RAN1-105-e-NWM-LTE-eMTC5-01 - Version 0.0.2
RAN1

3GPP TSG RAN WG1 Meeting #105-e **R1-2106214**

e-Meeting, May 10th – 27th, 2021

Agenda Item: 6.2.1

Source: Moderator (Huawei)

Title: Feature lead summary on 105-e-LTE-eMTC5-01

Document for: Discussion and Decision

1 Introduction

In RAN4#98-e meeting, an LS [2] was sent to RAN2 and CC RAN1. In the LS, two options regarding RSS based RSRQ for eMTC are considered from RAN4 point of view. RAN4 also asked RAN2 to decide which option should be pursued.

- Option 1: Remove RSRQ from the cell selection and cell re-selection criterion when a cell is measured using RSS.

- Option 2: Define RSRQ for RSS measurements.

In RAN2#113bis-e, RAN2 sent the reply LS [1] to RAN4 and RAN1, with following conclusion:

RAN2 has discussed the options listed in the LS and concluded that from RAN2 perspective option 1 is not preferred because it may have an impact on cell (re)-selection performance and behaviour, but it is up to RAN1 and RAN4 to decide.

The proposals from contributions [3-5] are summarized in the following table.

Table 1: The proposals from contributions

Sourcing	Proposals
[3]	***Observation 1: If RSS-based RSRP measurement is enabled, RSRQ can be calculated according to RSS-based RSRP and CRS-based RSSI.*** ***Proposal 1: RAN1 requests RAN4 to consider whether RSRQ calculation according to RSS-based RSRP and CRS-based RSSI can be used as cell selection and cell re-selection criterion.***

[4]	**Observation 1: Defining RSS-based RSRQ measurements has the following issues:** **RSSI is defined over a subset of OFDM symbols, and the OFDM symbol boundary may not be known when performing RSS-based measurements.** **RSS and CRS processing have different bandwidth (2 PRBs vs 6 PRBs)** **Symbols containing RSS will lead to higher RSSI than symbols containing only CRS.** **Observation 2: If RSS-based RSRQ is introduced, it is expected that CRS-based RSRQ and RSS-based RSRQ will be different.** **Observation 3: If RSS-based RSRQ is introduced, a different threshold (*q-QualMin*) should be introduced for usage when RSS-based RSRQ measurement is used for cell selection / reselection.** **Proposal: Do not introduce RSS-based RSRQ measurements in Rel-16.**
[5]	**Proposal 1: Send RAN4/RAN2 LS to confirm that option 2 (define RSRQ for RSS measurements) is supported.** **Proposal 2: Endorse the text proposal to TS 36.214.**

2 Discussion

Q1: whether option 2 in [2] can be supported?

Feedback Form 1: Q1: Whether the option 2 in [2] is acceptable?

1 – Qualcomm Incorporated As expressed in our contribution, we think there are many issues to solve to define RSS-based RSRQ measurements, especially more than one year after the work item is closed. This is for sure not something that can be done in the maintenance phase.
2 – ZTE Corporation RSS-based RSRQ measurement is out of the WID scope
3 – Ericsson Limited In RAN1#94 the feasibility of using RSS for measurements was discussed and the agreement was as follows: *From RAN1 perspective, it is feasible to use RSS for measuring RSRP for cells at least for IDLE mode mobility*

In the discussion, using RSS for measuring RSRQ was also discussed with a negative outcome although that was not explicitly captured in the agreement above. Hence, in order to be consistent with past agreements, **RSRQ should not be supported.**

4 – HUAWEI TECHNOLOGIES Co. Ltd.

The RSRQ is very useful for cell selection/reselection, triggering of neighbor cell measurement etc. Without RSRQ, there will be inconsistent behaviors for UEs supporting RSS or not, and for cells configured with RSS or not. RAN2 has been aware of this negative impact on performance, they prefer to not remove RSRQ. **In that sense, we support option 2 to define RSRQ for RSS measurement**.

Regarding the following problems of RSS based RSRQ measurement in [4], although RSS based performance may be performed in time domain, but it doesn't mean the OFDM symbol boundary is unknown to UE, as RSS also carries timing information, UE is re-syncing the timing including symbol boundary when detecting RSS.

RSSI is defined over a subset of OFDM symbols, and the OFDM symbol boundary may not be known when performing RSS-based measurements.

We agree that RSS based RSRQ would have a bias with CRS based RSRQ. However, this can be easily resolved by introducing an offset or setting proper bandwidth when calculating RSS based RSRQ.

Q2: if the answer is no to Q1, then is there any other option considering the preference of RAN2?

Feedback Form 2: Q2: if the answer is no to Q1, then is there any other option considering the preference of RAN2?

1 – Qualcomm Incorporated

Our preference would be to remove RSRQ from cell selection / reselection.

2 – ZTE Corporation

ask RAN4 whether RSRQ calculation according to RSS-based RSRP and CRS-based RSSI can be used as cell selection and cell re-selection criterion. If not, remove RSRQ from cell selection/reselection

3 – Ericsson Limited

RAN2 clearly states that it is up to RAN1 and RAN4 to decide. Also, quite possibly, RAN2 is not aware of the resulting bias between RSS and CRS based RSRQ measurements, as presented in [4], likely offsetting any advantages with RSS based RSRQ measurements as RAN2 sees. Hence, RAN1 can leave to RAN4 to decide, taking into account the consequences of bias.

4 – HUAWEI TECHNOLOGIES Co. Ltd.

As commented in Q1, we support to define RSS based RSRQ measurement, considering the significant impact to RAN2 performance. If finally the RSS based RSRQ is removed, eNB may have to give up the configuration of RSS to avoid the inconsistent behaviors in cell selection/reselection.

3 Discussion on conclusion

Feedback Form 3: Discussion on proposed conclusion.

1 – HUAWEI TECHNOLOGIES Co. Ltd.

[Moderator]: Regarding the option 2 (Define RSRQ for RSS measurements), RAN1 has observed that there will be a bias between CRS based RSRQ and RSS based RSRQ. It is up to RAN4 to decide on RSS based RSRQ for LTE-MTC.

2 – Qualcomm Incorporated

This is not acceptable to us, as discussed above. If there is a bias, we would need to configure a new parameter, which is too late to do under maintenance. The conclusion should be to reply that RAN1 has decided to not introduce RSS-based RSRQ measurements.

3 – HUAWEI TECHNOLOGIES Co. Ltd.

[To QC] With a bias, there's also possibility that no new parameter is needed, e.g., a fixed bias is used to offset the discrepancy between CRS based and RSS based. This issue was raised by RAN4, I would propose to inform them what RAN1 has observed, and let them decide as they are also aware of the timing of Rel-16. Please check whether it's acceptable with following update:

Regarding the option 2 (Define RSRQ for RSS measurements), RAN1 has observed that there will be a bias between CRS based RSRQ and RSS based RSRQ. It is not preferred if a new parameter is needed to offset the bias. It is up to RAN4 to decide on RSS based RSRQ for LTE-MTC.

4 – ZTE Corporation

For the proposed conclusion, we are fine with "up to RAN4 to dedice on RSS based RSRQ for LTE-MTC" and the bias observed by RAN1. But the sentence "It is not preferred if a new parameter is needed to offset the bias" is not clear. Do you want to say "It is not preferred in RAN1 to introduce a new parameter to offset the bias" or "RAN1 has no consensus on whether a new parameter is needed to offset the bias"?

5 – HUAWEI TECHNOLOGIES Co. Ltd.

[To ZTE]: Thanks for the refinement. To me, it seems to better reflect the situation of discussion that "RAN1 has no consensus on whether a new parameter is needed to offset the bias."

[To all] The proposed conclusion is updated as below, please have a checking:

Regarding the option 2 (Define RSRQ for RSS measurements), RAN1 has observed that there will be a bias between CRS based RSRQ and RSS based RSRQ. RAN1 has no consensus on whether a new parameter is needed to offset the bias. It is up to RAN4 to decide on RSS based RSRQ for LTE-MTC.

6 – Ericsson Limited

We **support** Huawei's proposed conclusion.

7 – Qualcomm Incorporated

This conclusion is a bit unfortunate. This chain of LSs was started by RAN4 asking RAN2/RAN1 what to do with RSS-based RSRQ, and now we send an LS back to RAN4 with no additional information. Could we at least include that RAN1 does not intend to define RSS-based RSRQ? This is maintenance for an item that has been closed for over a year.

8 – HUAWEI TECHNOLOGIES Co. Ltd.

[To QC] This issue was started RAN4, as they saw something that needs to be fixed with options considered. With the proposed conclusion, we have informed them the problem of one option from RAN1 point of view. As RAN4 has decided to send the LS previously due to the issues they saw in RAN4, I think it's fair enough to inform RAN4 the observation in RAN1. With the problems observed from RAN1 and RAN2, RAN4 could be able to make their decision by considering the opinions from RAN1 and RAN2 and the problem seen in RAN4.

4 Reference

[1] R1-2104159, "Reply LS related to RSS based RSRQ for LTE-MTC", RAN2, Huawei, HiSilicon, May, 2021, RAN1#105-e

[2] R4-2103728, "LS related to RSS based RSRQ for LTE-MTC", RAN4, Huawei, HiSilicon, January, 2021, RAN4#98-e

[3] R1-2104709, "Discussion on RAN2 reply LS on RSS based RSRQ ", ZTE, May, 2021, RAN1#105-e

[4] R1-2104818, "Discussion on RSS-based measurements", Qualcomm Incorporated, May, 2021, RAN1#105-e

[5] R1-2105941, "Discussion on RSS based RSRQ for LTE-MTC", Huawei, HiSilicon, May, 2021, RAN1#105-e