**3GPP TSG RAN WG1 #102-e R1- 200XXXX**

**e-Meeting, August 17th – August 28th, 2020**

**Agenda item: 7.2.2.2.1**

**Source: Moderator (Nokia)**

**Title: Summary of [102-e-NR-unlic-NRU-ChAcc-02] Email discussion/approval on XXXX**

**Document for: Discussion and Decision**

# 1 Introduction

This document captures the discussion in the following RAN1#102-e email thread:

[102-e-NR-unlic-NRU-ChAcc-02] Email discussion/approval of TPs to capture earlier agreements and align specifications on clarifications to UL to DL COT sharing (Issue#3 in R1-2006675) until 8/19 – Timo (Nokia)

This contribution summarizes the discussion and collects companies’ views.

# 2. Issue #3

**Issue #3** Clarifications to UL to DL COT sharing

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| Clarifications to UL to DL COT sharing | R1-2005600 (p2)  R1-2006020 (p1)  R1-2006301 (p4)  R1-2006881 (p1) |

Three contributions address the issue of ED threshold adaptation according to the agreement from RAN1#101e:

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| Agreement:  For at least PUSCH transmissions with configured grants, a UE is allowed to choose between the ED threshold given by ul-toDL-CO-SharingED-Threshold-r16 and the default one. Whether a spec change is required needs further discussion. Discuss and decide the possible TPs in the next meeting. |

**R1-2005600**

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| --------------------------------------------------------- Start of TP #1-----------------------------------------------------------------  4.2.3 Energy detection threshold adaptation procedure  A UE accessing a channel on which UL transmission(s) are performed, shall set the energy detection threshold () to be less than or equal to the maximum energy detection threshold .  is determined as follows:  - If the UE is configured with higher layer parameter *maxEnergyDetectionThreshold-r14* or *maxEnergyDetectionThreshold-r16*,  - is set equal to the value signalled by the higher layer parameter;  - otherwise  - the UE shall determine according to the procedure described in clause 4.2.3.1;  - if the UE is configured with higher layer parameter *energyDetectionThresholdOffset-r14* or *energyDetectionThresholdOffset-r16*  - is set by adjusting according to the offset value signalled by the higher layer parameter;  - otherwise  - the UE shall set .  If the higher layer parameter *absenceOfAnyOtherTechnology-r16* is not configured to a UE, and the higher layer parameter *ul-toDL-COT-SharingED-Threshold-r16* is configured to the UE, the gNB should use the gNB's transmit power in determining the resulting energy detection threshold *ul-toDL-COT-SharingED-Threshold-r16*.  For the case where a UE performs channel access procedures as described in clause 4.2.1.2.1 and shares its corresponding channel occupancy time with the gNB, for scheduling UL transmission, is set equal to the value provided by the higher layer parameter *ul-toDL-COT-SharingED-Threshold-r16*, if provided. Otherwise, is set by the above method in Section 4.2.3.1. For configured grant UL transmission, is determined by UE to choose the energy detection threshold given by the higher layer parameter *ul-toDL-COT-SharingED-Threshold-r16* if provided and the above method in Section 4.2.3.1  --------------------------------------------------------- End of TP #1----------------------------------------------------------------- |

**R1-2006020**

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| ----------------------------------- TP1: Start of TP 37.213 section 4.2.3 ---------------------------------------  4.2.3 Energy detection threshold adaptation procedure  <Unchanged parts are omitted>  If the higher layer parameter *absenceOfAnyOtherTechnology-r16* is not configured to a UE, and the higher layer parameter *ul-toDL-COT-SharingED-Threshold-r16* is configured to the UE, the gNB should use the gNB's transmit power in determining the resulting energy detection threshold *ul-toDL-COT-SharingED-Threshold-r16*.  ~~For the case where a~~ When a UE performs channel access procedures as described in clause 4.2.1.2.1 ~~and shares its corresponding channel occupancy time with the gNB~~,   * is set equal to the value provided by the higher layer parameter *ul-toDL-COT-SharingED-Threshold-r16*, if provided~~.~~ and if the UE shares its corresponding channel occupancy time with the gNB.  * Otherwise, may be determined according to the procedure described in clause 4.2.3.1 and the UE indicates no COT sharing in the corresponding CG-UCI according to Clause 6.3.2.1.3 [x, 38.212].   ----------------------------------------End of TP 37.213 section 4.2.3 ----------------------------------------- |

**R1-2006301**

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| ================================ Start of TP#3 for TS 37.213 ===============================  4.2.3 Energy detection threshold adaptation procedure  ================================ Unchanged Texts Omitted =================================  For the case where a UE performs channel access procedures as described in clause 4.2.1.1 and shares its corresponding channel occupancy time with the gNB, is set equal to the value provided by the higher layer parameter *ul-toDL-CO-SharingED-Threshold-r16*, if provided. For the case where a UE configured with *ul-toDL-CO-SharingED-Threshold-r16* performs channel access procedure as described in clause 4.2.1.1 and does not share its corresponding channel occupancy time with the gNB, the UE shall set according to the procedure described in clause 4.2.3.  ================================ Unchanged Texts Omitted =================================  ================================= End of TP#3 for TS 37.213 =============================== |

Companies are asked to provide their views related to the above proposals with the table below, namely:

* is a spec change needed?
* which one of the three TPs is the preferred starting point for a TP and what modifications are needed, if any?

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| Company | Comment | |
| OPPO | A spec change is needed.  We are fine for R1-2006020 or R1-2006301. | |
| Intel | We are supportive of either TP from R1-2006020 or R1-2006301. | |
| LG | The current specification is not clear when the UE intends not to share its COT with gNB. Therefore it is better to clarify this behaviour by adopting the one of TP in the above that if UE does not share its corresponding channel occupancy time with the gNB, the UE shall set XThresh\_max according to the procedure described in clause 4.2.3. The last TP in R1-2006301 can be starting point and the exact wording can be further discussed. | |
| ZTE, Sanechips | Support to capture the previous agreement, but about how to present this agreement more accurately, we can further discuss in draft TP phase. | |
| Nokia, NSB | ok to update the specs to capture the agreement. R1-2006301 can be the starting point for the discussion. | |
| Lenovo, Motorola Mobility | We support a spec change is needed.  Since R1-2005600 differentiates ED threshold selection for DG PUSCH and CG PUSCH, we think it can be a starting point for TP discussion. | |
| WILUS | We support either TP in R1-2006020 or R1-2006301. TP in R1-2006301 can be starting point for making better wording in draft TP phase. | |
| Vivo | Spec change is needed. TP in R1-2005600 is preferred since it clearly addressed the different cases for DG PUSCH and CG PUSCH. |
| Ericsson | The proposals seem to assume that the UE knows when the COT will be shared when the UE initiates the COT using a scheduled UL. And that is not true. It’s up to the gNB if it wants to utilize the remaining of the UE’s COT or not. We don’t know how those TPs solve any issue. | |
| Broadcom | Clause 4.2.1.2.1 in 37.213 specifies Type 2A channel access procedure. In that case what does it mean by the UE sharing its corresponding channel occupancy with the gNB? Do the proposed TPs intend to cover only the case of DL-UL-DL switch? Even in that case, the phrase “shares its corresponding channel occupancy time with the gNB” is confusing. | |
| Huawei, Hisilicon | We think it clear from the flow of this subclause (4.2.3) that will always be set to the default value for any UL transmission scheduled or configured unless the following conditions are met in which case *ul-toDL-CO-SharingED-Threshold-r16 is used:*   1. *ul-toDL-CO-SharingED-Threshold-r16* is provided, and 2. Type 1 UL channel access procedure is used to initiate the CO, and 3. only for CO initiated with PUSCH transmission on configured resources, the UE indicates COT sharing information other than ‘COT sharing is not available‘ in CG-UCI   From the above, only condition need to be captured (c.) instead of relying on “and shares its corresponding channel occupancy time with the gNB” which is not applicable for scheduled UL.  Therefore, we propose to capture in the TP the UE indication in CG-UCI as the FL suggested in the email thread as follows:  For the case where a UE performs channel access procedures as described in clause 4.2.1~~.2~~.1 ~~and shares its corresponding channel occupancy time with the gNB~~, is set equal to the value provided by the higher layer parameter *ul-toDL-CO-SharingED-Threshold-r16*, if provided, and for CO initiated with PUSCH transmission on configured resources, if the UE indicates in CG-UCI COT sharing information other than ‘COT sharing is not available‘. | |
| Qualcomm | Agree with the analysis by HW. We propose the following TP:  For the case where a UE performs channel access procedures as described in clause 4.2.1.1,   * is determined according to the procedure described in clause 4.2.3.1 if   + the higher layer parameter *ul-toDL-COT-SharingED-Threshold-r16* is not provided, or   + the higher layer parameter *ul-toDL-COT-SharingED-Threshold-r16* is provided, and the UE performs channel access for configured grant PUSCH with CG-UCI indicating “COT sharing is not available” * Otherwise, is set equal to the value provided by the higher layer parameter *ul-toDL-COT-SharingED-Threshold-r16*. | |

**R1-2006881** considers a bit different issue related to UL-DL Cot sharing:

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| ===========================Start of Text Proposal for TS37.213============================  4.1.3 DL channel access procedures in a shared channel occupancy  For the case where an eNB shares a channel occupancy initiated by a UE, the eNB may transmit a transmission that follows an autonomous PUSCH transmission by the UE as follows:  - If 'COT sharing indication' in AUL-UCI in subframe indicates '1', an eNB may transmit a transmission in subframe , where is subframeOffsetCOT-Sharing, including PDCCH but not including PDSCH on the same channel immediately after performing Type 2A DL channel access procedures in clause 4.1.2.1, if the duration of the PDCCH is less than or equal to duration of two OFDM symbols and it shall contain at least AUL-DFI or UL grant to the UE from which the PUSCH transmission indicating COT sharing was received.  If a gNB shares a channel occupancy initiated by a UE using the channel access procedures described in clause 4.2.1.1 on a channel, the gNB may transmit a transmission that follows a UL transmission on scheduled resources or a PUSCH transmission on configured resources by the UE after a gap as follows:  - The transmission shall contain transmission to the UE that initiated the channel occupancy and can include non-unicast and/or unicast transmissions where any unicast transmission ~~that includes user plane data~~ is only transmitted to the UE that initiated the channel occupancy.  - If the higher layer parameters *ul-toDL-COT-SharingED-Threshold-r16* is not provided, the transmission shall not include any unicast transmissions with user plane data and the transmission duration is not more than the duration of 2, 4 and 8 symbols for subcarrier spacing of 15, 30 and 60 kHz of the corresponding channel, respectively.  - If the gap is up to , the gNB can transmit the transmission on the channel after performing Type 2C DL channel access as described in clause 4.1.2.3.  - If the gap is or , the gNB can transmit the transmission on the channel after performing Type 2A or Type 2B DL channel access procedures as described in clause 4.1.2.1 and 4.1.2.2, respectively.  For the case where a gNB shares a channel occupancy initiated by a UE with configured grant PUSCH transmission, the gNB may transmit a transmission that follows the configured grant PUSCH transmission by the UE as follows:  - If the higher layer parameter *ul-toDL-COT-SharingED-Threshold-r16* is provided, the UE is configured by *cg-COT-SharingList-r16* where *cg-COT-SharingList-r16* provides a table configured by higher layer. Each row of the table provides a channel occupancy sharing information given by higher layer parameter *CG-COT-Sharing-r16*. One row of the table is configured for indicating that the channel occupancy sharing is not available.  - If the 'COT sharing information' in CG-UCI detected in slot *n* indicates a row index that corresponds to a *CG-COT-Sharing-r16* that provides channel occupancy sharing information, the gNB can share the UE channel occupancy assuming a channel access priority class *p= channelAccessPriority-r16*, starting from slot *n+O*, where *O=offset-r16* slots, for a duration of *D=duration-r16* slots where *duration-r16*, *offset-r16*, and *channelAccessPriority-r16* are higher layer parameters provided by *CG-COT-Sharing-r16*.  - If the higher layer parameter *ul-toDL-COT-SharingED-Threshold-r16* is not provided, and if 'COT sharing information' in CG-UCI indicates '1', the gNB can share the UE channel occupancy and start the DL transmission X= *cg-COT-SharingOffset-r16* symbols from the end of the slot where CG-UCI is detected, where *cg-COT-SharingOffset-r16* is provided by higher layer. The transmission shall not include any unicast transmissions with user plane data and the transmission duration is not more than the duration of 2, 4 and 8 symbols for subcarrier spacing of 15, 30 and 60 kHz of the corresponding channel, respectively.  =========================== End of Text Proposal for TS37.213============================ |

Companies are asked to provide their views related to the above proposals with the table below:

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| Company | Comment | |
| OPPO | The TP seems inline with RAN1 agreement  Agreement:  Sharing of a UE-initiated channel occupancy (either CG-PUSCH or scheduled UL) with gNB is supported, such that the gNB is allowed to transmit control/broadcast signals/channels for any UEs as long as the transmission contains transmissions for the UE that initiated the channel occupancy and/or DL signals/channels (PDSCH, PDCCH, reference signals) meant for the UE that initiated the channel occupancy. | |
| Intel | We support this TP. | |
| LG | Support the TP. | |
| ZTE, Sanechips | support | |
| Nokia, NSB | OK with the TP | |
| Lenovo, Motorola Mobility | We are OK with this TP. | |
| WILUS | We support this TP. | |
| vivo | Agree with the TP. |
| Ericsson | We do not agree with the proposal. This has been discussed before. And the purpose of adding user plane data was not to exclude sending unicast control plane data (such as RRC reconfiguration, paging etc..) to other UEs. our understanding is that, the intentions when the agreement was made is that any form of control information to other UEs can be sent. | |
| Huawei, HiSilicon | We share the same view as Ericsson | |
| Qualcomm | Agree with Ericsson | |

# 3. Conclusions

TBA

# References

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| 1 | [**R1-2005333**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_102-e/Docs/R1-2005333.zip) | Remaining issues on the channel access procedures | vivo |
| 2 | [**R1-2005600**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_102-e/Docs/R1-2005600.zip) | Remaining issues on the channel access procedure for NR-U | ZTE, Sanechips |
| 3 | [**R1-2005809**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_102-e/Docs/R1-2005809.zip) | Maintenance on channel access procedures | Huawei, HiSilicon |
| 4 | [**R1-2005914**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_102-e/Docs/R1-2005914.zip) | Channel access procedures | Ericsson |
| 5 | [**R1-2006020**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_102-e/Docs/R1-2006020.zip) | Discussion on the remaining issues of channel access procedure | OPPO |
| 6 | [**R1-2006095**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_102-e/Docs/R1-2006095.zip) | Channel access procedures for NR-U | Samsung |
| 7 | [**R1-2006301**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_102-e/Docs/R1-2006301.zip) | Remaining issues of channel access procedure for NR-U | LG Electronics |
| 8 | [**R1-2006351**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_102-e/Docs/R1-2006351.zip) | Remaining issues on channel access procedures for NR-U | ETRI |
| 9 | **[R1-2006370](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_102-e/Docs/R1-2006370.zip)** | Remaining Issues on Channel Access Procedures for NR-U | Nokia, Nokia Shanghai Bell |
| 10 | [**R1-2006763**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_102-e/Docs/R1-2006763.zip) | TP for Channel access procedures for NR unlicensed | Qualcomm Incorporated |
| 11 | [**R1-2006881**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_102-e/Docs/R1-2006881.zip) | Remaining issues on channel access procedure for NR-U | WILUS Inc. |