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

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

**Agenda item: 7.2.2**

**Source: Moderator (Nokia)**

**Title: Feature Lead Summary of emails discussion [103-e-NR-NRU-04]**

**Document for: Discussion and Decision**

# 1 Introduction

This document summarizes the following email discussion on NR-U Channel Access Procedures:

[103-e-NR-NRU-04] Email discussion/approval on issues CA2.1, CA2.3, CA2.7 and CA2.8 in R1-2008888 until 10/29 with potential CRs by 11/5 – Timo (Nokia)

# 2. Issues identified in the contributions

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

## 2.1 LBT type for non-contiguous SRS and PUSCH/PUCCH

|  |  |
| --- | --- |
| LBT type for non-contiguous SRS and PUSCH/PUCCH | R1-2007903R1-2008043R1-2008127R1-2008248R1-2008383R1-2007985 |

Six contributions discuss the determination of LBT type and other related parameters for non-contiguous SRS and PUSCH/PUCCH transmissions, that are triggered with a single DCI.

**R1-2007903:**

|  |
| --- |
| ***Proposal 1*** *No special behavior is defined for the case where a single DCI schedules multiple UL transmissions. The related TP for 38.212 is in TP#1 in this document.* ================================= Start of TP#1 for TS 38.212 ==============================7.3.1.1.2 Format 0\_1================================ Unchanged Texts Omitted =================================- 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; 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.* The indicated CP extension and the channel access type only apply to the first UL transmission scheduled by the scheduling DCI.================================ Unchanged Texts Omitted =================================7.3.1.2.2 Format 1\_1================================ Unchanged Texts Omitted =================================- 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; 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.* The indicated CP extension and the channel access type only apply to the first UL transmission scheduled by the scheduling DCI.================================ Unchanged Texts Omitted ================================================================== End of TP#1 for TS 38.212 =========================== |

**R1-2008043:**

Moderators note: no TPs are provided.

|  |
| --- |
| **Proposal #1: It should be clarified that the indicated LBT type and CPE can be applied even if it is an SRS-only transmission when the SRS is triggered without PUSCH or PUCCH.****Proposal #2: The LBT type and CPE for the second UL transmission, the following options can be considered:*** **Option 1: Use Type 2A LBT with a zero-CP extension regardless of what was indicated for the first transmission, unless it falls outside of the gNB COT, in which case Type 1 LBT is used**
* **Option 2: The LBT type and CPE can be determined by the ChannelAccess-CPext table configured in advance for the second transmission**
 |

**R1-2008127:**

|  |
| --- |
| **Proposal 1: For 2nd UL transmission of two non-consecutive UL transmissions (e.g., PUSCH&SRS, or PUCCH&SRS) scheduled by a single DCI, CP extension is zero, LBT type is Type 2A inside gNB’s COT and type 1 LBT outside gNB’s COT.*** **Adopt the following TP for TS 38.211 & TS 37.213.**

================================= Start of TP for TS 38.211 ================================5.3.1 OFDM baseband signal generation for all channels except PRACH and RIM-RS================================ Unchanged Texts Omitted =================================- 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.================================ Unchanged Texts Omitted ================================================================== End of TP for TS 38.211 ================================================================== Start of TP for TS 37.213 ================================4.2.1 Channel access procedures for uplink transmission(s)A UE can access a channel on which UL transmission(s) are performed according to one of Type 1 or Type 2 UL channel access procedures. Type 1 channel access procedure is described in clause 4.2.1.1. Type 2 channel access procedure is described in clause 4.2.1.2.If a UL grant scheduling a PUSCH transmission indicates Type 1 channel access procedures, the UE shall use Type 1 channel access procedures for transmitting transmissions including the PUSCH transmission unless stated otherwise in this clause. A UE shall use Type 1 channel access procedures for transmitting transmissions including the autonomous or configured grant PUSCH transmission on configured UL resources unless stated otherwise in this clause.If a UL grant scheduling a PUSCH transmission indicates Type 2 channel access procedures, the UE shall use Type 2 channel access procedures for transmitting transmissions including the PUSCH transmission unless stated otherwise in this clause. A UE shall use Type 1 channel access procedures for transmitting SRS transmissions not including a PUSCH transmission. UL channel access priority class in Table 4.2.1-1 is used for SRS transmissions not including a PUSCH. If a UE is scheduled by an eNB/gNB to transmit PUSCH and SRS in contiguous transmissions without any gaps in between, and if the UE cannot access the channel for PUSCH transmission, the UE shall attempt to make SRS transmission according to uplink channel access procedures specified for SRS transmission.If a UE is scheduled by a gNB to transmit PUSCH and SRS by a single UL grant in non-contiguous transmissions with gap in between, or a UE is scheduled by a gNB to transmit PUCCH and SRS by a single DL assignment in non-contiguous transmissions with gap in between, the UE shall use the channel access procedure for first UL transmission scheduled by the UL grant or the DL assignment according to the channel access indicated by the UL grant or the DL assignment, and the UE shall use Type 2A channel access procedure for second UL transmission scheduled by the UL grant or the DL assignment if the second UL transmission is within gNB *Channel Occupancy Time,* otherwise the UE shall use Type 1 channel access procedure for the second UL transmission. A UE shall use Type 1 channel access procedures for PUCCH transmissions unless stated otherwise in this clause. If a DL grant determined according to Clause 9.2.3 in [7, TS38.213] 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.================================= End of TP for TS 37.213 ================================= |

**R1-2008248:**

Moderators note: no TPs are provided.

|  |
| --- |
| ***Proposal 2: for cases where one DCI schedules/triggers two UL transmissions, select the following one option**** ***Option 1: a default LBT type and CP extension are used for the second UL transmission.***
* ***Option 2: the second UL transmission also follows the indicated CP extension and the LBT type.***
 |

**R1-2008383:**

|  |
| --- |
| **Proposal 1:*** **The second one of the two non-consecutive UL transmissions scheduled with a single DCI:**
	+ **Type 1 LBT is used (switching to Type 2A LBT is still applicable as in a normal UL transmission),**
	+ **CP extension length is zero,**
	+ **The indicated CAPC in DCI format 1\_0 applies to the PUSCH regardless of the order of the PUSCH and SRS transmissions.**
* **Adopt the following Text proposal #1.**

**Text proposal #1**--------- beginning of text proposal for TS 37.213 **<omitted>**4.2.1 Channel access procedures for uplink transmission(s) A UE can access a channel on which UL transmission(s) are performed according to one of Type 1 or Type 2 UL channel access procedures. Type 1 channel access procedure is described in clause 4.2.1.1. Type 2 channel access procedure is described in clause 4.2.1.2.If a UL grant scheduling a PUSCH transmission indicates Type 1 channel access procedures, the UE shall use Type 1 channel access procedures for transmitting transmissions including the PUSCH transmission unless stated otherwise in this clause. A UE shall use Type 1 channel access procedures for transmitting transmissions including the autonomous or configured grant PUSCH transmission on configured UL resources unless stated otherwise in this clause.If a UL grant scheduling a PUSCH transmission indicates Type 2 channel access procedures, the UE shall use Type 2 channel access procedures for transmitting transmissions including the PUSCH transmission unless stated otherwise in this clause. A UE shall use Type 1 channel access procedures for transmitting SRS transmissions not including a PUSCH transmission. UL channel access priority class in Table 4.2.1-1 is used for SRS transmissions not including a PUSCH. If a UE is scheduled by an eNB/gNB to transmit PUSCH and SRS in contiguous transmissions without any gaps in between, and if the UE cannot access the channel for PUSCH transmission, the UE shall attempt to make SRS transmission according to uplink channel access procedures specified for SRS transmission.If a UE is scheduled with a DCI by a gNB to transmit PUSCH/PUCCH and SRS in non-contiguous transmissions with a gap in between, the UE shall use the indicated channel access type and the indicated CP extension index for the first UL transmission and shall use Type 1 channel access procedures and CP extension index 0 for the second UL transmission. If a UE is scheduled with a DCI by a gNB to transmit PUSCH and SRS in non-contiguous transmissions with a gap in between, the UE shall use the indicated channel access priority class for the PUSCH transmission. |

**FL summary:**

A TP is needed to address the issue of PUCCH/PUSCH and SRS scheduled with a single DCI. Companies are asked to provide their view on which TP to choose as the baseline.

|  |  |
| --- | --- |
| Company  | Comments  |
| OPPO | We agree with Samsung’s TP in principle. But we think, if the first UL is type 1, the second UL can be allowed to use type 2A when the first and the second UL are in the same UE COT. Thus, we propose the following update. Based on Samsumg’s TP. If a UE is scheduled by a gNB to transmit PUSCH and SRS by a single UL grant in non-contiguous transmissions with gap in between, or a UE is scheduled by a gNB to transmit PUCCH and SRS by a single DL assignment in non-contiguous transmissions with gap in between, the UE shall use the channel access procedure for first UL transmission scheduled by the UL grant or the DL assignment according to the channel access indicated by the UL grant or the DL assignment, and the UE shall use-Type 2A channel access procedure for second UL transmission scheduled by the UL grant or the DL assignment if the second UL transmission is within gNB *Channel Occupancy Time* or if the second UL transmission is within a UE channel Occupancy time initiated by the first UL transmission; -Otherwise the UE shall use Type 1 channel access procedure for the second UL transmission.  |
| Samsung | We support our TPs in R1-2008127 as the proposing company. In our understanding, NR-U does not support a UE to initiate a COT with 1st transmission, and then a gap >16 us, and then a 2nd UL transmission. So the revision proposed by OPPO may not be applicable.  |
| Intel | We support TPs in R1-2008127. |
| Huawei, HiSilicon | We agree with Samsung that paused COT is not applicable to UE-initiated CO and also UL-DL-UL is not supported. We agree with the TPs in R1-200127 with the following clarification that the UE shall not apply a CP extension for the second UL transmission (even though the indicated CP extension is applied to the 1st UL transmission scheduled by the scheduling DCI), in addition to some suggested editorial changes for conciseness:If a UE is scheduled by a gNB to transmit PUSCH and SRS by a single UL grant in non-contiguous transmissions with a gap in between, or a UE is scheduled by a gNB to transmit PUCCH and SRS by a single DL assignment in non-contiguous transmissions with a gap in between, the UE shall use the channel access procedure indicated by the scheduling DCI for the first UL transmission scheduled by the scheduling DCI ~~UL grant or the DL assignment according to the channel access indicated by the UL grant or the DL assignment~~, and the UE shall use Type 2A channel access procedure without applying a CP extension for the second UL transmission scheduled by the scheduling DCI ~~UL grant or the DL assignment~~ if the second UL transmission is within gNB *Channel Occupancy Time,* otherwise the UE shall use Type 1 channel access procedure for the second UL transmission. Note: “with a gap in between” may not be necessary since the TP reads “non-contiguous transmissions”  |
| Qualcomm | We support TPs in R1-2008127. |
| Ericsson | Proposal from HW is OK for is. |
| ETRI | We support the TP from Samsung. |
| Sharp | Ok with TPs in R1-2008127 in principle. On the other hand, for switching to Type 2A channel access procedure, the existing description in 4.2.1.0.0 of 37.213 is still applicable to this second UL transmission. Therefore, we don’t see the need to describe it here again.If a UE is scheduled by a gNB to transmit PUSCH and SRS by a single UL grant in non-contiguous transmissions with gap in between, or a UE is scheduled by a gNB to transmit PUCCH and SRS by a single DL assignment in non-contiguous transmissions with gap in between, the UE shall use the channel access procedure for first UL transmission scheduled by the UL grant or the DL assignment according to the channel access indicated by the UL grant or the DL assignment, and ~~the UE shall use Type 2A channel access procedure for second UL transmission scheduled by the UL grant or the DL assignment if the second UL transmission is within gNB~~ *~~Channel Occupancy Time,~~* ~~otherwise~~ the UE shall use Type 1 channel access procedure for the second UL transmission.  |

**R1-2007985:**

|  |  |
| --- | --- |
| **Proposal 1: For an SRS transmission, the UE can transmit from the earliest SRS symbol that passes the LBT procedure.****Proposal 2: The potential change of channel access type due to the DCI format 2\_0** **Proposal 3: The CP extension is applicable to the first SRS symbol.**The revised text is proposed below to address our clarifications.

|  |
| --- |
| Draft TS 37.213-g30, section 4.2.1.0.1For 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 , 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 a transmission in the set prior to the last transmission 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 or SRS symbol(s) using a UL grant, the UE shall not apply a CP extension for the remaining UL transmissions in the set after the first UL transmission after accessing the channel.- 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 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 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.- 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. |

 |

**FL summary:**

This TP considers the issue of multiple consecutive SRS transmissions. Companies are asked to provide their view with the Table below:

|  |  |
| --- | --- |
| Company  | Comments  |
| OPPO | Fine with the TP |
| Samsung | OK with the TP.  |
| Intel | We are OK with this TP. |
| Huawei, HiSilicon | OK in principle. However, since the term “transmission occasions” is associated in the spec with transmission with CG, it is not clear if we can extend it to configured SRS symbols  |
| Qualcomm | Ok with the TP  |
| Ericsson | Ok with the TP |
| ETRI | We are fine with the TP. In addition, we would like to clarify whether or not an SRS resource can be considered as consecutive SRS symbols in channel access perspective. In our understanding, an SRS resource with multiple symbols are subject to consecutive UL transmission following the TS 37.213. We hope to see other companies’ view. |
| Sharp | In our view, per-SRS-symbol LBT is over-optimization. “symbol(s)” should be removed from the 1st proposed change. |

## 2.3 Clarifications to channel access for semi-static channel occupancy

|  |  |
| --- | --- |
| Clarifications to channel access for semi-static channel occupancy | R1-2007608R1-2007903R1-2007980R1-2008601 |

One contribution proposes a clarification to the conditions when a UE is permitted to transmit within a gNB COT:

**R1-2007608:**

|  |
| --- |
| \*\*\* <Beginning of **Text Proposal 1**> \*\*\*4.3 Channel access procedures for semi-static channel occupancy\*\*\* Unchanged text is omitted \*\*\*A channel occupancy initiated by a gNB and shared with UE(s) shall satisfy thefollowing:- The gNB shall transmit a DL transmission burst starting at the beginning of the channel occupancy time immediately after sensing the channel to be idle for at least a sensing slot duration . If the channel is sensed to be busy, the gNB shall not perform any transmission during the current period. - The gNB may transmit a DL transmission burst(s) within the channel occupancy time immediately after sensing the channel to be idle for at least a sensing slot duration if the gap between the DL transmission burst(s) and any previous transmission burst is more than .- The gNB may transmit DL transmission burst(s) after UL transmission burst(s) within the channel occupancy time without sensing the channel if the gap between the DL and UL transmission bursts is at most  - A UE may transmit UL transmission burst(s) after detection of a DL transmission burst(s) within the channel occupancy time if the UL transmission burst(s) is scheduled by one or more DCI(s) detected within the same channel occupancy time as follows:- If the gap between the UL and DL transmission bursts is at most , the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time without sensing the channel.- If the gap between the UL and DL transmission bursts is more than , the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time after sensing the channel to be idle for at least a sensing slot duration within a interval ending immediately before transmission.\*\*\* Unchanged text is omitted \*\*\*\*\*\* <End of **Text Proposal 1**> \*\*\* |

**FL summary:**

Companies are asked to provide their view with the Table below:

|  |  |
| --- | --- |
| Company  | Comments  |
| OPPO | It does not seem necessary to restrict the DCI and the scheduled UL in the same COT. It can be up to gNB implementation. |
| Samsung | The restriction is not needed. The correspondence relationship has already been implied by detecting a DL transmission.  |
| Intel | We are fine with the TP and we believe that this clarification is needed given that from the text in Sec. 4.2.7.3.1.4 of the ETSI BRAN cross-FFP scheduling is not allowed:

|  |
| --- |
| 4.2.7.3.1.4 Initiating Device Channel Access MechanismThe *Initiating Device (Frame Based Equipment)* shall implement a *Channel Access Mechanism* that complies with the following requirements:…1. An *Initiating Device* is allowed to grant an authorization to one or more associated *Responding Devices* to transmit on the current channel within the current *Channel Occupancy Time.* A *Responding Device* that receives such a grant shall follow the procedure described in clause 4.2.7.3.1.5.
2. The *Channel Occupancy Time* shall not be greater than 95 % of the *Fixed Frame Period* defined in point 1) and shall be followed by an *Idle Period* until the start of the next *Fixed Frame Period* such that the *Idle Period* is at least 5 % of the *Channel Occupancy Time*, with a minimum of 100 µs.

… |

  |
| Huawei, HiSilicon | We agree with Intel. The TP is needed.We have provided the TP in our tdoc R1-2007608based on the same highlighted text from ETSI BRAN EN 301 893.Detecting DL transmission is not a sufficient condition to authorize UL transmission within the a current gNB CO |
| Qualcomm | The TP is not necessary. Per current spec, the cross COT UL grant is supported, only the PUSCH will not be transmitted if DL is not detected in the COT the PUSCH is scheduled in. |
| Ericsson | Disagree with the proposal.Step three of the procedure indicates that COT sharing is allowed, and defined the responding device behaviour (“*Responding Devices* to transmit on the current channel within the current *Channel Occupancy Time.*”) and does not define the procedure of how to enable it is not specified. Therefore, there is no reason why the UL grant/configuration has to come in the same COT. Besides, if the gNB schedules across COTs, it’s the gNB’s responsibility to make sure the COT will be anyway initiated for that COT. And the UE should expect that the gNB will take care of that. Also, the understanding in R1-2007608 would mean no pre-configured transmissions are allowed in gNB initiated COT in FBE unless the grant/configuration comes in the same COT? that is not our understanding. |
| Sharp | Agree with OPPO. We do not see the need to capture such restriction in the Spec. |

Three contributions discuss aspects related to indication of the LBT type, CP extension and CAPC in the case of semi-static channel access:

**R1-2007903:**

|  |
| --- |
| ================================= Start of TP#2 for TS 37.213 ============================================================== Unchanged Texts Omitted =================================4.3 Channel access procedures for semi-static channel occupancyChannel assess procedures based on semi-static channel occupancy as described in this Clause, are intended for environments where the absence of other technologies is guaranteed e.g., by level of regulations, private premises policies, etc. If a gNB provides UE(s) with higher layer parameters *ChannelAccessMode-r16 ='semistatic'* by SIB1 or dedicated configuration, a periodic channel occupancy can be initiated by the gNB every within every two consecutive radio frames, starting from the even indexed radio frame at with a maximum channel occupancy time , where *period* in , is a higher layer parameter provided in *SemiStaticChannelAccessConfig* and *.* In the following procedures in this clause, when a gNB or UE performs sensing for evaluating a channel availability, the sensing is performed at least during a sensing slot duration . The corresponding adjustment for performing sensing by a gNB or a UE is described in clauses 4.1.5 and 4.2.3, respectively.A channel occupancy initiated by a gNB and shared with UE(s) shall satisfy thefollowing:- The gNB shall transmit a DL transmission burst starting at the beginning of the channel occupancy time immediately after sensing the channel to be idle for at least a sensing slot duration . If the channel is sensed to be busy, the gNB shall not perform any transmission during the current period. - The gNB may transmit a DL transmission burst(s) within the channel occupancy time immediately after sensing the channel to be idle for at least a sensing slot duration if the gap between the DL transmission burst(s) and any previous transmission burst is more than .- The gNB may transmit DL transmission burst(s) after UL transmission burst(s) within the channel occupancy time without sensing the channel if the gap between the DL and UL transmission bursts is at most  - A UE may transmit UL transmission burst(s) after detection of a DL transmission burst(s) within the channel occupancy time as follows:- If the UE is indicated to perform Type 2C UL channel access procedures, the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time without sensing the channel.- If the UE is indicated to perform Type 2A UL channel access procedures , the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time after sensing the channel to be idle for at least a sensing slot duration within a interval ending immediately before transmission.- The gNB and UEs shall not transmit any transmissions in a set of consecutive symbols for a duration of at least before the start of the next period.If a UE fails to access the channel(s) prior to an intended UL transmission to a gNB, Layer 1 notifies higher layers about the channel access failure.================================ Unchanged Texts Omitted ================================================================== End of TP#1 for TS 38.212 =============================== |

**R1-2007980:**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Proposal 2 Introduce a new table in 38.212 to capture the following combinations for channel access and CP extension for operation based on semi-static channel access.****1. No sensing (no LBT) without CP extension****2. No sensing (no LBT) with CP extension of C2\*symbol length – 16 us – TA****3. Sensing (LBT) of 9us without CP extension****• Adopt TPs in Proposals 3,4,5 for clauses 7.3.1.1.1, 7.3.1.1.2, 7.3.1.2.1, 7.3.1.2.2 in TS38.212, clauses 8.2 and 8.2A in TS38.213 and clause 4.3 in TS37.213, respectively, to properly specify indication of channel access and CP extension and corresponding UE behavior.****Proposal 3 Adopt the following changes in clause 7.3.1.1.1, 7.3.1.1.2, 7.3.1.2.1, 7.3.1.2.2 in TS38.212:**===============<Start of Text Proposal for TS 38.212>======================7.3.1.1.1 Format 0\_0DCI format 0\_0 is used for the scheduling of PUSCH in one cell. The following information is transmitted by means of the DCI format 0\_0 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI:<Unchanged text omitted>- ChannelAccess-CPext – 2 bits indicating combinations of channel access type and CP extension as defined in Table 7.3.1.1.1-4A if *ChannelAccessMode-r16* = "*semistatic*" is provided or Table 7.3.1.1.1.4, for operation in a cell with shared spectrum channel access; 0 bit otherwise.<Unchanged text omitted>The following information is transmitted by means of the DCI format 0\_0 with CRC scrambled by TC-RNTI:<Unchanged text omitted>- ChannelAccess-CPext – 2 bits indicating combinations of channel access type and CP extension as defined in Table 7.3.1.1.1-4A if *ChannelAccessMode-r16* = "*semistatic*" is provided or Table 7.3.1.1.1.4, for operation in a cell with shared spectrum channel access; 0 bit otherwise.<Unchanged text omitted>Table 7.3.1.1.1-4: Channel access type & CP extension for DCI format 0\_0 and DCI format 1\_0 unless *ChannelAccessMode-r16* = "*semistatic*" is provided

|  |  |  |
| --- | --- | --- |
| **Bit field mapped to index** | **Channel Access Type**  | **The CP extension T\_"ext" index defined in Clause 5.3.1 of [4, TS 38.211]** |
| 0 | Type2C-ULChannelAccess defined in [clause 4.2.1.2.3 in 37.213] | 2 |
| 1 | Type2A-ULChannelAccess defined in [clause 4.2.1.2.1 in 37.213] | 3 |
| 2 | Type2A-ULChannelAccess defined in [clause 4.2.1.2.1 in 37.213] | 1 |
| 3 | Type1-ULChannelAccess defined in [clause 4.2.1.1 in 37.213] | 0 |

Table 7.3.1.1.1-4A: Channel access type & CP extension if *ChannelAccessMode-r16* = "*semistatic*" is provided

|  |  |  |
| --- | --- | --- |
| **Bit field mapped to index** | **Channel Access Type**  | **The CP extension T\_"ext" index defined in Clause 5.3.1 of [4, TS 38.211]** |
| 0 | No sensing as defined in Clause 4.3 in TS 37.213 | 0 |
| 1 | No sensing as defined in Clause 4.3 in TS 37.213 | 2 |
| 2 | Sensing as defined in Clause 4.3 in TS 37.213 | 0 |
| 3 | Reserved | - |

7.3.1.1.2 Format 0\_1DCI 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. The following information is transmitted by means of the DCI format 0\_1 with CRC scrambled by C-RNTI or CS-RNTI or SP-CSI-RNTI or MCS-C-RNTI:<Unchanged text omitted>- 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* or in Table 7.3.1.1.1-4A if *ChannelAccessMode-r16* = "*semistatic*" is provided for operation in a cell with shared spectrum channel access; 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.*<Unchanged text omitted>7.3.1.2.1 Format 1\_0DCI format 1\_0 is used for the scheduling of PDSCH in one DL cell. The following information is transmitted by means of the DCI format 1\_0 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI:<Unchanged text omitted>- ChannelAccess-CPext – 2 bits indicating combinations of channel access type and CP extension as defined in Table 7.3.1.1.1-4A if *ChannelAccessMode-r16* = "*semistatic*" is provided or Table 7.3.1.1.1.4, for operation in a cell with shared spectrum channel access; 0 bit otherwise.<Unchanged text omitted>The following information is transmitted by means of the DCI format 1\_0 with CRC scrambled by TC-RNTI:<Unchanged text omitted>- ChannelAccess-CPext – 2 bits indicating combinations of channel access type and CP extension as defined in Table 7.3.1.1.1-4A if *ChannelAccessMode-r16* = "*semistatic*" is provided or Table 7.3.1.1.1.4, for operation in a cell with shared spectrum channel access; 0 bit otherwise.===============<Unchanged text omitted>=============7.3.1.2.2 Format 1\_1DCI format 1\_1 is used for the scheduling of PDSCH in one cell. The following information is transmitted by means of the DCI format 1\_1 with CRC scrambled by C-RNTI or CS-RNTI or MCS-C-RNTI: ===============<Unchanged text omitted>=============- 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* or in Table 7.3.1.1.1-4A if *ChannelAccessMode-r16* = "*semistatic*" is provided for operation in a cell with shared spectrum channel access; 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.*===============<End of Text Proposal for TS 38.212>====================== |

|  |
| --- |
| ===============<Start of Text Proposal for TS 37.213>======================4.3 Channel access procedures for semi-static channel occupancy<Unchanged text omitted>A channel occupancy initiated by a gNB and shared with UE(s) shall satisfy thefollowing:- The gNB shall transmit a DL transmission burst starting at the beginning of the channel occupancy time immediately after sensing the channel to be idle for at least a sensing slot duration . If the channel is sensed to be busy, the gNB shall not perform any transmission during the current period. - The gNB may transmit a DL transmission burst(s) within the channel occupancy time immediately after sensing the channel to be idle for at least a sensing slot duration if the gap between the DL transmission burst(s) and any previous transmission burst is more than .- The gNB may transmit DL transmission burst(s) after UL transmission burst(s) within the channel occupancy time without sensing the channel if the gap between the DL and UL transmission bursts is at most  - A UE may transmit UL transmission burst(s) after detection of a DL transmission burst(s) within the channel occupancy time as follows:- If the gap between the UL and DL transmission bursts is at most , the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time without sensing the channel.- If the gap between the UL and DL transmission bursts is more than , the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time after sensing the channel to be idle for at least a sensing slot duration within a interval ending immediately before transmission.- A UE may be indicated by the gNB to transmit UL transmission burst(s) within the channel occupancy time without sensing the channel or after sensing the channel to be idle for at least a sensing slot duration within a interval ending immediately before transmission.- The gNB and UEs shall not transmit any transmissions in a set of consecutive symbols for a duration of at least before the start of the next period.<Unchanged text omitted>===============<End of Text Proposal for TS 38.213>===================== |

**R1-2008601:**

|  |
| --- |
| ============TP for 38.212==================================7.3.1.1.2 Format 0\_1----------Unchanged text omitted------------------------ 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 *ULDCI-trigerred-UL-ChannelAccess-CPext-CAPC-List-r16* for operation in a cell with shared spectrum channel; otherwise 0 bit. One or more entries from Table 7.3.1.1.2-35 are configured by the higher layer parameter *ULDCI-trigerred-UL-ChannelAccess-CPext-CAPC-List-r16.* When *ChannelAccessMode-r16*=”*semi-static*”, UE will ignore the CAPC value indicated by ChannelAccess-CPext-CAPC.----------Unchanged text omitted-----------------------===================================================================TP for 37.213 4.3==================================4.3 Channel access procedures for semi-static channel occupancyChannel assess procedures based on semi-static channel occupancy as described in this Clause, are intended for environments where the absence of other technologies is guaranteed e.g., by level of regulations, private premises policies, etc. If a gNB provides UE(s) with higher layer parameters *ChannelAccessMode-r16 ='semistatic'* by SIB1 or dedicated configuration, a periodic channel occupancy can be initiated by the gNB every within every two consecutive radio frames, starting from the even indexed radio frame at with a maximum channel occupancy time, where *period* in , is a higher layer parameter provided in *SemiStaticChannelAccessConfig* and *.*In the following procedures in this subclause, when a gNB or UE performs sensing for evaluating a channel availability, the sensing is performed at least during a sensing slot duration . The corresponding adjustment for performing sensing by a gNB or a UE is described in subclauses 4.1.5 and 4.2.3, respectively.A channel occupancy initiated by a gNB and shared with UE(s) shall satisfy thefollowing:- The gNB shall transmit a DL transmission burst starting at the beginning of the channel occupancy time immediately after sensing the channel to be idle for at least a sensing slot duration . If the channel is sensed to be busy, the gNB shall not perform any transmission during the current period. - The gNB may transmit a DL transmission burst(s) within the channel occupancy time immediately after sensing the channel to be idle for at least a sensing slot duration if the gap between the DL transmission burst(s) and any previous transmission burst is more than .- The gNB may transmit DL transmission burst(s) after UL transmission burst(s) within the channel occupancy time without sensing the channel if the gap between the DL and UL transmission bursts is at most  - A UE may transmit UL transmission burst(s) after detection of a DL transmission burst(s) within the channel occupancy time as follows:- If the UL transmission is indicated by DCI format 0\_1 or DCI format 1\_1 to use Type 2C channel access, the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time without sensing the channel.- If the UL transmission is indicated by DCI format 0\_0 or DCI format 1\_0 or RAR UL grant to use Type 1 channel access or Type 2A channel access, or if the UL transmission is indicated by DCI format 1\_1 or DCI format 0\_1 to use Type 2A channel access, the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time after sensing the channel to be idle for at least a sensing slot duration before transmission.- The gNB and UEs shall not transmit any transmissions in a set of consecutive symbols for a duration of at least before the start of the next period.======================================================= |

**FL summary:**

Companies are asked to provide their view with the Table below:

|  |  |
| --- | --- |
| Company  | Comments  |
| OPPO | For TP#2 of R1-2007903, the current spec should not restricted to be applied for scheduled UL. We understand configured UL can be applied too. Thus, leaving the original wording can cover these two cases. Thus, we think the original text is better. For the proposal from R1-2007980, we think the TP is not essential for the following reasons: 1) the current spec seems work fine. 2) the TP is reverting RAN1 agreement (RAN1#99 meeting). Agreement:At least for LBE operation:* For signaling of LBT type & CP extension for both Fallback DL assignment and Fallback UL Grant, the following table is used:

|  |  |
| --- | --- |
| **LBT Type** | **CP extension** |
| **Cat1 16 µs** | C2\*symbol length – 16 us – TA |
| **Cat2 25 µs** | C3\*symbol length – 25 us – TA |
| **Cat2 25 µs** | C1\*symbol length – 25 us |
| **Cat4** | 0 |

* + CAPC is not indicated explicitly:
		- For the UL grants
			* The UE assumes CAPC=4 was used by the gNB to acquire the CO,
			* For UE initiated COTs (Cat4 case) the UE may select the CAPC by itself.
				+ Note: The mapping between priority classes and traffic classes follows the same mechanism as defined for UL CG transmissions.
		- Note: For PUCCH associated with DL assignments may use the highest priority CAPC when CAT4 LBT is used, as agreed earlier.
* If the network indicates FBE operation, for an indication of LBT type of Cat 2 25 us or Cat4 the UE follows the mechanism whereby one 9 microsecond slot is measured within a 25 microsecond interval as in 37.213.

For TP of R1-2008601TP for 38.212 seems reasonable. TP for 37.213 4.3, we are fine with the TP on maximum channel occupancy. But we have a concern on the later part for LBT type determination with a similar reasoning explain above for TP#2 of R1-2007903.  |
| Samsung | For dealing with CAPC in BFE, TP for 38.212 in R1-2008601 is more preferable, and new table in R1-2007980 is not needed. For dealing with the gap duration issue, maybe we can keep both conditions to resolve OPPO’s concern: keeping the original text (if the UE knows the gap duration), and adding new condition of indicated channel access type (if the UE solely relies on indication to know the gap duration). More specifically, this is the TP we have in mind: - If the gap between the UL and DL transmission bursts is at most , or if the UL transmission is indicated by DCI format 0\_1 or DCI format 1\_1 to use Type 2C channel access, the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time without sensing the channel.- If the gap between the UL and DL transmission bursts is more than , or if the UL transmission is indicated by DCI format 0\_0 or DCI format 1\_0 or RAR UL grant to use Type 1 channel access or Type 2A channel access, or if the UL transmission is indicated by DCI format 1\_1 or DCI format 0\_1 to use Type 2A channel access, the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time after sensing the channel to be idle for at least a sensing slot duration before transmission. |
| Intel | * For R1-2007903, we agree with the proposed changes to solve the possible ambiguity between UE and gNB in terms of the exact gaps between different burst.
* For R1-2007980, we agree that the current tables to which the field *ChannelAccess-CPext* and *ChannelAccess-CPext-CAPC* are linked to are not suitable for semi-static channel access operation, and we are generally OK with correcting this inconsistency. However, we beleive that the exact tables proposed here reverts the RAN1 agreement from #99 meeting, which OPPO is listing above. If the group decides to go with the proposed approach of this TP, we beleive that the related TP in R1-2001987 could be used instead as a baseline for further discussion.
* For R1-2008601, as mentioned in the previous bullet we agree that the issue should be solved, and if the group prefers this approach, we are OK with this TP.
 |
| Huawei, HiSilicon | We agree with OPPO and Intel that the new table proposed in R1-2007980 would revert the cited agreement.We also agree that dealing with CAPC for UL transmission with gNB semi-static CO should be captured in 38.212 as in R1-2008601.We are OK with proposed changes in R1-2007903 to address the gap issue with the following edit:- If the UE is indicated to perform Type 2C UL channel access procedures, the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time without sensing the channel.- If the UE is indicated to perform Type 2A UL channel access procedures or Type 1 UL channel access procedures , the UE may transmit UL transmission burst(s) after a DL transmission burst(s) within the channel occupancy time after sensing the channel to be idle for at least a sensing slot duration within a interval ending immediately before transmission.  |
| Qualcomm | As proposing company, we prefer the TP in R1-2008601 over the TP in R1-2007903. The spec is written from UE perspective, and the UE does not know exactly how long the gap is. Thus it is better to use indicated channel access type directly to define behaviour.For R1-2007980, we do like the idea of introducing a new table to make the spec cleaner. However this may involve a lot of changes and may be too late. The current spec is still correct under certain scheduler restriction.  |
| Ericsson | It seems there is a misunderstanding on intention of TP in 7980 as it mentioned that it implies reverting the agreement. First of all, from functionality pov, the TP is aligned with the agreement. As we explain below, the intention of the TP is **about how to capture the agreement properly in the spec**, in a clean way, without unnecessarily **creating coupling between FBE and LBE** and complicating the spec. So, it is about different way of capturing the agreement. I explain below the issue with approach of “interpretation LBE parameters” from specification point of view.* Assume UE is supposed to do no LBT.
1. UE configured with FBE. From channel access, operations in 4.3 in 37.213 are applicable as currently specified.
2. UE detects the filed in DCI with channel access, cp ext parameters.
3. The bit-field points to an entry in Table 7.3.1.1.2-35 (or Table 7.3.1.1.1-4).
4. The entry in table points to a **functionality** in spec that is described in clause 4.2.1.2.3 for Type 2C.
5. In 37.213, section 4.3, for UE behaviour, it says if it is 2C, perform no LBT, etc. That is mention of 2C in 4.3 does not mean that the procedures in clause 4.2.1.2.3 should be followed.

This is very strange way of specifying. Few issues:The proposed TP for “interpretation based approach” are not fully specifying the behaviour. For example:* due to Step D above, you have to add in 4.2.1.2.3 that what are the modifications you need to do for FBE, such as no constraint on transmission duration, etc (and similarly for 2A)
* Also, clause 4.1 and 4.2 are only for LBE. Now, you are making an exception in the middle of everything, without even using the functionality (step E)
* You have to create the link between Step D and E. That means that in clause 4.2.1.2.3, you have to add if it is FBE, do this and that and go to clause 4.3…

So, that’s why I don’t think this is good way of specifying. FBE and LBE operation are independent. It is also good from the spec point of view, to keep them independent. Please think about the updates we need to do for Rel.17.Convoluted specifications would create unnecessary complications.So, an approach that decouple FBE and LBE is preferable. Our TP was such an attempt to consider all aspects. If there are better proposals, we would like to discuss them.Another issue with the TP updated with TP is that it mixes the text applicable for configured UL transmission and scheduled ones. In our TP, we did not mix these too. Also thinking about Rel17 as well,But I guess these are the aspects that Editors can find a good way to ensure good readability of the spec.  |
| Sharp | We support the clarification on CAPC proposed in TP for 38.212 in R1-2008601.For TP in R1-2007980, although we understand the intention, the proposed change is not essential. The current Spec with the clarification by TP for 38.212 in R1-2008601 does not break anything.For the gap issue, we support the TP in R1-2007903. |

## 2.7 RACH related

|  |  |
| --- | --- |
| Channel access for 2-step RACH | R1-2008248 |
| Indication of LBT type for RACH | [R1-2007980](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007980.zip) |

One TDoc considers channel access for 2-step RACH:

**R1-2008248:**

|  |
| --- |
| ***Proposal 1: In 2-step RACH, if a PO is within a COT initiated by a UE for PRACH transmission on an associated RO, for PUSCH transmission on the PO,**** ***If the gap between the RO and the PO is smaller than 16, type 2C channel access procedure should be used.***

* ***If the gap between the RO and the PO is more than or equal to 16 but less than 25, type 2B channel access procedure should be used.***

* ***If the gap between the RO and the PO is more than or equal to 25, type 2A channel access procedure should be used.***

* ***Adopt TP1 into section 4.2.1 of TS 37.213.***

----------------------------------- TP1: 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 procedure for PRACH transmissions and PUSCH transmissions without user plane data related to random access procedure that initiate a channel occupancy with UL channel access priority class in Table 4.2.1-1. In Type-2 random access procedure, a UE may transmit a PUSCH on a PUSCH occasion within a channel occupancy that the UE initiated for a PRACH transmission on an associated RACH occasion after a gap as follows:- If the gap is up to, the UE can transmit the PUSCH on the channel after performing Type 2C UL channel access as described in subclause 4.2.1.2.3.- If the gap is more than or equal to 16 but less than 25,the UE can transmit the PUSCH on the channel after performing Type 2B UL channel access as described in subclause 4.2.1.2.2.- If the gap is more than or equal to 25, the UE can transmit the PUSCH on the channel after performing Type 2A UL channel access as described in subclause 4.2.1.2.1.<Unchanged parts are omitted>----------------------------------------End of TP 37.213 section 4.2.1 --------------------------------------------- |

Another Tdoc considers indication of LBT type for RACH.

[**R1-2007980**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007980.zip)**:**

|  |  |
| --- | --- |
| 1. Adopt the following changes in Clause 8.2 and Clause 8.2A of TS38.213 to determine the indicated channel access procedures and CP extension for random access procedures.

|  |
| --- |
| ===============<Start of Text Proposal for TS 38.213>======================8.2 Random access response – Type-1 random access procedure===============<Unchanged text omitted>=============The ChannelAccess-Cpext field indicates a channel access type and CP extension for operation with shared spectrum channel access [15, TS 37.213] as defined in Table 7.3.1.1.1-4 in TS 38.212.===============<Unchanged text omitted>=============8.2A Random access response – Type-2 random access procedure===============<Unchanged text omitted>=============- for operation with shared spectrum channel access, a channel access type and CP extension [15, TS 37.213] for a PUCCH transmission is indicated by a ChannelAccess-Cpext field in the successRAR as defined in Table 7.3.1.1.1-4 in TS 38.212. ===============<End of Text Proposal for TS 38.213>====================== |

 |

**FL summary:**

Companies are asked to provide their views on the two proposals with the table below:

|  |  |
| --- | --- |
| Company  | Comments  |
| OPPO | We would like to update our TP as follows, please provide your comment based on this updated TP.----------------------------------- TP1: 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 procedure for PRACH transmissions and PUSCH transmissions without user plane data related to random access procedure that initiate a channel occupancy with UL channel access priority class in Table 4.2.1-1. In Type-2 random access procedure, the UE can perform Type 2A channel access procedure for a PUSCH associated with a PRACH, if the PUSCH is within a *Channel Occupancy Time* initiated by the associated PRACH.<Unchanged parts are omitted>----------------------------------------End of TP 37.213 section 4.2.1 ---------------------------------------------For TP of 2007980, we are fine.  |
| Samsung | In our understanding, NR-U does not support a UE to initiate a COT with 1st transmission, and then a gap >16 us, and then a 2nd UL transmission. For 2-step RACH, the gap between PRACH and associated PUSCH is at least 2 symbols, so the 16 us gap cannot be met in general. Hence, we don’t think OPPO’s revised TP can be supported. OK with the TP of R1-2007980, but this is not a quite essential change.  |
| Intel | The revised TP from OPPO seems reasonable. As for the clarification TP from R1-2007980, we share same view as Samsung, and we believe it is not essential. |
| Huawei, HiSilicon  | We share the same view as Intel regarding the revised TP from OPPOWe also share the same view as Samsung and Intel that the clarification in R1-2007980 is not essential. |
| Qualcomm | For TP in R1-2008248, consider the minimum 2 symbol gap between RO and PO, we don’t think the change is needed.We support Oppo’s revised TP in the comment section. It helps to reduce the need for a Cat 4 LBT between RO and PO, and use a Cat 2 LBT instead, especially when the CW is too long that we may not be able to fit in a Cat 2 LBT in between.The TP in R1-2007980 is editorial in nature. We are fine with it. |
| Ericsson | We would like to clarify the intention of the TP in R1-2007980, since the comments made referring that the TP is not essential.The TP is about proper specifications such that all the references are properly addressed where the implementation is possible.The situation is as follows: The UE from RARgrant, determines two bits that by these two bits, the UE could determine the channel access type and CP extension.**When the UE determines** which type of channel access, the UE executes corresponding behaviour as it is specified in 37.213. Also, **when the UE determines** the CP extension, the UE applies the corresponding CP extension as specified in 38.211.However, the intermediate link is missing since in order for the UE to determine which channel access or CP extension to be used, the UE to determine which rows in table 7.3.1.1.1-4 is addressed by these two bits. When the row is determined, the channel access and CP extension are also determine.Please note that 37.214 specifies “how” to perform channel access. But other spec, that is 38.213 determines which channel access is applicable.Hopefully that clarifies the intension of the TP because without that, the UE behaviour is not properly specified because UE doesn’t know how to use the two bits to determine the channel access and CP extension,**Comments to R1-2008248:**According to 37.213: “A *UL transmission burst* is defined as a set of transmissions from a UE without any gaps greater than . Transmissions from a UE separated by a gap of more than 16 us are considered as separate UL transmission bursts. A UE can transmit transmission(s) after a gap within a *UL transmission burs*t without sensing the corresponding channel(s) for availability.”The case in which PUSCH comes after the PRACH with a gap<=16 us is already covered by the specification. In this case no LBT is needed. For the case in which the gap is greater than 16 us between consecutive transmissions from the initiating device, generally, 37.213 does not allow gaps larger than 16us within an UL or DL transmission burst (see above), we do not see the need to exceptionally allow a gap >16 us for the case of PRACH followed by PUSCH |

## 2.8 RAN2 LS on CAPC

Four Tdocs consider the RAN2 LS in [R1-2007526](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007526.zip). This topic was also discussed under AI 5.

|  |  |
| --- | --- |
| RAN2 LS on CAPC in [**R1-2007526**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007526.zip) | [R1-2007968](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007968.zip) (AI 5)[R1-2008305](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008305.zip) (AI 5)[R1-2007903](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007903.zip)[R1-2008127](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008127.zip) |

[**R1-2007968**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007968.zip) **(AI 5):**

**Proposal 1: *Adopt TP#1 to revise the related description on the CAPC for MSG3 and MSGA PUSCH in Clause 4.2.1 of TS 37.213.***

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Reasons for change**To achieve the alignment between TS 37.213 and TS 38.300 on CAPC and remove redundant text description.**Summary of changes**1. Statement are reordered to improve legibility;
2. Change the CAPC for MSG3/MSGA PUSCH from “channel access priority class p=1” to “follow CAPC description mentioned in Clause 5.6.2 in 3GPP TS 38.300”;
3. Delete “with user plane data” after PUSCH transmission and remove “or related to random access procedure” in the paragraph “When a UE uses Type 1… for PUSCH transmissions with user plane data indicated by a UL grant or related to random access procedure … on configured resources using Type 1 channel access procedures. ”

**Specs/Sections impacted**TS 37.213, Section 4.2.1.< Start of text proposal for 37.213 [3]>================== Beginning of text proposal 1===================4.2.1 Channel access procedures for uplink transmission(s)A UE can access a channel on which UL transmission(s) are performed according to one of Type 1 or Type 2 UL channel access procedures. Type 1 channel access procedure is described in clause 4.2.1.1. Type 2 channel access procedure is described in clause 4.2.1.2.If a UL grant scheduling a PUSCH transmission indicates Type 1 channel access procedures, the UE shall use Type 1 channel access procedures for transmitting transmissions including the PUSCH transmission unless stated otherwise in this clause. A UE shall use Type 1 channel access procedures for transmitting transmissions including the autonomous or configured grant PUSCH transmission on configured UL resources unless stated otherwise in this clause.If a UL grant scheduling a PUSCH transmission indicates Type 2 channel access procedures, the UE shall use Type 2 channel access procedures for transmitting transmissions including the PUSCH transmission unless stated otherwise in this clause. A UE shall use Type 1 channel access procedures for transmitting SRS transmissions not including a PUSCH transmission. UL channel access priority class in Table 4.2.1-1 is used for SRS transmissions not including a PUSCH. If a UE is scheduled by an eNB/gNB to transmit PUSCH and SRS in contiguous transmissions without any gaps in between, and if the UE cannot access the channel for PUSCH transmission, the UE shall attempt to make SRS transmission according to uplink channel access procedures specified for SRS transmission.A UE shall use Type 1 channel access procedures for PUCCH transmissions unless stated otherwise in this clause. If a DL grant determined according to Clause 9.2.3 in [7, TS38.213] 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.When a UE uses Type 1 channel access procedures for PUCCH transmissions or PUSCH only transmissions without UL-SCH, the UE shall use UL channel access priority class in Table 4.2.1-1.When a~~A~~ UE ~~shall~~ uses Type 1 channel access procedure for PRACH transmissions to ~~and PUSCH transmissions without user plane data related to random access procedure that~~ initiate a channel occupancy, the UE shall use ~~with~~ UL channel access priority class in Table 4.2.1-1. When a UE uses Type 1 channel access procedures for PUSCH transmissions on configured resource or PUSCH transmission related to random access procedure that initiate a channel occupancy, the UE determines the corresponding UL channel access priority in Table 4.2.1-1 following the procedures described in Clause 5.6.2 in [9].When a UE uses Type 1 channel access procedures for PUSCH transmissions ~~with user plane data~~ indicated by a UL grant ~~or related to random access procedure~~ where the corresponding UL channel access priority is not indicated, the UE determines in Table 4.2.1-1 following the same procedures as for PUSCH transmission on configured resources using Type 1 channel access procedures. When a UE uses Type 2A, Type 2B, or Type 2C UL channel access procedures for PUSCH transmissions indicated by a UL grant or related to random access procedures where the corresponding UL channel access priority is not indicated, the UE assumes that the channel access priority class is used by the gNB for the Channel Occupancy Time.A UE shall not transmit on a channel for a *Channel Occupancy Time* that exceeds where the channel access procedure is performed based on the channel access priority class associated with the UE transmissions, as given in Table 4.2.1-1.The total *Channel Occupancy Time* of autonomous uplink transmission(s) obtained by the channel access procedure in this clause, including the following DL transmission if the UE sets ‘COT sharing indication’ in AUL-UCI to ‘1’ in a subframe within the autonomous uplink transmission(s) as described in Clause 4.1.3, shall not exceed , where is given in Table 4.2.1-1.Table 4.2.1-1: Channel Access Priority Class (CAPC) for UL

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Channel Access Priority Class () |  |  |  |  | allowed sizes |
| 1 | 2 | 3 | 7 | 2 ms | {3,7} |
| 2 | 2 | 7 | 15 | 4 ms | {7,15} |
| 3 | 3 | 15 | 1023 | 6ms or 10 ms  | {15,31,63,127,255,511,1023} |
| 4 | 7 | 15 | 1023 | 6ms or 10 ms | {15,31,63,127,255,511,1023} |
| NOTE1: For , if the higher layer parameter *absenceOfAnyOtherTechnology-r14* or *absenceOfAnyOtherTechnology-*r16 is provided, otherwise, . NOTE 2: When it may be increased to by inserting one or more gaps. The minimum duration of a gap shall be . The maximum duration before including any such gap shall be .  |

< End of text proposal 1> |

[**R1-2008305**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008305.zip) **(AI 5):**

|  |
| --- |
| -------------------------------------- Text Proposal (TP#1) for 37.213 Section 4.2.1 -----------------------------\*\*\* Unchanged text omitted \*\*\*A UE shall use Type 1 channel access procedure for PRACH transmissions and PUSCH transmissions ~~without user plane data~~ related to random access procedure that initiate a channel occupancy. ~~With~~ When a UE uses Type 1 channel access procedures for PRACH transmissions, the UL channel access priority class in Table 4.2.1-1 is used. When a UE uses Type 1 channel access procedures for PUSCH transmissions on configured resource, the UE determines the corresponding UL channel access priority in Table 4.2.1-1 following the procedures described in Clause 5.6.2 in [9].When a UE uses Type 1 channel access procedures for PUSCH transmissions ~~with user plane data~~ indicated by a UL grant or related to random access procedure where the corresponding UL channel access priority is not indicated, the UE determines in Table 4.2.1-1 following ~~the same procedures as for PUSCH transmission on configured resources using Type 1 channel access procedures.~~ The procedures described in Clause 5.6.2 in [9].\*\*\* Unchanged text omitted \*\*\*------------------------------------------------------ |

[**R1-2007903**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007903.zip)**:**

|  |
| --- |
| ================================= Start of TP#3 for TS 37.213 ==============================4.2.1 Channel access procedures for uplink transmission(s)================================ Unchanged Texts Omitted =================================A UE shall use Type 1 channel access procedure for PRACH transmissions and PUSCH transmissions without user plane data related to random access procedure that initiate a channel occupancy. In this case, channel access priority class in Table 4.2.1-1 is used for PRACH transmission, and is determined as specified in subclause 5.6.2 in [9] for PUSCH transmissions. ================================ Unchanged Texts Omitted ================================================================== End of TP#3 for TS 37.213 =============================== |

[**R1-2008127**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008127.zip)**:**

|  |
| --- |
| **Proposal 4: Adopt the following TP for TS 37.213.**================================= Start of TP for TS 37.213 ================================4.2.1 Channel access procedures for uplink transmission(s)================================ Unchanged Texts Omitted =================================A UE shall use Type 1 channel access procedure for PRACH transmissions and PUSCH transmissions without user plane data related to random access procedure that initiate a channel occupancy. In this case, UL channel access priority class in Table 4.2.1-1 is used for PRACH transmissions, and UL channel access priority class used for PUSCH transmissions is determined according to Clause 5.6.2 in [9]. ================================ Unchanged Texts Omitted ================================================================== End of TP for TS 37.213 ================================= |

**FL summary:**

It seems a TP is needed. Companies are asked to provide their views on which one of the four proposals to adopt, and whether further modifications are needed.:

|  |  |
| --- | --- |
| Company  | Comments  |
| Samsung | Our TP in R1-2008127 (a little bit revision from the text in the LS) is more preferable.  |
| Intel | Either TP from [R1-2007903](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007903.zip) or [R1-2008127](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008127.zip) are fine for us. |
| Huawei, HiSilicon | We prefer the draft CR in R1-2008305 (AI 5) as it addresses the issue raised in the LS and removes the unnecessary condition ”with user plane data” from the related subsequent subclause  |
| Qualcomm | TP in R1-2008127 is preferred, though R1-2007903 is also fine |
| Ericsson | Our preference is the TP in [R1-2008305](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008305.zip), which includes cleaner referencing to 38.300. |
| Sharp | Either TP from [R1-2007903](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007903.zip) or [R1-2008127](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008127.zip) is fine. |

# References

|  |  |  |  |
| --- | --- | --- | --- |
| 1 | [**R1-2007608**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007608.zip) | Maintenance on channel access procedures | Huawei, HiSilicon |
| 2 | [**R1-2007903**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007903.zip) | Remaining Issues and Corrections on Channel Access Procedures and Configured Grants for NR-U | Nokia, Nokia Shanghai Bell |
| 3 | [**R1-2007980**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007980.zip) | Channel Access Procedures | Ericsson |
| 4 | [**R1-2008043**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008043.zip) | Remaining issues of channel access procedure and configured grant for NR-U | LG Electronics |
| 5 | [**R1-2008127**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008127.zip) | Remaining issues on channel access | Samsung |
| 6 | [**R1-2008248**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008248.zip) | Discussion on the remaining issues of channel access procedure | OPPO |
| 7 | [**R1-2008383**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008383.zip) | Remaining issues on channel access procedure for NR-U | Sharp |
| 8 | [**R1-2008601**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008601.zip) | TP for Channel access procedures for NR unlicensed | Qualcomm Incorporated |
| 9 | [**R1-2008724**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2008724.zip) | Correction on UL channel access procedure for NR-U | WILUS Inc. |
| 10 | [**R1-2007985**](https://www.3gpp.org/ftp/TSG_RAN/WG1_RL1/TSGR1_103-e/Docs/R1-2007985.zip) | Remaining issues on UL transmissions | ETRI |