**3GPP TSG RAN WG1 #101-e** **R1-XXXXXX**

**e-meeting, May 25 – June 5, 2020**

**Agenda item: 7.2.2.2.1**

**Source: Moderator (Nokia)**

**Title: Discussion on Remaining TPs for [101-e-NR-unlic-NRU-ChAcc-01]**

**Document for: Discussion and Decision**

# 1 Introduction

This document relates to the discussion in the following RAN1#101s-e email thread:

[101-e-NR-unlic-NRU-ChAcc-01] Email discussion/approval on the following from R1-2004539 by 5/29; if necessary, endorse associated TPs by 6/4 – Timo (Nokia)

* Issue#1: Indication of LBT type, CP extension and CAPC; N1 timeline for UL transmissions with CP extension
* Issue#2: Clarifications to LBT with consecutive UL transmissions

Based on the intermediated agreements from the email discussion summarized in R1-2004858, the following points remain for discussion:

**Issue #1:**

**Section 2.2 Other CP extension / LBT type indication related issues**

Continue discussions on Proposals 2 and 6 in Section 4 of R1-200xxxx (FL summary v017) and if there is consensus, endorse TPs by 6/4.

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| ------------------------------------TP6: Start of TP 37.213 section 4.2.1 ---------------------------------------------  4.2.1 Channel access procedures for uplink transmission(s)  <Unchanged parts are omitted>  A UE shall use Type 1 channel access procedures for PUCCH transmissions unless stated otherwise in this subclause. If ~~a~~ the last DL grant among the DL grants scheduling a PUCCH transmission on a same slot indicates Type 2 channel access procedures, or a random access response (RAR) message for successRAR scheduling a PUCCH transmission indicates Type 2 channel access procedures, the UE shall use Type 2 channel access procedures.  <Unchanged parts are omitted>  ----------------------------------------End of TP 37.213 section 4.2.1 --------------------------------------------- |

**Companies are invited to comment on the following points:**

Q: is the TP agreeable as is, agreeable with some are some changes, or not needed?

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| **Company** | **Comment** |
| Nokia, NSB | Based on the discussion and the clarifications, we are ok to agree the TP as is. |
| Samsung | We are OK with this TP. |
| Huawei, HiSilicon | Agree with this TP |
| LG | We share the same view with Ericsson. This TP is not needed because it is redundant. |
| Intel | We are OK with the TP as is. |
| WILUS | We also share the view with Ericsson. From the perspective of the channel access procedure, this TP is not needed. |
| ZTE, Sanechips | Firstly, I tend to support LBT for PUCCH can follow indication of last DL grant.  But which spec to capture this content can up to editor from TS37.213 and/or TS 38.213. |
| OPPO | We originally raised this issue because we think the spec was not completely clear, in particular on the highlighted part below.  ---------------------------------------------------------  A UE shall use Type 1 channel access procedures for PUCCH transmissions unless stated otherwise in this subclause. If a DL grant or a random access response (RAR) message for successRAR scheduling a PUCCH transmission indicates Type 2 channel access procedures, the UE shall use Type 2 channel access procedures.  -----------------------------------------------------------  But after reading Editor’s comments, we understand the concern and fully respect Editor’s reasoning to keep a good consistency in TS 37.213. Therefore, we would like to come up with a revised proposal that hopefully can address the concerns on both sides.  OPPO revised TP  ------------------------------------TP6: Start of TP 37.213 section 4.2.1 ---------------------------------------------  4.2.1 Channel access procedures for uplink transmission(s)  <Unchanged parts are omitted>  A UE shall use Type 1 channel access procedures for PUCCH transmissions unless stated otherwise in this subclause. If a DL grant determined according to Clause 9.2.3 [TS 38.213] or a random access response (RAR) message for successRAR scheduling a PUCCH transmission indicates Type 2 channel access procedures, the UE shall use Type 2 channel access procedures.  <Unchanged parts are omitted>  ----------------------------------------End of TP 37.213 section 4.2.1 --------------------------------------------- |

**Section 2.5 Applicability of CP extension for SRS**

Agreement:

When Aperiodic SRS is triggered with a DCI (0\_1, 1\_1) that also includes indication of CP extension, the CP extension applies to SRS as well.

Endorse TP for the above agreement by 6/4.

The corresponding TP for 38.211 in R1-2004275 is as follows.

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| ------------- Beginning of Text Proposal, 38.211 ------------  In case of cyclic prefix extension of the first OFDM symbol allocated for PUSCH, SRS or PUCCH transmission, the time-continuous signal for the interval preceding the first OFDM symbol for PUSCH, SRS or PUCCH is given by  where refers to the signal in the previous subframe and  - for dynamically scheduled PUSCH, SRS and PUCCH transmissions  ------------- End of Text Proposal ------------ |

**Companies are invited to comment on the following points:**

Q1: is the TP agreeable or are some changes needed?

Q2: are other TPs needed for other parts of the specs? (we may consider addressing these, if any, in a later meeting)

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| **Company** | **Comment** |
| Nokia, NSB | Q1: the TP is agreeable  Q2: we have not identified a need for other CRs, but if they appear, we may consider them at RAN1#102e |
| Samsung | Q1: We are OK with this TP, but this TP may not be sufficient.  Q2: We believe there are more TPs needed, related to the following aspects: A-SRS can be triggered by DCI 1\_1/1\_2, DCI 0\_1/0\_2 and DCI 2\_3. DCI 0\_1 and DCI 1\_1 can include CP extension & channel access indication. gNB can schedule a PUSCH transmission and also trigger A-SRS by a single DCI 0\_1. And also, gNB can schedule a PDSCH with corresponding PUCCH and also trigger A-SRS by a single DCI 1\_1. In both cases, how to apply the indicated CP extension & channel access in the DCI should be decided, e.g. (1) apply CP extension to both A-SRS and PUCCH/PUSCH or (2) only apply CP extension to first UL signal/channel while no CP for second UL signal/channel. Considering CP extension is mainly for the scenario to occupy the channel before the first scheduled UL symbol and the previous transmission and LBT duration, which is a more typical scenario for a first UL signal/channel.    We added another two TPs related to above discussion for TS 38.212, and details can be discussed further as long as the above issues can be addressed.  ============== Start of TP for TS 38.212 ===================== 7.3.1.1.2 Format 0\_1 DCI format 0\_1 is used for the scheduling of one or multiple PUSCH in one cell, or indicating CG downlink feedback information (CG-DFI) to a UE.  ….  - ChannelAccess-CPext-CAPC – 0, 1, 2, 3, 4, 5 or 6 bits. The bitwidth for this field is determined as bits, where *I* is the number of entries in the higher layer parameter *ul-dci-triggered-UL-ChannelAccess-CPext-CAPC-r16* for operation in a cell with shared spectrum channel access and *ChannelAccessMode-r16* = "*dynamic*"; otherwise 0 bit. One or more entries from Table 7.3.1.1.2-35 are configured by the higher layer parameter *ul-dci-triggered-UL-ChannelAccess-CPext-CAPC-r16.* Text, determined according to this field as described in Clause 5.3.1 of [4, TS 38.211], applies to the first UL transmission scheduled/triggered by the DCI.  ….. 7.3.1.2.2 Format 1\_1 DCI format 1\_1 is used for the scheduling of PDSCH in one cell.  ….  - ChannelAccess-CPext – 0, 1, 2, 3 or 4 bits. The bitwidth for this field is determined as bits, where *I* is the number of entries in the higher layer parameter *dl-DCI-triggered-UL-ChannelAccess-CPext-r16* for operation in a cell with shared spectrum channel access and *ChannelAccessMode-r16* = "*dynamic*"; otherwise 0 bit. One or more entries from Table 7.3.1.2.2-6 are configured by the higher layer parameter *dl-DCI-triggered-UL-ChannelAccess-CPext-r16.* Text, determined according to this field as described in Clause 5.3.1 of [4, TS 38.211], applies to the first UL transmission scheduled/triggered by the DCI.  ============== End of TP for TS 38.212 ===================== |
| Huawei, HiSilicon | Q1: Agree with this TP. We also agree with Samsung that it will not be sufficient by itself given the fact that a non-fallback DCI can trigger A-SRS before or after the scheduled PUSCH/PUCCH  Q2: We think we can at least cover the aspect of applying the filed in the DCI to the first UL transmission by adding the following clarification to the same TP for 38.211 instead of additional TP for 38.212  ------------- Beginning of Text Proposal, 38.211 ------------  In case of cyclic prefix extension of the first OFDM symbol allocated for PUSCH, SRS or PUCCH transmission, the time-continuous signal for the interval preceding the first OFDM symbol for PUSCH, SRS or PUCCH is given by  where refers to the signal in the previous subframe and  - for dynamically scheduled PUSCH, SRS and PUCCH transmissions  where is given by Table 5.3.1-1 with for , for , and and given by the higher-layer parameters *cp-ExtensionC2-r16* and *cp-ExtensionC3-r16*, respectively, and given by clause 4.3.1. *Text* is applied to the first UL transmission scheduled by the scheduling DCI. For contention-based random access, or in absence of higher-layer configuration of and , the value of shall be set to the largest integer fulfilling for each of the values of .  ------------- End of Text Proposal ------------ |
| LG | Q1: We agree with Samsung that the TP is not sufficient.  Q2: We support the TP modified in TS 38.211 by Huawei. |
| Intel | We are OK with the TP, and we agreed with Samsung’s comments. Latest TP from Huawei is also OK. |
| WILUS | Q1: Agree with the TP but we also share the view with Samsung that the TP is not sufficient.  Q2: We agree with HW’s modification above. |
| ZTE, Sanechips | Support the latest TP modified from HW. |
| OPPO | Q1: agree with Samsung that the TP is not sufficient.  Q2: based on Samsung’s analysis on three cases, we think that at least for the latter two cases, the CP extension can also be applied to the later UL transmission.  ------------- Beginning of Text Proposal, 38.211 ------------  In case of cyclic prefix extension of the first OFDM symbol allocated for PUSCH, SRS or PUCCH transmission, the time-continuous signal for the interval preceding the first OFDM symbol for PUSCH, SRS or PUCCH is given by  where refers to the signal in the previous subframe and  - for dynamically scheduled PUSCH, SRS and PUCCH transmissions  where is given by Table 5.3.1-1 with for , for , and and given by the higher-layer parameters *cp-ExtensionC2-r16* and *cp-ExtensionC3-r16*, respectively, and given by clause 4.3.1. For contention-based random access, or in absence of higher-layer configuration of and , the value of shall be set to the largest integer fulfilling for each of the values of .  For the case that a DCI schedules two UL transmissions, *Text* is applied to the both UL transmissions, if the two UL transmissions are not consecutive; otherwise *Text* is applied to the first UL transmission.  ------------- End of Text Proposal ------------ |
| Samsung2 | We are OK with Huawei’s suggestion on using TP in 38.211 only. One small change is to move the sentence to the end of the paragraph, for a better statement: describing a complete feature on how to determine the parameters and then describing how to use T\_ext.  ------------- Beginning of Text Proposal, 38.211 ------------  In case of cyclic prefix extension of the first OFDM symbol allocated for PUSCH, SRS or PUCCH transmission, the time-continuous signal for the interval preceding the first OFDM symbol for PUSCH, SRS or PUCCH is given by  where refers to the signal in the previous subframe and  - for dynamically scheduled PUSCH, SRS and PUCCH transmissions  where is given by Table 5.3.1-1 with for , for , and and given by the higher-layer parameters *cp-ExtensionC2-r16* and *cp-ExtensionC3-r16*, respectively, and given by clause 4.3.1. For contention-based random access, or in absence of higher-layer configuration of and , the value of shall be set to the largest integer fulfilling for each of the values of . *Text* is applied to the first UL transmission scheduled by the scheduling DCI.  ------------- End of Text Proposal ------------ |

**Issue #2**

**Section 3.1 CG UL transmission cancellation**

Endorse TP on CG UL transmission cancellation taking the TP in R1-2003512 as the starting point by 6/4.

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| The corresponding TP is copied below:\*\*\* <Beginning of **Text Proposal 8**> \*\*\*  4.2.1.0.1 Channel access procedures for consecutive UL transmission(s)  \*\*\* Unchanged text is omitted \*\*\*  For UL transmission(s) following autonomous UL transmission(s), the following are applicable:  - If a UE is scheduled by an eNB to transmit on channel by a UL grant received on channel , , and if the UE is transmitting using autonomous UL on channel , the UE shall terminate the ongoing PUSCH transmissions using the autonomous UL at least one subframe before the UL transmission according to the received UL grant.  - If a UE is scheduled by a UL grant received from an eNB on a channel to transmit a PUSCH transmission(s) starting from subframe on the same channel using Type 1 channel access procedure and if at least for the first scheduled subframe occupies resource blocks and the indicated PUSCH starting position is OFDM symbol zero, and if the UE starts autonomous UL transmissions before subframe using Type 1 channel access procedure on the same channel, the UE may transmit UL transmission(s) according to the received UL grant from subframe without a gap, if the priority class value of the performed channel access procedure is larger than or equal to priority class value indicated in the UL grant, and the autonomous UL transmission in the subframe preceding subframe shall end at the last OFDM symbol of the subframe regardless of the higher layer parameter *endingSymbolAUL*. The sum of the lengths of the autonomous UL transmission(s) and the scheduled UL transmission(s) shall not exceed the maximum channel occupancy time corresponding to the priority class value used to perform the autonomous uplink channel access procedure. Otherwise, the UE shall terminate the ongoing autonomous UL transmission at least one subframe before the start of the UL transmission according to the received UL grant on the same channel.  For UL transmission(s) following configured grant UL transmission(s), the following are applicable:  - If a UE is scheduled to transmit UL transmission(s) starting from symbol in slot using Type 1 channel access procedures without CP extension with a corresponding CAPC, and if the UE starts configured grant UL transmissions before slot using Type 1 channel access procedures with a corresponding CAPC, and the scheduled UL transmission(s) occupies all the RBs of the same channels occupied by the configured grant UL transmission(s) or all the RBs of a subset thereof, the UE may directly continue to transmit the scheduled UL transmission(s) to the corresponding CAPC from symbol in slot without a gap, if the CAPC value of the performed channel access procedure is larger than or equal to the CAPC value corresponding to the scheduled UL transmission(s). The sum of the transmission durations of the configured grant UL transmission(s) and the scheduled UL transmission(s) shall not exceed the MCOT duration corresponding to the CAPC value used to transmit the configured grant UL transmission(s). Otherwise, the UE shall terminate the configured grant UL transmission(s) by dropping the transmission on the symbols of at least the last configured grant UL transmission before symbol in slot and attempt to transmit the scheduled UL transmission(s) according to the corresponding CAPC. PUSCH transmission with a configured grant in a slot is dropped according to the mechanism in Clause 11.1 of [7, TS 38.213] relative to a last symbol of a CORESET where the UE detected the scheduling DCI. In this case, if the UE cannot terminate the configured grant UL transmission(s), the UE ignores the scheduling DCI.  \*\*\* Unchanged text is omitted \*\*\*  \*\*\* <End of **Text Proposal 8**> \*\*\* |

**Companies are invited to comment on the following points:**

Q: is the TP agreeable as is, agreeable with some are some changes, or not needed?

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| **Company** | **Comment** |
| Nokia, NSB | We are ok to agree the TP as is. |
| Samsung | We are OK with the TP |
| Huawei, HiSilicon | We agree with this TP |
| LG | We are fine in general with this TP. But we think clarification is needed where the cancellation mechanism is described in Clause 11.1 of TS 38.213. |
| Intel | We are OK with this TP. |
| WILUS | We agree with this TP |
| Samsung | After double check the TP, we think at least following update [yellow part] seems necessary.  If a UE is scheduled to transmit UL transmission(s) starting from symbol in slot using Type 1 channel access procedures without CP extension with a corresponding CAPC, and if the UE starts configured grant UL transmissions before symbol in slot using Type 1 channel access procedures with a corresponding CAPC, … |
| ZTE, Sanechips | Agree with Samsung’s modification above. |
| OPPO | Agree with Samsung’s modification and also after a double check on our side, we propose an update to make the TP consistency with the lighted text (inserted also Samsung’s updates).  For UL transmission(s) following configured grant UL transmission(s), the following are applicable:  - If a UE is scheduled to transmit UL transmission(s) starting from symbol in slot using Type 1 channel access procedures without CP extension with a corresponding CAPC, and if the UE starts configured grant UL transmissions before symbol *i* in slot using Type 1 channel access procedures with a corresponding CAPC, and the scheduled UL transmission(s) occupies all the RBs of the same channels occupied by the configured grant UL transmission(s) or all the RBs of a subset thereof, the UE may directly continue to transmit the scheduled UL transmission(s) to the corresponding CAPC from symbol in slot without a gap, if the CAPC value of the performed channel access procedure is larger than or equal to the CAPC value corresponding to the scheduled UL transmission(s). The sum of the transmission durations of the configured grant UL transmission(s) and the scheduled UL transmission(s) shall not exceed the MCOT duration corresponding to the CAPC value used to transmit the configured grant UL transmission(s). Otherwise, the UE shall terminate the configured grant UL transmission(s) by dropping the transmission on the symbols of at least the last configured grant UL transmission before symbol in slot and attempt to transmit the scheduled UL transmission(s) according to the corresponding CAPC. The symbols of the PUSCH transmission with a configured grant in a slot is dropped according to the mechanism in Clause 11.1 of [7, TS 38.213] relative to a last symbol of a CORESET where the UE detected the scheduling DCI. In this case, if the UE cannot terminate the configured grant UL transmission(s), the UE ignores the scheduling DCI. |

**Section 3.2 UL transmission in a contiguous UL transmission burst**

Continue discussions on Proposals 2 and **6** in Section 4 of R1-200xxxx (FL summary v017) and if there is consensus, endorse TPs by 6/4.

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| **Proposal 1. For LBT type and CP extension, of a contiguous burst of UL transmission (including PUCCH, PUSCH and SRS) scheduled by one or more DL or UL grants, where the first scheduled transmission is indicated to use UL Type 2A, Type 2B, or Type 2C channel access, if the UE failed the LBT to transmit the first scheduled transmission, for the later transmissions, the UE will use Type 2A UL channel access with CP extension of 0.**  =====TP for 37.213 4.2.1.0.1================  4.2.1.0.1 Channel access procedures for consecutive UL transmission(s)  For contiguous UL transmission(s), the following are applicable:  - If a UE is scheduled to transmit a set of UL transmissions including PUSCH using a UL grant, PUCCH using a DL grant, or SRS with either a DL grant or UL grant , and if the UE cannot access the channel for a transmission in the set prior to the last transmission according to one of Type 1, Type 2, or Type 2A UL channel access procedures, the UE shall attempt to transmit the next transmission according to the channel access type indicated in the DL grant or UL grant. Otherwise, if the UE cannot access the channel for the first of the consecutive UL transmissions according to Type 2B UL channel access procedure, the UE shall attempt to transmit the next transmission according to Type 2A UL channel access procedure.  -  If a UE is scheduled by a gNB to transmit a set of UL transmissions including PUSCH using a UL grant, PUCCH using a DL grant, or SRS with either a DL grant or UL grant, the UE shall not apply a CP extension for the UL transmissions except for the first of the consecutive UL transmissions.  - If a UE is scheduled to transmit a set of consecutive UL transmissions without gaps including PUSCH using one or more UL grant(s), PUCCH using one or more DL grant(s), or SRS with one or more DL grant(s) or UL grant(s) and the UE transmits one of the scheduled UL transmissions in the set after accessing the channel according to one of Type 1, Type 2, Type 2A, Type 2B or Type 2C UL channel access procedures, the UE may continue transmission of the remaining UL transmissions in the set, if any.  -    If a UE is configured to transmit a set of consecutive PUSCH, PUCCH, or SRS transmissions on resources configured by the gNB, the time domain resource configuration defines multiple transmission occasions, and if the UE cannot access the channel according to Type 1 UL channel access procedure for transmitting in a transmission occasion prior to the last transmission occasion, the UE shall attempt to transmit in the next transmission occasion according to Type 1 UL channel access procedure. If the UE transmits in one of the multiple transmission occasions after accessing the channel according to Type 1 UL channel access procedure, the UE may continue transmission in the remaining transmission occasions in the set, wherein each transmission occasion starts at the starting symbol of a configured grant PUSCH, periodic PUCCH, or periodic SRS within the duration of the COT.  - A UE is not expected to be indicated with different channel access types for any consecutive UL transmissions without gaps in between the transmissions, except if Type 2B or Type 2C UL channel access procedures are identified for the first of the consecutive UL transmissions.  ============================<<unchanged text omitted>>=============================== |

**Companies are invited to comment on the following points:**

Q: is the TP agreeable as is, agreeable with some are some changes, or not needed?

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| **Company** | **Comment** |
| Nokia, NSB | Based on the discussion we tend to agree that the modifications related to the 2 first sub-bullets should not be made, since these sub-bullets relate to multi-PUSCH scheduling.  We support the modification to the 3rd sub-bullet.  The 4th sub-bullet may also be confusing, as it relates to CG-PUSCH, where PUCCH and SRS do not apply. |
| Huawei, HiSilicon | Agree with Nokia for all 4 sub-bullets  For the configured contiguous UL transmissions, we propose not to modify the 4th sub-bullet and rather introduce a 5th sub-bullet similar to the 3rd sub-bullet for the scheduled UL case as follows:  -    If a UE is configured to transmit a set of consecutive PUSCH transmissions on resources configured by the gNB, the time domain resource configuration defines multiple transmission occasions, and if the UE cannot access the channel according to Type 1 UL channel access procedure for transmitting in a transmission occasion prior to the last transmission occasion, the UE shall attempt to transmit in the next transmission occasion according to Type 1 UL channel access procedure. If the UE transmits in one of the multiple transmission occasions after accessing the channel according to Type 1 UL channel access procedure, the UE may continue transmission in the remaining transmission occasions in the set, wherein each transmission occasion starts at the starting symbol of a configured grant PUSCH within the duration of the COT.  - If a UE is configured by the gNB to transmit a set of consecutive UL transmissions without gaps including PUSCH, periodic PUCCH, or periodic SRS and the UE transmits one of the configured UL transmissions in the set after accessing the channel according to Type 1 UL channel access procedures, the UE may continue transmission of the remaining UL transmissions in the set, if any. |
| LG | We agree with Nokia for all 4 sub-bullets. |
| Intel | We also agree with Nokia’s comments on all 4 sub-bullets. |
| WILUS | We also think the 2 first sub-bullets should not be changed and the current sentences of 2 first sub-bullets in the spec (including CRs in previous RAN1#100b-e meeting) is clear for the case of multi-slot PUSCH scheduling by single UL grant.  For the 3rd sub-bullet, we support the modification.  For the 4th sub-bullet, we share the view with Nokia which is only related to CG-PUSCH and we are ok with HW’s suggested TP separately. |
| ZTE, Sanechips | For first 3 sub-bullets, we have the same views with Nokia.  For the 4th sub-bullet, we support latest modification from HW. |
| OPPO | From the agreement of 100b meeting   |  | | --- | | Agreement:  For LBT type and CP extension, after failing to transmit first PUSCH(s) of a set scheduled by a single UL grant,   * If a UE fails to access the channel with UL Type 2B channel access, Type 2A UL channel access shall be used for the following consecutively scheduled transmissions. * If a UE fails to access the channel prior to the first of the consecutive UL transmissions, it shall use “0” CP extension for the subsequent UL transmissions irrespective of the CP extension indicated in the scheduling grant. |   It seems a SRS and multi-PUSCH scheduled to by a UL grant to transmit consecutively is not precluded. If our understanding is correct, we think at least the following TP can be captured.  =====TP for 37.213 4.2.1.0.1================  For contiguous UL transmission(s), the following are applicable:  - If a UE is scheduled to transmit a set of UL transmissions including PUSCH using a UL grant, or SRS using a UL grant, and if the UE cannot access the channel for a transmission in the set prior to the last transmission according to one of Type 1, Type 2, or Type 2A UL channel access procedures, the UE shall attempt to transmit the next transmission according to the channel access type indicated in the UL grant. Otherwise, if the UE cannot access the channel for the first of the consecutive UL transmissions according to Type 2B UL channel access procedure, the UE shall attempt to transmit the next transmission according to Type 2A UL channel access procedure.  -  If a UE is scheduled by a gNB to transmit a set of UL transmissions including PUSCH using a UL grant, or SRS using a UL grant, the UE shall not apply a CP extension for the UL transmissions except for the first of the consecutive UL transmissions.  =====TP for 37.213 4.2.1.0.1================  For PUCCH and SRS scheduled by a DL grant, we shall further discuss in the next meeting. |

# References