**3GPP TSG RAN WG1 #103-e R1-200xxxx**

**e-Meeting, October 26th – November 13th, 2020**

**Agenda item:** 6.6

**Source:** Moderator (Qualcomm Incorporated)

**Title:** Summary of email discussion [103-e-LTE-6.6CRs]

**Document for:** Discussion and Decision

# Background

In RAN1#103-e, the following two issues were submitted for Rel-16 corrections to DAPS:

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| [R1-2008524](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Docs/R1-2008524.zip) | Power control for DAPS | Qualcomm Incorporated |
| [R1-2008799](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Docs/R1-2008799.zip) | Draft CR on power sharing for LTE DAPS | Huawei, HiSilicon |

Both contributions try to capture the agreement made in the previous meeting regarding power sharing for LTE DAPS.

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| 8524 (QC) | 8799 (HW/HiSi) |
| 5.1.4a(new) Power allocation for dual active protocol stack  If a UE indicates a capability for dual active protocol stack based handover (DAPS HO), the UE can be provided with a source MCG and a target MCG.  If a UE is configured with a target MCG and a source MCG in different bands, and the UE is configured with *DAPS-PowerCoordinationInfo*, the UE shall apply the procedures described in clause 5.1.4 with the following modifications  - Consider the target MCG as the MCG and the source MCG as the SCG.  - Replace *p-MeNB* and *p-SeNB* by *p-DAPS-Target* and *p-DAPS-Source*, respectively.  - Replace “(a)synchronous dual connectivity” by “(a)synchronous DAPS”. | 17 Dual active protocol stack based handover If a UE indicates a capability for dual active protocol stack based handover (DAPS HO), the UE can be provided with a source MCG and a target MCG.  If a UE is configured with a target MCG and a source MCG, the UE is indidated the guaranteed power for transmissions on the target MCG by *p-DAPS-Target-r16* and the guaranteed power for transmissions on the source MCG by *p-DAPS-Source-r16* and with an inter-CG power sharing mode by *uplinkPowerSharingDAPS-Mode-r16*.  If the UE indicates support of power control mode 1 and is provided *uplinkPowerSharingDAPS-Mode-r16* = 1, the UE determines a transmission power for the target MCG or for the source MCG as described in Clause 5.1.4.1 by replacing the MCG with the target MCG and the SCG with the source MCG and the UE assumes only Pcell exists in each MCG.  If the UE indicates support for power control mode 2 and is provided *uplinkPowerSharingDAPS-Mode-r16* = 2, the UE determines a transmission power for the target MCG or for the source MCG as described in Clause 5.1.4.2 by replacing the MCG with the target MCG and the SCG with the source MCG and the UE assumes only Pcell exists in each MCG.  If UE does not indicate a capability for power sharing between source and target MCGs in DAPS handover, the UE does not expect the transmissions on the target and source cell overlapped in time domain. |

# Merged text

Based on the input received in the two contributions, the moderator tried to merge both TPs based on the following principles:

1. It is preferred to keep this section under power control.
2. The first paragraph is identical in both TPs.
3. There are several conditions in legacy DC text that are not captured in the Huawei TP, e.g. the following

if the UE supports synchronous dual connectivity but does not support asynchronous dual connectivity, or if the UE supports both synchronous dual connectivity and asynchronous dual connectivity and if the higher layer parameter *powerControlMode* indicates dual connectivity power control mode 1

- if the maximum uplink timing difference between transmitted signals to different serving cells including serving cells belonging to different CGs is equal to or less than the minimum requirement for maximum transmission timing difference for synchronous dual connectivity defined in [10].

thus, it is preferred to completely reuse the DC section and refer to 5.1.4 instead of 5.1.4.1/2. At the same time, the Huawei TP includes the correct reference to the DAPS power control parameter – this is added.

1. The TP from Huawei includes the additional information about the UE behavior when the UE does not support power sharing. This information is added. Added also that for “intra-band DAPS” the same behavior is expected.

5.1.4a(new) Power allocation for dual active protocol stack

If a UE indicates a capability for dual active protocol stack based handover (DAPS HO), the UE can be provided with a source MCG and a target MCG.

If a UE is configured with a target MCG and a source MCG in different bands, and the UE is configured with *DAPS-PowerCoordinationInfo*, the UE shall apply the procedures described in clause 5.1.4 with the following modifications

- Consider the target MCG as the MCG and the source MCG as the SCG.

- Replace *p-MeNB* and *p-SeNB* by *p-DAPS-Target* and *p-DAPS-Source*, respectively.

- Replace “(a)synchronous dual connectivity” by “(a)synchronous DAPS”.

- “Dual connectivity power control mode” is replaced by “DAPS power control mode”, and is given by higher layer parameter *uplinkPowerSharingDAPS-Mode*”.

If UE does not indicate a capability for power sharing between source and target MCGs in DAPS handover, or if a UE is configured with a target MCG and a source MCG in the same band, the UE does not expect the transmissions on the target and source cell overlapped in time domain.

Companies are encouraged to provide feedback on the above merged TP in the table below.

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| Company | Comment |
| Ericsson | Support the proposal. Appropriate to keep it under the power control section, and to maintain consistency with other parts of 36.213. Commonality with NR DAPS specification is less important.  Pending RAN2 confirmation of the parameter names, the names can be put in brackets.  There seems to be typo in the final sentence: should be UE does not expect the transmissions on the target and source cell to overlap in the time domain |
| Nokia, Nokia Shanghai Bell | We are OK to reuse legacy LTE DC specification text as much as possible. It is also Ok to capture this in the power control section. Regarding the phrase “UE does not expect…” it seems something commonly used in 38.213 but not in 36.213. We agree that if UE is configured to use DAPS handover but not configured for power sharing, TDM operation realized by network is assumed. But as was concluded in the RAN1 LS R1-1913686, collisions may sometimes happen and based on discussion in the last meeting, it is then up to UE implementation to decide what is transmitted. |
| Huawei | The reason we propose adding a new clause in 213 instead of a sub-clause under power control is for consistence with NR DAPS for possible extensibility in case of any potentially possible enhancement for DAPS particularly in furture.  Regarding the contents of this clause, a couple of comments as follows:   1. We need to point our only PCell exists in each MCG for LTE DAPS because power sharing in DC also considers Scell of CG. 2. The main contents are for UE indicating a specific power sharing mode and UE is configured with such a mode, but “If UE indicates… power sharing mode xx and is configured … power sharing mode xx” is missing in the FL proposed changes but only “If UE does not indicate a capability….”, it looks sort of incomplete or asymmetric.   Based on the above comments, we think our TP is more appropriate as the baseline for merging the TPs. Regarding the comment of referring to 5.1.4 instead of 5.1.4.1/2, the relevant issues were not fully discussed in the last meeting. As agreed in the last meeting, supporting power sharing is a separate capability from the capability indicating sync/async DAPS. This is the same as NR DAPS. Sync/async DAPS is RAN4 defined feature and is normally mentioned in RAN1 spec. So in my opinion, as long as sync/async DAPS capability and power sharing capability are reported to NW, NW would accordingly configure the appropriate power sharing mode, so can refer to 5.1.4.1/2 for the concerned purpose. |

# Round #2

5.1.4a(new) Power allocation for dual active protocol stack

If a UE indicates a capability for dual active protocol stack based handover (DAPS HO), the UE can be provided with a source MCG and a target MCG.

If a UE is configured with a target MCG and a source MCG in different bands, and the UE is configured with *DAPS-PowerCoordinationInfo*, the UE shall apply the procedures described in clause 5.1.4 with the following modifications

- Consider the target MCG as the MCG and the source MCG as the SCG.

- Replace *p-MeNB* and *p-SeNB* by *p-DAPS-Target* and *p-DAPS-Source*, respectively.

- Replace “(a)synchronous dual connectivity” by “(a)synchronous DAPS”.

- “Dual connectivity power control mode” is replaced by “DAPS power control mode”, and is given by higher layer parameter *uplinkPowerSharingDAPS-Mode*”.

- The UE assumes only Pcell exists in each MCG..If UE does not indicate a capability for power sharing between source and target MCGs in DAPS handover, or if a UE is configured with a target MCG and a source MCG in the same band, the UE does not expect the transmissions on the target and source cell to overlap in time domain.

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| Company | Comment |
| Moderator (QC) | In line with the feedback above, the following changes highlighted in TP above were made:   * Added “The UE assumes only Pcell exists in each MCG” * Corrected typo on the last sentence.   Now, it seems that the main issue is whether to refer to Section 5.1.4 or to Sections 5.1.4.x. My original concern with doing 5.1.4.x was that it doesn’t capture the conditions for applying the power control depending on timing difference, and also there is not power control equation for PRACH (which may not be important for DAPS).  I would welcome some additional feedback from companies regarding whether to refer to 5.1.4 or 5.1.4.x. |
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# Conclusion

<To be completed>