**3GPP TSG RAN WG1 Meeting #100bis-E R1-200xxxx**

**e-Meeting, April 20 – 30, 2020**

**Source: Moderator (Intel Corporation)**

**Title: Summary of email discussions for NR Mobility Enhancements**

**Agenda item: 7.2.9**

**Document for: Discussion**

# Introduction

In this contribution, we summarize the email discussion approved for discussion during RAN1 #100bis-E. Chairman has approved three email discussion threads for RAN1 #100bis-E. The following are the approved email discussions:

* [100b-e-NR-Mob-Enh-01] Email discussion/approval on UL cancellation in UL DAPS-HO by 4/24; if necessary, followed by endorsing the corresponding TP by 4/30 – Daewon (Intel)
* [100b-e-NR-Mob-Enh-02] Email discussion/approval on power sharing mode for UL DAPS-HO by 4/23; if necessary, followed by endorsing the corresponding TP by 4/29 – Daewon (Intel)
* [100b-e-NR-Mob-Enh-03] Email discussion/approval on PDCCH/PDSCH restrictions for DL DAPS-HO by 4/22; if necessary, followed by endorsing the corresponding TP by 4/28 – Daewon (Intel)

# Email Discussion [100b-e-NR-Mob-Enh-01]

[Copy discussion from the document for email thread-01]

# Email Discussion [100b-e-NR-Mob-Enh-02]

This discussion is regarding the power Sharing Mode for UL DAPS-HO (Issue #6 from [11]).

**Issue and Proposal Summary:**

Several companies provided discussion on how to correct the power sharing mode description for UL DAPS-HO. The following are list of proposals and corresponding TPs:

* Proposal by Intel [3] The indication from the gNB to UE to have the UE to no perform any power sharing operation and always drop the source cell transmission when it overlaps with target cell could be done by not providing the *UplinkPowerSharingDAPS-HO-mode* RRC configuration. Alternative method would be explicitly introducing a ‘no-powersharing mode’ indication for *UplinkPowerSharingDAPS-HO-mode*.
  + The following is proposed TP:

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| 15   Dual active protocol stack based handover *< Unchanged parts are omitted >*  If the UE does not provide ~~indicates~~ *UplinkPowerSharingDAPS-HO* ~~=~~ *~~Semistatic-mode1~~* and is provided *UplinkPowerSharingDAPS-HO-mode* = *Semi-static-mode1*, the UE determines a transmission power for the target MCG or for the source MCG as described in Clause 7.6.2 for *~~UplinkPowerSharingDAPS-HO~~NR-DC-PC-mode* = *Semi-static-mode1* by considering the target MCG as the MCG and the source MCG as the SCG.  If the UE does not provide ~~indicates~~ *UplinkPowerSharingDAPS-HO* ~~= Semistatic-mode2~~and is provided *UplinkPowerSharingDAPS-HO-mode* = *Semi-static-mode2*, the UE determines a transmission power for the target MCG or for the source SCG as described in Clause 7.6.2 for *~~UplinkPowerSharingDAPS-HO~~NR-DC-PC-mode* = *Semi-static-mode2* by considering the target MCG as the MCG and the source MCG as the SCG.  If the UE indicates *UplinkPowerSharingDAPS-HO* ~~= Dynamic~~and is provided *UplinkPowerSharingDAPS-HO-mode* = *Dynamic*, the UE determines a transmission power for the target MCG or for the source MCG as described in Clause 7.6.2 for *~~UplinkPowerSharingDAPS-HO~~NR-DC-PC-mode* = *Dynamic* by considering the target MCG as the MCG and the source MCG as the SCG.  If  -   the UE is not provided with ~~does not provides~~ *UplinkPowerSharingDAPS-HO-mode,* and  -   UE transmissions on the target cell and the source cell ~~overlap~~ are in overlapping time resources  the UE transmits only on the target cell |

* Two alternative TP are provided by Samsung [4]. The first alternative TP is proposed if the UE feature group 21-2 description is agreed with ALT 1 formulation (described in NTT Docomo’s contribution on UE feature list summary). The second alternative TP is proposed if the UE feature group 21-2 description is agreed with ALT 2 formulation.
  + ALT 1 formulation:

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| 15   Dual active protocol stack based handover *< Unchanged parts are omitted >*  If the UE does not provide ~~indicates~~ *UplinkPowerSharingDAPS-HO* ~~=~~ *~~Semistatic-mode1~~* and is provided *UplinkPowerSharingDAPS-HO-mode* = *Semi-static-mode1*, the UE determines a transmission power for the target MCG or for the source MCG as described in Clause 7.6.2 for *~~UplinkPowerSharingDAPS-HO~~NR-DC-PC-mode* = *Semi-static-mode1* by considering the target MCG as the MCG and the source MCG as the SCG.  If the UE does not provide ~~indicates~~ *UplinkPowerSharingDAPS-HO* ~~= Semistatic-mode2~~and is provided *UplinkPowerSharingDAPS-HO-mode* = *Semi-static-mode2*, the UE determines a transmission power for the target MCG or for the source SCG as described in Clause 7.6.2 for *~~UplinkPowerSharingDAPS-HO~~NR-DC-PC-mode* = *Semi-static-mode2* by considering the target MCG as the MCG and the source MCG as the SCG.  If the UE indicates *UplinkPowerSharingDAPS-HO* ~~= Dynamic~~and is provided *UplinkPowerSharingDAPS-HO-mode* = *Dynamic*, the UE determines a transmission power for the target MCG or for the source MCG as described in Clause 7.6.2 for *~~UplinkPowerSharingDAPS-HO~~NR-DC-PC-mode* = *Dynamic* by considering the target MCG as the MCG and the source MCG as the SCG.  If  -   the UE is not provided with ~~does not provides~~ *UplinkPowerSharingDAPS-HO-mode,* and  -   UE transmissions on the target cell and the source cell ~~overlap~~ are in overlapping time resources  the UE transmits only on the target cell  If  -   the UE is provided *UplinkPowerSharingDAPS-HO-mode*, and  -   UE transmissions on the target cell and the source cell overlap  the UE transmits only on the target cell  ----omitted---- |

* + ALT 2 formulation:

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| 15 Dual active protocol stack based handover ----omitted----  If  -   the UE does not provide *UplinkPowerSharingDAPS-HO*, or is not provided *UplinkPowerSharingDAPS-HO-Mode* and  -   UE transmissions on the target cell and the source cell are in overlapping time resources  the UE transmits only on the target cell.  If  -   the UE ~~does not~~ provides *UplinkPowerSharingDAPS-HO*, and  -   UE transmissions on the target cell and the source cell overlap  the UE transmits only on the target cell  UE transmissions on the target cell and the source cell overlap if they are in  -   overlapping time resources if the carrier frequencies for the target MCG and the source MCG are intra-frequency and intra-band  -   overlapping time resources and overlapping frequency resources if the carrier frequencies for the target MCG and the source MCG are not intra-frequency and intra-band  For intra-frequency DAPS HO operation, the UE expects that an active DL BWP and an active UL BWP on the target cell are within an active DL BWP and an active UL BWP on the source cell, respectively.  The UE determines intra-frequency as described in Clause 9.2.1 of [10, TS38.133].  ----omitted---- |

* Proposal by Nokia [5] : suggests to remove the *UplinkPowerSharingDAPS-HO* capability parameter description and replaces it with statement if which power control mode is used.
  + The following is the proposed TP:

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| If the UE indicates capability for *~~UplinkPowerSharingDAPS-HO~~* ~~=~~ *Semistatic-mode1* power sharing and is provided *UplinkPowerSharingDAPS-HO-mode* = *Semi-static-mode1*, the UE determines a transmission power for the target MCG or for the source MCG as described in Clause 7.6.2 for *~~UplinkPowerSharingDAPS-HO~~NR-DC-PC-mode* = *Semi-static-mode1* by considering the target MCG as the MCG and the source MCG as the SCG.  If the UE indicates capability for *~~UplinkPowerSharingDAPS-HO~~* ~~=~~ *Semistatic-mode2* power sharing and is provided *UplinkPowerSharingDAPS-HO-mode* = *Semi-static-mode2*, the UE determines a transmission power for the target MCG or for the source SCG as described in Clause 7.6.2 for *~~UplinkPowerSharingDAPS-HO~~NR-DC-PC-mode* = *Semi-static-mode2* by considering the target MCG as the MCG and the source MCG as the SCG.  If the UE indicates capability for*~~UplinkPowerSharingDAPS-HO~~* ~~=~~ *Dynamic* power sharing and is provided *UplinkPowerSharingDAPS-HO-mode* = *Dynamic*, the UE determines a transmission power for the target MCG or for the source MCG as described in Clause 7.6.2 for *~~UplinkPowerSharingDAPS-HO~~NR-DC-PC-mode* = *Dynamic* by considering the target MCG as the MCG and the source MCG as the SCG.  If  - the UE is~~does~~ not provided *UplinkPowerSharingDAPS-HO-mode*, and  - UE transmissions on the target cell and the source cell overlap  the UE transmits only on the target cell  UE transmissions on the target cell and the source cell overlap if they are in  - overlapping time resources if the carrier frequencies for the target MCG and the source MCG are intra-frequency and intra-band  - overlapping time resources and overlapping frequency resources if the carrier frequencies for the target MCG and the source MCG are not intra-frequency and intra-band |

* Proposal by Apple [6]: If gNB doesn’t configure the parameter UplinkPowerSharingDAPS-HO-mode, then no simultaneous UL transmission is allowed for UE with or without simultaneous transmission capability. UE drop the transmission to source cell if transmission collide in time domain resources. If gNB configures the parameter UplinkPowerSharingDAPS-HO-mode to UE with simultaneous transmission capability, if transmissions collide for intra-frequency intra-band and inter-frequency intra-band DAPS HO, then UE drops the transmission to source cell.
  + The following the proposed TP:

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| 15 Dual active protocol stack based handover  If  - the UE is not provided with *UplinkPowerSharingDAPS-HO-mode* , and  - UE transmissions on the target cell and the source cell are overlapping in time resources  Or if  - the UE is ~~does not~~ provided with *UplinkPowerSharingDAPS-HO-mode*, and  - UE transmissions on the target cell and the source cell overlap  the UE transmits only on the target cell  UE transmissions on the target cell and the source cell overlap if they are in  - overlapping time resources if the carrier frequencies for the target MCG and the source MCG are intra-frequency and intra-band  - overlapping time resources and overlapping frequency resources if the carrier frequencies for the target MCG and the source MCG are not intra-frequency and intra-band  For intra-frequency DAPS HO operation, the UE expects that an active DL BWP and an active UL BWP on the target cell are within an active DL BWP and an active UL BWP on the source cell, respectively. |

* Proposal by Ericsson [7]: If the NW does not signal to the UE how to distribute the transmit power between source and target, i.e., if the UE is not provided with the RRC parameter UplinkPowerSharingDAPS-HO-mode, the UE drops any UL transmission to the source if it overlaps with an UL transmission to target.
  + The following the proposed TP:

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| 15 Dual active protocol stack based handover  If  - the UE does not provide *UplinkPowerSharingDAPS-HO,* or is not provided *UplinkPowerSharingDAPS-HO-mode*, and  - UE transmissions on the target cell and the source cell overlap  the UE transmits only on the target cell. |

* Proposal by Qualcomm [8]: Change UplinkPowerSharingDAPS-HO in “… as described in Clause 7.6.2 for UplinkPowerSharingDAPS-HO …” to NR-DC-PC-mode. Furthermore, we should align the terminology for Semi-static mode i.e., changing “Semistatic-mode” to “Semi-static-mode”.
  + Note: similar to proposal in [5]
  + The following the proposed TP:

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| **15 Dual active protocol stack based handover**  <unchanged text omitted>  If the UE indicates *UplinkPowerSharingDAPS-HO* = *Semi-static-mode1* and is provided *UplinkPowerSharingDAPS-HO-mode* = *Semi-static-mode1*, the UE determines a transmission power for the target MCG or for the source MCG as described in Clause 7.6.2 for *NR-DC-PC-mode* = *Semi-static-mode1* by considering the target MCG as the MCG and the source MCG as the SCG.  If the UE indicates *UplinkPowerSharingDAPS-HO* = *Semi-static-mode2* and is provided *UplinkPowerSharingDAPS-HO-mode* = *Semi-static-mode2*, the UE determines a transmission power for the target MCG or for the source SCG as described in Clause 7.6.2 for *NR-DC-PC-mode* = *Semi-static-mode2* by considering the target MCG as the MCG and the source MCG as the SCG.  If the UE indicates *UplinkPowerSharingDAPS-HO* = *Dynamic* and is provided *UplinkPowerSharingDAPS-HO-mode* = *Dynamic*, the UE determines a transmission power for the target MCG or for the source MCG as described in Clause 7.6.2 for *NR-DC-PC-mode* = *Dynamic* by considering the target MCG as the MCG and the source MCG as the SCG.  <unchanged text omitted> |

**Discussion Summary:**

Companies are encouraged to provide comments on the proposal above. Comments should include views on whether proposal by Intel [3], Samsung [4], Nokia [5], Apple [6], Ericsson [7], and/or Qualcomm [8] is/are acceptable or not. Also, if companies have a merged proposal based on proposal from above companies, please do provide them below as well.

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| Company Name | Comments/Views |
| Company-A | Comments here |
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# Email Discussion [100b-e-NR-Mob-Enh-03]

[Copy discussion from the document for email thread-03]

# Reference

1. R1-2001530, “Remaining issues on DAPS-HO,” Huawei, HiSilicon
2. R1-2001624, “Remaining issues on NR mobility enhancements in physical layer,” ZTE
3. R1-2002011, “Corrections to Physical layer aspects of NR mobility enhancement,” Intel Corporation
4. R1-2002148, “Remaining issues for NR Mobility Enhancement,” Samsung
5. R1-2002221, “Remaining physical layer aspects of dual active protocol stack based HO,” Nokia, Nokia Shanghai Bell
6. R1-2002344, “On remaining issues on NR mobility enhancements,” Apple
7. R1-2002490, “Correction to UL power sharing for DAPS HO,” Ericsson
8. R1-2002558, “Maintenance for NR mobility enhancements,” Qualcomm Incorporated
9. R1-2001531, “Remaining PHY aspects for CHO,” Huawei, HiSilicon
10. R1-2001625, “Discussion on FR2 mobility interruption enhancements,” ZTE
11. R1-2002010, “Issue Summary for NR Mobility Enhancements,” Moderator (Intel Corporation)