3GPP TSG-RAN WG3 Meeting #112-e R3-212628

Online, 17 – 27 May 2021

**Agenda item: 9.3.7**

**Source: Nokia (moderator)**

**Title: Summary of Offline: Mobility restrictions in SN Addition**

**Document for: Discussion and Decision**

# 1 Introduction

This paper summarizes the following email discussion:

**CB: # 32\_MobRestr\_SNadd**

**- (HW) Change the last part of semantics description of the Rel-15 XnAP: RAT Restriction Information IE to “This version of the specification does not use bits 2-7.” Change the last part of semantics description of the Rel-16 XnAP: RAT Restriction Information IE to “This version of the specification does not use bits 3-7.” Include the 5GC Mobility Restriction List Container IE in XnAP: S-NODE ADDITION REQUEST and S-NODE MODIFICATION REQUEST messages. Include EPC Handover Restriction List Container IE in X2AP:SGNB ADDITION REQUEST and SGNB MODIFICATION REQUEST messages.**

**- (QC,HW) 5GC Mobility Restriction List Container is passed to the SN, but it is possible (via stage 2 text) to define the information that the SN still reads from the legacy IE**

**- (Nok,E///) For NG-RAN and E-UTRAN, agree to a stage 2 clarification for Rel-16; Correct the semantics description of the RAT Restriction information IE, to state that reserved bits are for future use and ignored if received**

**- (E///) correct ambiguous wording on the 5GC/EPC Mobility Restriction List Container IE; correct manipulation of information provided in MRL IE; abstain from including 5GC Mobility Restriction List Container IE in the S-NODE ADDITION REQUEST message.**

(Nok - moderator)

Summary of offline disc R3-212628

# 2 For the Chairman’s Notes

[TBD]

# 3 Discussion (Phase 1)

Please provide your Phase 1 views by 18:00 UTC Friday May 21st

## 3.1 Correction of *RAT Restriction Information* IE

There are two sets of XnAP CRs (from Rel-15) which propose a correction to the semantics description of the *RAT Restriction Information* IE contained in the MRL (and issue spotted during the discussion at RAN3#111e). The CRs appear to have the same intention, but with different wording.

Alt-1: “This version of the specification does not use bits 2-7.” (see R3-211523/24)

Alt-2: “Bits 2-7 are reserved for future use and ignored if received.” (see R3-211611/12)

**Question 1: Do you agree that a correction is needed to the semantics description of the *RAT Restriction Information* IE in Rel-15/16, and if so, which wording do you prefer: Alt-1, Alt-2 or other (please describe)?**

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| **Company** | **Comments** |
| ZTE | Alt-2 wording seems better. For R-15, bits 2-7 are reserved for future use, while for R-16, bits 3-7 are reserved for future use. |
| Huawei | Prefer alt-1, as whether to ignore the other bits can leave to the receiving node’s implementation. As the original text does not require the receiving node to ignore these bits. |
| Qualcomm | One issue is what “ignored if received” means in terms of general handling. Because of that, it may be safer to go to Alt 1, or maybe “bits 2-7 are reserved for future use” ?  |
| Ericsson | if the common ground is to only remove the sender’s behaviour, then probably this is a good step forward to agree on. |

Moderator’s Summary: All companies agree that a correction is needed, although there are different preferences for the exact wording.

Proposed Conclusion: Revise Alt-2 by dropping the part about ignoring other bits (i.e. follow Qualcomm’s suggestion which is also aligned with numerous instances already existing in XnAP).

## 3.2 Mobility Restriction List in case of Dual Connectivity

This is a continuation of the discussion initiated at RAN3#110-e, where the following issue was acknowledged:

During S-Node addition, it is unclear whether the MRL propagated over Xn in the Mobility Restriction List IE is based on information from (a) the Mobility Restriction List IE previously received over Xn, or (b) the 5GC Mobility Restriction List Container IE previously received over Xn

The previous Summary of Discussion is in [1]. At this meeting, there are two sets of papers proposing a way forward:

- **Option 1 (“Stage 2 only”)**: Clarify in TS 38.300 that information contained in the 5GC MRL Container replaces the information contained in the XnAP MRL (with a few exceptions that are explicitly defined).

- Discussion papers in R3-211528 and R3-212098.

- TS 38.300 CR in R3-211609 (Rel-16).

- **Option 2 (“Stage 3 + Stage 2”)**: Introduce the *5GC Mobility Restriction List Container* IE in the S-NODE ADDITION REQUEST and S-NODE MODIFICATION REQUEST messages with usage specified in TS 37.340.

- Discussion papers in R3-211522 and R3-211781.

- TS 37.340 CRs in R3-211782/2129 (Rel-15/16)

- TS 38.423 CRs in R3-211525/26 (Rel-15/16)

Option 1 is the same as the proposed Way Forward from last meeting (see section 4 of [1]) and has been extensively discussed already.

Option 2 is similar to the “Stage 3 solution” from last meeting (see [1]) but is now coupled with a stage 2 (TS 37.340) CR in an effort to address concerns/comments brought up in the past. In particular:

- To address concerns by some companies that Option 1 impacts existing implementations in the mobility case: The behaviour where NG-RAN node shall use the information contained in a received *5GC Mobility Restriction List Container* IE to replace the information contained in the *Mobility Restriction List* IE is proposed to be specified in TS 37.340 (rather than TS 38.300). This makes the behaviour applicable only to dual connectivity case and avoids impacting the mobility case (which does not have an issue).

- To address concerns by some companies that the “Stage 3 (only) solution” enables functionality in the SN that is not supported in the MN: The TS 37.340 CR defines an additional exception for when information in the 5GC Mobility Restriction List Container is not used: for “information related to features that require concurrent MN/SN functional support”, the SN shall use the related information (if any) contained in the *Mobility Restriction List* IE.

In order to try to cover “new ground”, the moderator would like to suggest that discussion focus on the new “Stage 3 + Stage 2” (Option 2) proposal to evaluate whether there are elements that can be agreeable (e.g. wholly or in part, potentially with revisions).

**Question 2: Please provide your views on Option 2, e.g. are there elements that can lead to an agreeable way forward?**

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| **Company** | **Comments** |
| ZTE | Option1 and Option2 go for different direction. The key question here is whether Option1 is enough for R15 and R16, for MR-DC case, enabling the SN to operate with a Rel-16 MRL alone is necessary or not. On our understanding, it seems Option1 for R15 and R16 is sufficient. The drawback of stage2 text in Option2 is that it’s difficult to define features that require concurrent MN/SN functional support and maintain the list always. |
| Huawei | Support option2. |
| Qualcomm | The intention of option 2 is to provide a compromise that focusses only on DC behaviour. We can acknowledge that identifying “features that require concurrent MN/SN functional support” is an added burden, but likely this will only occur once or twice per release. On the other hand, option 1 creates anyway a hidden requirement for that check, because for any new feature we need to check whether this would get passed transparently anyway (e.g. bitmaps, other IEs), and create an issue or not. So in reality some level of checking is needed anyway.  |
| Ericsson | So, with only applying the TS 38.300 change, if the 5GC container is received in the MN, the MN would “filter” the content by means of knowledge of its own supported features and would pass on this “filtered” content within the MRL towards the SN.If the 5GC container is provided in addition, we would create a situation where SN is enabled to activate features the MN does not support, a situation, we still want to avoid.Apart from the scenario described above, is there anything else I missed to be considered wrt to usefulness of the 5GC container? |

Moderator’s Summary: Stage 3 CR is not agreeable by 2 companies.

Proposed Conclusion: Please see Phase 2 of the discussion in section 4.

## 3.3 Handover Restriction List in case of Dual Connectivity

Finally, several companies propose that a solution is also needed for E-UTRAN (see [2], [10], [11]). A natural choice would be to introduce a solution in E-UTRAN that is analogous to what is agreed for NG-RAN. However, since company views may depend on the NG-RAN decision, the moderator would like to suggest addressing the E-UTRAN question after a potential NG-RAN solution becomes clearer.

# 4 Discussion (Phase 2)

A Stage 3 CR is not agreeable by 2 companies, so it does not seem possible to move forward with Option 2 as it currently standards. That leaves only Option 1, or possibly the following compromise (“Option 3”) that is essentially a subset of Option 2:

- **Option 3 (“TS 37.340 CR only”)**:

- Leave TS 38.300 and TS 38.423 unchanged.

- Agree to a revision of the TS 37.340 CR in R3-212129 (Rel-16), modified as follows:

--- Begin TS 37.340 text proposal ---

If NG-RAN nodes with different versions of the XnAP or NGAP protocol are deployed, information provided by the 5GC within the NGAP Mobility Restriction List may be lost, as described in TS 38.300 [3]. In order to avoid such loss of information at the SN, the MN shall use the information in the 5GC Mobility Restriction List Container described in TS 38.300 [3], if available, when constructing the Mobility Restriction List to be sent to the SN, except for the Serving PLMN and the Equivalent PLMNs which the MN shall use from the Mobility Restriction List.

--- End TS 37.340 text proposal

Possible rationale for Option 3 (compared to Option 1):

- No change to TS 38.300 means that the mobility case remains ambiguous. However, the mobility case is not a problem, so the ambiguity allows existing implementations to remain unchanged.

- Introducing the Stage 2 clarification instead in TS 37.340, which focuses/isolates the impact to dual connectivity.

- This option is essentially a subset of Option 2 and can be easily extended in the future if consensus is someday achieved on introducing the *5GC Mobility Restriction List Container* IE in the S-NODE ADDITION REQUEST and S-NODE MODIFICATION REQUEST messages.

**Question 3: Please indicate whether Option 1 and/or Option 3 is an agreeable way forward.**

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| **Company** | **Comments** |
| Nokia | We prefer Option 1, to keep the same text/behavior for both the mobility and DC cases when constructing the MRL. Also, the concern that Option 1 may impact existing implementations for the mobility case seems only theoretical, since anyway the target will use the 5GC MRL Container. However, if there is strong concern about Option 1 impact to mobility case, then perhaps Option 3 could be a way forward (but not preferred). |
| Huawei | First about the *RAT Restriction* IE related CRs, our CRs should be the ones to be further proceed.Then for option 1 and option 2, we prefer option2, as if the container is not provided to the SN, the information provided from MN to the SN will be incomplete, the missing of the new release related information ,will lead to wrong behaviour by the SN.Option 3 is better than option1, as we commented before, option 1 put requirement on the RAN node in non-DC case, option 3 only for DC scenario, but similar to option1, the incomplete MRL information info issue still exist in option 3. |
| ZTE | Option3 seems fine for us, TS37.340 is proper to capture stage2 text for MR-DC. |
| Qualcomm | We understand the effort of the moderator to find a compromise.We would point out that option 3 essentially postpones the issue in two dimensions, first that the stage 3 discussion may come back in general, and second that it will probably be triggered anyway whenever the MRL is modified (if people are doing a good job anyway, and remember to check). We still think it would be safer to go for option 2.Obviously if the choice is between 1 and 3, 3 is preferred as it decouples slightly DC case from other mobility. This decoupling does not seem that problematic, since anyway DC handling should be significantly separate in general from mobility. But we still think this is postponing the underlying issue. |
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# 5 Conclusions, Recommendations

Correction of RAT Restriction Information IE:

R3-211523 rev in R3-21xxxx – agreed (Rel-15 CR for TS 38.423)

R3-2111524 rev in R2-21xxxx – agreed (Rel-16 CR for TS 38.423)

Mobility Restriction List in case of Dual connectivity:

[TBD]we

# References

1. R3-210967, Summary of Offline Discussion – mobility restrictions in SN Addition (Nokia)
2. R3-211522, Consideration on Mobility Restriction in SN addition (Huawei)
3. R3-211781, Mobility Restrictions in SN Addition (Qualcomm Incorporated)
4. R3-211782, Introduce 5GC Mobility Restriction List Container in DC (Qualcomm Incorporated, Huawei)
5. R3-212129, Introduce 5GC Mobility Retriction List Container in DC (Qualcomm Incorporated, Huawei)
6. R3-211525, Introduce 5GC Mobility Restriction List Container in DC (Huawei, Qualcomm Incorporated)
7. R3-211526, Introduce 5GC Mobility Restriction List Container in DC (Huawei, Qualcomm Incorporated)
8. R3-211527, Introduce EPC Handover Restriction List Container in EN-DC (Huawei, Qualcomm Incorporated)
9. R3-211528, Introduce EPC Handover Restriction List Container in EN-DC (Huawei, Qualcomm Incorporated)
10. R3-211608, Mobility Restrictions in S-Node Addition (Nokia, Nokia Shanghai Bell)
11. R3-212098, Necessary corrections on the usage of the 5GC MRL Container IE on Xn (Ericsson)
12. R3-211609, Clarification of 5GC Mobility Restriction List Container (Nokia, Nokia Shanghai Bell, Ericsson)
13. R3-211610, Clarification of EPC Handover Restriction List Container (Nokia, Nokia Shanghai Bell, Ericsson)
14. R3-211523, Correction on the RAT Restriction Information (Huawei)
15. R3-211524, Correction on the RAT Restriction Information (Huawei)
16. R3-211611, Correction to RAT Restriction Information IE in the Mobility Restriction List (Nokia, Nokia Shanghai Bell, Ericsson)
17. R3-211612, Correction to RAT Restriction Information IE in the Mobility Restriction List (Nokia, Nokia Shanghai Bell, Ericsson)