**3GPP TSG-RAN WG4 Meeting # 96-e R4-20012228**

**Electronic Meeting, 17 – 28 August., 2020**

**Agenda item:** 6.1.1.2, 6.1.2

**Source:** Moderator (Ericsson)

**Title:** Email discussion summary for [96e][228] LTE\_eMTC5\_RRM

**Document for:** Information

# Introduction

This document is the email discussion summary for [96e][229] LTE\_eMTC5\_RRM with the following topics covered

* Topic #1: Core requirements maintenance: RSS
* Topic #2: Core requirements maintenance: PUR
* Topic #3: Core requirements maintenance: MPDCCH improvement
* Topic #4: Core requirements maintenance: DL quality reporting
* Topic #5: Performance: RSS measurement accuracy
* Topic #6: Performance: Test cases

# Topic #1: Core requirements maintenance: RSS

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2009886 | Qualcomm Incorporated | CR: Corrections to RSS-based RSRP measurement requirements |
| R4-2011177 | Huawei, Hisilicon | **Proposal 1:** For RSRP1 and RSRP2 in PUR requirements in clause 4.7.4.3, N=1 if relaxed serving cell monitoring is not in use.  **Proposal 2:** Define separate MPDCCH tables for Qout\_Cat M1 and QE1\_out\_CatM1.  **Proposal 3-1:** For serving cell measurement in NC, RSS measurement period is defined as 3 DRX cycles, and the requirements are only applicable for DRX cycle of 320ms and 640ms.  **Proposal 3-2:** For serving cell measurement in EC, RSS measurement period is defined as 5 DRX cycles, and the requirements are only applicable for DRX cycle of 320ms and 640ms.  **Proposal 3-3:** For neighbor cell measurement in NC, RSS measurement period is defined as Table 2.  **Proposal 3-4:** For neighbor cell measurement in EC, RSS measurement period is defined as Table 3 and Table 4.  **Proposal 4-1:** Update the conditions for RSS measurement in Connected mode to reflect the time location of the last RSS subframe, the time relation between RSS and MG, and the dependency of RSS frequency location on UE capability.  **Proposal 4-2:** For non-DRX in Connected mode and rmax\*G >= 80ms case, the RSS measurement period is defined as Max(rmax\*G, TRSS ) x N. |
| R4-2011178 | Huawei, Hisilicon | **CR:** RSS based measurement requriements |
| R4-2011179 | Huawei, Hisilicon | **CR:** RLM requriements based on enhanced MPDCCH |
| R4-2011180 | Huawei, Hisilicon | **CR:** PUR related requirements |
| R4-2011208 | Ericsson | **CR:** Correction of eMTC DL channel quality report mapping table and RSS measurement requirements |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 1-1: Corrections to RSS based RSRP measurement requirements

*Sub-topic description:*

RSS measurement requirements were introduced into Release 16 specification at last meeting. Corrections to those are addressed in this subtopic.

*Open issues and candidate options before e-meeting:*

**Issue 1-1: Correction to serving cell RSS measurement period in normal coverage in IDLE mode**

Proposals:

* Proposal: For serving cell measurement in NC, RSS measurement period is defined as 3 DRX cycles, and the requirements are only applicable for DRX cycle of 320ms and 640ms.
* Recommended WF
  + Discussions needed

**Issue 1-2: Correction to serving cell RSS measurement period in enhanced coverage in IDLE mode**

Proposals:

* **Proposal:** For serving cell measurement in EC, RSS measurement period is defined as 5 DRX cycles, and the requirements are only applicable for DRX cycle of 320ms and 640ms.
* Recommended WF
  + Discussions needed

**Issue 1-3: Correction to neighbour cell RSS measurement period in normal coverage in IDLE mode**

Proposals:

* **Proposal:** For neighbor cell measurement in NC, RSS measurement period is defined as Table 2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DRX cycle length [s]** | **Tdetect,EUTRAN\_Intra\_NC [s] (number of DRX cycles)** | **Tmeasure,EUTRAN\_Intra\_NC [s] (number of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_NC**  **[s] (number of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_NC\_RSS**  **[s] (number of DRX cycles)** |
| 0.32 | 11.52 (36) | 1.28 (4) | 5.12 (16) | 3.84 (12) |
| 0.64 | 17.92 (28) | 1.28 (2) | 5.12 (8) | 3.84 (6) |
| 1.28 | 32(25) | 1.28 (1) | 6.4 (5) | 3.84 (3) |
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) | 3.84 (3) |

* Recommended WF
  + Discussions needed

**Issue 1-4: Correction to neighbour cell RSS measurement period in enhanced coverage in IDLE mode**

Proposals:

* Proposal: **For neighbor cell measurement in EC, RSS measurement period is defined as Table 3 and Table 4.**

**Table 3: Measurement period for RSS measurement of neighbour cells in EC with DRX**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCH Ês/Iot of neighboring cell: Q2 [dB]** | **DRX cycle length [s]** | **Tdetect,EUTRAN\_Intra\_EC [s] (number of DRX cycles)** | **Tmeasure,EUTRAN\_Intra\_EC [s] (number of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_EC**  **[s] (number of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_EC\_RSS**  **[s] (number of DRX cycles)** |
| **-15≤ Q2 < -6** | 0.32 | 330.24 (1032) | 1.28 (4) | 10.24 (32) | 6.4 (20) |
| 0.64 | 330.24 (516) | 1.28 (2) | 10.24 (16) | 6.4 (10) |
| 1.28 | 524.8 (410) | 1.28 (1) | 12.8 (10) | 6.4 (5) |
| 2.56 | 1039.36 (406) | 2.56 (1) | 15.36 (6) | 12.8 (5) |
| **Q2≥-6** | 0.32 | 16.64 (52) | 1.28 (4) | 10.24 (32) | 6.4 (20) |
| 0.64 | 23.04 (36) | 1.28 (2) | 10.24 (16) | 6.4 (10) |
| 1.28 | 38.4 (30) | 1.28 (1) | 12.8 (10) | 6.4 (5) |
| 2.56 | 66.56 (26) | 2.56 (1) | 15.36 (6) | 12.8 (5) |

**Table 4: Measurement period for RSS measurement of neighbour cells in EC with eDRX**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **eDRX\_IDLE cycle length [s]** | **DRX cycle length [s]** | **PTW length [s] (number of 1.28s periods)** | **Tdetect,EU-TRAN\_Intra\_EC [s] (number *N* of DRX cycles) for neighboring cell with SCH Es/IoT:**  **-15≤ Q2 < -6 [dB]** | **Tdetect,EUTRAN\_Intra\_EC [s] (number *N* of DRX cycles) for neighboring cell with SCH Es/IoT:**  **Q2≥-6 [dB]** | **Tmeasure,EUTRAN\_Intra\_EC [s] (number *N* of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_EC**  **[s] (number *N* of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_EC\_RSS**  **[s] (number *N* of DRX cycles)** |
| 5.12 ≤ eDRX\_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | Note 3 (406) | Note 3 (26) | 0.32 (1) | Note 3 (6) | Note 3 (5) |
| 0.64 | ≥1.28 (1) | 0.64 (1) | Note 3 (6) | Note 3 (5) |
| 1.28 | ≥2.28 (1) | 1.28 (1) | Note 3 (6) | Note 3 (5) |
| 2.56 | ≥2.56 (2) | 2.56 (1) | Note 3 (6) | Note 3 (5) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.  NOTE 2: The eDRX\_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].  NOTE 3: The detection period and the evaluation period depend on the number *N* of DRX cycles and are calculated according to the formula below:  . | | | | | | | |

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* Recommended WF
  + Discussions needed

**Issue 1-5: Correction to RSS measurement requirements in CONNECTED mode**

Proposals:

* **Proposal1:** Update the conditions for RSS measurement in Connected mode to reflect the time location of the last RSS subframe, the time relation between RSS and MG, and the dependency of RSS frequency location on UE capability.
* **Proposal2:** For non-DRX in Connected mode and rmax\*G >= 80ms case, the RSS measurement period is defined as Max(rmax\*G, TRSS ) x N.
* Recommended WF
  + Discussions needed

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |
| Qualcomm | Issue 1-1: We have a question for clarification. RAN4 didn’t agree on limiting the RSS period to 320/640ms. However, we agreed to make RSS based measurement applicable only if its measurement period is smaller than CRS based measurement. Is that what proposal 1 is trying to say? Since, with other DRX cycles, the measurement period will be longer than CRS?  Issue 1-2: same question as in issue 1-1.  Issue 1-3: There is a mistake in 2.56 DRX cycle number. 3 DRX cycles means 7.68s; not 3.84. Also, a question for clarification, why isn’t eDRX applicable in this case?  Issue 1-4: seems ok.  Issue 1-5: For proposal 1, we don’t quite understand why the following condition is crossed out:  For proposal 2, our concern is that with the proposed change, there can be more than one T\_RSS between samples which effectively prolongs the measurement delay. Also, the accuracy results and the agreements so far all assume N successive RSS samples (N=3 for NC and N=5 for EC). |
| Ericsson | Issue 1-1/1-2: RAN4 only had agreement on the number of samples to use for measurements in normal and enhanced coverage. But there was no agreement to limit the measurements for some of the DRX cycles only.  Issue 1-3/1-4: the changes R4-2009886 with scaling factor is a better way specifying these requirements. We prefer the approach in R4-2009886.  Issue 1-5: in our view, the measurement conditions in section 8.13.2.1 already addresses the relation between RSS and measurement gap, and the frequency location of RSS. |
| Huawei | 1-1:  To QC, yes, that is the intention. Current serving cell measurement period Nserv is 2 DRX cycles for 1280/2560ms DRX cycle in NC, so RSS measurement period will be longer than CRS based.  To Ericsson, the intention is not to limit the applicable DRX cycles, but to capture the agreement about RSS measurement period being shorter than CRS measurement period.  1-2:  Same comment as for 1-1.  1-3:  To QC, yes, for 2.56s DRX cycle it should be 7.68s. For eDRX, the current CRS based measurement period is defined as 2 samples (Table 4.2.2.3-2), which is shorter than RSS based measurement.  To Ericsson, we do not think the current scaling factor based approach works. Tmeasure does not need to be scaled. Tevaluate is unnecessarily long for RSS, e.g. we agreed to use 3 samples for NC, but the Tevaluate is at least 9 DRX cycles for RSS in NC. We also noticed that there is a CR R4-2011208 from Ericsson to remove the scaling factor, so the above comment is a bit confusing to us.  1-4:  same comment as 1-3.  1-5:  To QC/Ericsson, on proposal 1, we think the “measured subframes” in the current wording is unclear, so we suggest to update the condition related to MG as below:   * There are at least 2 consecutive subframes available outside measurement gaps (if configured) in the window of [n-6, n-2]   To QC, on proposal 2, we understand the reason to have rmax\*G in the CRS based requirements is to enable UE power saving, i.e. UE does not need to wake up just for measurement when not monitoring MPDCCH. In this sense, rmax\*G plays similar role as DRX cycle. Without the change, UE would have to wake up additionally for RSS measurement in between MPDCCH monitoring occasions. WE think same principle should apply for RSS and CRS measurement. On the accuracy, we may already have non-successive RSS samples with DRX, e.g. when DRX=320ms and RSS=160ms.  To Ericsson, for the frequency location we have agreed to follow the same principle for Connected mode as for Idle mode, which means it should be based on the UE capability (whether UE supports RSS measurement on the MPDCCH NB). |

### CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2009886 | Ericsson: We support this CR. |
| Huawei: We have proposed a different way to capture “RSS-based measurement requirements are not applicable if RSS-based measurement period is longer than CRS-based measurement period”, i.e. by only defining RSS measurement period for DRX cycles which gives shorter measurement period than CRS, but we are open to discuss which way is better. |
|  |
| R4-2011178 | Company A |
| Ericsson: This CR contains new changes which have not been discussed/agreed yet. |
| Qualcomm: why is “two successive subframes” condition removed from clause 4.7.2.1 (and similar places?). For neighbor cell measurement, why is the window changed to [n-6, n-2] from what it used to be [n-5, n-1]? |
| Huawei: To QC, we think the “two successive subframes” condition is redundant given that it is specified that the last subframe of the RSS occasion is in the window [n-5, n-1], or did we miss something here?  On the window, in last meeting we were suggesting to define the min distance between RSS and DRX on-duration as 1, because we think the last subframe before DRX on-duration may not be used for RSS measurement. Finally we compromised to 0 based on the understanding that the even the last RSS subframe is in subframe n-1, UE can still measure the 2 RSS subframes in [n-3, n-2]. In our view, with last RSS subframe in [n-5,n-1], the measurement window is [n-6,n-2] |
| R4-2011208 | Ericsson: This CR contains corrections to both DL quality reporting and RSS due to contribution limitation for maintenance. The RSS changes in R4-2009886 is acceptable to us. Hence, the RSS changes in this CR (R4-2011208) skipped. |
|  | Company B |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | To be updated…  *Tentative agreement:*  **Issue 1-1: Correction to serving cell RSS measurement period in normal coverage in IDLE mode**  For serving cell measurement in NC, RSS measurement period is defined as 3 DRX cycles, and the requirements are only applicable for DRX cycle of 320ms and 640ms.  **Issue 1-2: Correction to serving cell RSS measurement period in enhanced coverage in IDLE mode**  For serving cell measurement in EC, RSS measurement period is defined as 5 DRX cycles, and the requirements are only applicable for DRX cycle of 320ms and 640ms.  *Recommendations for 2nd round:*  **Issue 1-3: Correction to neighbour cell RSS measurement period in normal coverage in IDLE mode**  Is it possible to agree on option 1 below for RSS based measurement period in normal coverage in IDLE mode?   * Option 1: For neighbor cell measurement in NC, RSS measurement period is defined as Table 2.  |  |  |  |  |  | | --- | --- | --- | --- | --- | | **DRX cycle length [s]** | **Tdetect,EUTRAN\_Intra\_NC [s] (number of DRX cycles)** | **Tmeasure,EUTRAN\_Intra\_NC [s] (number of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_NC**  **[s] (number of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_NC\_RSS**  **[s] (number of DRX cycles)** | | 0.32 | 11.52 (36) | 1.28 (4) | 5.12 (16) | 3.84 (12) | | 0.64 | 17.92 (28) | 1.28 (2) | 5.12 (8) | 3.84 (6) | | 1.28 | 32(25) | 1.28 (1) | 6.4 (5) | 3.84 (3) | | 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) | 7.68 (3) |   **Issue 1-4: Correction to neighbour cell RSS measurement period in enhanced coverage in IDLE mode**  Is it possible to agree on option 1 below for RSS based measurement period in enhanced coverage in IDLE mode?   * Option 1: For neighbor cell measurement in EC, RSS measurement period is defined as Table 3 and Table 4.   **Table 3: Measurement period for RSS measurement of neighbour cells in EC with DRX**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **SCH Ês/Iot of neighboring cell: Q2 [dB]** | **DRX cycle length [s]** | **Tdetect,EUTRAN\_Intra\_EC [s] (number of DRX cycles)** | **Tmeasure,EUTRAN\_Intra\_EC [s] (number of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_EC**  **[s] (number of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_EC\_RSS**  **[s] (number of DRX cycles)** | | **-15≤ Q2 < -6** | 0.32 | 330.24 (1032) | 1.28 (4) | 10.24 (32) | 6.4 (20) | | 0.64 | 330.24 (516) | 1.28 (2) | 10.24 (16) | 6.4 (10) | | 1.28 | 524.8 (410) | 1.28 (1) | 12.8 (10) | 6.4 (5) | | 2.56 | 1039.36 (406) | 2.56 (1) | 15.36 (6) | 12.8 (5) | | **Q2≥-6** | 0.32 | 16.64 (52) | 1.28 (4) | 10.24 (32) | 6.4 (20) | | 0.64 | 23.04 (36) | 1.28 (2) | 10.24 (16) | 6.4 (10) | | 1.28 | 38.4 (30) | 1.28 (1) | 12.8 (10) | 6.4 (5) | | 2.56 | 66.56 (26) | 2.56 (1) | 15.36 (6) | 12.8 (5) |   **Table 4: Measurement period for RSS measurement of neighbour cells in EC with eDRX**   |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | **eDRX\_IDLE cycle length [s]** | **DRX cycle length [s]** | **PTW length [s] (number of 1.28s periods)** | **Tdetect,EU-TRAN\_Intra\_EC [s] (number *N* of DRX cycles) for neighboring cell with SCH Es/IoT:**  **-15≤ Q2 < -6 [dB]** | **Tdetect,EUTRAN\_Intra\_EC [s] (number *N* of DRX cycles) for neighboring cell with SCH Es/IoT:**  **Q2≥-6 [dB]** | **Tmeasure,EUTRAN\_Intra\_EC [s] (number *N* of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_EC**  **[s] (number *N* of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_EC\_RSS**  **[s] (number *N* of DRX cycles)** | | 5.12 ≤ eDRX\_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | Note 3 (406) | Note 3 (26) | 0.32 (1) | Note 3 (6) | Note 3 (5) | | 0.64 | ≥1.28 (1) | 0.64 (1) | Note 3 (6) | Note 3 (5) | | 1.28 | ≥2.28 (1) | 1.28 (1) | Note 3 (6) | Note 3 (5) | | 2.56 | ≥2.56 (2) | 2.56 (1) | Note 3 (6) | Note 3 (5) | | NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.  NOTE 2: The eDRX\_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].  NOTE 3: The detection period and the evaluation period depend on the number *N* of DRX cycles and are calculated according to the formula below:  . | | | | | | | |   **Issue 1-5: Correction to RSS measurement requirements in CONNECTED mode**  Continue the discussions from the 1st round for following proposals:   * **Proposal1:** Update the conditions for RSS measurement in Connected mode to reflect the time location of the last RSS subframe, the time relation between RSS and MG, and the dependency of RSS frequency location on UE capability. * **Proposal2:** For non-DRX in Connected mode and rmax\*G >= 80ms case, the RSS measurement period is defined as Max(rmax\*G, TRSS ) x N. |
|  |  |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2009886 | To be noted |
| R4-2011178 | To be revised |

## Discussion on 2nd round (if applicable)

**Issue 1-3: Correction to neighbour cell RSS measurement period in normal coverage in IDLE mode**

Is it possible to agree on option 1 below for RSS based measurement period in normal coverage in IDLE mode?

* Option 1: For neighbor cell measurement in NC, RSS measurement period is defined as Table 2.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **DRX cycle length [s]** | **Tdetect,EUTRAN\_Intra\_NC [s] (number of DRX cycles)** | **Tmeasure,EUTRAN\_Intra\_NC [s] (number of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_NC**  **[s] (number of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_NC\_RSS**  **[s] (number of DRX cycles)** |
| 0.32 | 11.52 (36) | 1.28 (4) | 5.12 (16) | 3.84 (12) |
| 0.64 | 17.92 (28) | 1.28 (2) | 5.12 (8) | 3.84 (6) |
| 1.28 | 32(25) | 1.28 (1) | 6.4 (5) | 3.84 (3) |
| 2.56 | 58.88 (23) | 2.56 (1) | 7.68 (3) | 7.68 (3) |

**Issue 1-4: Correction to neighbour cell RSS measurement period in enhanced coverage in IDLE mode**

Is it possible to agree on option 1 below for RSS based measurement period in enhanced coverage in IDLE mode?

* Option 1: For neighbor cell measurement in EC, RSS measurement period is defined as Table 3 and Table 4.

**Table 3: Measurement period for RSS measurement of neighbour cells in EC with DRX**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **SCH Ês/Iot of neighboring cell: Q2 [dB]** | **DRX cycle length [s]** | **Tdetect,EUTRAN\_Intra\_EC [s] (number of DRX cycles)** | **Tmeasure,EUTRAN\_Intra\_EC [s] (number of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_EC**  **[s] (number of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_EC\_RSS**  **[s] (number of DRX cycles)** |
| **-15≤ Q2 < -6** | 0.32 | 330.24 (1032) | 1.28 (4) | 10.24 (32) | 6.4 (20) |
| 0.64 | 330.24 (516) | 1.28 (2) | 10.24 (16) | 6.4 (10) |
| 1.28 | 524.8 (410) | 1.28 (1) | 12.8 (10) | 6.4 (5) |
| 2.56 | 1039.36 (406) | 2.56 (1) | 15.36 (6) | 12.8 (5) |
| **Q2≥-6** | 0.32 | 16.64 (52) | 1.28 (4) | 10.24 (32) | 6.4 (20) |
| 0.64 | 23.04 (36) | 1.28 (2) | 10.24 (16) | 6.4 (10) |
| 1.28 | 38.4 (30) | 1.28 (1) | 12.8 (10) | 6.4 (5) |
| 2.56 | 66.56 (26) | 2.56 (1) | 15.36 (6) | 12.8 (5) |

**Table 4: Measurement period for RSS measurement of neighbour cells in EC with eDRX**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **eDRX\_IDLE cycle length [s]** | **DRX cycle length [s]** | **PTW length [s] (number of 1.28s periods)** | **Tdetect,EU-TRAN\_Intra\_EC [s] (number *N* of DRX cycles) for neighboring cell with SCH Es/IoT:**  **-15≤ Q2 < -6 [dB]** | **Tdetect,EUTRAN\_Intra\_EC [s] (number *N* of DRX cycles) for neighboring cell with SCH Es/IoT:**  **Q2≥-6 [dB]** | **Tmeasure,EUTRAN\_Intra\_EC [s] (number *N* of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_EC**  **[s] (number *N* of DRX cycles)** | **Tevaluate,E-UTRAN\_intra\_EC\_RSS**  **[s] (number *N* of DRX cycles)** |
| 5.12 ≤ eDRX\_IDLE cycle length ≤ 2621.44 | 0.32 | ≥1.28 (1) | Note 3 (406) | Note 3 (26) | 0.32 (1) | Note 3 (6) | Note 3 (5) |
| 0.64 | ≥1.28 (1) | 0.64 (1) | Note 3 (6) | Note 3 (5) |
| 1.28 | ≥2.28 (1) | 1.28 (1) | Note 3 (6) | Note 3 (5) |
| 2.56 | ≥2.56 (2) | 2.56 (1) | Note 3 (6) | Note 3 (5) |
| NOTE 1: The number of DRX cycles in this table is given for the DRX cycles within PTWs.  NOTE 2: The eDRX\_IDLE cycle lengths are as specified in Section 10.5.5.32 of TS 24.008 [34].  NOTE 3: The detection period and the evaluation period depend on the number *N* of DRX cycles and are calculated according to the formula below:  . | | | | | | | |

**Issue 1-5: Correction to RSS measurement requirements in CONNECTED mode**

Continue the discussions from the 1st round for following proposals:

* **Proposal1:** Update the conditions for RSS measurement in Connected mode to reflect the time location of the last RSS subframe, the time relation between RSS and MG, and the dependency of RSS frequency location on UE capability.
* **Proposal2:** For non-DRX in Connected mode and rmax\*G >= 80ms case, the RSS measurement period is defined as Max(rmax\*G, TRSS ) x N.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |
| Qualcomm | Issue 1-3: option 1 is ok  Issue 1-4: option 1 is ok  Issue 1-5: no strong view on either proposal. |
| Ericsson | **Issue 1-3:**  Option 1 is agreeable.  **Issue 1-4:**  Option 1 is agreeable.  **Issue 1-5:**  On this issue, we are not confine that this change is really needed. In our opinion, the conditions for measurements on RSS location is sufficient. Since this is not urgent, we would like to look into this more. |
| Huawei | **Issue 1-3:**  Option 1 is OK.  **Issue 1-4:**  Option 1 is OK.  **Issue 1-5:**  Proposal 1:  We have the following agreement for RSS measurement in Connected mode in last meeting   |  | | --- | | RSS location in frequency with respect to measured neighbor cell:   * Follow the similar agreement from IDLE mode   Minimum/maximum distance:   * Follow the agreement from issue 1-1. |  * RSS time location: For Idle mode [n-5,n-1] is the window for last RSS subframe, and we understand the same should apply for Connected mode based on above agreement. * RSS frequency domain location: For Idle mode, whether UE supports RSS measurement on MPDCCH narrow-band or same RSS location as serving cell is depending on UE capability, and we understand the same should apply for Connected mode based on above agreement. * RSS and MG location: This can be further discussed in next meeting if companies need time to check.   Proposal 2:  This can be further discussed in next meeting if companies need time to check.  Another issue: It is noted that in this meeting RAN2 is also discussing the UE capability for eMTC, and they are confused by our agreements last meeting:  On one hand, we have agreed to introduce capability signaling   |  | | --- | | Agreement: Introduce capability signaling to indicate whether the UE is able to measure on neighbor cell RSS that is in the same NB that UE monitors. |   On the other hand, the feature list says the capability is optional without signaling (see 1-4 in section 3.1 of R4-2009174).  We suggest to change the capability 1-4 to be “capability with signaling” to avoid confusion, and we are open to hear other companies’ views. |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
|  |  |
|  |  |

# Topic #2: Core requirements maintenance: PUR

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2011180 | Huawei, Hisilicon | **CR:** PUR related requirements |
| R4-2011177 | Huawei, Hisilicon | **Proposal 1:** For RSRP1 and RSRP2 in PUR requirements in clause 4.7.4.3, N=1 if relaxed serving cell monitoring is not in use. |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

### Sub-topic 2-1: Corrections to preconfigured uplink resources

*Sub-topic description:*

PUR requirements were introduced into Release 16 specification at last meeting. Corrections to those are addressed in this subtopic.

*Open issues and candidate options before e-meeting:*

**Issue 2-1: PUR and relaxed serving cell montoring**

* Proposal: For RSRP1 and RSRP2 in PUR requirements in clause 4.7.4.3, N=1 if relaxed serving cell monitoring is not in use.
* Recommended WF
  + Discussions needed

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |
| Qualcomm | Issue 2-1: ok with the proposal |
| Ericsson | Issue 2-1: Looks OK, but we have commented on the exact wording for the CR (see below). |
| Nokia | Issue 2-1: we are fine with the proposal. |

### CRs/TPs comments collection

*Major close-to-finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2011180 | Company A |
| Company B |
| Qualcomm: I believe the intention is to negate the following sentence:  - N=1 if relaxed serving cell monitoring, as defined in clause 4.7.2.1.1A for normal coverage or 4.7.2.2.1A for enhanced coverage, is NOT applied. |
| Ericsson: Can we modify the wording as follows: “N is applicable only if relaxed serving cell monitoring as defined in clause 4.7.2.1.1A for normal coverage or 4.7.2.2.1 is configured. Otherwise, N=1.” |
| Huawei: To QC, yes, “NOT” is missed. We will correct in the revision.  To Ericsson, we do not have strong view on the wording, but we cannot just say “N is applicable” because we need to define the exact value for N (as in current spec). Is below wording ok?   * For normal coverage, N is the relaxation factor and is given by Table 4.7.2.1.1A-1 if the UE is not configured with eDRX\_IDLE cycle and by Table 4.7.2.1.1A-2 if the UE is configured with eDRX\_IDLE cycle, if relaxed serving cell monitoring as defined in clause 4.7.2.1.1A is applied, N=1 otherwise. |
| Nokia: We support the proposed change by Ericsson for N=1.  Furthermore, regarding the removal of the timing alignment validation bullet, we do not agree to remove this second bullet. This results in the phrase that the “UE is allowed to transmit using PUR,..,provided that first and second RSRP measurements … are valid measurements”. This condition is not sufficient as the RSRP change criterion must be fulfilled as well, which is defined in TS 36.331, clause 5.3.3.19. The following text in 36.133 after the proposed change only covers the issue that both RSRP measurements are valid. So, the second bullet cannot be removed.  Our understanding of TS 36.331, 5.3.3.19 is that the timing alignment validation (title of 5.3.3.19) covers both the TA timer criterion and the RSRP change criterion. The second bullet in TS 36.133 hence refers to the RSRP change criterion in 5.3.3.19 (RSRP increase/decrease thresholds).  Then, the text in 4.7.4.3 refers to the case where only the RSRP change criterion is configured, but how should the UE proceed in case the TA timer criterion and the RSRP change criterion are both configured? To identify whether RSRP1 and RSRP2 are valid measurements, it needs to follow the procedure in 4.7.4.3 as well. Thus, we propose to use following wording at start of 4.7.4.3:  “When *rsrp-ChangeThresh* [TS 36.331] is configured for TA validation based on the RSRP change criterion according to TS 36.331, clause 5.3.3.19, with or without other TA validation criteria, the UE is allowed to transmit using PUR using the timing derived using the latest available value as specified in subclause 7.24.1 provided that  - the first RSRP (RSRP1) measurement and the second RSRP (RSRP2) measurements used in the TA validation are valid measurements and,  - timing alignment validation for transmission using PUR is valid according to the configured validation criteria in [TS 36.331], clause 5.3.3.19 for all configured TA validation criteria.”  The same change would then also apply for NB-IoT. |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#2** | **Issue 2-1: PUR and relaxed serving cell montoring**  *Tentative agreement:*  - For RSRP1 and RSRP2 in PUR requirements in clause 4.7.4.3, N=1 if relaxed serving cell monitoring is not in use.  *To be discussed in second round:*  Continue the discussion on exact wording for CR. |
|  |  |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| R4-2011180 | To be revised |

## Discussion on 2nd round (if applicable)

**Moderator:** Continue the discussion on wording for the CR.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |
|  |  |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
|  |  |
|  |  |

# Topic #3: Core requirements maintenance: MPDCCH improvement

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2011179 | Huawei, Hisilicon | **Proposal 2:** Define separate MPDCCH tables for Qout\_Cat M1 and QE1\_out\_CatM1. |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 3-1: MPDCCH transmission parameters

*Sub-topic description:*

Ambiguity related to MPDCCH transmission parameters for legacy RLM evaluation and RLM evaluation based on enhanced MPDCCH.

*Open issues and candidate options before e-meeting:*

**Issue 3-1:**

* Proposals: **Define separate MPDCCH tables for Qout\_Cat M1 and QE1\_out\_CatM1.**
* Recommended WF
  + More discussions needed.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Proposal makes sense. |
| Ericsson | We want to keep the existing spec.  The intention of R4-2008647 was to apply enhanced MPDCCH parameters for Qout\_Cat\_M1 only. As CR mentioned clearly,  1) UE start to perform OOS based on enhanced MPDCCH parameters when the enhanced MPDCCH is configured, and UE indicate out-of-synch, or  2) UE start to perform OOS based on enhanced MPDCCH parameters when the enhanced MPDCCH is configured and UE trigger Event E1.  However, the proposed CR R4-2011179 proposes UE performs OOS and earlyQout whenever the enhanced MPDCCH is configured. It is different from the intention of CR. |
| Huawei | To Ericsson, if the intention is to apply enhanced MPDCCH parameters for Qout\_Cat\_M1 only, then we should remove the condition “Even E1 is triggered in the UE” for the enhanced MPDCCH based RLM. We do not have strong view, but the current requirements are mixing OOS and early OOS, which is incorrect. |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2011179 | Huawei: This CR is missed in the summary. |
| Company B |
|  |
|  | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#3** | *Candidate options:*  *Recommendations for 2nd round:*  There are different views about whether to introduce a separate MPDCCH table for Qout and earlyQout. Thus, continue the discussions on issue 3-1 from the first round, and focus should be on making essential corrections. |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |
| R4-2011179 | To be revised |

## Discussion on 2nd round (if applicable)

**Issue 3-1:**

* Proposals: **Define separate MPDCCH tables for Qout\_Cat M1 and QE1\_out\_CatM1.**
* Recommended WF
  + More discussions needed.

**Moderator:** There are different views about whether to introduce a separate MPDCCH table for Qout and earlyQout. Thus, continue the discussions based on the comments from the first round, and focus should be on making essential corrections.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |
| Qualcomm | We prefer Huawe’s approach and think separating the tables is clearer. |
| Ericsson | Issue 3-1:  If we understand the comments from Huawei in the 1st round, it looks they don’t want to mix OOS and early OOS.  Does Huawei accept the following way to separate RLM OOS and Event E1 for RLM with enhanced MPDCCH? Like out-of-sync, UE will use enhanced MPDDCH parameters when UE triggers early-out-of-sync to higher layer.  For a UE configured with *mpdcch-crs-connected-config*, threshold Qout\_Cat M1 is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to 10% block error rate of a hypothetical MPDCCH transmission with transmission parameters specified in Table 7.19.2-3, provided:  Out-of-sync indication is triggered in the UE.  Table 7.19.2-3 MPDCCH transmission parameters for Out-of-sync for UE category M1 with CE mode A configured with *mpdcch-crs-connected-config*   |  |  | | --- | --- | | Attribute | Out-of-sync | | DCI format | 6-1A | | Starting OFDM symbols | 2; Bandwidth >= 10MHz 3; 3MHz <= Bandwidth < 10MHz 4; Bandwidth = 1.4MHz | | Maximum MPDCCH repetition level | Rmax Note1 | | Aggregation level (ECCE) | L’max Note2 | | MPDCCH Transmission type | Distributed | | Power offset between CRS and DMRS antenna ports of MPDCCH | 0dB | | NOTE 1: Rmax is determined by the configurable parameter *mPDCCH-NumRepetition* defined in 36.331 and Rmax>1 to trigger Out-of-snych.  NOTE 2: L’max is derived from the configurable parameter *numberPRB-Pairs* defined in 36.331. L’max is 24, 16 and 8, if *numberPRB-Pairs* is 6, 4 and 2, respectively. | |   For a UE configured with *mpdcch-crs-connected-config*, threshold QE1\_out\_CatM1 is defined as the level at which the downlink radio link cannot be reliably received and shall correspond to 10% block error rate of a hypothetical MPDCCH transmission with transmission parameters specified in Table 7.19.2-4, provided:   * Early-out-of-sync is triggered in the UE   Table 7.19.2-4 MPDCCH transmission parameters for early Out-of-sync for UE category M1 with CE mode A configured with *mpdcch-crs-connected-config*   |  |  | | --- | --- | | Attribute | Event E1 | | DCI format | 6-1A | | Starting OFDM symbols | 2; Bandwidth >= 10MHz 3; 3MHz <= Bandwidth < 10MHz 4; Bandwidth = 1.4MHz | | Maximum MPDCCH repetition level | Rmax/2 Note1 | | Aggregation level (ECCE) | L’max-1 Note2 | | MPDCCH Transmission type | Distributed | | Power offset between CRS and DMRS antenna ports of MPDCCH | 0dB | | NOTE 1: Rmax is determined by the configurable parameter *mPDCCH-NumRepetition* defined in 36.331 and Rmax>1 to trigger Out-of-snych.  NOTE 2: L’max is derived from the configurable parameter *numberPRB-Pairs* defined in 36.331. L’max is 24, 16 and 8, if *numberPRB-Pairs* is 6, 4 and 2, respectively. | | |
| Huawei | We are fine with the suggested wording from Ericsson. |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
|  |  |

# Topic #4: Core requirements maintenance: DL quality reporting

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2011208 | Ericsson | CR containing corrections to DL channel quality reporting |
|  |  |  |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
|  |  |
|  |  |
|  |  |
|  |  |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2011208 | Company A |
| Company B |
| Qualcomm: OK with DL quality changes but prefer to merge RSS changes into one CR since HW and QC also have CRs on RSS. |
| Huawei: Changes related to DL channel quality reporting are OK. |
|  | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
|  |  |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |
| R4-2011208 | To be revised. |

## Discussion on 2nd round (if applicable)

|  |  |
| --- | --- |
| **Company** | **Comment** |
| XXX | Sub topic 1-1: |
|  |  |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
|  |  |
|  |  |

# Topic #5: Performance: RSS measurement accuracy

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2011181 | Huawei, Hisilicon | **Proposal:** Define the absolute accuracy requirements for RSS based measurement as in Table 3. |
| R4-2011182 | Huawei, Hisilicon | **CR:** Accuracy requirements for RSS based measurement |
| R4-2011206 | Ericsson | **Proposal:** Use 3 dB RF margin for the BL UEs and 2.5 dB for non-BL UEs. |
| R4-2011207 | Ericsson | **CR:** Introduction of RSS measurement accuracy for Rel-16 MTC |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 5-1: Accuracy requirements

*Sub-topic description:*

At last meeting following agreements were reached RF margins:

Non-BL UE: 2.5 dB

BL UE:

Option 1: 3 dB

Option 2: 4 dB

*Open issues and candidate options before e-meeting:*

**Issue 5-1: RF margin to use for RSS measurement for BL UE**

* Proposals
  + Option 1: 3 dB
  + Option 2: 4 dB
* Recommended WF
  + Discussions needed

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1:  Sub topic 2-2:  ….  Others: |
| Qualcomm | Issue 5-1: no strong view but slightly prefer to be consistent with CRS based RF margin, i.e., 4 dB. |
| Ericsson | Issue 5-2: We can compromise to use 4 dB RF margin. |
| Huawei | We support option 2 for the reasons listed in our paper R4-2011181. |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2011182 |  |
|  |
|  |
| R4-2011207 | Huawei: Requirements for non-BL UE is also needed. |
|  |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#5** | *Tentative agreements:*  RF margin to use for RSS measurement for BL UE is 4 dB.  *Candidate options:*  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 |  |  |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |
| R4-2011207 | To be revised. |
| R4-2011182 | To be noted |

## Discussion on 2nd round (if applicable)

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |
|  |  |
|  |  |
|  |  |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
| XXX | *Based on 2nd round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |
|  |  |

# Topic #6: Performance: Test cases

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2009872 | Qualcomm Incorporated | **Proposal 1:** RAN4 to specify performance tests for DL channel quality reporting in 4-bit reporting mode according to Table 1.  **Proposal 2:** RAN4 to not specify any performance tests for group WUS.  **Proposal 3:** RAN4 to specify performance tests for MPDCCH performance improvement according to Table 2.  **Proposal 4:** RAN4 to not specify any tests for transmission in PUR occasions.  **Proposal 5:** RAN4 to specify performance test for RSS-based RSRP measurement in connected mode for serving cell with AWGN channel according to Table 3. |
| R4-2011183 | Huawei, Hisilicon | **Proposal 1:** RAN4 to define RRM test for PUR related requirements: Tx timing accuracy and RSRP changed based TA validation.  **Proposal 2:** RAN4 to define RRM tests for RLM and event E1 reporting based on improved MPDCCH performance.  **Proposal 3-1:** RAN4 to define RRM tests for relaxed serving cell monitoring.  **Proposal 3-2:** RAN4 to define RRM tests for cell reselection, event triggered reporting and measurement accuracy for RSS based RSRP measurement.  **Proposal 4:** RAN4 to define RRM tests for DL channel quality reporting for both Msg3 based reporting in idle mode and MAC CE based reporting in connected mode. |
| R4-2011205 | Ericsson | **Proposal #4:** RAN4 shall reuse existing test configurations (RMCs and OCNGs) for defining new test cases.  **Proposal #5:** Test case discussions are summarized as follows: |

## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### Sub-topic 6-1: Test for DL channel quality reporting

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 6-1: Test for DL channel quality reporting**

* Proposal 1: RAN4 shall define test for channel quality reporting
* Proposal 2:RAN4 to define RRM tests for DL channel quality reporting for both Msg3 based reporting in idle mode and MAC CE based reporting in connected mode.
* Proposal 3: New test case in IDLE mode needed and CONNECTED mode needed
* Recommended WF
  + Try to agree on proposal 2 which seem to capture all other proposals.

**Issue 6-2: Test parameters for DL channel quality reporting**

* Proposals 1: **RAN4 to specify performance tests for DL channel quality reporting in 4-bit reporting mode according to Table 1.**

Table 1 4-bit DL channel quality reporting tests for idle and connected states

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Index | State | Mode | Test | Note |
| 1 | Idle | A | AL = 24, RP > 1 | Tests for FDD/HD-FDD/TDD, AWGN |
| 2 | Idle | B | AL = 24, RP > 1 | Tests for FDD/HD-FDD/TDD, AWGN |
| 3 | Connected | A | AL < 24, RP = 1 | Tests for FDD/HD-FDD/TDD, AWGN |
| 4 | Connected | B | AL = 24, RP > 1 | Tests for FDD/HD-FDD/TDD, AWGN |

* Recommended WF
  + Discussions needed

### Sub-topic 6-2: Test for preconfigured uplink resources

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 6-3: Test for preconfigured uplink resources**

* Proposal 1: New test case to verify TA validation using two RSRP measurements.
* Proposal 2: RAN4 to not specify any tests for transmission in PUR occasions.
* Proposal 3: RAN4 to define RRM test for PUR related requirements: Tx timing accuracy and RSRP changed based TA validation.
* Recommended WF
  + Discussions needed

### Sub-topic 6-3: Test for MPDCCH improvement

*Sub-topic description:*

*Open issues and candidate options before e-meeting:*

**Issue 6-4: Test for MPDCCH improvement**

* Proposal 1: **RAN4 to define RRM tests for RLM and event E1 reporting based on improved MPDCCH performance.**
* **Proposal 2: RAN4 to specify performance tests for MPDCCH performance improvement according to Table 2.**

Table 2 MPDCCH performance improvement tests

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Index | State | Mode | Test | Note |
| 1 | Non-DRX | A | RLM OOS | Tests for FDD/HD-FDD/TDD, AWGN |
| 2 | Non-DRX | B | RLM OOS | Tests for FDD/HD-FDD/TDD, AWGN |

* Proposal 3: **Introduce a new RLM test case to verify improved MPDCCH feature.**
* Recommended WF
  + Introduce at least RLM OOS test cases with improved MPDCCH parameters.
  + More discussions needed whether to introduce event E1 and regarding what scenarios to test exactly.

**Issue 6-5: Test for mobility enhancement**

* Proposal 1: RAN4 to specify performance test for RSS-based RSRP measurement in connected mode for serving cell with AWGN channel according to Table 3.
* Table 3 RSS-based RSRP measurements

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Index | State | Mode | Test | Note |
| 1 | Connected | A | Non-BL | Tests for FDD/HD-FDD/TDD, AWGN |
| 2 | Connected | A | BL | Tests for FDD/HD-FDD/TDD, AWGN |
| 3 | Connected | B | Non-BL | Tests for FDD/HD-FDD/TDD, AWGN |
| 4 | Connected | B | BL | Tests for FDD/HD-FDD/TDD, AWGN |

* Proposal 2: **RAN4 to define RRM tests for relaxed serving cell monitoring.**
* **Proposal 3: RAN4 to define RRM tests for cell reselection, event triggered reporting and measurement accuracy for RSS based RSRP measurement.**
* **Proposal 4:** New test case in CONNECTED mode needed to verify RSS measurement accuracy for the serving cell
* Recommended WF
  + RAN4 agrees to introduce test for RSS measurement, but more discussions needed on the test case scenarios.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1:  Sub topic 2-2:  ….  Others: |
| Qualcomm | Issue 6-1: Proposal 2 is fine.  Issue 6-2: We think the list in Proposal 1 is a reasonable set and pre-conditions.  Issue 6-3: We prefer option 2 and don’t know how practical test issues can be resolved as discussed in our paper. We’re open to sending an LS to RAN5 and soliciting their feedback if other companies insist on having tests for PUR.  Issue 6-4: Generally, RAN4 does not mix two optional features in a test. We think testing RLM OOS is sufficient in terms of this enhanced feature and testing event E1 does not have much added value.  Issue 6-5: We are ok with proposal 2 as well. However, we don’t think testing RSS-based measurement in both idle and connected mode is necessary. |
| Ericsson | Issue 6-1: We are fine with proposal 2.  Issue 6-2: We are fine with proposal 1.  Issue 6-3: It might be possible to define test cases by setting and modifying the RSRP levels in different time periods such that, in one time period the difference between the two RSRP measurements is larger than the allowed threshold, and in the second time period the difference is smaller than allowed threshold. It is then verified in the test that UE does not carry out the transmission in the first time period, but transmission is performed on the latter time period.  Issue 6-4: We are fine to define RLM OOS test cases with enhanced MPDCCH, as in Proposal 2. We are fine not to introduce Event E1 case with enhanced MPDCCH.  Issue 6-5: We support proposal 2. We are fine to introduce test case in CONNECTED mode to verify the accuracy level for the serving cell. |
| Huawei | 6-1:  We support the Recommended WF  6-2:  OK with proposal 1.  6-3:  We do not have very strong view. We agree that the test method is an issue and we were thinking it can be easily overcome by RAN5, but if there are different views we are also fine to go with option 2, considering that there is limited time for the Perf part of the WI.  6-4:  We are fine to just have RLM OOS test.  6-5:  For RSS, we can prioritize Idle mode cell reselection tests and accuracy tests, if other companies have concern on the number of test cases.  For relaxed serving cell measurement, we support to define test cases since the test cases have also been defined for NB-IoT. |

### CRs/TPs comments collection

*Major close to finalize WIs and Rel-15 maintenance, comments collections can be arranged for TPs and CRs. For Rel-16 on-going WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
|  | Company A |
| Company B |
|  |
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## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  **Issue 6-1: Test for DL channel quality reporting**  RAN4 to define RRM tests for DL channel quality reporting for both Msg3 based reporting in idle mode and MAC CE based reporting in connected mode.  **Issue 6-2: Test parameters for DL channel quality reporting**  RAN4 to specify performance tests for DL channel quality reporting in 4-bit reporting mode according to Table 1.  Table 1 4-bit DL channel quality reporting tests for idle and connected states   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Index | State | Mode | Test | Note | | 1 | Idle | A | AL = 24, RP > 1 | Tests for FDD/HD-FDD/TDD, AWGN | | 2 | Idle | B | AL = 24, RP > 1 | Tests for FDD/HD-FDD/TDD, AWGN | | 3 | Connected | A | AL < 24, RP = 1 | Tests for FDD/HD-FDD/TDD, AWGN | | 4 | Connected | B | AL = 24, RP > 1 | Tests for FDD/HD-FDD/TDD, AWGN |   **Issue 6-4: Test for MPDCCH improvement**  RAN4 to specify performance test for MPDCCH performance improvement when RLM out-of-sync is triggered.  **Issue 6-5: Test for mobility enhancement**  RAN4 to define RRM tests for relaxed serving cell monitoring.  *Candidate options:*  *Recommendations for 2nd round:*  **Issue 6-3: Test for preconfigured uplink resources**   * Proposal 1: New test case to verify TA validation using two RSRP measurements. * Proposal 2: RAN4 to not specify any tests for transmission in PUR occasions. * Proposal 3: RAN4 to define RRM test for PUR related requirements: Tx timing accuracy and RSRP changed based TA validation.   **Moderator:** Continue the discussions from the 1st round. Also soliciting feedback from TE vendors in RAN4.  **Issue 6-4: Test for MPDCCH improvement**  Can following test cases scenarios be agreed?   |  |  |  |  | | --- | --- | --- | --- | | Index | State | Mode | Note | | 1 | Non-DRX | A | Tests for FDD/HD-FDD/TDD, AWGN | | 2 | Non-DRX | B | Tests for FDD/HD-FDD/TDD, AWGN |   **Issue 6-5: Test for mobility enhancement**  Can it be agreed to introduce following two types of test cases?   * 6-5-a: IDLE mode cell reselection test for RSS based measurement * 6-5-b: CONNECTED mode accuracy test for RSS based measurement |

*Suggestion on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| 1 | WF on RRM performance requirements for MTC | Ericsson |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provided recommendation on CRs/TPs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation** |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

**Issue 6-3: Test for preconfigured uplink resources**

* Proposal 1: New test case to verify TA validation using two RSRP measurements.
* Proposal 2: RAN4 to not specify any tests for transmission in PUR occasions.
* Proposal 3: RAN4 to define RRM test for PUR related requirements: Tx timing accuracy and RSRP changed based TA validation.

**Moderator:** Continue the discussions from the 1st round. Also solicit feedback from TE vendors in RAN4.

**Issue 6-4: Test for MPDCCH improvement**

Can following test cases scenarios be agreed for the MPDCCH performance improvement test when RLM out-of-sync is triggered?

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| --- | --- | --- | --- |
| Index | State | Mode | Note |
| 1 | Non-DRX | A | Tests for FDD/HD-FDD/TDD, AWGN |
| 2 | Non-DRX | B | Tests for FDD/HD-FDD/TDD, AWGN |

**Issue 6-5: Test for mobility enhancement**

Can it be agreed to introduce following two types of test cases?

* 6-5-a: IDLE mode cell reselection test for RSS based measurement
* 6-5-b: CONNECTED mode accuracy test for RSS based measurement

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |
| Qualcomm | Issue 6-3: we support proposal 1. Transmission of data during any PUR occasion is highly dependent on UE implementation and cannot be effectively tested.  Issue 6-4: Our proposal  Issue 6-5: ok with the proposal |
| Ericsson | **Issue 6-3:**  We are OK to send LS to RAN5 and ask for their feedback on how this can be tested.  Updated comments: We are fine to not introduce any test case for PUR.  **Issue 6-4:**  We are fine with the test scenario in the table.  **Issue 6-5:**  We can accept 6-5-a and 6-5-b. |
| Huawei | **Issue 6-3:**  We support proposal 2 considering the timeline of Perf part. Technically, we have similar understanding as QC that use of PUR is up to UE implementation, so it is difficult to verify the UE behavior with tests.  **Issue 6-4:**  We are OK with the test cases scenarios in the table.  **Issue 6-5:**  We are OK with 6-5-a and 6-5-b. |

## Summary on 2nd round (if applicable)

*Moderator tries to summarize discussion status for 2nd round and provided recommendation on CRs/TPs/WFs/LSs Status update suggestion*

|  |  |
| --- | --- |
| **CR/TP/LS/WF number** | **T-doc Status update recommendation** |
|  |  |