**3GPP TSG-RAN WG4 Meeting #94-e R4-20xxxxx**

**Electronic Meeting, Feb.24th – Mar.6th 2020**

**Agenda item:** 7.12.1

**Source:** Moderator (Nokia, Nokia Shanghai Bell)

**Title:** Email discussion summary for RAN4#94e\_#72\_LTE\_feMob\_RRM

**Document for:** Information

# Introduction

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

In RAN4#93 meeting, we have agreed most of the requirements for LTE mobility enhancement and the requirements were introduced in the specification 36.133 Rel-16 (R4-1915943 & R4-1915948). The open issues were captured in the agreed way forward (R4-1915920), and this way forward will be the input for this topic in RAN4#94-e meeting.

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| *Companies are encouraged to provided analysis on:*   * *Interruption in DAPS HO D1 to down select from option 1 and option 2 in slide 2.* * *Power imbalance between the source and target cells in DAPS intra-frequency HO side condition.* * *Restrictions related to source and target BW.* * *TRRC\_2 in conditional handover*   *Conclusion on issues above will be made in RAN4#94.* |

According to the meeting agenda, we will have 2 topics for discussion:

* Conditional handover
* Reduction of user data interruption (DAPS)

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

* 1st round: Get agreement on the conditional handover delay requirements and DAPS delay requirements, if possible, we can also get agreement on text proposals.
* 2nd round: Get agreement on the text proposals if text proposals for conditional handover delay requirement and DAPS delay requirements are not treated in 1st round.

# Topic #1: Conditional Handover

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

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2001336 | Nokia, Nokia Shanghai Bell | 1. Remove *TCHO\_execution* from Dhandover for conditional handover. 2. Agree to one of the text proposals in section 2.3. |
| R4-2001411 | Ericsson | **Proposal 1**: TCHO\_execution is specified as [5]ms  **Observation 1**: Conditional PSCell addition or release is not within the scope of release 16 mobility enhancements since it involves the MN  **Proposal 2:** No additional requirements are needed for PSCell addition, release or change in 36.133 |
| R4-2001412 | Ericsson | Text Proposal to capture the proposal#1 in R4-2001411 |
| R4-2001839 | Qualcomm Incorporated | CR, Corrections to HO delay requirements for conditional HO   1. Clarified measurement period defintion and corrected references and included inter-frequency case 2. Clarified preparetion time defintion 3. Clarified the interruption time defintion 4. Corrected reference in clause 5.1.2.7 5. TCHO\_execution is specified as [10]ms |

## Open issues summary

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

Based on the contributions, observations and proposals following list of sub-topics for further discussion and agreement have been identified:

1. TCHO\_execution
2. Text Proposals for conditional Handover
3. Additional requirements for PSCell addition, release or change in 36.133

### Sub-topic 1-1

*Sub-topic description:* Discuss the needed of TCHO\_execution and its’ value for conditional handover delay requirement.

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

**Issue 1-1: TCHO\_execution**

* Proposals
  + Option 1: Removed
  + Option 2: [5] ms
  + Option 3: [10] ms
* Recommended WF:
  + Firstly, discuss if TCHO\_execution should be removed from Dhandover for conditional handover.
    - Option 1: Removed
    - Option 2: Not removed
  + Secondly, if TCHO\_execution is needed, what it should be:
    - Option 1: [5] ms
    - Option 2: [10] ms

### Sub-topic 1-2

*Sub-topic description:* Discuss the text proposal for correction of the conditional handover requirements

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

**Issue 1-2: Reference for TDD cell is not correct in conditional handover requirements**

* Proposals
  + Option 1: When the target cell is a TDD cell, the references should refer to TDD requirements.
* Recommended WF
  + Potential agreements: In Conditional handover requirements, when the target cell is a TDD cell, the references should refer to TDD requirements.

### Sub-topic 1-3

*Sub-topic description:* discuss the inter-F cases in conditional handover requirements

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

**Issue 1-3: Add inter-F cases in conditional handover requirements**

* Proposals
  + Option 1: add inter-F cases in conditional handover requirements
* Recommended WF
  + Need further discussion if inter-F cases are needed in conditional handover requirements

### Sub-topic 1-4

*Sub-topic description:* discuss the needed of additional requirements for PSCell addition, release or change in 36.133

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

**Issue 1-4: Additional requirements for PSCell addition, release or change in 36.133**

* Proposals
  + Option 1: Not needed
* Recommended WF
  + Potential agreement: No additional requirements are needed for PSCell addition, release or change in 36.133

## Companies views’ collection for 1st round

### Open issues

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| --- | --- |
| **Company** | **Comments** |
| Ericsson | Sub topic 1-1: TCHO\_execution For the same topic in NR, we are OK with [10]ms as a compromise value (Ericsson proposal was 5ms for both LTE and NR). Then we don’t think this will be shorter in LTE CHO than NR CHO, and don’t see that this is so critical as long as it is much shorter than the shortest possible measurement period. Therefore although any of the options including removal, [5]ms or [10]ms are OK for us, we think it would be best to use the same value as is decided in this meeting for NR to make progress.  Sub topic 1-2: Reference for TDD cell is not correct in conditional handover requirements Agree the reference should be updated  Sub topic 1-3: Add inter-F cases in conditional handover requirements : Agree that inter-f conditional HO should be possible.  Sub topic 1-4: Additional requirements for PSCell addition, release or change in 36.133 : PSCell addition or release involves MN which is outside the scope of the WI. Conditional PSCell change is possible in LTE DC or NE-DC, however there are no unconditional requirements for PSCell change in 36.133 so we also don’t propose to add conditional varaints, and support the potential agreement above,  Others: |
| Qualcomm | Sub topic 1-1: we support Ericsson’s views and suggestions above.  Sub topic 1-2: we support Ericsson’s views and suggestions above.  Sub topic 1-3: we support Ericsson’s views and suggestions above.  Sub topic 1-4: We support potential agreement proposed. |
| Huawei, HiSilicon | Issue 1-1: we don’t agree TCHO\_execution  to be removed. The exact value of TCHO\_execution can be 10ms.  Issue 1-2: agree with the recommended WF.  Issue 1-3: agree with option 1, since the inter-f and intra-f handover shall be distinguished in CHO.  Issue 1-4: In RAN2 there is no conclusion of CHO based PSCell addition and release. So we suggest RAN4 can focus on CHO based PSCell change in NE-DC. We have no strong view on whether to specify the requirements for PSCell change in LTE. |
| Nokia | Sub topic 1-1: TCHO\_execution: We support to remove TCHO\_execution. The current delay is already very relaxed and hence we see this delay as being redundant or at most very short. For the sake of progress, we can support 5ms.  Sub topic 1-2: Reference for TDD cell is not correct in conditional handover requirements: We agree the option 1, the reference for TDD should be updated in conditional handover requirements.  Sub topic 1-3: Add inter-F cases in conditional handover requirements: We are fine with option 1, we should have inter-F cases in CHO requirements.  Sub topic 1-4: Additional requirements for PSCell addition, release or change in 36.133: We agree with option 1, there is no need to introduce additional requirements for PSCell. |

### 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.*

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| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | 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.*

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| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *Candidate options:*  *Recommendations for 2nd round:* |

*Recommendations on WF/LS assignment*

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

### CRs/TPs

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

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

## 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*

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

# Topic #2: Reduction of user data interruption (DAPS)

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

## Companies’ contributions summary

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| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| R4-2001409 | Ericsson | **Proposal 1** : 1ms interruption is specified for the case that bandwidth of target cell is larger than the bandwidth of source cell for in intra-frequency DAPS handover.  **Proposal 2**: power imbalance between the two cells should be within [6] dB. |
| R4-2001410 | Ericsson | TP for 5.7 E-UTRAN DAPS Handover to capture the proposals in R4-2001409 |
| R4-2001670 | Huawei, HiSilicon | CR for 5.7 E-UTRAN DAPS Handover  -Tinterrupt1 is 2ms if the bandwidth of target cell is larger than the bandwidth of source cell for intra-frequency DAPS handover.  -Tinterrupt2 is 1ms if the bandwidth of target cell is larger than the bandwidth of source cell for intra-frequency DAPS handover. |
| R4-2001840 | Qualcomm Incorporated | CR for 5.7 E-UTRAN DAPS Handover   1. Replaced [TBD] for source cell release message to RRC command 2. Clarified Dhandover2 defintion 3. Clarified intra-frequency requirements are for sync case 4. Added a note on further possible interruptions on source cell in case simultaneous UL Tx to source/target cells are not possible (per agreement in WF of RAN4#93 meeting) |

## Open issues summary

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

Based on the contributions, observations and proposals following list of sub-topics for further discussion and agreement have been identified:

1. Tinterruption1
2. Tinterruption2
3. The power imbalance between source cell and target cell
4. Source cell release message
5. Synchronous intra-frequency DAPS handover

### Sub-topic 2-1

*Sub-topic description:* Discuss the interruption delay Tinterruption1 for the case that bandwidth of target cell is larger than the bandwidth of source cell for in intra-frequency DAPS handover

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

**Issue 2-1: Tinterruption1 for the case that bandwidth of target cell is larger than the bandwidth of source cell for in intra-frequency DAPS handover**

* Proposals
  + Option 1: 2 ms
  + Option 2: not needed
* Recommended WF
  + Potential agreement: Tinterrupt1 is 1ms if the bandwidth of target cell is larger than the bandwidth of source cell for intra-frequency DAPS handover

### Sub-topic 2-2

*Sub-topic description:* Discuss the interruption delay Tinterruption2 for the case that bandwidth of target cell is larger than the bandwidth of source cell for in intra-frequency DAPS handover

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

**Issue 2-2: Tinterruption2 for the case that bandwidth of target cell is larger than the bandwidth of source cell for in intra-frequency DAPS handover**

* Proposals
  + Option 1: 1 ms
* Recommended WF
  + Potential agreement: Tinterrupt2 is 1ms if the bandwidth of target cell is larger than the bandwidth of source cell for intra-frequency DAPS handover

### Sub-topic 2-3

*Sub-topic description:* discussthe power imbalance between source cell and target cell

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

**Issue 2-3: The power imbalance between source cell and target cell**

* Proposals
  + Option 1: 6 dB
* Recommended WF
  + Potential agreement: The power imbalance between source cell and target cell should be within 6 dB

### Sub-topic 2-4

*Sub-topic description:* discuss which message UE will receive to start source cell release.

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

**Issue 2-4: Source cell release message**

* Proposals
  + Option 1: RRC command
* Recommended WF
  + Potential agreement: the UE receives a RRC command implying source cell release.

### Sub-topic 2-5

*Sub-topic description:* Discuss the requirements of intra-frequency DAPS handover are applied for synchronous case

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

**Issue 2-5: Synchronous intra-frequency DAPS handover**

* Proposals
  + Option 1: Clarify the requirements of intra-frequency DAPS handover for synchronous case
* Recommended WF
  + Potential agreement: The requirements of intra-frequency DAPS handover are applied for synchronous case

## Companies views’ collection for 1st round

### Open issues

|  |  |
| --- | --- |
| **Company** | **Comments** |
| Ericsson | Issue 2-1: Tinterruption1 for the case that bandwidth of target cell is larger than the bandwidth of source cell for in intra-frequency DAPS handover  We support the potential agreement of 1ms. It should be possible to perform any needed baseband and RF reconfigurations in parallel.  Issue 2-2: Tinterruption2 for the case that bandwidth of target cell is larger than the bandwidth of source cell for in intra-frequency DAPS handover  We support the potential agreement of 1ms as a compromise; in this case there is no RF reconfiguration and BB reconfiguration time would be similar as in issue 2-1.  Issue 2-3: The power imbalance between source cell and target cell  Based on the NR discussion, further clarification seems necessary on the meaning of power imbalance, ie is it a short term or long term imbalance, and does the requirement apply for the entire duration of the DAPS handover (target addition, dual link operation and source release)?  Issue 2-4: Source cell release message  The recommended WF is fine. RAN2 will define the RRC signaling that implies source cell release  Issue 2-5: Synchronous intra-frequency DAPS handover  Potential agreement appears to be OK; if we define interruptions of 1ms for issue 2-1 and 2.2 then we are implicitly assuming synchronous intra-frequency DAPS anyway.  Others: |
| Qualcomm | Issue 2-1: We support option 1, i.e., 2ms. When RF retuning is required, it was already agreed to use 2ms as interruption 2. So 1ms interruption is not aligned with the agreement.  Issue 2-2: We can support 1ms interruption in this case since no RF retuning is required.  Issue 2-3: We also propose to wait for conclusion in NR discussion.  Issue 2-4: Agree to WF. We don’t believe there is an alternative.  Issue 2-5: We prefer to be explicit and specify so in the spec text. |
| Huawei, HiSilicon | Issue 2-1: disagree with the recommended WF. Tinterrupt1 Shall be 2ms as the RF retuning is performed in the case that the bandwidth of target cell is larger than the bandwidth of source cell.  Issue 2-2: agree with the recommended WF.  Issue 2-3: the power difference shall be smaller.  Issue 2-4: waiting for RAN2’s conclusion.  Issue 2-5: This may limit the application scenarios of DAPS handover. In addition, what is the definition of “sync”? within CP/2 or something else? Anyway, this restriction needs careful discussion. |
| Nokia | Issue 2-1: Tinterruption1 for the case that bandwidth of target cell is larger than the bandwidth of source cell for in intra-frequency DAPS handover: we support the potential agreement, 1ms for this case.  Issue 2-2: Tinterruption2 for the case that bandwidth of target cell is larger than the bandwidth of source cell for in intra-frequency DAPS handover: we support the potential agreement, 1ms for this case.  Issue 2-4: Source cell release message: We agree with the recommended WF. Do we have this RRC message defined already?  Issue 2-5: Synchronous intra-frequency DAPS handover: We are fine with the potential agreement. |

### 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.*

|  |  |
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|  |

## Summary for 1st round

### Open issues

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

|  |  |
| --- | --- |
|  | **Status summary** |
| **Sub-topic#1** | *Tentative agreements:*  *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”* |

## Discussion on 2nd round (if applicable)

## 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”* |