDs, we are not really sure this is always the case, or can be relied upon for the future, but can discuss this in a second step. |
| Huawei | So far we don’t see the need of this IE (not fully understand what “outside/inside container” means).  But we agree Qualcomm that some thinking should be considered. E.g., we should focus on the IEs may not be present in the handover Request message, thus handover is failed. Is this reason to include the IE code to the target to source **failure** transparent container? |
| CATT | Based on the above discussion, if we only focus on the NGAP IE Support*,* the *IE presence* proposed in 3374 is not needed. |
| Nokia | Unless the IE ID is reused, the IE presence IE is not needed. But this can be further discussed in next step. |
| ZTE | The “IE Presence” seems to be unnecessary. |
| Qualcomm2 | As a starting point, in the RACS-type use case (but also UP IP and maybe more in future), it is not enough to know the support of the target, you need to know that the CN is sending the appropriate IEs (this is how you could detect in some cases if the features are operational, which may be PLMN related etc).  Then: the first question is whether the target provides support indication only if the IE is present; if not, then you really need a presence indicator. Codepoints are a second-level discussion. |

### Enumeration "no information available" in *NGAP Protocol IE Support Information*

R3-223376 suggests indicating the NGAP protocol IE support not only by means of 2 codepoints (supported/not supported) but also enable a kind of "don’t know (yet)" response.

NOTE: in R3-223376, the IE description text in §9.3.1.y needs to updated.

Please provide your view whether the suggestion is acceptable/necessary.

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| Company | Comment |
| Ericsson | We think that such additional codepoint could make the final solution future proof. We agree that for RACS (and similar features) such is definitely not needed. |
| Qualcomm | We are not sure of the use case, but ok to think about it. Actually it could apply to the case of an IE that is not used in HANDOVER REQUEST… |
| Huawei | Not sure this use case. E.g., how to understand the differences between the “not support” or “no information available”? does the “not support” mean the IE is received but not supported?  Also could the “not support” or “no information available” be included in the successful target to source container? |
| CATT | We can take the enumerated values in 3376 as the baseline.  The code-points and corresponding usage may need to be further elaborated, e.g., whether the code-points for success and failure procedures are same or not? Whether the code-point “not support” could be applied in failure container? |
| Nokia | We do not understand how this value is used. the IE can be defined extensible for future-proof. |
| ZTE | Acceptable for us, this codepoint could be future-proof. |

### any other aspect to be discussed

Please provide below any other important aspect which was forgotten by the rapporteur. You can also chose to add a new sub-chapter below.

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| Company | Comment |
| Huawei | We acknowledge the benefits of the new “generic” approach (with details to be further discussed at next round).  But we need to consider solutions to detect node capability for new features without any new NGAP IEs, e.g., RedCap like features. Then it means approach#2 in R3-223334 can cover all cases. |
| Qualcomm2 | In our understanding, there are variants of the generic approach that will also do that. Ultimately, introducing a new IE in the TC automatically makes it a NGAP IE, and hence useable in the IE support reporting too. |
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# Discussion second round

## Introducing the *Criticality Diagnostics* IE in a CN transparent HO container

The moderator understands that history is written by everyone’s own memory and suggests closing this point without conclusion.

The moderator was referring to the exercise performed at RAN3#113-e where respective criticality assignments were changed to “ignore”, e.g. in R3-214334.

If there is more to say, please do so below

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| Company | Comment |
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## R3-223376 remains the baseline and seems to cover all aspects discussed

Along the replies the following principles are proposed:

* The query of support of functions associated to NGAP IEs which have an IE-Id assigned are related to support of those functions on the interface instance via which the NGAP HANDOVER REQUEST message has been received
* *All* NGAP IE-Id may be queried, i.e. it is not explicitly prohibited that support of functions related to an IE-Id are restricted to the HO procedure or even to the actual HO attempt.
* All inter-system scenarios are covered now for RACS, explicit support via S1AP transparent containers, IE-Id support approach by means of NGAP transparent containers.
* Whether support of RedCap can be queried and whether this has some implication on already made agreements for RedCap will be discussed separately, contribution driven (but the moderator assumes that RedCap is covered).
* It is the common understanding that the support of features that are not associated with an NGAP IE-Id cannot be covered with this approach.
* This new approach does not need to indicate the assigned criticality, presences. Only “support” or “no support” (“not available” codepoint was removed) is of interest.

Please provide comments, either to the above or to the new revision, if any, below.

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| Company | Comment |
| Qualcomm | Principles #1 and #2 are interesting, and we also agree that RedCap could be considered partly covered if we go this way.  However there are some points that don’t quite work just yet, so some of the principles still require discussion:   * This approach still doesn’t work 100% for RACS or in fact using the UP IP example. In both of those, support by the target is only part of the story, knowing whether the IE is actually received from the CN is important. So we think that “presence” (in the associated message) is still important. Note that in our CR “presence” was implicit, and the IE was only used to disambiguate cases where the IE might be present inside and outside the container. We could however just make it clear that “presence” means outside the container. Without this we think the solution is incomplete. [Ericsson: the information that RACS is supported \*and\* used would stem from the fact that this IE is actually used on the target side. With that ] * We still think that the S1 solution for RACS should be ported across to NGAP. If we don’t do that, then a gNB (for example) needs to work in different ways depending on whether the target is inter or intra system. RACS has been designed as a global feature in 4G/5G, so this is not preferred. It also means that an eNB needs anyway to adopt the new signalling etc for inter-system handover, which is again not preferred. [Ericsson: but NG-RAN nodes as target would require the use of an NGAP container, irrespective of whether the source is 4G or 5G. Usage of a 5G container by a 4G node is part of system principles since the begin of 3gpp times. The same is true for eNBs being targets. Or do you suggest to adopt the 5G approach to 4G?] * The RedCap case probably needs more thought but indeed the *RedCap Indication* IE is a NGAP IE hence support could be requested. A positive response however does not mean support in the target cell. But this combined with the existing cause value may be enough; anyway this can be contribution driven. [Ericsson: would agree. this is not the main point to discuss here as there exists a solution for RedCap.] |
| Huawei | We generally agree with the items above. Then we can first agree that all NGAP IEs can be queried [Ericsson: we do not suggest to have explicit procedure text on that, but to simply not prohibit this possibility, so my comment above was how the suggested text in the CR is to be interpreted.], i.e. not limited to the NGAP IEs in the Handover Request message. (thanks Qualcomm pointing out that we have Redcap NG-AP ID, e.g., RedCap Indication).  Here we want to further ask:   * If the NG-RAN reports “support” either in the successful/unsuccessful container, then does it mean the feature is supported by   + for RACS, both the NG-RAN and CN support; [Ericsson: the text related to that in the CR is that the support is related to the “interface instance” ]   + for UPIP like feature, only NG-RAN support [Ericsson: we do not think that the proposed mechanism covers all kind of functions.]   It seems fine to have general procedure texts at least the whole feature can be supported.   * For the “not support”, how could the NG-RAN report “not support” if it is a legacy node, or a node not enabling the feature? [Ericsson: a node that does not implement this new mechanism will not be able to react on the query, that is clear] In other words, do we need to consider the “no support” codepoint or the “support” codepoint would be sufficient? [Ericsson: no support is for sure needed] |
| ZTE | Generally fine with the above principles.  Just a reminder that, in last meeting, there was the discussion about the RedCap with NG handover in R3-222533 (Section 3.1). Although there is no final agreement, some companies preferred to waiting for the outcome of this CB/issue. |
| Qualcomm | Coming back based on the above discussion.  To move forward, we are ok to leave the mirroring of the S1AP solution out, at least for now.  Otherwise, we think that as mentioned before and also by Huawei, the detection that the feature is operational at the target side involves CN functionality too. However using just the current approach, this seems not quite guaranteed because (1) the interpretation of “support” will not be closely defined so may be interpreted differently, and (2) there may be cases where in fact the RAN does not know (and also detection of support on the interface instance seems a complex task for the RAN).  With that, we think that a useful and simple addition is to have a report on whether the IE is present in the message that carried the request (HANDOVER REQUEST). This works well for features like RACS and UP IP, where such a report immediately informs the source if the feature is operational from the CN perspective.  This also achieves functional parity with how RACS detection is defined in S1AP, because the detection there is based on the target having received a URCI.  I have dropped a revised version of the CR with this addition, please check / consider. |
| CATT | Generally, we’re fine with the principle and the solution provided in the draft CR.  One thing to double confirm:  Only the “NGAP Protocol IE-Id” of the HANDOVER REQUEST message could be requested by the source gNB in the source to target container? Or all the NGAP Protocol IE-Ids could be requested, not limit to the HANDOVER REQUEST? |

# Conclusion, Recommendations [if needed]

If needed

# References

1. R3-223334 "On node capability detection for non-direct-connected nodes" (Huawei, China Unicom, China Telecom), discussion
2. R3-223335 "On node capability detection for non-direct-connected nodes [Node\_Cap\_Dect]" (Huawei, China Unicom, China Telecom), CR TS 38.413
3. R3-223373 "Further discussion on RACS Capability Detection for NG handover (and generalizing detection of target functionality by source NG-RAN node)" (Qualcomm Incorporated, Vodafone), discussion
4. R3-223374 "Detection of RACS support at target during N2/S1 handover" (Qualcomm Incorporated, Vodafone) CR TS 38.413
5. R3-223375 "Exchange of protocol support at target RAN node for NG handover" (Ericsson), discussion
6. R3-223376 "Exchange of protocol support at target RAN node for NG handover" (Ericsson), CR TS 38.413