**3GPP TSG-RAN WG4 Meeting # 95-e R4-2009091**

**Electronic Meeting, May 25 – June 05, 2020**

**Agenda item:** 5.10.3

**Source:** Moderator (Ericsson)

**Title:** Email discussion summary for [95e][229] LTE\_eMTC5\_RRM

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this email discussion and provide some guidelines for email discussion if necessary.*

The open issues of release 16 MTC RRM work item are addressed in this email discussions. In particular, following subtopics are addressed: PUR, RSS, DL quality reporting, MPDCCH improvement. First priority is given to the completing the open issues belonging to the core part of the WI, and second priority is given to the discussions on performance requirements.

*List of candidate target of email discussion for 1st round and 2nd round*

1. 1st round: Collect companies view on the open issues for sub-features. If there are no open issues for the sub-features, collect comments for the CRs submitted
2. 2nd round: Reach technical agreements on the open issues and assign CRs to companies. If possible, high-level agreement on performance requirements can be reached.

# Topic #1: Mobility enhancement

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2006165 | Qualcomm Incorporated | **Proposal 1.**  RSS-based serving cell measurement in idle mode is applicable only if RSS occasion precedes the paging occasion.  **Proposal 2.**  Min distance between last subframe of RSS occasion and first subframe of paging MPDCCH to be 0ms.  **Proposal 3.**  Max distance between last subframe of RSS occasion and first subframe of paging MPDCCH to be 5ms.  **Proposal 4.**  RSS-based neighbor cell measurement in idle mode is applicable if RSS occasion appears immediately before or immediately after the paging occasion.  **Proposal 5.**  Min distance between last subframe of RSS occasion and first subframe of paging MPDCCH, or last subframe of paging MPDCCH and first subframe of RSS occasion, to be 0ms.  **Proposal 6.**  Max distance between last subframe of RSS occasion and first subframe of paging MPDCCH, or last subframe of paging MPDCCH and first subframe of RSS occasion, to be 5ms.  **Proposal 7.**  In idle mode, UE is not required to concurrently measure based on RSS and CRS.  **Proposal 8.**  If neighbor cell RSS frequency location is contained in the NB that UE monitors for MPDCCH/PDSCH, then the measurement requirements apply provided that the remaining conditions are satisfied.  **Proposal 9.**  Use Tmeasure for establishing the neighbor cell measurement delay. |
| R4-2007875 | Huawei, HiSilicon | **Proposal 1:**  UE is required to measure serving cell RSS in idle provided following conditions are met:   * serving cell RSS share the same NB as that of paging MPDCCH for successive N DRX cycles, * two RSS subframes exists in the window of [n-3, n-1] where n is the first subframe of paging MPDCCH, for N successive DRX cycles * RSS power offset with respect to CRS is equal to or greater than 0 dB, * RSS-based measurement period is not longer than CRS-based measurement period.   **Proposal 2:**  UE is required to measure neighbour cell RSS in idle provided following conditions are met:   * neighbour cell RSS share the same 2-RB as that of serving cell RSS, * two RSS subframes exists in the window of [n-3, n-1] where n is the first subframe of paging MPDCCH, for N successive DRX cycles * RSS power offset with respect to CRS is equal to or greater than 0 dB, * RSS-based measurement period is not longer than CRS-based measurement period.   **Proposal 3:**  RSS measurement period for neighbour cell in idle is Tevalaute. Tmeasure also applies for RSS based measurement in idle.  **Proposal 4:**  UE is required to measure serving cell RSS in connected provided following conditions are met:   * serving cell RSS share the same NB as that of paging MPDCCH for successive N DRX cycles, * two RSS subframes exists in the window of [n-3, n-1] where n is the first subframe of DRX on-duration, for N successive DRX cycles * RSS power offset with respect to CRS is equal to or greater than 0 dB, * FFS: RSS-based measurement period is not longer than CRS-based measurement period.   **Proposal 5:**  UE is required to measure neighbour cell RSS in connected provided following conditions are met:   * neighbour cell RSS share the same 2-RB as that of serving cell RSS for successive N DRX cycles, * two RSS subframes exists in the window of [n-3, n-1] where n is the first subframe of DRX on-duration, for N successive DRX cycles * RSS power offset with respect to CRS is equal to or greater than 0 dB, * FFS: RSS-based measurement period is not longer than CRS-based measurement period.   **Proposal 6:**  UE is not required to measure both CRS and RSS for the same serving or neighbour cell.  **Proposal 7:**  UE is required to meet the current CRS based requirements for cells which cannot be measured based on RSS. |
| R4-2007885 | Ericsson | **Proposal #1:** At least two RSS subframes (n-1, n-2) shall be provided before the start of paging reception at subframe n.  **Proposal #2:** No need to put any conditions on RSS presence in subframes after the paging reception.  **Proposal #3:** RSS measurement requirements are defined for RSS periodicities of 160 ms and 320 ms only.  **Proposal #4:** Conditioned on proposal 3, the UE is not expected to measure on both RSS and CRS for RSRP measurements.   * **Proposal #5:** No need to specify any condition on the location of RSS PRBs of the neighbor cell with respect to the serving cell RSS location. * **Proposal #6:** We support the proposal in [4], i.e. for a UE that supports RSS-based RSRP measurement, UE shall be required to use RSS for RSRP measurement of a serving or neighbour cell in RRC\_CONNECTED mode and meet the corresponding accuracy requirements only if:   + RSS frequency location of the cell being measured occurs in the NB(s) that UE monitors for MPDDCH for the *N* number of samples, and   + RSS time location of the cell being measured does not coincide with UE’s measurement gap (if configured), and   + RSS power offset of the cell being measured is not smaller than 0 dB   **Proposal #7:** Assuming RSS periodicities of 160 ms and 320 ms, the CRS measurement delay requirements in IDLE mode can be reused.  **Proposal #8:** In CONNECTED mode, L1 measurement period for RSS based RSRP measurement is defined as  If TRSS=160 ms, L1 measurement period is 480 ms and 800 ms in normal and enhanced coverage respectively for BL and non-BL UEs in non-DRX.  If TRSS=320 ms, L1 measurement period is 960 ms and 1600 ms in normal and enhanced coverage respectively for BL and non-BL UEs in non-DRX.  L1 measurement period is defined as max (DRX cycle length, TRSS ) x 3 in normal coverage in DRX.  L1 measurement period is defined as max (DRX cycle length, TRSS ) x 5 in enhanced coverage in DRX.  **Proposal #9:** Use 3 dB RF margin for the BL UEs and 2.5 dB for non-BL UEs. |
| R4-2007886 | Ericsson | CR: CR to capture the RSS measurement conditions in normal coverage. |
| R4-2007887 | Ericsson | CR: CR to capture the RSS measurement conditions in enhanced coverage. |

## 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: RSS Measurement conditions and delays

*Sub-topic description:*

The measurement conditions for IDLE- and CONNECTED mode for serving- and neighbor cell measurements are treated in this subtopic.

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

**Issue 1-1: IDLE mode serving measurement conditions**

Some of the proposals in R4-2007875 were agreed at last meeting, see [R4-2005288]. Thus they are not listed below.

Proposals:

* P1: Min distance between last subframe of RSS occasion and first subframe of paging MPDCCH to be 0ms.
* P2: Max distance between last subframe of RSS occasion and first subframe of paging MPDCCH to be 5ms.
* P3: two RSS subframes exists in the window of [n-3, n-1] where n is the first subframe of paging MPDCCH, for N successive DRX cycles
* P4: At least two RSS subframes (n-1, n-2) shall be provided before the start of paging reception at subframe n.
* P5: RSS measurement requirements are defined for RSS periodicities of 160 ms and 320 ms only.
* Recommended WF
  + More discussions needed.

**Issue 1-2: IDLE mode neighbour cell measurement conditions**

Some of the proposals in R4-2007875 were agreed at last meeting, see [R4-2005288]. Thus they are not listed below.

Proposals:

* P1: RSS-based neighbor cell measurement in idle mode is applicable if RSS occasion appears immediately before or immediately after the paging occasion.
* P2: Min distance between last subframe of RSS occasion and first subframe of paging MPDCCH, or last subframe of paging MPDCCH and first subframe of RSS occasion, to be 0ms.
* P3: Max distance between last subframe of RSS occasion and first subframe of paging MPDCCH, or last subframe of paging MPDCCH and first subframe of RSS occasion, to be 5ms.
* P4: If neighbor cell RSS frequency location is contained in the NB that UE monitors for MPDCCH/PDSCH, then the measurement requirements apply provided that the remaining conditions are satisfied.
* P5: neighbour cell RSS share the same 2-RB as that of serving cell RSS,
* P6: two RSS subframes exists in the window of [n-3, n-1] where n is the first subframe of paging MPDCCH, for N successive DRX cycles
* P8: No need to specify any condition on the location of RSS PRBs of the neighbor cell with respect to the serving cell RSS location.
* Recommended WF
  + More discussions needed.

**Issue 1-3: CONNECTED mode serving measurement conditions**

Some of the proposals in R4-2007875 were agreed at last meeting, see [R4-2005288]. Thus they are not listed below.

Proposals:

* P1: serving cell RSS share the same NB as that of paging MPDCCH for successive N DRX cycles,
* P2: two RSS subframes exists in the window of [n-3, n-1] where n is the first subframe of DRX on-duration, for N successive DRX cycles
* P3: RSS power offset with respect to CRS is equal to or greater than 0 dB,
* P4: RSS frequency location of the cell being measured occurs in the NB(s) that UE monitors for MPDDCH for the *N* number of samples, and
* P5: RSS time location of the cell being measured does not coincide with UE’s measurement gap (if configured), and
* P6: RSS power offset of the cell being measured is not smaller than 0 dB
* P7: FFS: RSS-based measurement period is not longer than CRS-based measurement period.
* Recommended WF
  + More discussions needed.

**Issue 1-4: CONNECTED mode neighbour cell measurement conditions**

Some of the proposals in R4-2007875 were agreed at last meeting, see [R4-2005288]. Thus they are not listed below.

Proposals:

* P1: RSS frequency location of the cell being measured occurs in the NB(s) that UE monitors for MPDDCH for the *N* number of samples
* P2: RSS time location of the cell being measured does not coincide with UE’s measurement gap (if configured)
* P3: RSS power offset of the cell being measured is not smaller than 0 dB
* P4: neighbour cell RSS share the same 2-RB as that of serving cell RSS for successive N DRX cycles,
* P5: two RSS subframes exists in the window of [n-3, n-1] where n is the first subframe of DRX on-duration, for N successive DRX cycles
* P6: FFS: RSS-based measurement period is not longer than CRS-based measurement period.
* Recommended WF
  + More discussions needed.

**Issue 1-5: Measurement delays in IDLE mode**

Proposals:

* P1: Use Tmeasure for establishing the neighbor cell measurement delay.
* P2: RSS measurement period for neighbour cell in idle is Tevalaute. Tmeasure also applies for RSS based measurement in idle.
* P3: RSS-based measurement period is not longer than CRS-based measurement period.
* P4: Assuming RSS periodicities of 160 ms and 320 ms, the CRS measurement delay requirements in IDLE mode can be reused.
* Recommended WF
  + More discussions needed.

**Issue 1-6: Measurement delays in CONNECTED mode**

Proposals:

* P1:
  + TRSS=160 ms, L1 measurement period is 480 ms and 800 ms in normal and enhanced coverage respectively for BL and non-BL UEs in non-DRX.
  + If TRSS=320 ms, L1 measurement period is 960 ms and 1600 ms in normal and enhanced coverage respectively for BL and non-BL UEs in non-DRX.
  + L1 measurement period is defined as max (DRX cycle length, TRSS ) x 3 in normal coverage in DRX.
  + L1 measurement period is defined as max (DRX cycle length, TRSS ) x 5 in enhanced coverage in DRX.
* Recommended WF
  + More discussions needed.

**Issue 1-7: Concurrent CRS and RSS measurements**

Proposals:

* P1: The UE is not expected to measure on both RSS and CRS for RSRP measurements.
* P2: In idle mode, UE is not required to concurrently measure based on RSS and CRS.
* P2: UE is required to meet the current CRS based requirements for cells which cannot be measured based on RSS.
* P3: UE is not required to measure both CRS and RSS for the same serving or neighbour cell.
* Recommended WF
  + More discussions needed.

### Sub-topic 1-2

*Sub-topic description:*

Discussions on CRs to capture the agreements.

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

**Issue 2-2: Please provide comments on CRs directly**

* Proposals
  + Option 1: TBA
  + Option 2: TBA
* Recommended WF
  + TBA

## 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 support P1 and P2. In our view, P3 and P4 are a little too restrictive. Do we really think that if subframes [n-4, n-3] are RSS subframes instead of [n-3, n-2] or [n-2, n-1], RSS measurements are not possible? Or will there be a large power penalty? We don’t think so.  For P5, we’d like to understand the motivation better. Why do we need to have this restriction on RSS periodicity?  Issue 1-2:  Our view is that neighbor cell measurement can be done before or after paging occasion. So the same conditions as serving cell apply in terms of RSS placement in time before PO but similar (mirror) conditions can be added to after PO. Similar to issue 1-1, we think specifying RSS to only appear in subframes [n-3, n-2] is restrictive.  In terms of RSS location in frequency, we share the same view as last meeting that as long as RSS of neighbor is in the same NB that UE monitors, the requirements apply. Since this is not agreeable to some companies and RAN4 has discussed this for a few meetings, maybe we need to resort to capability signaling. Some UEs can do better than just processing the same 2-PRB as RSS of serving cell so these UEs can signal such capability.  Issue 1-3:  We support P1, P2, P3 and P5. For P7, we are not sure if this condition is necessary. In connected mode, power saving is not a primary concern so even if the measurement period of RSS is longer than CRS, it should be ok. The goal is achieving better accuracy in connected mode.  Issue 1-4:  Similar to the issues above. We support P1-P3. P4 is already discussed in issue 1-2. P5 is discussed in issue 1-1. P6 is discussed in issue 1-3.  Issue 1-5:  We support P1 and don’t understand why Teval should be used for RSS measurement period. P3 is fine. We don’t understand the motivation for P4.  Issue 1-6: the first two bullets depend on whether RAN4 agrees to only define requirements for 160/320ms. If not, these two bullets should be written parametrically. Last two bullets are fine.  Issue 1-7: concurrent CRS and RSS measurement should not be required. And if conditions for RSS-based measurement are not satisfied, then UE should obviously satisfy CRS-based measurement requirements. |
| Ericsson | **Issue 1-1:**  We are fine with P1 and P2.  The motivation behind P5 is that if RSS periodicity is too long, it may not be very suitable for measurements. For example, in IDLE mode the UE is expected to measure on every DRX cycle, but if RSS precocity is larger than the DRX cycle length, then there may not be any RSS available for measurements. Instead mixing RSS with CRS for same measurement does not give better performance, but it introduces more complexity.  **Issue 1-2:**  We are fine with P1, P2, P3 and P4.  **Issue 1-3:**  P1: we are fine.  P2: we are fine.  P3: we are fine.  P4: this proposal is similar to P1.  P5: we are fine.  P6: we are fine.  P7: Our proposal has been to define the RSS requirements for the case TRSS ≤ 320 ms. This also simplifies a lot when it comes to measurement delays requirements. We have agreed on the number of sampels required for RSS measurement in normal and enhanced coverage. This means, the measurement delay can be defined as 3 x TRSS and 5 x TRSS in normal and enhanced coverage respectively. Hence, condition as proposed in P7 is not needed.  **Issue 1-4:**  P1: we are fine.  P2: we are fine.  P3: we are fine.  P4: we have different views as in previous issue.  P5: we are fine, but we don’t have strong view.  P6: same view as in previous issue.  **Issue 1-5:**  We support P4 for same motivations as provided in issue 1-1.  **Issue 1-6:**  Our proposal has been to define the RSS requirements for the case TRSS ≤ 320 ms. This also simplifies a lot when it comes to measurement delays requirements. We have agreed on the number of sampels required for RSS measurement in normal and enhanced coverage. This means, the measurement delay can be defined as 3 x TRSS and 5 x TRSS in normal and enhanced coverage. In DRX, it can be defined as max(DRX cycle length, TRSS ) x 3. We support P1.    **Issue 1-7:**  P1: we agree.  P2: we agree.  P3: we agree.  P4: we agree. |
| Huawei | **Issue 1-1:**  First we want to clarify our proposal is not correctly reflecting the discussion in our paper, so instead of [n-3,n-1] what we wanted to propose is [n-3,n-2].  We understand there is typically a gap between RSS and PO to allow UE to fine-tune the tracking loops, so we propose the min distance is 1ms.  For the max distance, we propose 3ms to not increase power consumption due to RSS measurement, but we can further check on P2.  We are not sure if P5 is needed, given that we have agreed the condition that RSS should be available for N consecutive DRX cycles.  **Issue 1-2:**  On P1, we do not think UE should be required to measure RSS after PO, as this will increase power consumption when UE is not paged. Also if the UE is paged, UE may retune to another NB for PDSCH so the RSS measurement performance cannot be guaranteed.  On the min and max distance between RSS and PO, we have same comments as in 1-1.  On P5, we are fine to define UE capability as Qualcomm mentioned.  **Issue 1-3:**  P1: ok.  P2: Similar as in 1-1, our proposal for P2 should be [n-3,n-2] instead of [n-3,n-1].  P3: ok.  P4: same as P1..  P5: ok.  P6: same as P3.  P7: we still think the condition is needed.  To Qualcomm, in our view, measurement delay is more important than accuracy in connected mode as it will impact the HO and the quality of the ongoing data session.  To Ericsson, the CRS measurement period can be at smallest 480/800ms for CEModeA/B, which is smaller than RSS with 320ms periodicity.  **Issue 1-4:**  P1: we understand it should be   * RSS frequency location of the cell being measured occurs in the NB(s) that UE monitors for MPDDCH for the *N* consecutive number of samples   P2: ok.  P3: ok.  P4: same as for 1-2.  P5: same as for 1-1.  P6: same as for 1-3.  **Issue 1-5:**  P1/P2:  We understand Tmeasure is the time interval with which UE should perform a measurement, e.g. with 320ms DRX cycle, UE is required to measure every 4 DRX cycles to allow power saving.  Tevaluate is the time within which UE should be able to evaluate a neighbour cell against the reselection criteria, which is more similar to the measurement period in connected (during which UE should be able to evaluate a neighbour cell against the triggering event)  If we use Tmeasure for RSS measurement period, what should be Tevaluate for RSS?  P3: ok, already agreed.  P4: same as for 1-1.  **Issue 1-6:**  Same as for 1-1. We understand a generic principle is needed.    **Issue 1-7:**  UE is not required to measure both CRS and RSS for the same cell.  UE is required to measure CRS and RSS for different cells, i.e. some cells are measured based on CRS, and the other cells are measured based on RSS. |
|  |  |

### 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** |
| R4-2007886 | Company A |
| Company B |
| Qualcomm: should wait until conclusion of topics above. |
| R4-2007887 | Company A |
| Company B |
| Qualcomm: should wait until conclusion of topics above. |

## 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** | **Issue 1-1: IDLE mode serving measurement conditions**  There are different views about the minimum and maximum distance between last subframe of RSS and first subframe of paging MPDCCH. Following options shall be discussed in 2nd round.  **Minimum distance:**   * Option 1: 0 ms [Qualcomm, Ericsson] * Option 2: 1 ms [Huawei]   **Maximum distance:**  - Option 1: 3 ms [Huawei]  - Option 2: 5 ms [Qualcomm, Ericsson]  **RSS measurement requirements are defined for RSS periodicities of 160 ms and 320 ms only.**   * Option 1: Yes, * Option 2: No   **Issue 1-2: IDLE mode neighbour cell measurement conditions**  **Whether neighbour cell measurements can be done before or after paging occasion:**   * Option 1: yes, under same conditions in terms of RSS placement with respect to PO [Qualcomm, Ericsson] * Option 2: no [Huawei] * **Minimum distance:** * Option 1: 0 ms [Qualcomm, Ericsson] * Option 2: 1 ms [Huawei]   **Maximum distance:**   * Option 1: 3 ms [Huawei] * Option 2: 5 ms [Qualcomm, Ericsson] * **RSS location in frequency with respect to measured neighbor cell:** * **Tentative 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.   **Issue 1-3: CONNECTED mode serving measurement conditions**  **Tentative agreement:**   * serving cell RSS share the same NB as that of paging MPDCCH for successive N DRX cycles, * two RSS subframes exists in the window of [n-3, n-2] where n is the first subframe of DRX on-duration, for N successive DRX cycles * RSS power offset with respect to CRS is equal to or greater than 0 dB, * RSS time location of the cell being measured does not coincide with UE’s measurement gap (if configured), and   To be discussed in 2nd round:  RSS-based measurement period is not longer than CRS-based measurement period.  **Issue 1-4: CONNECTED mode neighbour cell measurement conditions**  Tentative agreements:   * RSS frequency location of the cell being measured occurs in the NB(s) that UE monitors for MPDDCH for the *N* consecutive number of samples * P2: RSS time location of the cell being measured does not coincide with UE’s measurement gap (if configured) * P3: RSS power offset of the cell being measured is not smaller than 0 dB * **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.  To be discussed in 2nd round:  RSS-based measurement period is not longer than CRS-based measurement period.  **Issue 1-5: Measurement delays in IDLE mode**  Tentative agreement:  RSS-based measurement period is not longer than CRS-based measurement period.  To be discussed in 2nd round:   * Whether to define the RSS requirements for RSS periodicities of 160 ms and 320 ms. * Option 1: Yes * Option 2: No * How to define RSS measurement delays in IDLE mode: * Option 1: in terms of Tmeasure * Option 2: in terms of Tevaluate * Option 3: in terms of Tmeasure and Tevaluate   **Issue 1-6: Measurement delays in CONNECTED mode**  Follow the approach from IDLE mode for issue 1-5.  **Issue 1-7: Concurrent CRS and RSS measurements**  **Tentative agreement:**  The UE is not expected to measure on both RSS and CRS for RSRP measurements.   * In idle mode, UE is not required to concurrently measure based on RSS and CRS. * UE is required to meet the current CRS based requirements for cells which cannot be measured based on RSS. * UE is not required to measure both CRS and RSS for the same serving or neighbour cell. |
|  |  |

*Recommendations on WF/LS assignment*

|  |  |  |
| --- | --- | --- |
|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 | WF on Rel-16 MTC RRM requirements  *Note: This WF will cover all topics (1-5).* | Ericsson |
| #2 | LS on capability signaling for RSS neighbor cell measurements | Qualcomm Incorporated |

### 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** |
| R4-2007886 | To be revised |
| R4-2007887 | To be revised |
| R4-2007888 | To be revised. |

## Discussion on 2nd round (if applicable)

**Issue 1-1: IDLE mode serving measurement conditions**

There are different views about the minimum and maximum distance between last subframe of RSS and first subframe of paging MPDCCH. Following options shall be discussed in 2nd round.

**Minimum distance:**

* Option 1: 0 ms [Qualcomm, Ericsson]
* Option 2: 1 ms [Huawei]

**Maximum distance:**

- Option 1: 3 ms [Huawei]

- Option 2: 5 ms [Qualcomm, Ericsson]

**Issue 1-2: IDLE mode neighbour cell measurement conditions**

**Whether neighbour cell measurements can be done before or after paging occasion:**

* Option 1: yes, under same conditions in terms of RSS placement with respect to PO [Qualcomm, Ericsson]
* Option 2: no [Huawei]

**Minimum distance:**

* Option 1: 0 ms [Qualcomm, Ericsson]
* Option 2: 1 ms [Huawei]

**Maximum distance:**

* Option 1: 3 ms [Huawei]
* Option 2: 5 ms [Qualcomm, Ericsson]

**Issue 1-2a: IDLE mode neighbour cell measurement conditions**

How to proceed with following agreement from 1st round: “Introduce capability signalling to indicate whether the UE is able to measure on neighbour cell RSS that is in the same NB that UE monitors.”.

Option 1: Indicate the capability in the LTE feature list

Option 2: Send LS to RAN2

**Issue 1-3: CONNECTED mode serving measurement conditions**

* A: serving cell RSS share the same NB as that of paging MPDCCH for successive N DRX cycles,
* B: two RSS subframes exists in the window of [n-3, n-2] where n is the first subframe of DRX on-duration, for N successive DRX cycles
* C: RSS power offset with respect to CRS is equal to or greater than 0 dB,
* D: RSS time location of the cell being measured does not coincide with UE’s measurement gap (if configured), and

Based on the 1st round of discussions A, C and D in issue 1-3 above are agreeable. Companies are to confirm these bullets are agreeable. For issue, the agreement from similar IDLE mode issue 1-1 can be reused.

**Issue 1-3a: CONNECTED mode serving measurement conditions**

Whether RSS-based measurement period is not longer than CRS-based measurement period.

**Issue 1-4: CONNECTED mode neighbour cell measurement conditions**

In following agreement: “Agreement: RSS frequency location of the cell being measured occurs in the NB(s) that UE monitors for MPDDCH for the *N* number of samples”

Session chair: word “consecutive” samples removed and shall be further discussed

Confirm the use of consecutive samples.

**Issue 1-5a: Measurement delays in IDLE mode**

* Whether to define the RSS requirements for RSS periodicities of 160 ms and 320 ms.
* Option 1: Yes
* Option 2: No

**Issue 1-5b: Measurement delays in IDLE mode**

How to define RSS measurement delays in IDLE mode:

* Option 1: in terms of Tmeasure
* Option 2: in terms of Tevaluate
* Option 3: in terms of Tmeasure and Tevaluate

**Issue 1-6: Measurement delays in CONNECTED mode**

Proposals:

* P1:
  + TRSS=160 ms, L1 measurement period is 480 ms and 800 ms in normal and enhanced coverage respectively for BL and non-BL UEs in non-DRX.
  + If TRSS=320 ms, L1 measurement period is 960 ms and 1600 ms in normal and enhanced coverage respectively for BL and non-BL UEs in non-DRX.
  + L1 measurement period is defined as max (DRX cycle length, TRSS ) x 3 in normal coverage in DRX.
  + L1 measurement period is defined as max (DRX cycle length, TRSS ) x 5 in enhanced coverage in DRX.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |
| Ericsson | **Issue 1-1:**  We support option 1. In our view, option 1 (0 ms) for minimum distance and option 2 (5 ms) for maximum distance has more flexibility than specifying the exact RSS subframe location.  **Issue 1-2:**  **Whether neighbour cell measurements can be done before or after paging occasion:**  We prefer option 1, but we don’t have strong view.  **Minimum /maximum distance:**  Same view as for the serving cell in issue 1-1.  **Issue 1-2a: IDLE mode neighbour cell measurement conditions**  We prefer to update the feature list accordingly, no LS is needed.  **Issue 1-3: CONNECTED mode serving measurement conditions**  Based on the discussions on the first round, points A, C and D are agreeable already. So companies should now discuss point B.  For point B, we prefer to reuse the corresponding agreement from IDLE mode.  **Issue 1-3a: CONNECTED mode serving measurement conditions**  It would depend the RSS periodicity. RAN4 has earlier agreed on the number of samples required for RSS based measurement, and now total time will depend also on the configured periodicity. If RSS precocity is long, then also the measurement delay is likely to be long.  **Issue 1-4: CONNECTED mode neighbour cell measurement conditions**  We could use “successive samples” instead of “consecutive samples”.  **Issue 1-5a: Measurement delays in IDLE mode**   * We are flexible. Our initial thinking was that the longer RSS periodicities are not very suitable for the measurements. But if companies prefer to define the requirements for all four periodicities, we are also fine with that.   **Issue 1-5b: Measurement delays in IDLE mode**  We can comprise to option 3.  **Issue 1-6: Measurement delays in CONNECTED mode**  We are fine with P1 for CONNECTED mode. |
| Qualcomm | **Issue 1-1:**  Support option 1 for min distance. It is noted that the issue is discussing the distance of last subframe of RSS with respect to first subframe of paging MPDCCH. RSS occasion is at least 8 subframes which means even if it is immediately preceded by RSS, it still satisfies what Huawei is aiming for.  Support option 2 for max distance. We prefer to specify a window of length > 2ms where two RSS subframes can exist rather than a very specific window of length 2ms. In our view, measuring RSS in subframes [n-6,n-5] should not have an adverse impact on power consumption.  **Issue 1-2:**  For placement of RSS after PO, our view is that a majority of time, there is no paging for UE so in these situations, there is an opportunity for UE to measure neighbor cell on RSS (perhaps without even colliding with serving cell). In cases where there is a page, the condition for N successive RSS occasions are not satisfied anyway so UE will have to resort to CRS for NCELL. It is noted that even without RSS, a current UE implementation may measure NCELL after PO subframes so for RSS-based measurement, this should also be allowed.  Regarding min/max distance, same view as in issue 1-1.  **Issue 1-2a:** option 1. Update the capability signaling.  **Issue 1-3:**  A, C and D are agreeable. For B, we have the same view as in idle mode.  **Issue 1-3a:**  Is the issue whether the RSS measurement requirements are applicable if measurement delay is longer than CRS-based measurement delay? If so, we can agree to have the same rule as in idle mode.  **Issue 1-4:**  We should have the word consecutive or successive (either one is fine).  **Issue 1-5a:**  RSS periods of 160/320ms: still not convinced why this is needed. In our view, as long as the rule about measurement delay of RSS not longer than CRS is specified, it would cover this automatically.  **Issue 1-5b:**  We can agree to Teval as well.(option 2)  **Issue 1-6:**  We are fine with P1 but this depends on issue 1-5a as well. |
| Huawei | **Issue 1-1:**  Min distance, we can compromise to option 1 based on QC’s comments, provided that it is clearly captured in the spec that the distance is between last subframe of RSS and first subframe of paging MPDCCH.  Max distance, we can compromise to 4ms, so UE will measure RSS if the last RSS subframe falls in the window of [n-5,n-1]. It should be noted that if the last RSS subframe is n-5, UE is already measuring n-6 as we need 2 RSS subframes to meet the accuracy. We still think it would cause additional power consumption but to move forward we can compromise here.  **Issue 1-2:**  **Whether neighbour cell measurements can be done before or after paging occasion:**  We prefer option 2.  Response to QC comments, if UE gets paged, QC proposed that UE should measure CRS for the neighbor cell. We do not agree to this, because it means whether RSS or CRS requirements apply for a certain neighbor cell is dynamically changing depending on if the UE gets paged. In our view, which RS UE should measure for a neighbor cell should be semi-static, i.e. if the condition for RSS measurement are met, UE should then measure RSS for neighbor cell. This is, in our understanding, what is meant by the agreement we had in the 1st round that UE is not required to measure both CRS and RSS for the same serving or neighbour cell.  In addition, there will be additional power consumption even UE does not get a paging in PO.  **Minimum /maximum distance:**  We can apply the same rule as for serving cell in 1-1.  **Issue 1-2a: IDLE mode neighbour cell measurement conditions**  Option 1 is also fine for us.  **Issue 1-3: CONNECTED mode serving measurement conditions**  A, C and D are agreeable.  For B we can reuse the same rule as for idle mode in 1-1.  **Issue 1-3a: CONNECTED mode serving measurement conditions**  We suggest to have this as one of the conditions for RSS measurement in connected mode. We have agreed same for idle mode and in our view, measurement delay is more critical in connected than in idle.  **Issue 1-4: CONNECTED mode neighbour cell measurement conditions**  We need to have either “successive samples” or “consecutive samples”.  **Issue 1-5a: Measurement delays in IDLE mode**  Similar view as QC. The issue can be addressed by the defined RSS measurement conditions.  **Issue 1-5b: Measurement delays in IDLE mode**  We think measurement period should be defined in Tevaluate, but Tmeasure is also applicable for RSS measurement. Basically the RSS requirements should be in the same format as CRS measurement with different number of samples, i.e. Tmeasure can be reused and Tevaluate can be derived based on 3 or 5 samples we agreed for RSS.  **Issue 1-6: Measurement delays in CONNECTED mode**  P1 is fine. |

## 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** |
| [R4-2009117](https://www.3gpp.org/ftp/tsg_ran/WG4_Radio/TSGR4_95_e/Inbox/R4-2009117.zip) | Agreeable |
| R4-2008644 | Agreeable |
| R4-2008643 | Agreeable |
| R4-2008641 | Agreeable |

# Topic #2: Preconfigured uplink resources

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2007883 | Ericsson, Nokia, Nokia Shanghai Bell | **Observation:**  It is important to have synchronization requirements for PUR transmission especially for UEs configured with eDRX. |
| R4-2007919 | Ericsson, Nokia, Nokia Shanghai Bell | This CR contains the PUR RRM requirements as agreed in earlier way forwards [R4-1907733, R4-1910107, R4-1912735, R4-1915889]. |
| R4-2006164 | Qualcomm Incorporated | **Proposal 1.**  Tsearch in normal DRX is 120ms.  **Proposal 2.**  Transmit timing accuracy requirement in clause 7.24.2 to reflect transmission in PUR.  **Proposal 3.**  No further specification is necessary for synchronization requirements prior to PUR transmission. |
| R4-2007872 | Huawei, HiSilicon | **Observation 1:**  whether to use PUR for UL transmission is up to UE implementation according to RAN2 specification.  **Observation 2:**  RAN4 did not specify any sync requirements for RA or EDT based UL transmission.  **Proposal 1:**  RAN4 do not need to further specify the UE synchronization requirements before PUR.  **Proposal 2:**  RAN4 does not define additional measurement requirements for RSRP1. |
| R4-2007873 | Huawei, HiSilicon | CR: CR to add additional timing requirements for PUR |
| R4-2007874 | Huawei, HiSilicon | CR: CR on RRM requirements for PUR |

## 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 2-1: Tsearch in normal DRX

*Sub-topic description:*

Last meeting Tsearch in normal DRX was agrred as 5 SFs in normal and enhanced coverage. Other options were not precluded.

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

**Issue 2-1:**

* Proposals
  + Tsearch = 120 ms SF in normal DRX.
* Recommended WF
  + More discussions needed.

**Issue 2-2:**

* Proposals 1: RAN4 do not need to further specify the UE synchronization requirements before PUR.
* Proposals 2: RAN4 does not define additional measurement requirements for RSRP1.
* Proposal 3: Transmit timing accuracy requirement in clause 7.24.2 to reflect transmission in PUR.
* Proposal 4: No further specification is necessary for synchronization requirements prior to PUR transmission.
* Proposal 5: Important to have synchronization requirements for PUR transmission especially for UEs configured with eDRX.
* Recommended WF
  + More discussions needed. Based on the proposals and discussions so far, one of the following two options shall be selected and agreed:
    - * Option 1: RAN4 sticks to the previous agreements regarding the synchronization, and discussions can take place on corresponding CR wording.
      * Option 2: RAN4 agrees to not define any synchronization requirements for PUR, and discussions can take place on corresponding CR wording.

**Issue 2-3: conditions on RSRP1 measurement for TA validation**

RAN4 has earlier agreed on the measurement conditions for the first (RSRP1) and second (RSRP2) measurements that are used for TA validation.

* Proposal 1: RAN4 does not define additional measurement requirements for RSRP1.
* Recommended WF
  + Based on the proposals and discussions so far, one of the following two options shall be selected and agreed:
    - * Option 1: RAN4 sticks to eh previous agreement on the measurement conditions and discussions can take place on CR wording.
      * Option 2: RAN4 agrees to not introduce any measurement conditions and discussions can take place on CR wording.

### Sub-topic 2-2

*Sub-topic description:*

Discussions on CRs to capture the agreements.

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

**Issue 2-2: Please provide comments on CRs directly**

* Proposals
  + Option 1: TBA
  + Option 2: TBA
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Issue 2-2: We support proposals 1, 3, and 4. As discussed in our paper, Proposal 5 has issues because UE is not even required to transmit in every PUR occasion regardless of synchronization. In addition, synchronization requirements are satisfied once UE satisfies transmit timing accuracy requirements (Proposal 3). Support option 2 of WF.  Issue 2-3: We can support proposal 1 but no strong view on whether RSRP1 text should be dropped or not. |
| Ericsson | We are fine to revise section 4.7.3.2 to align with RAN2 agreements. In the revision , we do not specify the exact time duration for synchronization and Tserach times for normal DRX and eDRX are removed, instead it is stated that the UE shall be synchronized towards the serving cell prior to the transmission, and otherwise UE shall not transmit. I hope companies are fine with this revision and OK to make progress, this is the last meeting to close the core part.  On issue 2-3, the section in 4.7.3.3 captures the earlier RAN4 agreements which was agreed after lots of discussions, see R4-2007883. This does not conflict with any other agreements in any WGs. Thus we prefer to stick to the previous agreements. |
| Huawei | 2-2: We are fine with the compromise proposal from Ericsson above.  2-3: We still do not see the necessity have requirements for RSRP1, given the agreement we had in RAN4#93, i.e. RSRP1 := RSRP2. To us this is over-specifying.  **Reply to Huawei:**  That is a good point, this agreement is from the Chairman’s notes. This affects T1 and in current T1 definition it already says that it is the latest obtained NTA. But we can clarify in the revision as follows: - T1 is the time when the latest was obtained by the UE via Timing Advance Command MAC control element or PDCCH for transmission on PUR. I hope this addresses your concern. |
| Nokia | **Issue 2-2:** We prefer option 1.  **Issue 2-3: conditions on RSRP1 measurement for TA validation**  We prefer option 1. |

### 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** |
| R4-2007919 | Company A |
| Company B |
| Qualcomm: 4.7.3.2 is not necessary but we don’t have strong views on 4.7.3.3 but it needs some polishing.  Ericsson: as commented above for issue 2-1 and issue 2-2, also copied here:  We are fine to revise section 4.7.3.2 to align with RAN2 agreements. In the revision , we do not specify the exact time duration for synchronization and Tserach times for normal DRX and eDRX are removed, instead it is stated that the UE shall be synchronized towards the serving cell prior to the transmission, and otherwise UE shall not transmit. I hope companies are fine with this revision and OK to make progress, this is the last meeting to close the core part. |
| R4-2007873 | Company A |
| Company B |
| Qualcomm: OK, but we need to remove PUR from Section 7.1. Who will do it?  Ericsson: Agree that the PUR should be removed from old CR in section 7.1. Maybe this cam be done using the same timing CR (R4-2007873)? It is also possible to make this change at next meeting.  Huawei: After re-checking, we understand the Tx timing requirements are defined in  - 7.24 for Cat-M1, this is changed on 7873.  - 7.26 for Cat-M2, but no need to change as the applicability is referring to 7.24  - 7.26 for non-BL (as defined in 3.6.1), so we need to remove PUR from 7.1 which is not included in 7873.  Therefore, if this is ok for everyone we suggest to revise this CRto remove the PUR in 7.1- |
| R4-2007874 | Company A  Ericsson: We preference is to use R4-2007919 and work on the revision as discussed above.  Huawei: OK, we can work on 7919. |
| 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#2-1** | **Issue 2-1 and Issue 2-2:**  *Tentative agreements:*   * Do not specify the exact time duration for synchronization and Tserach times for normal DRX and eDRX, instead it is stated that the UE shall be synchronized towards the serving cell prior to the transmission, and otherwise UE shall not transmit (drop or postpone).   **To be discussed in 2nd round:**  **Issue 2-3: conditions on RSRP1 measurement for TA validation**  Whether to keep current agreements, but clarify that T1 is the time when the latest was obtained by the UE via Timing Advance Command MAC control element or PDCCH for transmission on PUR.    *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”* |
| R4-2007919 | To be revised. |
| R4-2007873 | To be revised. |
| R4-2007874 | Noted. |
|  |  |

## Discussion on 2nd round (if applicable)

**Issue 2-3: conditions on RSRP1 measurement for TA validation**

Whether to keep current agreements, but clarify that T1 is the time when the latest was obtained by the UE via Timing Advance Command MAC control element or PDCCH for transmission on PUR.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |
| Qualcomm | Keep the current agreement with the above clarification. |
| Huawei | We are fine with moderator’s suggestion. |

## 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** |
| R4-200xxxx | Agreeable |
| R4-2008646 | Agreeable |
|  |  |

# Topic #3: 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** |
| R4-2007367 | Ericsson | **Observation:**  Performance gain of MPDSCH with DMRS+CRS is more than 1dB compared with DMRS-only MPDCCH, except for with static channel with SNR>-10dB.  **Proposal:**  When the network configures the improved MPDCCH (*mpdcch-crs-connected-config*), UE applies the improved MPDCCH transmission parameters for evaluating the out-of-synch when 1) UE reports the Event E1 to the network or 2) UE triggers the out-of-synch indication to the higher layers. This is applicable for both CE Mode A UE and CE Mode B UE. |
| R4-2007368 | Ericsson | CR: CR to capture the enhanced MPDCCH requirement |

## Open issues summary

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

At last meeting it was agreed to support enhanced MPDCCH for following wo cases [R4-2005288]:

1. Enhanced MPDCCH is used:
   * When enhanced RLM E1 event is triggered
   * When in normal RLM OOS is triggered

### Sub-topic 3-1: CR

*Sub-topic description:*

Other interested companies were encouraged to provide simulation results to better compare and align the results. However, no new contribution with simulation results have been submitted for this meeting.

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

**Issue 3-1: CR**

* Proposals 1
  + CR in R4-2007368
* Recommended WF
  + Try to agree on the CR to capture the agreement from last meeting.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Qualcomm | Issue 3-1.  Why is event E1 having the same hypothetical parameters as normal OOS? The event E1 is supposed to be with Rmax/2; not Rmax. As we mentioned last time, we have only two sets of simulation results. One does not show the gain in fading channel even in low SNR and the other one does. What is the procedure here? We can only agree on moving forward if RAN4 agrees to define performance test case in static channel condition only. Otherwise, we need to wait for other companies to submit results. |
| Ericsson | We are fine with the recommended WF.  **Updated comments:**  Regarding event E1, our intention is to use this configuration only for OOS (not both OOS and E2) when UE indicate OOS or transmit Event E1.  Since the existing eMTC RLM test cases mainly use AWGN and ETU30. If Qualcomm concerns the performance in fading channel condition, we are fine to specify the test with static condition only, since we don’t expect more simulation result in the future. |
| Huawei | Similar comment as Qualcomm. We understand the new table is applicable for OOS but not for early OOS. We do not think the MPDCCH configuration for early OOS should be changed due to using CRS+DMRS for demodulation. |
|  |  |

### 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** |
| R4-2007368 | Company A |
| Company B |
| Qualcomm: please see comments in issue 3-1 above. |
|  | 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** |
| **Issue 3-1: CR** | **To be discussed in the 2nd round:**  Continue the discussion to sort out the questions raised in the 1st 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”* |
| R4-2007368 | To be revised. |

## Discussion on 2nd round (if applicable)

### Sub-topic 3-1: CR

Continue the discussions on the CR form the first round.

|  |  |
| --- | --- |
| **Company** | **Comment** |
| XXX | Sub topic 1-1: |
| Ericsson | Sub topic 3-1: (For CR revision R4-2008647)  The CR sets enhanced MPDCCH parameters only for legacy RLM OOS threshold. We do not intend to change MPDCCH parameters for early out-of-synch. This is the reason the table shows only OOS.  This CR also sets the condition when enhanced MPDCCH parameters are applied. We are proposing two conditions: 1) when UE triggers Event E1 and 2) when UE triggers Out-of-sync indication.  We are fine to specify the test with static condition only, and it will be discussed in performance part. If necessary we are fine to capture it in WF. |
| Huawei | We are still concerned why MPDCCH parameters for early OOS is changed when enhanced MPDCCH is assumed. |
| Ericsson | Our intention is to use the new enhanced MPDCCH parameters in CR to derive Qout\_catM1 **only**, when UE triggers   * Event E1 * Out of synch indication   We do **not** to indent to use this new enhanced MPDCCH parameters to derive both Qout\_catM1 and QE2\_out\_CatM1.  We hope this clarifies. |

## 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** |
| R4-2008647 | Agreeable |
|  |  |

# Topic #4: 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** |
| R4-2006181 | Qualcomm Inc. | CR: Correction of terminology in draft CR submitted in R4-2005422 |
| R4-2007369 | Ericsson | **Proposal 1:**  RAN4 reuse the downlink channel quality measurement report mapping of CQI-NPDCCH-Short-NB for eMTC short downlink channel quality report in MAC CE.  **Proposal 2:**  RAN4 defines the downlink channel quality measurement report mapping of short downlink channel quality report MAC CE as follow (see proposal 3 below). |
| R4-2007370 | Ericsson | CR:   * Introdution of measurement reporting table * Introdution of accuracy requirements for DL channel quality report. |
| R4-2007870 | Huawei, HiSilicon | **Proposal:**  Use the same 2-bit report mapping from Rel-14 NB-IoT for eMTC. |
| R4-2007871 | Huawei, HiSilicon | CR: DratfCR endorsed in R4-2005423 in RAN4#94-e-bis |

## 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 4-1: Reporting tables

*Sub-topic description:*

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

**Issue 4-1: Reporting table for 2-bit reporting**

* Proposals 1: Use the same 2-bit report mapping from Rel-14 NB-IoT for eMTC. [Huawei, HiSilicon]
* Proposal 2: RAN4 reuse the downlink channel quality measurement report mapping of CQI-NPDCCH-Short-NB for eMTC short downlink channel quality report in MAC CE. [Ericsson]
* Proposal 3: RAN4 defines the downlink channel quality measurement report mapping of short downlink channel quality report MAC CE as follow: [Ericsson]

|  |  |
| --- | --- |
| Reported value | MPDCCH repetition level |
| No short DCQR | No measurement reporting |
| Short DCCQ 1 | Rmax/8 (Note 1) |
| Short DCCQ 2 | Rmax (Note 2) |
| Short DCCQ 3 | 4xRmax (Note 3) |
| Note 1: When Rmax is less than 8, set Short DCCQ 1 to 1.  Note 2: When Rmax is 1, set Short DCQR 2 to 2.  Note 3: When Rmax is more than 32, set Short DCQR 3 to 256. | |

* Recommended WF
  + All three proposals seem aligned from a technical standpoint. It is recommended to agree on all proposals and work the CR.

**Issue 4-2: CR**

* Recommended WF
  + CR: R4-2006181: Merge with R4-2007370.
  + CR: R4-2007870: Agree on the CR since it has already endorsed in last meeting.

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1:  Sub topic 2-2:  ….  Others: |
| Qualcomm | Issue 4-1: we agree that the table is common among all proposals but there are subtle differences in the NOTES sections. We prefer the notes in our CR (6181) as they are aligned with limitations of Rmax.  Issue 4-2: we are fine to merge our CR to 7370. |
| Ericsson | **Issue 4-1:**  We are fine with the recommended WF, i.e. to agree on proposals and work on the CR.  **Issue 4-2:**  We are fine with the recommended WF.  **Updated comments:**  If we compare the proposal between Qualcomm (6181) and Ericsson (7370),  6181:  NOTE 1:   When Rmax is less than 8, set candidateRep-1 to 1.  NOTE 2:   When Rmax is more than 64, set candidateRep-3 to 512.  NOTE 3:   When Rmax is 1, set candidateRep-2 to 2.  NOTE 4:   Aggregation level (ECCE) is assumed to be L’max = 24.  7370:  Note 1:      When Rmax is less than 8, set Short DCCQ 1 to 1.  Note 2:      When Rmax is 1, set Short DCQR 2 to 2.  Note 3: When Rmax is more than 32, set Short DCQR 3 to 256.  Since MPDCCH max repetition is 256 (it is different from NB-IoT NPDCCH repetition), it is impossible to set 512 for QC’s proposal. So we want to use our Note 3. |
| Huawei | We agree with Ericsson’s view about the note for max value. |

### 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** |
| R4-2006181 |  |
|  |
|  |
| R4-2007370 |  |
|  |
|  |
| R4-2007871 |  |
|  |
|  |

## 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:*   * Proposals 1: Use the same 2-bit report mapping from Rel-14 NB-IoT for eMTC. [Huawei, HiSilicon] * Proposal 2: RAN4 reuse the downlink channel quality measurement report mapping of CQI-NPDCCH-Short-NB for eMTC short downlink channel quality report in MAC CE. [Ericsson]   *To be discussed in the 2nd round:*   * Proposal 3: RAN4 defines the downlink channel quality measurement report mapping of short downlink channel quality report MAC CE as follow: [Merge Qualcomm’s proposal to Ericsson’s table]  |  |  | | --- | --- | | Reported value | MPDCCH repetition level | | No short DCQR | No measurement reporting | | Short DCCQ 1 | Rmax/8 (Note 1) | | Short DCCQ 2 | Rmax (Note 3) | | Short DCCQ 3 | 4xRmax (Note 2) | | Note 1: When Rmax is less than 8, set Short DCCQ 1 to 1.  Note 2: When Rmax is more than 32, set Short DCQR 3 to 256.  Note 3: When Rmax is 1, set Short DCQR 2 to 2.  Note 4: Aggregation level (ECCE) is assumed to be L’max = 24. | |   According to the comments from Ericsson. The maximum value of Rmax=256 for MPDDCH, moderators set Note 2. *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”* |
| R4-2006181 | Noted |
| R4-2007870 | Agreeable |
| R4-2007370 | Revised |

## Discussion on 2nd round (if applicable)

**Issue 4-2: CR**

Discuss the following notes in the table:

Proposal 3: RAN4 defines the downlink channel quality measurement report mapping of short downlink channel quality report MAC CE as follow: [Merge Qualcomm’s proposal to Ericsson’s table]

|  |  |
| --- | --- |
| Reported value | MPDCCH repetition level |
| No short DCQR | No measurement reporting |
| Short DCCQ 1 | Rmax/8 (Note 1) |
| Short DCCQ 2 | Rmax (Note 3) |
| Short DCCQ 3 | 4xRmax (Note 2) |
| Note 1: When Rmax is less than 8, set Short DCCQ 1 to 1.  Note 2: When Rmax is more than 32, set Short DCQR 3 to 256.  Note 3: When Rmax is 1, set Short DCQR 2 to 2.  Note 4: Aggregation level (ECCE) is assumed to be L’max = 24. | |

According to the comments from Ericsson. The maximum value of Rmax=256 for MPDDCH, moderators set Note 2.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |
| Qualcomm | OK with Proposal 3 above. |
| Ericsson | We have uploaded the CR revision: R4-2008648 according to proposal 3. |
| Huawei | OK. |

## 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”* |
| R4-2008648 | Agreeable |
| R4-2007871 | Agreeable |
|  |  |

# Topic #5: Performance Requirements

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2007875 | Huawei, HiSilicon | **Proposal 8:**  RF margin for BL UE is assumed to be 4dB. |
| R4-2007885 | Ericsson | **Proposal #9:**  Use 3 dB RF margin for the BL UEs and 2.5 dB for non-BL UEs. |
| R4-2007889 | Ericsson | CR: CR to capture the RSS measurement accuracy 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 5-1: Accuracy requirements

*Sub-topic description:*

At last meeting the RF margin for non-BL UE was agreed as 2.5 dB. For RF margin of BL UE, there were two options in the WF [R4-2005288]:

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

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

* Proposals
  + P1: RF margin for BL UE is assumed to be 4dB.
  + P2: Use 3 dB RF margin for the BL UEs and 2.5 dB for non-BL UEs.
* Recommended WF
  + Companies are encouraged to provide their view on what RF margin to use.

**Issue 5-2: Please provide comments on CRs directly**

* Proposals
  + Option 1: TBA
  + Option 2: TBA
* Recommended WF
  + TBA

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 2-1:  Sub topic 2-2:  ….  Others: |
| Qualcomm | Issue 5-1: prefer P2 |
| Ericsson | Issue 5-1: we also have preference to use P2. |
| Huawei | Issue 5-1: prefer P1. We have agreed to use same margin as for CRS measurement which is 4dB. Also, we do not have the scope on tightening RF margin for the WI. |
| Ericsson | Since this belongs to the performance part, we prefer to focus on completing controversial issues of core part in this meeting. |

### 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** |
| R4-2007889 | Company A |
| Company B |
| Qualcomm: please define “R-RSRP” somewhere  Ericsson: We can do that.  Huawei: is the plan to agree the CR with TBD or [] for exact accuracy? It may be conflicting with the requirement for ITU submission.  Ericsson: Since this CR belongs to the performance part, it is not very urgent. Since this is the last meeting to complete the core part, we prefer and encourage companies to focus on the open issues of the core part since this is the last meeting. |
|  |  |
|  |
|  |

## 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#5-1** | *Tentative agreements:*  *Candidate options:*  **Issue 5-1: RF margin to use for RSS measurement for BL UE**   * + *Option 1:* RF margin for BL UE is assumed to be 4dB. [Huawei]   + *Option 2:* Use 3 dB RF margin for the BL UEs and 2.5 dB for non-BL UEs. [Ericsson, Qualcomm]   Moderator: Topic #5 shall treated with lower priority since it belongs to the performance part. Companies shall instead focus on resolving the remaining issues belonging to the core part since this is the last meeting.  *Recommendations for 2nd round:* |

*Suggestion on WF/LS assignment*

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

### 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”* |
| R4-2007889 | Postponed |

## Discussion on 2nd round (if applicable)

Priority is given to the previous topics (1-4) which belong to the core part. If time allows, companies can discussion topic #6.

|  |  |
| --- | --- |
| **Company** | **Comments** |
| XXX | Sub topic 1-1:  Sub topic 1-2:  ….  Others: |
| Qualcomm | Prefer option 2 but no strong view. |
| Huawei | Support option 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** |
|  |  |