**3GPP TSG-RAN WG4 Meeting # 97-e R4-2017297**

**Electronic Meeting, 2 – 13 Nov., 2020**

**Agenda item: 6.3**

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

**Title:** Email discussion summary for [97e][227] 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#96e meeting, we have discussed the core requirements and performance requirements for LTE mobility enhancement, the agreements and the remaining open issues were captured in the 2nd round email discussion summary R4-2012230. This email summary will be the input for this topic in RAN4#97e meeting.

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

* Core requirements
* Performance requirements

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

* 1st round: Discuss the core requirements and the test cases for performance requirements. Get agreement on the core requirements, Get agreement on the test cases for performance requirements if possible.
* 2nd round: Get agreements on the remaining open issues after 1st round discussion. Get agreement on the CRs for performance requirements.

# Topic #1: Core requirements

*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** |
| [R4-2015502](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015502.zip) | Huawei, HiSilicon | CR for Correction on the synchronous condition for DAPS handover  Summary of change:   1. Synchronous condition for DAPS handover aligns with the agreement for NR mobility enhancement in [R4-2012265]. 2. Further correct note2 and note 3 to leave enough DL-to-UL and UL-to-DL switching time between source cell and target cell |
| [R4-2016385](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016385.zip) | Nokia, Nokia Shanghai Bell | Maintenance CR on 36133 LTE CHO  Summary of change:   * Update the equation of conditional handover delay and align with NR conditional handover. |

## Open issues summary

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

Provide comments on CR directly in 1.3.2.

## Companies views’ collection for 1st round

### Open issues

Provide comments on CRs directly in 1.3.2.

### 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** |
| R4-2015502 | Ericsson : Identical issue to the discussion on the corresponding NR mobility thread [#207] so I copy NR comments here for visibility  *This needs significant further discussion. The issue is that if we agree the CR it means that DAPS can only work for TDD with perfect sync (cell phase sync) between the source and target cells. Taking the case of a very small cell we can only set Nta=0 so Nta+Nta,offset is at earliest 25600 Tc before the downlink. Since UL2DL switching time can’t be configured with any margin in this case, we are always done unless the 2 cells are perfectly syncronised. For example, if we thought about time between source cell UL slot and target cell DL slot, and the UE is operating with source cell UL Nta=0, and that the target cell is coming 3us early due to cell phase sync there is nothing we can do.*  *The same problem exists for the DL2UL switching since the guard period allows up to a cetain cell size to be used in the existing TDD deployment without any propagation delay causing a DL-UL switching problem. If we now say that switching time applies jointly to both cells, and we were on the limit of the cell size before, we can only achive that if we have perfect sync between the cells.*  *The problem Huawei has raised here is indeed completely valid, but as the proposed solution could only work with absolutely perfect sync between the cells in the network we cannot agree it and we need to discuss how to move forward. There doesn’t seem to be an obvious simple answer.* |
| Qualcomm: Our view is that the proposed clarifications are consistent with the original intent of the text and therefore are not adding or modifying any requirements. From that point of view, we can support the changes. To Ericsson’s concern: if Ericsson can show that these changes are creating a *new* issue then we would be open to further discussion. |
| Huawei: two main changes in the CR:  First change: Synchronous condition for DAPS handover aligns with the agreement for NR mobility enhancement in [R4-2012265].  Second change is to guarantee enough time for DL-to-UL/ UL-to-DL switching not only for the same cell but also for the source and target cell. Thanks Ericsson for pointing out good question. However we think the modification in the CR can still work.   * for DL-to-UL (Note 2)   Note 2 refers the UE performing DL-to-UL switching, which can be shown as follow:    For single cell, the allowed switching period equals to ‘GP - NTA - NTA-offset’, where ‘NTA + NTA-offset’ is the timing advance for uplink. In considering the MRTD between source and target cell, the allowed switching period equals to ‘GP - NTA - NTA-offset - MRTD’. This means network can configure proper GP length to make ‘GP - NTA - NTA-offset - MRTD’ longer than 20us.   * For UL-to-DL (Note 3)   Note 3 refers the UE performing UL-to-DL switching, which can be shown as follow:    The question raised by Ericsson is valid in the scenario with TA=0. The above figure shows the worst with NTA=0 for one cell. According to Note 3, the UE will not receive signals before T2, and will miss the reception of source cell between T1 and T2. However, as clarified in Note 1, the demodulation performance degradation for the first symbol of the slot is allowed. In other words, the issue can be covered by note 1. |
| R4-2016385 | Ericsson : Agree this improves the readability of CHO requirements |
| Qualcomm: Suggest to clarify the wording in 5.1.2.6.2.  The measurement time delay Tmeasure is defined *as the time period* from the end of TEvent\_DU until the UE begins the preparation time for handover execution. |
| Nokia: To Qualcomm, OK, we can update to make it clear. |

## 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.*

### 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”* |
| R4-2015502 | Suggest to “*Return to*”, further discussion is needed for this CR. |
| R4-2016385 | Suggest to “*To be revised*”, to capture Qualcomm’s comments. |

## Discussion on 2nd round (if applicable)

Continue discussion on CR R4-2015502 in 2nd round, Companies are welcome to provide comments on CR directly.

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| **CR/TP number** | **Comments collection** |
| R4-2015502 | Ericsson: Since identical discussion is taking place on #207 thread, we provide our comments for LTE DAPS for visibility purposes. In addition, we expect that the requirements/side conditions for NR DAPS HO and LTE DAPS HO will remain aligned. At any rate, our comments are:  Ericsson cannot agree with option 1 after first round comments. For large TA, the solution proposed by the proponents would reduce available TDD GP by the synchronization accuracy between source and target which according to cell phase sync requirements is up to 3us.  Since the GP determines feasible cell size, in an already deployed TDD network with given GP for which the operator then wants to upgrade to support DAPS there would be areas within the network (especially at cell edge where it is needed) where DAPS cannot be supported unless the assumption has been that GP had a margin (such as 3uS) prior to DAPS deployment. Reconfiguring (increasing) GP to roll out DAPS is unattractive as it increases TDD switching overhead and may need to be coordinated and agreed between operators on adjacent channels.  For the small TA case we also still have concerns. One is that earlier we had understood note 1 to be about an AGC issue because that was the explanation of companies in RAN4 where it came from. So we expected it would only occur when the UE performs AGC update. Although this is up to UE implementation, our understanding has been that AGC updating would typically relatively infrequently such as every SMTC (20ms+) or even much less frequently especially if the UE is not moving, the pathloss/channel is rather static and the new AGC value is often the same as the old AGC value. We acknowledge that note 1, as it is written, allows the UE to drop every first symbol of every slot if MRTD>CP, on the other hand it could be expected considering real AGC and a desire to make good implementations that this is a very pessimistic view of what would actually happen. However, the reinterpretation of note 1 to include T2R switching adds something we expect that this is going to happen on each T2R switch. So it becomes a much more frequent degradation that the former explanation would have predicted.  For Qualcomm, this is a new issue, because we were fine with the spec before whereas the update creates implicit new requirements that if DAPS is to be supported, we need to have perfect sync in NW between geographically separate sites (not feasible), or provide a margin in GP and accept loss of first symbol in cases where it would not have been specified before. We understand that the spec as it was captured before created a similar implementation impossibility for the UE (T2R and R2T switching time requirement is effectively tightened by up to 3uS due to cell phase sync) but if this solution is agreed it provides a very major disincentive for any TDD network to implement DAPS at all. It becomes about as attractive as it would be to tighten the UE switching.  Finally, we would like to emphasize that the NW is blind to the actual cell phase sync difference/ MRTD at the UE or even Nta used by the UE for either link (network may track accumulated Nta commands but does not know which the UE received). So it means that, in principle, if this condition cannot be ensured by deployment consideration for the entire NW coverage, we should increase GP.  So we think RAN4 needs to discuss other solutions. |
| Huawei: Thanks Ericsson for the further discussion. As this part is simultaneously discussed in NR, we can leave it. There are another changes in the CR (first change), synchronous condition for DAPS handover aligns with the agreement for NR mobility enhancement in [R4-2012265]. This meeting the CR can focus on the first change. |
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## 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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|  | **Status Summary** |
|  | **Issue 1-1: clarification on DL-to-UL and UL-to-DL switching time in DAPS handover**  *Candidate options:*   * Option1:leave enough DL-to-UL and UL-to-DL switching time 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 20usafter the end of the last received downlink symbol from source or target cell in the same TDD band. * 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 20us after the end of the last transmitted uplink symbol towards source or target cell in the same TDD band. * Other options   *Conclusion:* Continue the discussion in next meeting. |

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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”* |
| R4-2017322 | *Suggest to “agreeable”, (Revised from R4-2015502)* |
| R4-2017079 | *Suggest to “agreeable”. (Revised from R4-2016385)* |

# Topic #2: Performance requirements

*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** |
| [R4-2015501](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2015501.zip) | Huawei, Hisilicon | CR for Test cases for inter-frequency DAPS handover  Summary of change:  The following test cases for inter-frequency DAPS are defined:   * Intra-band Inter-frequency sync DAPS handover test for FDD-FDD * Intra-band Inter-frequency async DAPS handover test for FDD-FDD * Inter-band Inter-frequency sync DAPS handover test for FDD-FDD * Inter-band Inter-frequency async DAPS handover test for FDD-FDD |
| [R4-2016384](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016384.zip) | Nokia, Nokia Shanghai Bell | CR on 36133 LTE CHO TCs  Summary of change:  Add test cases for LTE CHO:  1. E-UTRAN FDD – FDD intra-F test cases  2. E-UTRAN FDD – FDD inter-F test cases  3. E-UTRAN TDD – TDD intra-F test cases  4. E-UTRAN TDD – TDD inter-F test cases  5. E-UTRAN FDD – TDD inter-F test cases  6. E-UTRAN TDD – FDD inter-F test cases |
| [R4-2016554](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_97_e/Docs/R4-2016554.zip) | Qualcomm Incorporated | CR for Introduction of intra-frequency sync and async LTE DAPS HO test cases  Summary of change:   1. Adding LTE FDD-FDD intra-frequency DAPS HO test case (async) 2. Adding LTE TDD-TDD intra-frequency DAPS HO test case (sync) |

## Open issues summary

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

Provide comments on CRs directly in 2.3.2

## Companies views’ collection for 1st round

### Open issues

Provide comments on CRs directly in 2.3.2

### 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** |
| R4-2015501 | Nokia: Generally are fine, TDD test cases need to be added according to the agreement in last meeting that for inter-F DAPS HO should cover both FDD and TDD |
| Huawei: Thanks Nokia. According the work split in R4-2009135, Huawei is only responsible for these 4 tests in the CR. |
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| R4-2016384 | Company A |
| Company B |
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| R4-2016554 | Company A |
| Company B |
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## Summary for 1st round

### Open issues

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

Moderator’s comment: This open issue is raised during 1st round discussion. Suggest to discuss it in 2nd round.

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|  | **Status summary** |
| **Sub-topic#1** | **Issue 2-1: Missing TCs for DAPS handover**  Background: In RAN4#96e meeting, it was agreed that inter-frequency DAPS handover and conditional handover test cases should cover both for FDD and TDD since the related TCs for TDD were missing in the list TCs agreed WF R4-2009135 in RAN4#95e. TCs for TDD CHO were introduced in CR R4-2016384 in this meeting. TCs for TDD inter-frequency DAPS HO are still missing, and TDD-FDD inter-frequency TCs are also not assigned yet.  Here is the proposal for missing inter-frequency DAPS HO test cases:   * TDD – TDD intra-band inter-frequency synchronous DAPS handover * TDD – TDD inter-band inter-frequency synchronous DAPS handover * FDD – TDD inter-frequency synchronous DAPS handover * FDD – TDD inter-frequency asynchronous DAPS handover * TDD – FDD inter-frequency synchronous DAPS handover * TDD – FDD inter-frequency asynchronous DAPS handover   *Recommendations for 2nd round:* Companies are encouraged to comment and volunteer on the test cases in 2nd round*.* |

*Suggestion on WF/LS assignment*

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|  | **WF/LS t-doc Title** | **Assigned Company,**  **WF or LS lead** |
| #1 | WF on further test cases for LTE feMob | Nokia, Nokia Shanghai Bell |

### CRs/TPs

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

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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”* |
| R4-2015501 | Suggest to *“Agreeable”* |
| R4-2016384 | Suggest to *“Agreeable”* |
| R4-2016554 | Suggest to *“Agreeable”* |

## Discussion on 2nd round (if applicable)

### Open issues

**Issue 2-1: Missing TCs for DAPS handover**

Background: In RAN4#96e meeting, it was agreed that inter-frequency DAPS handover and conditional handover test cases should cover both for FDD and TDD since the related TCs for TDD were missing in the list TCs agreed WF R4-2009135 in RAN4#95e. TCs for TDD CHO were introduced in CR R4-2016384 in this meeting. TCs for TDD inter-frequency DAPS HO are still missing, and TDD-FDD inter-frequency TCs are also not assigned yet.

* Proposal for missing inter-frequency DAPS HO test cases:

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| **TC** | **Company** |
| TC1: TDD – TDD intra-band inter-frequency synchronous DAPS handover | Huawei |
| TC2: TDD – TDD inter-band inter-frequency synchronous DAPS handover | Huawei |
| TC3: FDD – TDD inter-frequency synchronous DAPS handover |  |
| TC4: FDD – TDD inter-frequency asynchronous DAPS handover |  |
| TC5: TDD – FDD inter-frequency synchronous DAPS handover |  |
| TC6: TDD – FDD inter-frequency asynchronous DAPS handover |  |

* Recommended WF:
  + Discuss is needed. Companies are encouraged to comment and volunteer on the test cases

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| **Company** | **Comments** |
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| xxx |  |

## 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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|  | **Status Summary** |
|  | **Issue 2-1: Missing TCs for DAPS handover**  *Candidate options:*   |  |  | | --- | --- | | **TC** | **Company** | | TC1: TDD – TDD intra-band inter-frequency synchronous DAPS handover | Huawei | | TC2: TDD – TDD inter-band inter-frequency synchronous DAPS handover | Huawei | | TC3: FDD – TDD inter-frequency synchronous DAPS handover | Nokia | | TC4: FDD – TDD inter-frequency asynchronous DAPS handover | Ericsson | | TC5: TDD – FDD inter-frequency synchronous DAPS handover | Nokia | | TC6: TDD – FDD inter-frequency asynchronous DAPS handover | Ericsson |   *Conclusion:* Companies provide the missing test cases in next meeting. |

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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”* |
| R4-2017078 | *Suggest to “agreeable”* |
| R4-2017308 | *Suggest to “agreeable”. (Revised from R4-2016384)* |