**3GPP TSG RAN WG1 #100bis-e** **R1-200XXXX**

**e-meeting, April 20-30, 2020**

**Agenda item: 7.2.2.2.1**

**Source: Moderator (Nokia)**

**Title: Summary of [100b-e-NR-unlic-NRU-ChAcc-02] Email discussion/approval on clarifications to UL to DL COT sharing**

**Document for: Discussion and Decision**

# 1 Introduction

This document captures the discussion in the following RAN1#100bis-e email thread:

[100b-e-NR-unlic-NRU-ChAcc-02] Email discussion/approval on clarifications to UL to DL COT sharing by 4/24; if necessary, followed by endorsing the corresponding TPs by 4/29 – Timo (Nokia)

During the preparation phase it was identified that the following TDocs and proposals relate to corrections and clarifications to UL to DL COT sharing:

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

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| Clarifications to UL to DL COT sharing | R1-2001652 (2.2)  R1-2001705 (2.1)  R1-2001759 (2.3, 2.4)  R1-2001935 (p5, p6)  R1-2002247 (p1)  R1-2002530 (p3)  R1-2002632 (p1)  R1-2002684 (p1, p2, p3) |

Note: Proposals p2 and p3 in R1-2002632 will be discussed in a later meeting together with other CWS update related CRs.

# 2. Issues identified in the contributions

To organize the email discussion, the issues have been grouped according to the chairman’s guidance.

## 2.1 ED Threshold for COT sharing

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| **R1-2001652**  *Proposal 2: The UL to DL COT sharing ED threshold should be dynamically indicated to the UE or gNB.* |
| **R1- 2001935**  *Proposal #5: For a UE configured with ED threshold to be used for UE-initiated channel occupancy, the UE is allowed to select between configured ED threshold and ED threshold calculated based on UE’s configured maximum transmission power. If the UE does not choose the configured ED threshold, the UE indicates the row index corresponding to no COT sharing information in CG-UCI.*  *Proposal #6: For a UE configured with ED threshold to be used for UE-initiated channel occupancy, UL grant indicates which ED threshold between configured ED threshold and ED threshold calculated based on UE’s configured maximum transmission power is applied to channel access procedure for the scheduled PUSCH.* |

**FL Proposal #1**: *Discuss whether the above two proposals are agreeable.*

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| **Company / Org.** | **View on FL proposal #1** |
| Intel | Forcing a UE to use a specific ED threshold configured by gNB may reduce greatly the channel access probability of the UE. Therefore, we believe that the choice of the ED threshold to use should be left to the UE. However, the UE should always use the ED threshold configured by the gNB in case it decides to share its remaining COT with the gNB for transmissions longer than 2/4/ or 8 symbols for 15/30 and 60 KHz subcarrier spacing, respectively. If the UE decides to use the ED threshold calculated by the UE based on the UL transmission power, the UE should always indicate within the CG-UCI that there will be no COT sharing with the gNB. Also we believe that the ED threshold used by the UE should be transparent to the gNB, and there is no necessity for the UE to indicate this explicitly to the gNB. |
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## 2.2 UL-DL gap > 25 us

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| **R1-2001705**  **Proposal 1**: ***For the COT sharing, the gNB behavior of the gap between a DL transmission and the last PUSCH transmission is larger than 25us shall be clarified. It is preferred to follow the same behavior with the case that the gap is equal to 25us.***  4.1.3 DL channel access procedures in a shared channel occupancy  --------------------------------------------------------- Start of TP #1----------------------------------------------------------------  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 PUSCH transmission on scheduled or 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-CO-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 at least or equal to , 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.  <unchanged part omitted>  For the case where a gNB uses channel access procedures as described in clause 4.1.1 to initiate a transmission and shares the corresponding channel occupancy with a UE that transmits a transmission as described in clause 4.2.1.2, the gNB may transmit a transmission within its channel occupancy that follows the UE's transmission if any gap between any two transmissions in the gNB channel occupancy is at least or up to 16us. In this case the following applies:  - If the gap is at least 25us or equal to 16us, the gNB can transmit the transmission on the channel after performing Type 2A or 2B DL channel access procedures as described in clause 4.1.2.1 and 4.1.2.2, 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.  <unchanged part omitted>  --------------------------------------------------------- End of TP #1----------------------------------------------------------------- |
| **R1-2002530**  **Proposal 3. For UL to DL COT sharing, if the gap is more than 25 us, Type 2A channel access can be used by gNB to transmit**  ==============TP for 37.213 4.1.3===================================  ----------------unchanged text removed-----------------------  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 PUSCH transmission on scheduled or 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-CO-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 no less than or is , 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. |
| **R1-2001537**  ***Proposal 1：Some rows should be added to the cg-COT-SharingList-r16 table such that each additional row indicates a possible UL-burst-end symbol within a slot.***   * ***If the gNB receives a CG-UCI indicating a row index providing a UL-burst-end before the start of a slot-based DL transmission opportunity sharing the UL COT, the gNB may transmit the DL transmission after a gap from the symbol indicated by the UL-burst-end in the immediately preceding slot.***   \*\*\* <Beginning of **Text Proposal 1**> \*\*\*  4.1.3 DL channel access procedures in a shared channel occupancy  \*\*\* Unchanged text is omitted \*\*\*  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-CO-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 information is not available.  - If the 'COT sharing information' in CG-UCI 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 *O=offset-r16* slots from the end of the slot where CG-UCI is detected, 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 additional rows are configured in the table provided by *cg-COT-SharingList-r16* wherein each additional row indicates a possible ‘*UL-burst-end’* symbol within a slot and if the gNB receives a 'COT sharing information' in a CG-UCI indicating a row index that corresponds to a *ulBurstEnd-r16* before the start of a DL transmission opportunity sharing the UL COT, the gNB assumes that the CG UL burst will end at the symbol indicated by the *ulBurstEnd-r16* in the slot immediately preceding the slot determined by the parameter *offset-r16* in another CG-UCI received before the start of the DL transmission opportunity. In that case, the gNB may transmit the DL transmission after a gap duration specified earlier in this subclause from the symbol indicated by the *ulBurstEnd-r16.*     - If the higher layer parameter *ul-toDL-CO-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.  \*\*\* Unchanged text is omitted \*\*\*  \*\*\* <End of **Text Proposal 1**> \*\*\* |

**FL Proposal #2**: *Discuss whether and how to capture the support for UL-DL gap larger than 25 us in a UE-initiated COT*

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| **Company / Org.** | **View on FL proposal #2** |
| Intel | We believe that the support of type 2A if the gap within a UE’s shared COT between UL and DL is larger than 25us would be beneficial for the UE’s shared COT procedure and widen its utilization. Otherwise, the use of the UE’s shared COT will be very restrictive.  As for proposal in R1-2001537, we are not supportive. While we understand the motivation behind it, we feel this is an optimization which is not essential at this point of the WI. |
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## 2.3 Clarification of the max duration of a UL-DL shared COT

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| **R1-2001759**  ***Proposal 4:*** *For uplink COT sharing, clarify that the total duration of UL and DL transmissions should not exceed the MCOT which initiated by the UE.*   * *Adopt TP4 into section 4.1.3 of TS 37.213.*   ----------------------------------- TP4: Start of TP 37.213 section 4.1.3 ---------------------------------------------  4.1.3 DL channel access procedures in a shared channel occupancy  <Unchanged parts are omitted>  If a gNB shares a channel occupancy initiated by a UE using the channel access procedures described in subclause 4.2.1.1 on a channel, the gNB may transmit a transmission that follows a PUSCH transmission on scheduled or 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-CO-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.  - The total duration of a PUSCH transmission on scheduled or configured resources including the following DL transmission obtained by Type 1 channel access procedure with UL channel access priority class , shall not exceed , where is given in Table 4.2.1-1.  - 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 subclause 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 subclause 4.1.2.1 and 4.1.2.2, respectively.  <Unchanged parts are omitted>  ----------------------------------------End of TP 37.213 section 4.1.3 ---------------------------------------------- |

**FL Proposal #3**: *Discuss whether and how to capture the above clarification into 37.213*

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| **Company / Org.** | **View on FL proposal #3** |
| Intel | We support this clarification text. However, the text should not be restrictive to one switching point but should be written such a way that multiple switching points are allowed (as already agreed during the WI). Also the text should explicitly mention that the gaps between UL and DL bursts are also counted toward the . Therefore, the text may be revised as follows:  The total duration of all PUSCH transmissions on scheduled or configured resources including ~~the following~~ all DL transmissions and gaps inside the same channel occupancy obtained by Type 1 channel access procedure with UL channel access priority class , shall not exceed , where is given in Table 4.2.1-1. |
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## 2.4 COT sharing indication in CG-UCI

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| **R1-2001759**  ***Proposal 5:*** *The gNB shall ignore the COT sharing indication in CG-UCI if the CG-UCI and the corresponding CG-PUSCH is transmitted within the gNB’s COT.*   * *Adopt TP5 into section 4.2.1.0.0 of TS 37.213.*   -----------------------------------TP5: Start of TP 37.213 section 4.2.1.0.0------------------------------------  4.2.1.0.0 Channel access procedures upon detection of a common DCI  <Unchanged parts are omitted>  If a UE determines the duration in time domain and the location in frequency domain of a remaining channel occupancy initiated by the gNB from a DCI format 2\_0 as described in subclause 11.1.1 of [7], the following is applicable:  - The UE may switch from Type 1 channel access procedures as described in subclause 4.2.1.1 to Type 2A channel access procedures as described in subclause 4.2.1.2.1 for its corresponding UL transmissions within the determined duration in time and location in frequency domain of the remaining channel occupancy. In this case, if the UL transmissions are PUSCH transmissions on configured resources, the UE may assume any priority class for the channel occupancy shared with the gNB. The gNB shall ignore the ‘COT sharing information’ in CG-UCI.  <Unchanged parts are omitted>  ----------------------------------------End of TP 37.213 section 4.2.1.0.0------------------------------------------ |
| **R1-2002684**  *Proposal 1: COT sharing information in CG-UCI for indicating the shared resources is updated slot by slot; the indication is consistent.*  *Proposal 2: Upon reception of COT sharing information in CG-UCI, only DL unicast data with CAPC value not larger than the UL CAPC value indicated by the COT sharing information is allowed to be transmitted in the shared resources.*  *Proposal 3: Adopt the TP to reflect the above two proposals in TS37.213:*  -----------------------------------------------< BEGIN TEXT PROPOSAL >-------------------------------------------------  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 PUSCH transmission on scheduled or 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-CO-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 both the higher layer parameter *ul-toDL-CO-SharingED-Threshold-r16* and the higher layer parameter *cg-COT-SharingList-r16* are provided to the UE, the UE transmits CG-UCI with bits for COT sharing information, where *C* is the number of rows in a table provided in *cg-COT-SharingList-r16*. 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 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 *O=offset-r16* slots from the end of the slot where CG-UCI is detected, 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*. Only the DL unicast transmission with user plane data having CAPC value not larger than the *channelAccessPriority-r16* is allowed to be transmitted in the UE channel occupancy. The ‘COT sharing information’ in CG-UCI is updated by the UE slot by slot.  - If the 'COT sharing information' in CG-UCI indicates a row index that corresponds to a *CG-COT-Sharing-r16* that indicates channel occupancy sharing is not available, there is no channel occupancy sharing to gNB.  - If the higher layer parameter *ul-toDL-CO-SharingED-Threshold-r16* is not provided and the higher layer parameter *cg-COT-SharingOffset-r16* is provided to the UE, the UE transmits CG-UCI with 1 bit COT sharing information. 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. 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.  For the case where a gNB uses channel access procedures as described in clause 4.1.1 to initiate a transmission and shares the corresponding channel occupancy with a UE that transmits a transmission as described in clause 4.2.1.2, the gNB may transmit a transmission within its channel occupancy that follows the UE's transmission if any gap between any two transmissions in the gNB channel occupancy is at most . In this case the following applies:  - If the gap is , the gNB can transmit the transmission on the channel after performing Type 2A or 2B DL channel access procedures as described in clause 4.1.2.1 and 4.1.2.2, 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.  -----------------------------------------------< END TEXT PROPOSAL >------------------------------------------------- |

**FL Proposal #4**: *Discuss whether and how to capture the above into 37.213*

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| **Company / Org.** | **View on FL proposal #4** |
| Intel | We support both TPs. |
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## 2.5 Correction on DL channel access in a shared COT initiated by a UE

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| **R1-2002632**   * *Proposal 1: Adopt the following text proposal on TS 37.213.*  |  | | --- | | ===========================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 PUSCH transmission on scheduled or 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 is only transmitted to the UE that initiated the channel occupancy.  - If the higher layer parameters *ul-toDL-CO-SharingED-Threshold-r16* is not provided, the transmission shall not include any unicast transmissions 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-CO-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 information is not available.  - If the 'COT sharing information' in CG-UCI 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 *O=offset-r16* slots from the end of the slot where CG-UCI is detected, 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-CO-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 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.  <unchanged parts are omitted>  =========================== End of Text Proposal for TS37.213============================ | |

**FL Proposal #5**: *Discuss whether and how to capture the above change into 37.213*

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| **Company / Org.** | **View on FL proposal #5** |
| Intel | We do not support this TP and changes, since we believe that current text is very clear. Furthermore, during the WI we made the agreement that user plane data is not supported when ED threshold is not configured, and the specification text should reflect it. |
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## 2.6 Clarifications

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| **R1-2002247**  *In the DL channel access procedures in a shared COT, from our understanding, gNB can perform a DL transmission following any UL transmission if the prior UL burst includes a PUSCH. However, in TS 37.213 Subclause 4.1.3, it may be misread that a DL transmission in a shared COT should directly follow a PUSCH after a gap with the PUSCH [1]. To be clearer, the following change is proposed.*  **Proposal 1**: Update TS 37.213 Subclause 4.1.3 based on the following TP.  -------------------------------------------------------- Start of TP #1 ----------------------------------------------------  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 including a PUSCH transmission on scheduled or configured resources by the UE after a gap as follows:  <unchanged part omitted>  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 a UL transmission including the configured grant PUSCH transmission by the UE as follows:  -------------------------------------------------------- End of TP #1 ----------------------------------------------------- |

**FL Proposal #6**: *Discuss whether and how to capture the above clarification into 37.213*

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| **Company / Org.** | **View on FL proposal #6** |
| Intel | We believe the current specification text is already quite clear, and this text is unnecessary. |
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# 3. Conclusions

TBA

# References

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| 1 | [**R1-2001534**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2001534.zip) | Maintainance on the channel access procedure | Huawei, HiSilicon |
| 2 | [**R1-2001652**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2001652.zip) | Remaining issues on the channel access procedures | vivo |
| 3 | [**R1-2001705**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2001705.zip) | Remaining issues on the channel access procedure for NR-U | ZTE, Sanechips |
| 4 | [**R1-2001759**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2001759.zip) | Discussion on the remaining issues of channel access procedure | OPPO |
| 5 | [**R1-2001935**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2001935.zip) | Remaining issues of channel access procedure for NR-U | LG Electronics |
| 6 | [**R1-2001987**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2001987.zip) | Channel access mechanism for NR-unlicensed | Intel Corporation |
| 7 | [**R1-2002031**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002031.zip) | Channel access procedures | Ericsson |
| 8 | [**R1-2002117**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002117.zip) | Channel access procedures for NR-U | Samsung |
| 9 | [**R1-2002193**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002193.zip) | Remaining Issues on Channel Access Procedures for NR-U | Nokia, Nokia Shanghai Bell |
| 10 | [**R1-2002247**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002247.zip) | Remaining issues on channel access procedures for NR-U | ETRI |
| 11 | [**R1-2002383**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002383.zip) | Remaining issues and corrections on channel access procedure for NR-U | Sharp |
| 12 | [**R1-2002405**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002405.zip) | Remaining issues on channel access for NR-U operation | MediaTek Inc. |
| 13 | [**R1-2002434**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002434.zip) | Remaining issues on channel access procedures for NR-U | NTT DOCOMO, INC. |
| 14 | [**R1-2002465**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002465.zip) | TP on shared spectrum in NR-U | NEC |
| 15 | [**R1-2002530**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002530.zip) | TP for Channel access procedures for NR unlicensed | Qualcomm Incorporated |
| 16 | [**R1-2002632**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002632.zip) | Remaining issues on channel access procedure for NR-U | WILUS Inc. |
| 17 | [**R1-2002684**](http://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_100b_e/Docs/R1-2002684.zip) | COT sharing information in CG-UCI | Lenovo, Motorola Mobility |