3GPP TSG-RAN WG4 meeting #99-e *R4-210xxxx*

Electronic Meeting, 19th – 27th May 2021

**Agenda item:** 4.2.3, 5.2.2.3, 5.2.1

**Source:** Moderator (Ericsson)

**Title:** Email discussion summary for [99-e][203] LTE\_RRM\_maintenance

**Document for:** Information

# Introduction

The discussion covers NR-U AIs within 6.1.5.

**When updating this document, please remember to:**

* **use track changes while adding your comments in this document (only updates marked with change marks will be taken into the next version),**
* **change the file name, adding your company name, according to the instructions from RAN4 chair:**
* **Length of file names shall be reduced, e.g.**
  + **At the beginning of first round, moderators share / ftp / tsg\_ran / WG4\_Radio / TSGR4\_98\_e / Inbox / Drafts / [98e][101] NR\_NewRAT\_SysParameters\Summary\_101\_1st round\_v01.docx**
  + **After update by company A: Summary\_101\_1st round\_v02\_companyA**
  + **After update by company B: Summary\_101\_1st round\_v03\_companyA\_companyB**
  + **After update by company C: Summary\_101\_1st round\_v04\_companyB\_companyC**

## 1st round

The following list of open issues was identified, based on the contributions, for the 1st round.

The following colour marking is used below:

* A topic/issue proposed for discussion in: GTW session 1
* No discussion in the 1st round
* **Topic #1: NB-IoT (AI 4.2.3)**
* **Topic #2: Rel-16 MTC (AI 5.2.2.3)**

Sub-topic 3-1: RSS based RSRQ measurement

Issue 2-1-1: RSS based RSRQ measurement

Issue 2-1-2: LS to RAN2 about RAN4 agreement

* **Topic #3: Even further mobility enhancement (AI 5.2.1)**

Sub-topic 3-1: Further clarification on DL-to-UL and UL-to-DL switching time

Issue 3-1-1: Further clarification on DL-to-UL and UL-to-DL switching time in DAPS handover

## 2nd round

TBD

# Topic #1: NB-IoT

Contributions from AI 4.2.3 are discussed here.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2110349 | Huawei, HiSilicon | CR: On RRC re-establishment for NB-IoT R13 |
| R4-2110354 | Huawei, HiSilicon | CR: On requirements of cell reselection for NB-IoT R14 |
|  |  |  |
|  |  |  |

## 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** |
| Company A |  |

### CRs/TPs comments collection

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

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| R4-2110349 (Huawei, HiSilicon) | Company A |
| Company B |
| Ericsson: The CE level of the measured neighbour cell can be different than the CE level of the current servin cell. That is why there is a relation defined for Q2 in Table Table 4.6.2.4-1 . This table shows that the neighbour cell can hvae good coverage although the UE is operating in enhanced coverage wrt serving cell. Hence, this change is not needed. |
| Qualcomm: Ericsson makes a valid point and the change would not be justified by the stated reason for change. As an aside, perhaps RAN4 needs to discuss what would be the signal quality to guarantee successful detection on the first attempt. |
| Nokia: We agree with Ericsson that CE level may be different for serving cell and neighbour cell. This case is obviously treated by the 80 ms requirement. Thus, the CR is not needed. |
| Huawei:  To Ericsson and Nokia comments:  We have some different understandings. From Ericsson’s comments, 6.5.2.1 is for “serving cell” in normal coverage and 6.5.2.2 is for “serving cell” in enhanced coverage. But we have different understandings. First, different from cell reselection requirements as mentioned, there is no “serving cell” in RRC re-establishment. It could be observed from the test cases (A.6.1.15 and A.6.1.16), the channel condition of the nCell1 is same for both NC and EC, and what different is the conditions of nCell2 (4 dB for NC, -12.6 dB for EC). Also as mentioned about the Q, by tracking the change history of the spec, the requirements were also organized in the similar way as cell reselection (R4-164457), that there is Q and Tsearch is different when Q >-6 dB and -15 dB >Q> -6 dB in the same clause, and Q is defined as the NSCH Ês/Iot of target Cell NOT serving Cell. But eventually, the section is split in to NC and EC section and Q is removed. Hence, we believe the 6.5.2.2 is for target cell in enhanced coverage. Hence we believe the change is reasonable.  To Qualcomm: We prefer not to open the discussion on the specific conditions for the first attempt as it has been in the spec for long time in TS 36.133 for several requirements. |
| Huawei: 2nd round comment:  Thanks for companies’ comments in the 1st round. We think the thing needs to be clarified first is whether the requirement for NC/EC means when the “serving Cell” in NC/EC or the target Cell in NC/EC. From our understanding, it is for the channel condition of target cell which is different from that of IDLE mode cell reselection. The evidences are summarized as follows:   1. Test cases for NC and EC: Conditions for serving Cell as same but those for target cell are different. 2. In the initial CR (R4-164457), there is no separate clause for NC and EC and Q is used when Q >-6 dB and -15 dB >Q> -6 dB, and Q is defined as the NSCH Ês/Iot of target Cell NOT serving Cell, which is same as IDLE mode requirements as referred by companies. Then this clause is split into clause for NC and EC and Q is removed.   cid:image002.jpg@01D750CE.59832150   1. The requirements in NC and EC clause is 1400 ms and 14800ms respectively. The big difference of searching time depends on the condition of target cell based on simulation results. It has little to do with the conditions of serving cell as the connection to the source serving cell is already broken.   We also provided above comments in a separate thread for CR discussion for your easy checking.  Ericsson:  Regarding the CR in R4-2110349 (RRC re-establishment for NB-IoT R13), we have concern on this CR. We don’t it is essential to go back in Rel-13 and removing requirements. Also note that companies have different views about the applicability of CE level wrt serving/target cells. Please also refer to the session chair recommendation:  *“Session chair: Rel-13 CR. Need very strong justification to make changes to Rel-13. Further clarifications whether the change is critical and on backward compatibility shall be provided. Need to come back in GTW before CR is agreed.”* |
| Qualcomm (2nd round):  Since there seems to be disagreement about how CE level should be determined in this case, our suggestion is to return to this CR in the next meeting. This does not seem to be an urgent issue. |
|  | Nokia (2nd round): agree with Qualcomm. If clarification is needed, latest (active) release can be corrected. |
| R4-2110354 (Huawei, HiSilicon) | Ericsson: It seems the reference to the reselection margin table is missing also in inter-frequency EC case. So we should fix the reference to the table in both NC and EC. |
| Qualcomm: OK |
| Nokia: The CR needs revision.  In our view term ‘Pcarrier’ should be replaced in this section by more meaningful term “Nfreq\_NB-IoT”. This is then also needed in the EC related section (in total 4 occurences). Change from 5 dB to Y dB is ambiguous in table 4.6.2.6-3, as Y can take several values in the subsequent section for enhanced coverage. Thus, either keep 5 dB. or add condition: Q1 >=-6. Change “where Pcarrier is the number of inter-frequency measured”: this is not accurate wording, it should say: “where Pcarrier is the number of inter-frequency carriers for which carrier frequency information was provided by the serving NB-IoT cell” (this information is available at UE for doing the evaluation). The terms “NB-IoT\_SCH\_RP” and “SCH” are outdated, thus need to be updated, as done two paragraphs later. |
| Huawei:  To Ericsson and Nokia:  Thanks for the comments. We could revised this to capture your comments. |

## 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** |
|  | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

## Discussion on 2nd round (if applicable)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

**Issue 1-1-1: CR: On RRC re-establishment for NB-IoT R13**

Proposals

* Proposal 1 (HW):CR on On RRC re-establishment for NB-IoT R13

Recommended WF

* Companies to continue discussing the CR in R4-2110349 and provide comments directly under issue 1.3.2.

### CRs/TPs

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

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **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)

# Topic #2: Rel-16 MTC

Contributions from AI 5.2.2.3 are discussed here.

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2109868 | Qualcomm Incorporated | CR: Time synchronization assumption for RSS-based neighbor cell measurements |
| R4-2110276 | Nokia, Nokia Shanghai Bell | 1. RAN4 to discuss the pros and cons of both approaches, i.e. whether to introduce RSS based RSRQ requirements in RAN1 and RAN4 specifications or to adjust applicability requirements in TS 36.133 to enable reuse of existing CRS based RSRQ measurements in case of RSS based RSRP measurement configuration. |
| R4-2110853 | Huawei, HiSilicon | **Proposal:** Capture the following assumption and condition for RSS measurement in 36.133:  For performing RSRP measurement based on RSS on detected intra-frequency cells, UE assumes the neighbour cell RSS starts in the radio frame (w.r.t. neighbor cell timing) that is closest in time to the derived serving cell radio frame offset, and the requirements apply provided that neighbor cell starts RSS transmission from said radio frame. |
| R4-2110854 | Huawei, HiSilicon | CR: On remaining issues in Rel-16 eMTC RRM |
| R4-2111251 | Ericsson | * Observation #1: Rel-16 eMTC WI objective only includes improving the DL RSRP measurement accuracy through use of RSS, i.e. RSRQ is not included. * Observation #2: Rel-16 WI on eMTC is completed and thus RSRQ measurement support through use of RSS (if introduced) has be done under TEI work item. * Observation #3: Only small technical enhancement work is allowed under TEI work item. * Observation #4: The work of introducing RSS based RSRQ can be divided into following:   + Agreeing on simulation assumptions   + Evaluating the feasibility of RSRQ   + If found feasible, develop detailed requirements * **Proposal:** RSS based RSRQ shall not be introduced under TEI work for release 16 eMTC. |
| R4-2110647 | Ericsson | CR: Correction of RLM test parameters for MPDCCH performance improvement |

## 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

Background: RAN4 has received LS response related to RSS based RSRQ measurement as follows [R2-2104392]:

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| --- |
| The options proposed by RAN4 are:   * *Option 1: Remove RSRQ from the cell selection and cell re-selection criterion when a cell is measured using RSS.* * *Option 2: Define RSRQ for RSS measurements*   RAN2 has discussed the options listed in the LS and concluded that from RAN2 perspective option 1 is not preferred because it may have an impact on cell (re)-selection performance and behaviour, but it is up to RAN1 and RAN4 to decide. |

### Sub-topic 2-1: RSS based RSRQ measurement

**Issue 2-1-1: RSS based RSRQ measurement**

Proposals

* Proposal 1 (Ericsson):
  + RSS based RSRQ shall not be introduced under TEI work for release 16 eMTC.

Recommended WF

* Discuss the proposal

**Issue 2-1-2: LS to RAN2 about RAN4 agreement**

Proposals

* + Proposal 1 (Ericsson): Send LS RAN2 informing about the RAN4 agreement to no introduce RSS based RSRQ measurement in release 16.

Recommended WF

* Discuss whether to send the LS in R4-2111251

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| --- | --- |
| **Company** | **Comments** |
| Ericsson | **Issue 2-1-1: RSS based RSRQ measurement**  WI objective only includes RSS based RSRP measurement, and RSRQ is not stated. Introducing RSRQ will require a lot of work which comprises:   * Agreeing on simulation assumptions, * evaluating the feasibility of RSRQ, * if found feasible, develop detailed requirements   However, only small technical enhancement work is allowed under TEI and RSRQ is more than that in our view. Thus SS based RSRQ shall not be introduced under TEI work for release 16 eMTC. RAN4 can send LS to RAN2 informing about the RAN4 agreement to no introduce RSS based RSRQ measurement in release 16.  **Issue 2-1-2: LS to RAN2 about RAN4 agreement**  We support the proposal that RAN4 sends LS to RAN2 informing about the RAN4 agreement to no introduce RSS based RSRQ measurement in release 16 and update specification if needed. |
| Qualcomm | **Issue 2-1-1**  **Issue 2-1-2**  RAN1 is currently discussing this issue. RAN4 should wait for the response from RAN1. |
| Nokia | **Issue 2-1-1: RSS based RSRQ measurement**  We are surprised that our proposal to fallback to CRS based RSRQ is not included in the discussion, as it is related to this topic. We think our proposal to revert back to CRS based RSRQ should be discussed for Rel-16 as well. Then, RSS based RSRQ can be investigated for Rel-17 as proposed by Ericsson. This way, cell reselection can always rely on RSRQ evaluation, as preferred by RAN2.  **Issue 2-1-2: LS to RAN2 about RAN4 agreement**  In our view, informing RAN2 (and also sending a copy to RAN1) that Rel-16 UE has a different cell reselection algorithm, i.e. using RSS based RSRP only, than what could be expected for Rel-17, looks somewhat strange. Why should a Rel-15 UE support CRS based RSRQ evaluation, a Rel-16 UE discard RSRQ evaluation and a Rel-17 UE again apply it based on RSS. Further discussion is needed in RAN4 on the possible options before sending an LS. |
| Huawei | **Issue 2-1-1: RSS based RSRQ measurement**  We do not think it is up to RAN4 to make the decision on whether RSS RSRQ should be introduced or not. Actually, RAN4 sent LS R4-2103728 in RAN4#98-e because there was no consensus in RAN4. From RAN2 reply LS R2-2104392, there may be impact on the mobility performance if RSS RSRQ is not introduced. The issue is also being discussed in RAN1, so RAN4 should wait for conclusions from RAN1 instead of making decision in this RAN4 meeting.  On the possible efforts in RAN4 if RSS RSRQ is to be introduced, we acknowledge that RAN4 needs to develop the requirements (mainly accuracy), but there is no need to do simulation or evaluate the feasibility. Such work was never done for RSS RSRP, and we do not see why they are needed for RSS RSRQ.  We think the proposal from Nokia, i.e. to use CRS RRSQ is another alternative, but we need more time to check on it.  **Issue 2-1-2: LS to RAN2 about RAN4 agreement**  Same comment as for Issue 2-1-1. |

### 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** |
| *R4-2109868* (Qualcomm Incorporated) | Ericsson: In the beginning of the section, there is already a list of conditions under which RSS based measurements apply. Our preference is to add one more condition related to the neighbour cell measurements as follows:   * “RSS-based RSRP measurements defined in this section apply provided that the the start of RSS transmission on neighbor cells is within a window of +/- 5ms around the calculated frame offset calculated from RRC signalling [list the reference] in the serving cell.”   The above sentence is sufficient and rest can be removed. |
| Qualcomm:  Thanks for Ericsson’s comment. There is already a similar paragraph (right before our proposed change) stating an applicability condition based on assumptions about the BL/CE DL subframe configuration. We followed that structure when adding this new SFN timing assumption. Should we change both? |
| Nokia: The proposed text is somewhat clearer than in Huawei’s CR (also the alignment to 36.331 is preferable). However only idle mode is treated here and also connected mode related sections, i.e. for CE mode A and CE mode B, need to be included, as done in Huawei’s CR. Regarding the cover page, since the text specifies that neighbour cell needs to follow this rule for RSS transmission, the RAN box should be ticked as well. |
| R4-2110854 (Huawei, HiSilicon) | Ericsson: We prefer the wording similar to those proposed in R4-2109868 because it is more is more concrete, it states the condition that maximum timing difference is +/- 5 ms. This is much more clearer than stating that "RSS starts in the radio frame (w.r.t. neighbor cell timing) that is closest in time to the derived serving cell radio frame offset". |
| Qualcomm: We would prefer to make a more direct reference to the wording in the RAN1 LS response. Please consider the alternate wording suggested below.  “Additionally, for performing RSS-based RSRP measurements on detected intra-frequency cells, the UE assumes that the RSS transmission of each neighbor cell starts in the radio frame that is closest in time, i.e. within a window of +/- 5ms, around the corresponding radio frame offset calculated from RRC signalling in the serving cell, as described in TS 36.331 subclause 6.3. The requirements for RSS-based RSRP measurements for neighbor cells apply provided that the network can guarantee that the start of the neighbor cell RSS is within this time window.” |
| Nokia: The CR proposed by Qualcomm is preferred. A neighbour cell needs to follow this rule for RSS transmission. Thus, the RAN box should be ticked as well on cover page. |
| Huawei: To Ericsson, we understand that “start of RSS transmission” is not accurate enough for specification. UE measures neighbor cell RSS based on the detected neighbor cell frame timing, and UE needs to determine from which radio frame (w.r.t. neighbor cell timing) it should start RSS measurement, so it should be the “first RSS frame” that is within a window of +/- 5ms around ....  To QC, we are in principle fine with the wording suggested to align the wording in RAN1 LS, but we suggest to update condition part as highlighted, for the same reason above.  “Additionally, for performing RSS-based RSRP measurements on detected intra-frequency cells, the UE assumes that the RSS transmission of each neighbor cell starts in the radio frame that is closest in time, i.e. within a window of +/- 5ms, around the corresponding radio frame offset calculated from RRC signalling in the serving cell, as described in TS 36.331 subclause 6.3. The requirements for RSS-based RSRP measurements for neighbor cells apply provided that the network can guarantee that the RSS transmission of each neighbor cell starts in the radio frame within a window of +/- 5ms around the calculated radio frame offset of the serving cell.”  To Nokia, we can further discuss the wording, and also correct the cover page. |
| R4-2110647 (Ericsson) | Qualcomm: Suggest corrections below. OK otherwise. A.7.3.99.2 Test Requirements The UE shall compare the downlink radio link quality of the PCell over the last Qout\_CatM1 evaluation, which is defined in 7.19.4.1, with the threshold QE1\_out\_CatM. When the estimated quality becomes ~~better~~worse than the threshold starting….  Same correction in A.7.3.100.2 Test RequirementsA.7.3.101.2 Test Requirements |

## 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 2-1-1: RSS based RSRQ measurement**  *Tentative agreements:*  *Candidate options:*   * + Option 1:RSS based RSRQ shall not be introduced under TEI work for release 16 eMTC.   + Option 2: Adjust applicability requirements in TS 36.133 to enable reuse of existing CRS based RSRQ measurements in case of RSS based RSRP measurement configuration.   + Option 3: Wait for RAN1 conclusion on whether to introduce RSS based RSRQ under TEI work for release 16 eMTC.   *Recommendations for 2nd round:*  Continue the discussions from 1st round and companies to provide comments on the candidate options which now include option 2 from Nokia.  **Issue 2-1-2: LS to RAN2 about RAN4 agreement**  *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:*  *Focus on issue 2-1-1. If agreement is reached for issue 2-1-1, then discuss the content of LS to RAN2.* |

### 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)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

**Issue 2-1-1: RSS based RSRQ measurement**

Candidate options*:*

* + Option 1:RSS based RSRQ shall not be introduced under TEI work for release 16 eMTC.
  + Option 2: Adjust applicability requirements in TS 36.133 to enable reuse of existing CRS based RSRQ measurements in case of RSS based RSRP measurement configuration.
  + Option 3: Wait for RAN1 conclusion on whether to introduce RSS based RSRQ under TEI work for release 16 eMTC.

Recommended WF:

Continue the discussions from 1st round and companies to provide comments on the candidate options which now include option 2 from Nokia.

**Issue 2-1-2: LS to RAN2 about RAN4 agreement**

Recommended WF

Focus on issue 2-1-1. If agreement is reached for issue 2-1-1, then discuss the content of LS to RAN2 in R4-2111251.

## Companies views’ collection for 2nd round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Huawei | **Issue 2-1-1: RSS based RSRQ measurement**  Support option 3. We do not think RAN4 should make decision in parallel when RAN1 is also discussing the same issue.  **Issue 2-1-2: LS to RAN2 about RAN4 agreement**  Same comment as Issue 2-1-1. |
| Ericsson | **Issue 2-1-1: RSS based RSRQ measurement**  Although option 1 is our preference, we are open to investigate feasibility of option 2. We are fine to look into the whether and how option 2 can be realized. Both options can be captured in the WF and companies may look into them more in detail until next meeting.  **Issue 2-1-2: LS to RAN2 about RAN4 agreement**  Defer the LS until issue 2-1-1 is resolved. |
| Qualcomm | **Issue 2-1-1: RSS based RSRQ measurement**  We support option 3.  **Issue 2-1-2: LS to RAN2 about RAN4 agreement**  Wait for feedback from RAN1. |
| Nokia | **Issue 2-1-1: RSS based RSRQ measurement**  We support option 3. RAN4 should discuss alternative options (option 1, option 2, others) once RAN1 decided against TEI16 work.  **Issue 2-1-2: LS to RAN2 about RAN4 agreement**  There is no need to send an LS from this meeting. An LS should be sent to RAN2, e.g. once RAN1 has taken a decision against TEI16 work and RAN4 has identified an alternative solution. |

# Topic #3: Even further mobility enhancement

Contributions from AI 5.2.1 are discussed here.

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2110375 | Huawei, HiSilicon | CR: Clarification on asynchronous DAPS handover |
| R4-2110391 | Ericsson | CR: Correction on the synchronous condition for DAPS handover |
| R4-2110390 | Ericsson | **Observation 1:** Network does not know the exact timing condition at UE when DAPS HO is being performed  **Observation 2:** It is important not to extend GP to facilitate DAPS operation, from an overhead perspective  **Proposal 1:** Prior to random access procedure autonomous interruption is done in communication towards the target cell as necessary to enable the UE to have sufficient switching time, and after the random access procedure autonomous interruption is done in communication towards source cell as necessary to allow the UE to have sufficient switching time. |

## Open issues summary

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

Background:

Following issue from the NR DAPS way forward agreed in RAN4#97 is discussed:

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| --- |
| * Issue 1-3: further clarification on DL-to-UL and UL-to-DL switching time   + Option 1: clarify that 13us switching time is allowed between source cell and target cell:     - Note 2: For DAPS handover on a TDD band, a UE is not expected to transmit in the uplink to source or target cell earlier than NRX-TX after the end of the last received downlink symbol from source or target cell in the same TDD band where NRX-TX=25600Tc.     - Note 3: For DAPS handover on a TDD band, a UE is not expected to receive in the downlink from source or target cell earlier than NTX-RX after the end of the last transmitted uplink symbol toward source or target cell in the same TDD band where NTX-RX=25600Tc.   + Option 2: Retain the existing specification that DL-to-UL and UL-to-DL switching time applies within the same cell     - Note 2:      For DAPS handover on a TDD band, a UE is not expected to transmit in the uplink earlier than NRX-TXafter the end of the last received downlink symbol in the same cell where NRX-TX=25600Tc.     - Note 3:  For DAPS handover on a TDD band, a UE is not expected to receive in the downlink earlier than NTX-RX after the end of the last transmitted uplink symbol in the same cell where NTX-RX=25600Tc.   + Option 3: clarify that 10us switching time is allowed between source cell and target cell     - Note 2: For DAPS handover on a TDD band, a UE is not expected to transmit in the uplink to source or target cell earlier than NRX-TX after the end of the last received downlink symbol from source or target cell in the same TDD band where NRX-TX=19712Tc.     - Note 3: For DAPS handover on a TDD band, a UE is not expected to receive in the downlink from source or target cell earlier than NTX-RX after the end of the last transmitted uplink symbol toward source or target cell in the same TDD band where NTX-RX=19712Tc.   + Other options |

### Sub-topic 3-1: Further clarification on DL-to-UL and UL-to-DL switching time

**Issue 3-1-1: Further clarification on DL-to-UL and UL-to-DL switching time in DAPS handover**

Proposals

* Proposal 1 (Ericsson):
  + Prior to random access procedure autonomous interruption is done in communication towards the target cell as necessary to enable the UE to have sufficient switching time, and after the random access procedure autonomous interruption is done in communication towards source cell as necessary to allow the UE to have sufficient switching time.

Recommended WF

* Discuss the proposal

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | **Issue 3-1-1: Further clarification on DL-to-UL and UL-to-DL switching time**  The general condition is 20 µs as indicated, for example, in note 2 and note 3 of our CR R4-2110391. We all agree to that.  Note 2: For DAPS handover on a TDD band, a UE shall be capable to transmit in the uplink to source or target cell after 20usafter the end of the last received downlink symbol from the source or target cell in the same TDD-band.  Note 3: For DAPS handover on a TDD band, a UE shall be capable to receive in the downlink from source or target cell after 20us after the end of the last transmitted uplink symbol towards source or target cell in the same TDD-band.  However they key point in our proposal is that there are cases where this time constraint can not be met as shown in R4-2110390. For those cases we have added text in note 2 and note 3, “When this condition is not met, the UE may perform autonomous interruption as shown in table 5.7.1-2.” and “When this condition is not met, the UE may perform autonomous interruption as shown in table 5.7.1-3.”  This makes UE behavior complete and predictable during network operation, for all possible cases.  We think that just stating the general condition NRX-TX=26500 Tc then there are cases that become undefined and unpredictable, when it comes to network behavior.  Table 5.7.1-2: Autonomous interruptions related to DL to UL switching for syncrounous TDD DAPS handover in the same band   |  |  | | --- | --- | | **Scenario** | **Allowed interruption** | | Target cell earlier than source cellNote 1, prior to start of random access | Not applicable | | Target cell later than source cell Note 1, prior to start of random access | The UE may stop receiving the target DL up to 20µS prior to the start of the source UL | | Target cell earlier than source cell Note 1, after start of random access | The UE may stop receiving the source DL up to 20µS prior to the start of the target UL | | Target cell later than source cell Note 1, after start of random access | The UE may start transmitting the source UL up to 20µS after the start of the source DL | | Note 1: As observed by UE at antenna connector | |   Table 5.7.1-3: Autonomous interruptions related to UL to DL switching for syncrounous TDD DAPS handover in the same band   |  |  | | --- | --- | | **Scenario** | **Allowed interruption** | | Target cell earlier than source cell Note 1, prior to start of random access | The UE may start receiving the target DL up to 20µS after the end of the source UL | | Target cell later than source cell Note 1 prior to start of random access | Not applicable | | Target cell earlier than source cell Note 1, after start of random access | The UE may stop transmissions of the source UL up to 20µS prior to the start of target DL reception. | | Target cell later than source cell Note 1, after start of random access | The UE may start receiving the source DL up to 20µS after the end of the target UL | | Note 1: As observed by UE at antenna connector | | |
| Nokia | We can follow the conclusion of the same issue in NR\_mobility DAPS handover discussion |
| Huawei | **Issue 3-1-1: Further clarification on DL-to-UL and UL-to-DL switching time**  We have a different way: For DAPS handover on a TDD band, a UE is not expected to transmit in the uplink to source or target cell earlier than 20usafter the end of the last received downlink symbol from source or target cell in the same TDD band.  This issue is discussing in mail thread [204] NR DAPS. The same conclusion can be reused here |
| Qualcomm | **Issue 3-1-1:**  We agree in principle that the solutions for LTE and NR sync DAPS HO should be the same. However we’re not sure if this is possible due different transition time assumptions for each tech. We suggest to keep discussing in the 2nd round. |

### 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** |
| R4-2110375  (Huawei, HiSilicon) | Ericsson  There are cases when the general condition of 20 µs time constraint can not be met as shown in R4-2110390. For those cases we have added text in note 2 and note 3: “When this condition is not met, the UE may perform autonomous interruption as shown in table 5.7.1-2.” and “When this condition is not met, the UE may perform autonomous interruption as shown in table 5.7.1-3.”  This makes UE behaviour complete and predictable during network operation, for all possible cases.  We think that just stating the general condition of 20 µs then there are cases that become undefined and unpredictable, when it comes to network behaviour. |
| Nokia: Question for clarification: it will not be known to network when the conditions in Note 2 and Note 3 are fulfilled – correct?  If this is the case it seems difficult for the network to know when or if a UE would be capable of DAPS.  This CR needs to be discussed with the Ericsson CR. However, our understanding is that not limiting the UE transmission and reception in DAPS to the time difference observed on UE side (but instead allow some interrupts) would make the DAPS operation more visible on network side (from UE behavior point of view)? |
| Qualcomm: We’re not sure if the proposed solution is feasible. Continue discussing in the 2nd round. |
| R4-2110391 (Ericsson) | Ericsson  The general condition is 20 µs as indicated, for example, in note 2 and note 3 of our CR R4-2110391. We all agree to that.  Note 2: For DAPS handover on a TDD band, a UE shall be capable to transmit in the uplink to source or target cell after 20usafter the end of the last received downlink symbol from the source or target cell in the same TDD-band.  Note 3: For DAPS handover on a TDD band, a UE shall be capable to receive in the downlink from source or target cell after 20us after the end of the last transmitted uplink symbol towards source or target cell in the same TDD-band.  However they key point in our proposal is that there are cases where this time constraint can not be met as shown in R4-2110390. For those cases we have added text in note 2 and note 3, “When this condition is not met, the UE may perform autonomous interruption as shown in table 5.7.1-2.” and “When this condition is not met, the UE may perform autonomous interruption as shown in table 5.7.1-3.”  This makes UE behavior complete and predictable during network operation, for all possible cases.  We think that just stating the general condition NRX-TX=26500 Tc then there are cases that become undefined and unpredictable, when it comes to network behavior.  Table 5.7.1-2: Autonomous interruptions related to DL to UL switching for syncrounous TDD DAPS handover in the same band   |  |  | | --- | --- | | **Scenario** | **Allowed interruption** | | Target cell earlier than source cellNote 1, prior to start of random access | Not applicable | | Target cell later than source cell Note 1, prior to start of random access | The UE may stop receiving the target DL up to 20µS prior to the start of the source UL | | Target cell earlier than source cell Note 1, after start of random access | The UE may stop receiving the source DL up to 20µS prior to the start of the target UL | | Target cell later than source cell Note 1, after start of random access | The UE may start transmitting the source UL up to 20µS after the start of the source DL | | Note 1: As observed by UE at antenna connector | |   Table 5.7.1-3: Autonomous interruptions related to UL to DL switching for syncrounous TDD DAPS handover in the same band   |  |  | | --- | --- | | **Scenario** | **Allowed interruption** | | Target cell earlier than source cell Note 1, prior to start of random access | The UE may start receiving the target DL up to 20µS after the end of the source UL | | Target cell later than source cell Note 1 prior to start of random access | Not applicable | | Target cell earlier than source cell Note 1, after start of random access | The UE may stop transmissions of the source UL up to 20µS prior to the start of target DL reception. | | Target cell later than source cell Note 1, after start of random access | The UE may start receiving the source DL up to 20µS after the end of the target UL | | Note 1: As observed by UE at antenna connector | | |
| Nokia: In general support the solution where the deployment of DAPS does not affect the cells involved in general but instead only affects the actual UE operating under DAPS (with some potential degradation in TP).  One clarifying question related to ‘When this condition is not met, the UE may perform autonomous interruption as shown in Table 5.7.1-2’ which is inside the table. Should this be a note outside the table as it is not a requirement? |
| Huawei: wait for conclusion in mail thread [204] NR DAPS |
| Qualcomm: We would prefer to have a simpler solution. Continue discussing in the second round and monitor progress in NR thread 204. |

## 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 4-1** | **Issue 3-1-1: Further clarification on DL-to-UL and UL-to-DL switching time**  *Tentative agreements:*  *Candidate options:*   * Option 1: Apply the conclusion from NR mobilty DAPS discussions in thread 204 for this issue for LTE DAPS handover.   *Recommendations for 2nd round:*  Companies to provide their views on option 1 taking into account the differences between LTE DAPS HO and NR DAPS HO. |
|  |  |

### 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)

*Moderator can provide summary of 2nd round here. Note that recommended decisions on tdocs should be provided in the section titled ”Recommendations for Tdocs”.*

**Issue 3-1-1: Further clarification on DL-to-UL and UL-to-DL switching time**

Candidate options*:*

* + Option 1:Apply the conclusion from NR mobilty DAPS discussions in thread 204 for this issue for LTE DAPS handover.

Recommended WF

Companies to provide their views on option 1 taking into account the differences between LTE DAPS HO and NR DAPS HO.

## Companies views’ collection for 2nd round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
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# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |
| --- | --- | --- |
| **Title** | **Source** | **Comments** |
| WF on … | YYY |  |
| LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
| WF on LTE RRM maintenance | Ericsson | *WF to capture the agreements/issues from this thread.* |

**Existing tdocs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-2110349 | CR on RRC re-establishment for NB-IoT R13 | Huawei, HiSilicon | Return to |  |
| R4-2110350 | CR on RRC re-establishment for NB-IoT R14 | Huawei, HiSilicon | Return to |  |
| R4-2110351 | CR on RRC re-establishment for NB-IoT R15 | Huawei, HiSilicon | Return to |  |
| R4-2110352 | CR on RRC re-establishment for NB-IoT R16 | Huawei, HiSilicon | Return to |  |
| R4-2110353 | CR on RRC re-establishment for NB-IoT R17 | Huawei, HiSilicon | Return to |  |
| R4-2110354 | CR on requirements of cell reselection for NB-IoT R14 | Huawei, HiSilicon | Revised |  |
| R4-2110355 | CR on requirements of cell reselection for NB-IoT R15 | Huawei, HiSilicon | Return to |  |
| R4-2110356 | CR on requirements of cell reselection for NB-IoT R16 | Huawei, HiSilicon | Return to |  |
| R4-2110357 | CR on requirements of cell reselection for NB-IoT R17 | Huawei, HiSilicon | Return to |  |
| R4-2109868 | Time synchronization assumption for RSS-based neighbor cell measurements | Qualcomm Incorporated | Revised |  |
| R4-2109869 | Time synchronization assumption for RSS-based neighbor cell measurements | Qualcomm Incorporated | Return to |  |
| R4-2110854 | CR on remaining issues in Rel-16 eMTC RRM | Huawei, HiSilicon | Noted. | To be merged with R4-2109868 based on comments. |
| R4-2110855 | CR on remaining issues in Rel-16 eMTC RRM R17 | Huawei, HiSilicon | Withdrawn |  |
| R4-2111251 | LS on RAN4 agreement on RSS based RSRQ measurement for cat-M | Ericsson | Return to |  |
| R4-2110375 | Clarification on asynchronous DAPS handover R16 | Huawei, HiSilicon | Return to |  |
| R4-2110376 | Clarification on asynchronous DAPS handover R17 | Huawei, HiSilicon |  |  |
| R4-2110391 | Correction on the synchronous condition for DAPS handover | Ericsson | Return to |  |
| R4-2110392 | Correction on the synchronous condition for DAPS handover | Ericsson | Return to |  |
| R4-2110647 | Correction of RLM test parameters for MPDCCH performance improvement | Ericsson | Revised |  |
| R4-2110779 | Correction of RLM test parameters for MPDCCH performance improvement | Ericsson | Return to |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Tdoc number** | **Title** | **Source** | **Recommendation** | **Comments** |
| R4-210xxxx | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-210xxxx | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-210xxxx | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
   1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
   2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents