**3GPP TSG RAN WG1 #102-e R1-200XXXX**

**e-Meeting, August 17th – 28th, 2020**

**Agenda item:** 7.1

**Source:** Moderator (Samsung)

**Title:** Summary for [102-e-NR-7.1CRs-10] Determination of the number of RS for RLM

**Document for:** Discussion and Decision

# Introduction

This document is a summary for email discussion “[102-e-NR-7.1CRs-10] Determination of the number of RS for RLM”, focusing on whether a specification change is needed for Rel-16 TS 38.213 to clarify the procedure on determining the number of RS for RLM.

The draft CR R1-2006090 [1] triggering the email discussion was originated for Rel-15, but there was no consensus in RAN1 that the identified issues are essential for Rel-15. Hence, the email discussion is for Rel-16 maintenance consideration only.

# Summary of the Preparation Phase Email Discussion

In the preparation phase email discussion, 13 companies provided their initial views on this issue, and all were supportive to trigger the official email discussion (please refer to Appendix A for the detailed views from companies on this issue).

Two small issues have been reported in R1-2006090 [1], and need to be discussed in this email discussion.

1. an incomplete sentence to describe the dependence on determining the number of RS for RLM in Clause 5 of TS 38.213;
2. a wrong reference [9, TS 38.104] in Clause 5 of TS 38.213.

1 company further commented that “But it seems the wrong reference is introduced in NR-U. Thus, this CR should be discussed in Rel-16 NR-U maintenance.”

1 company further commented that “However, the correction proposed in the CR is not correct. Instead of referring N\_RLM to L\_max to Clause 4.1 (in TS 38.213) it should refer "Table 8.1.1-2: Maximum number of RLM-RS resources N\_RLM" defined in TS 38.133.”

Please take above two further comments into account in this email discussion.

# Collection of Companies’ View

The draft TP from R1-2006090 [1] is copied below for your easy reading and easy discussion. Note that only changes to the concerned sentence are listed, and the formal draft CR will be prepared, if needed, after a consensus of the group.

=========================== Start of TP for TS 38.213 ==================================

5 Radio link monitoring

=========================== Unchanged Texts Omitted =================================

From the  *RadioLinkMonitoringRS*, up to  *RadioLinkMonitoringRS* can be used for radio link monitoring depending on as described in Clause 4.1, and up to two *RadioLinkMonitoringRS* can be used for link recovery procedures.

=========================== End of TP for TS 38.213 ==================================

Please provide company’s view in the table: e.g. comments to the TP if you agree with the issues reported in R1-2006090 [1], or alternative TP, or any further comments.

|  |  |
| --- | --- |
| **Company** | **View** |
| Samsung | We believe the TP in R1-2006090 is sufficient to resolve the two identified issues.  To ZTE: The wrong reference of using TS 38.104 has been there since Rel-15 specifications, and not only in TS 38.213. We guess that’s a misalignment between RAN1’s and RAN4’s understanding. Rel-16 NR-U group has approved TPs to correct the wrong reference to “Clause 4.1 of TS 38.213”, since there is no definition of in TS 38.104. Hence, we believe a consistent change should also apply here, and based on our knowledge, this seems the last change needed in RAN1 spec regarding the wrong reference to TS 38.104.    To CATT: If we understand correctly, the wording “as described in Clause 4.1” from our TP was referring to only (not the whole procedure), while the proposal from CATT intends to refer to the whole procedure for determining the number of RS for RLM. It’s true that the description in current specification can be understood either way. However, we also observed that there are duplicated descriptions on determining in TS 38.213 and TS 38.133 (e.g. Table 5-1 in TS 38.213 and Table 8.1.1-2 in TS 38.133 deliver the same information on determining ), but there seems no intention to remove any of the descriptions since they are consistent. Hence, if the reference is for the whole procedure, then it’s more proper to refer to the same specification and limit the citation within RAN1 specification, since it looks a little bit awkward not to cite the Table 5-1 right below the concerned texts in the same section but to cite RAN4 spec ^ ^. |
| Ericsson | Support. Regarding CATTs remark, the use of the expression “as described” would in in our understanding indicate that the whole procedure. As the intention is to refer to Lmax, maybe it would be clearer to write “as defined in subclause 4.1” ? |
| Nokia | Firstly we agree that the reference is evidently wrong, thus some correction would be useful. Then we are not sure if we need the “depending” part in this sentence as the *N*LR-RLM is defined later in the same section including relation to *L*max. Thus the relation should be evident from the section.  If we omit that part, we are left with question, what we are trying to describe i.e. where ‘as described in’ refers to.  In (preceding) sentence;  “The UE can be configured with up to  *RadioLinkMonitoringRS* for link recovery procedures, as described in Clause 6, and for radio link monitoring.”,  it would appear as the description would relate to the procedure of link recovery.    If this is the interpretation, the reference could set to point to 38.133 to describe the radio link monitoring. Hence the alternative TP would look as follows:  “The UE can be configured with up to  *RadioLinkMonitoringRS* for link recovery procedures, as described in Clause 6, and for radio link monitoring. From the  *RadioLinkMonitoringRS*, up to  *RadioLinkMonitoringRS* can be used for radio link monitoring ~~depending on~~ as described in [10, TS38.133] ~~[9, TS 38.104]~~, and up to two *RadioLinkMonitoringRS* can be used for link recovery procedures. ”  If we want to clarify that the definition of *L*max can be found in Section 4.1, I think this would be best done in sentence before Table 5-1.  Regarding the duplication of Table 5.1 information in RAN4 specification, when this was introduced in RAN4 we raised concerns regarding duplicating information from one specification to another specification (due to risk of these becoming un-synchronized). In this case referring to RAN1 specification would have been sufficed, but companies preferred to have the information readily available for easier readability. Hence the original source for *N*LR-RLM and *N*RLM values is 38.213. |
| Huawei | Agree that the broken sentence should be fixed. One simple way is to refer to relevant text in Rel-15 specification. The sentence is there since f40 not sure what happened to Rel-16 spec…The change from Samsung is also fine since it is more concise.  “From the  *RadioLinkMonitoringRS*, up to  *RadioLinkMonitoringRS* can be used for radio link monitoring depending on a maximum number  of candidate SS/PBCH blocks per half frame as described in Clause 4.1, and up to two *RadioLinkMonitoringRS* can be used for link recovery procedures.” |
| LG Electronics | Support as Samsung suggested. As Huawei pointed out, the same phrase (highlighted in yellow) as in Rel-15 may be applied to Rel-16. However, the difference between Rel-15 and Rel-16 specs is that L\_{max} is already defined in Clause 4.1 in Re-16 while Clause 5 is the first place to define L\_{max} in Rel-15. With this regard, we support Samsung’s TP with more compact form. |
| CATT | It is indeed undesirable to have the same table for N\_RLM in both RAN1 and RAN4 specification as pointed out by Nokia. In our view, either referring to Table 8.1.1-2 in TS 38.133 38.133 or Clause 5 in TS 38.213 will resolve the problem, although our preference is referring 38.133, since the RLM will be implemented eventually follow the requires defined in 38.133 in order to pass the test.  By the way, there seems a typo is the following sentence in Clause 4.1 in 38.213:  “The candidate SS/PBCH blocks in a half frame are indexed in an ascending order in time from 0 to , where is determined according to SS/PBCH block patterns for Cases A through E. is a maximum number of SS/PBCH block indexes in a cell, and the maximum number of transmitted SS/PBCH blocks within a half frame is . “  The high-lighted should be in our view. If that is the case, suggest also fixing the typo, e.g.,  “The candidate SS/PBCH blocks in a half frame are indexed in an ascending order in time from 0 to , where is determined according to SS/PBCH block patterns for Cases A through E. is a maximum number of candidate SS/PBCH block indexes in a cell, and the maximum number of transmitted SS/PBCH blocks within a half frame is . “ |
|  |  |

# Summary and Conclusion

6 companies replied in the official email discussion, and all agree that the identified issues from R1-2006090 [1] are valid, however, there are alternative TPs for resolving the issues other than the one from R1-2006090 [1].

A summary of the discussion and moderator’s response are as follow:

First aspect is, the dependence is or . Actually this is not within the intended scope of the CR, since it should fall into the discussion in NR-U. In Rel-16 NR-U, two indexing for SS/PBCH blocks are introduced, and is the maximum SS/PBCH block index within a half frame (e.g. maximum number of SSB beams), while is the number of candidate SS/PBCH blocks within a half frame. For licensed band, ; and for unlicensed band, . No back to RLM, the dependence should be , and it’s clear from Table 5-1 (NR-U session also had an extensive discussion on this point). Another proof for this is, RAN1 sent an LS R1-2002992 to RAN4, explicitly asking to remove the term “candidate” when describing .

Second aspect is, the wording “as described …” is referring to “” or the whole sentence. The original intention from editor seems referring to “”, since the wording “ as described in [TS 38.104]” also shows up in other sessions and specifications (all the others have been revised to the correct one by the NR-U group for Rel-16). However, the moderator indeed agree that it can also be read as referring to the whole sentence. To resolve this confusion, an alternative TP is prepared by the moderator.

Third aspect is, if referring to the whole sentence, the correct reference is Table 5-1 in TS 38.213 or Table 8.1.1-2 in TS 38.133. As reported by several companies, the two tables provide same information, so technically either of the tables should work. However, considering the agreement was originated from RAN1, it would be more proper to quote RAN1 specification to avoid possible inconsistence in the future. Also, the moderator believes this is more aligned with the original intention from editor, since the editor may not even know RAN4 spec will copy the information into their spec when writing this sentence in Rel-15.

Based on above discussion, a revised TP from R1-2006090 [1] is as follow, and a formal CR will be prepared accordingly.

Proposal: The following text proposal is endorsed in R1-200XXXX (TS 38.213, Rel-16, CR#XXXX, Cat F).

=========================== Start of TP for TS 38.213 ==================================

5 Radio link monitoring

=========================== Unchanged Texts Omitted =================================

From the  *RadioLinkMonitoringRS*, up to  *RadioLinkMonitoringRS* can be used for radio link monitoring depending on as described in Table 5-1, wherein is as defined in Clause 4.1, and up to two *RadioLinkMonitoringRS* can be used for link recovery procedures.

=========================== End of TP for TS 38.213 ==================================

# Reference

[1] R1-2006090, Draft CR on determination of the number of RS for RLM, Samsung.

# Appendix A Views in the preparation phase email discussion.

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| --- | --- |
| **Moderator / Session Chair's initial view** | **Discuss over email in RAN1#102-e**  The proposed CR is to make the sentence complete and to remove the wrong reference. Without this correction, there could be confusion in interpreting the text. |
| **vivo** | Agree with Chairman's assessment |
| **Nokia** | Agree with this chairman's assessment |
| **CATT** | Agree to discuss it in RAN1#102-e. However, the correction proposed in the CR is not correct. Instead of referring N\_RLM to L\_max to Clause 4.1 (in TS 38.213)it should refer "Table 8.1.1-2: Maximum number of RLM-RS resources N\_RLM" defined in TS 38.133. |
| **Samsung** | OK to discuss over email |
| **Huawei** | Ok to discuss |
| **Apple** | Agree with chairman |
| **MediaTek** | Agree with chairman's view |
| **Intel** | Ok to discuss. We actually agree the CR. |
| **Ericsson** | OK to discuss |
| **OPPO** | Ok to discuss. |
| **ZTE** | Fine to discuss in this meeting. But it seems the wrong reference is introduced in NR-U. Thus, this CR should be discussed in Rel-16 NR-U maintenance. |
| **NTT DOCOMO** | OK to discuss in this meeting. |
| **QC** | OK to discuss over email in this meeting |