**3GPP TSG RAN WG1 #101-e** **R1-200XXXX**

**e-meeting, May 25 – June 5, 2020**

**Agenda item: 7.2.2.2.1**

**Source: Moderator (Nokia)**

**Title: Summary of [101-e-NR-unlic-NRU-ChAcc-02] Email discussion/approval on XXXX**

**Document for: Discussion and Decision**

# 1 Introduction

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

[101-e-NR-unlic-NRU-ChAcc-02] Email discussion/approval on the following from R1-2004539 by 5/28; if necessary, endorse associated TPs by 6/3 – Timo (Nokia)

* Related to Issue #3 on clarifications to UL to DL COT sharing, decide whether a spec change is needed in relation to the following agreement from 100bis-e:
  + Agreement:
  + For at least PUSCH transmissions with configured grants, a UE is allowed to choose between the ED threshold given by ul-toDL-CO-SharingED-Threshold-r16 and the default one. Whether a spec change is required needs further discussion. Discuss and decide the possible TPs in the next meeting.
* Issue #9: LS on LBT failure detection mechanism
* Editorial correction related to proposal 9 in R1-2003450

This contribution summarizes the discussion and collects companies views on each issue.

# 4. Issue #3

**Note: the discussion on this topic is limited to the following agreement only.**

At RAN1#101-e the following was agreed:

Agreement:

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

For RAN1#101-e, a number of companies submitted related proposals and TPs with proposals for some spec changes.

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

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| Clarifications to UL to DL COT sharing | R1-2003370 (p2, p3, p4, 5)  R1-2003512 (p2, p3)  R1-2004013 (p3, p4)  R1-2004085 (p1)  R1-2004443 (p3) |

**R1-2003370**

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| *Proposal 2: Adding a value ‘0’ for D (i.e. duration-r16*) *in cg-COT-SharingList-r16 to indicate that UE chooses the default ED threshold. If the row with D=0 is indicated in CG-UCI, gNB can transmit control/broadcast signals/channels at slot n+O, with length up to 2/4/8 OFDM symbols for 15/30/60 kHz SCS.*  *Proposal 3: Continuous “no COT sharing” indication from the beginning of the UL COT means that UE will not share the channel to the gNB. Otherwise, “no COT sharing” means that no new COT sharing information is available.*  *Proposal 4: A 1 bit filed can be included in a UL scheduling DCI to indicate the ED threshold for DG UL transmission.* |

**R1-2003512**

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| *Proposal 2：For UE choosing between ul-toDL-CO-SharingED-Threshold-r16 and the default one for a transmission with CG, no further Specification change is needed* |

**R1-2004013**

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| **Proposal #3: For a UE configured with ED threshold to be used for UE-initiated channel occupancy, UL grant indicates which ED threshold between configured ED threshold and ED threshold calculated based on UE’s configured maximum transmission power is applied to channel access procedure for the scheduled PUSCH.**  **Proposal #4: Adopt the following TP#3 for TS 37.213.**  ================================ Start of TP#3 for TS 37.213 ===============================  4.2.3 Energy detection threshold adaptation procedure  ================================ Unchanged Texts Omitted =================================  For the case where a UE performs channel access procedures as described in clause 4.2.1.1 and shares its corresponding channel occupancy time with the gNB, is set equal to the value provided by the higher layer parameter *ul-toDL-CO-SharingED-Threshold-r16*, if provided. For the case where a UE configured with *ul-toDL-CO-SharingED-Threshold-r16* performs channel access procedure as described in clause 4.2.1.1 and does not share its corresponding channel occupancy time with the gNB, the UE shall set according to the procedure described in clause 4.2.3.  ================================ Unchanged Texts Omitted =================================  ================================= End of TP#3 for TS 37.213 =============================== |

**R1-2004085**

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

**R1-2004443**

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| Proposal 3: Choose between the following two alternatives when *ul-toDL-CO-SharingED-Threshold-r16* is configured to the UE   * Alt-1: Add a bit in DCI 0\_1 to indicate which ED threshold to use for Type 1 UL channel access for dynamic scheduled PUSCH * Alt-2: Introduce an RRC parameter to indicate if the configured *ul-toDL-CO-SharingED-Threshold-r16* is applicable to the dynamic scheduled PUSCH or not |

Companies are asked to provide their views related to the above proposals with the table below, i.e.

* whether a spec change is needed to facilitate UE selecting the ED threshold between ul-toDL-CO-SharingED-Threshold-r16 and the default one, and
* if so, what would be the exact spec impact

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| Company | Comment |
| OPPO | First of all, we think the spec in the current version has not yet captured the agreement therefore clarifications are needed.  Secondly, regarding the TP, we are fine with R1-2004085 (OPPO) and R1-2004013 (LG), but it seems the TP of R1-2004013 is more concise. Thus, we can support the TP from R1-2004013 (LG). |
| Intel | Our first comments is that we should decouple the behavior for CG UEs and DG UEs:   1. For CG UEs, we share a similar understanding, and we believe that forcing a CG UE to use a specific ED threshold configured by gNB may reduce greatly its probability to succeed LBT and access the channel. As for the specification impact, some additional text should be included in 37.213 Sec. 4.2.3 along the line of the TP proposed by OPPO and LG with the distinction that we should specify that the UE behavior is only for UEs with configured grant PUSCH transmissions. 2. However, for DG UEs, we believe that the UEs should always follow the gNB’s configuration, and when ul-toDL-CO-SharingED-Threshold-r16 is configured, the UE should use the configured ED threshold (i.e., it should follow the current behavior in the spec). In this matter, no explicit indication would be required by the gNB in the UL grant, and UE’s shared COT will be handled through proper scheduling/configuration. |
| LG | Firstly, the current specification just describes that the UE can share its COT with gNB when the UE performs the Type 1 channel access using *ul-toDL-CO-SharingED-Threshold-r16*. To support that a UE is allowed to select ED threshold for Cat-4 LBT depending on whether or not to share its COT with gNB, the correction for Section 4.2.3 of TS 37.213 is necessary. Therefore, at least for PUSCH transmission with configured grants, the TP in the R1-2004013 is needed to be adopted.  Secondly, it is necessary to recall the motivation of the agreement that if we forcing a UE to use only a specific ED threshold configured by gNB may significantly reduce the channel access probability of the UE, if configured ED threshold is more sensitive than the ED threshold value calculated by the UE based on the UL transmission power configured by gNB. The exact same principle can be applied not only to CG-PUSCH but also to DG-PUSCH. Therefore, the ED threshold for the UE to use for DG-PUSCH transmission can be explicitly indicated by UL grant. In other word, the ED threshold can be determined by gNB depending on whether or not it will share channel occupancy initiated by the DG-PUSCH. |
| ZTE, Sanechips | It is not necessary to introduce a spec change to facilitate UE selecting the ED threshold between ul-toDL-CO-SharingED-Threshold-r16 and the default one. Such selection behavior is just an optimization. |
| Huawei, HiSilicon | We agree with Intel firstly in terms of decoupling the behavior for CG-PUSCH and DG\_PUSCH   * CG-PUSCH: The current spec captures that the UE chooses to set the max EDT to the configured *ul-toDL-CO-SharingED-Threshold-r16* if it wants to share its CO with the gNB; we thus proposed no spec change to capture that selection in R1-2003512 (p2). However, **in the case when the UE is configured with *ul-toDL-CO-SharingED-Threshold-r16* but chooses to use the default max EDT,** the UE should be able to support the CO sharing for short PDCCH at least for timely CG-DFI but it would not be able to do so as the COT sharing information field of ceil(log2 C) bits would have to be used and currently it does not support that**. We therefore support Proposal 2 in R1-2003370 to indicate D=0 slots in such field to allow for the sub-slot transmission for PDCCH in slot n+O.** * DG-PUSCH: We agree with Intel’s view |
| Charter Communications | For either CG-PUSCH or DG-PUSCH, the UE can choose to use a lower ED threshold than the configured *ul-toDL-CO-SharingED-Threshold-r16* by implementation and certainly no spec change is required for that. The interesting case is where the UE chooses to use a threshold higher than the configured *ul-toDL-CO-SharingED-Threshold-r16.* For DG-PUSCH, agree with Intel that UE should follow the configured parameter and no spec change is needed. For CG-PUSCH, we are fine with the TP from LG. |
| Qualcomm | For CG, we believe the current spec is enough.  For DG, we agree with LG’s observation. It will be more efficient to allow gNB more control on the ED threshold used. If adding control bit in UL grant is considered too expensive, we can also allow RRC configuration if the sharing enabling ED threshold is applicable to DG or not. |
| vivo | For CG PUSCH, when UE chooses to use the default ED threshold, it should be able to share its COT with gNB by allowing gNB to transmit only control or broadcast signals. As mentioned by Huawei, this could enable fast DFI feedback at least. Similar to the case when UL to DL COT sharing ED threshold is not configured. Therefore, we propose to use D=0 to indicate this case. If a row in cg-COT-SharingList-r16 with D=0 is indicated in CG-UCI, gNB can transmit control/broadcast signals/channels at slot n+O, with length up to 2/4/8 OFDM symbols for 15/30/60 kHz SCS.  “no COT sharing” means that no new COT sharing information is available, UE continues using the previous COT sharing information. It will not override anything. Continuous “no COT sharing” indication from the beginning of the UL COT means that UE will not share the channel to the gNB.  For DG PUSCH, agree with LG and QC, it is up to gNB to decide whether to transmit PDSCH by sharing the UE initiated COT or not. If gNB wants to transmit PDSCH in the UE initiated COT, gNB can indicate the UE to use the UL to DL COT sharing ED threshold. Otherwise, it indicates the UE’s default ED threshold. |
| Sony | For CG-PUSCH, we think spec change for UE choosing the ED threshold is required since current spec covers only the case where UE shares its COT with the gNB. We are fine with either LG’s or OPPO’s TP.  For DG-PUSCH, we share the same view with Intel. Explicit indication is not needed therefore no spec change is required. |
| Nokia, NSB | we are ok with the TP in R1-2004013 (LG). For the dynamic grant case we agree with Intel that the UE should follow the configured threshold. |

# 5. Issue #9

**Issue #9:** LSon LBT failure detection mechanism

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| UL LBT failure indication | R1-2003450 (p1)  R1-2003512 (p18)  R1-2003860 (p6)  **Under AI 5**:  R1-2004007  R1-2004502 |

Aspects related to LSon LBT failure detection mechanism have been discussed in a couple of recent meetings. The following contributions provide TPs for 37.213 on the related matter.

**R1-2003450**

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| --------------------------------------------------------- Start of TP #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 subclause 4.2.1.1. Type 2 channel access procedure is described in subclause 4.2.1.2.  If a UE fails to access the channel(s) prior to any UL transmission to a gNB, the physical layers sends a channel access failure indication to higher layers.  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 subclause.  <unchanged part omitted>  --------------------------------------------------------- End of TP #1-----------------------------------------------------------------  **Proposal 1**: **It is proposed to capture “If a UE fails to access the channel(s) prior to any UL transmission to a gNB, the physical layers sends a channel access failure indication to higher layers” in Section 4.2.1 of the latest version of TS 37.213** |

**R1-2003512**

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| \*\*\* <Beginning of **Text Proposal 11**> \*\*\*  4.2 Uplink channel access procedures  A UE performing transmission(s) on LAA Scell(s), an eNB scheduling or configuring UL transmission(s) for a UE performing transmission(s) on LAA Scell(s), and a UE performing transmission(s) on channel(s) and a gNB scheduling or configuring UL transmission(s) for a UE performing transmissions on channel(s) shall perform the procedures described in this clause for the UE to access the channel(s) on which the transmission(s) are performed.  In this clause, transmissions from a UE are considered as separate UL transmissions, irrespective of having a gap between transmissions or not, and  for sensing is adjusted as described in clause 4.2.3 when applicable.  A UE performs channel access procedures in this clause unless the higher layer parameter *ChannelAccessMode-r16* is provided and *ChannelAccessMode-r16 =' semistatic'*.  If a UE fails to access the channel(s) prior to a UL transmission intended to a gNB, Layer 1 notifies the higher layers of the channel access failure.  \*\*\* Unchanged text is omitted \*\*\*  \*\*\* <End of **Text Proposal 11**> \*\*\* |
| \*\*\* <Beginning of **Text Proposal 12**> \*\*\*  4.3 Channel access procedures for semi-static channel occupancy  If the absence of any other technology sharing a channel can be guaranteed on a long-term basis (e.g. by level of regulation) and 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 every within every two consecutive radio frames, starting from the even indexed radio frame at with a maximum channel occupancy time , where in , is a higher layer parameter provided in *semiStaticChannelAccessConfig-r16* 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:  \*\*\* Unchanged text is omitted \*\*\*  If a UE fails to access the channel(s) prior to a UL transmission intended to a gNB, Layer 1 notifies the higher layers of the channel access failure.  \*\*\* <End of **Text Proposal 12**> \*\*\* |

**R1-2003860**

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| ================================= Start of TP for TS 37.213 ================================ 4.2 Uplink channel access procedures A UE performing transmission(s) on LAA Scell(s), an eNB scheduling or configuring UL transmission(s) for a UE performing transmission(s) on LAA Scell(s), and a UE performing transmission(s) on channel(s) and a gNB scheduling or configuring UL transmission(s) for a UE performing transmissions on channel(s) shall perform the procedures described in this clause for the UE to access the channel(s) on which the transmission(s) are performed.  In this clause, transmissions from a UE are considered as separate UL transmissions, irrespective of having a gap between transmissions or not, and  for sensing is adjusted as described in clause 4.2.3 when applicable.  A UE performs channel access procedures in this clause unless the higher layer parameter *ChannelAccessMode-r16* is provided and *ChannelAccessMode-r16 =' semistatic'*.  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 ================================= |

**R1-2004007**

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| **Proposal: Adopt the following text proposal in Section 4.2 and Section 4.3 of TS 37.213.**  **If a UE fails to access the channel(s) prior to an UL transmission intended to a gNB, Layer 1 notifies higher layers about the channel access failure.** |

**R1-2004502**

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| **TS 37.213**  -------- Beginning of Text Proposal ------------ 4.2 Uplink channel access procedures A UE performing transmission(s) on LAA Scell(s), an eNB scheduling or configuring UL transmission(s) for a UE performing transmission(s) on LAA Scell(s), and a UE performing transmission(s) on channel(s) and a gNB scheduling or configuring UL transmission(s) for a UE performing transmissions on channel(s) shall perform the procedures described in this subclause for the UE to access the channel(s) on which the transmission(s) are performed.  In this subclause, transmissions from a UE are considered as separate UL transmissions, irrespective of having a gap between transmissions or not, and  for sensing is adjusted as described in subclause 4.2.3 when applicable.  A UE performs channel access procedures in this subclause unless the higher layer parameter *ChannelAccessMode-r16* is provided and *ChannelAccessMode-r16 =’ semistatic’*.  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.  –--------- End of Text Proposal -------------  -------- Beginning of Text Proposal ------------  \*\*\* Unchanged text is omitted \*\*\* 4.3 Channel access procedures for semi-static channel occupancy \*\*\* Unchanged text is omitted \*\*\*  - A UE may transmit UL transmission burst(s) after 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 before transmission  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.  –--------- End of Text Proposal ------------- |

All the TPs are essentially the same. Therefore, it seems possible to agree:

**Proposal:** Adopt the following text proposal in the end of Section 4.2 and Section 4.3 of TS 37.213.

-If a UE fails to access the channel(s) prior to an UL transmission intended to a gNB, Layer 1 notifies higher layers about the channel access failure.

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

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| Company | Comment |
| OPPO | The proposed TPs are aligned. We are fine with any one. |
| Intel | The proposal provided by the FL is fine for us, as long as the text indicating that a UE should report to higher layers when an LBT failure occurs is incorporated within both section 4.2 and 4.3, since this applies to both LBE and FBE mode. |
| LG | We support the proposal by the FL. |
| ZTE, Sanechips | This proposal looks good, but we would like to confirm whether such description can cover any UL transmission. If yes, we can accept that. Otherwise, we suggest modification wording to make it crystal clear. |
| Huawei, HiSilicon | Support FL’s proposal |
| Charter Communications | Support FL’s proposal |
| Qualcomm | Support FL |
| vivo | Support FL’s proposal |
| Sony | Support FL’s proposal |
| Nokia, NSB | Support FL’s proposal |

# 6. Editorial corrections

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| Clarification of “or *ChannelAccessMode-r16* is absent;” in 38.212 | R1-2003450 (p9) |

The above editorial correction was discussed already at RAN1#100bis-e, but the issue was not fully concluded.

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| --------------------------------------------------------- Start of TP #6---------------------------------------------------------------  7.3.1.1.2 Format 0\_1  <unchanged part 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 and *ChannelAccessMode-r16* = "*dynamic*" or *ChannelAccessMode-r16* is absent; 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 part omitted>  7.3.1.2.2 Format 1\_1  <unchanged part 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 and ChannelAccessMode-r16 = "dynamic" or *ChannelAccessMode-r16* is absent; 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.  <unchanged part omitted>  --------------------------------------------------------- End of TP #6--------------------------------------------------------------- |

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

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| Company | Comment |
| OPPO | We understand that the ChannelAccess-CPext-CAPC field is present in both LBE and FBE modes. Thus, based on our understanding, we propose the following changes.  7.3.1.1.2 Format 0\_1  <unchanged part 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.*  <unchanged part omitted>  7.3.1.2.2 Format 1\_1  <unchanged part 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.  <unchanged part omitted> |
| Intel | We acknowledge that a change in the current specification text is need in order to specify that the field *ChannelAccess-CPext-CAPC* within both DCI 0\_1 and 1\_1 is present and applies to both LBE and FBE mode, but we prefer OPPO’s proposal text. |
| LG | We support the above proposals. |
| ZTE, Sanechips | Support our TP in order to align with TR38.331. |
| Charter Communications | Fine with OPPO’s modification. |
| Qualcomm | Agree with Oppo |
| vivo | This issue is the same as second part of issue 2.3 in Email thread #1. We need to decide whether ChannelAccess-CPext-CAPC or ChannelAccess-CPext is included for FBE first. If allowed, maybe some further re-interpretation for FBE is needed and OPPO’s modification is fine. If not allowed, fine with TP#6 to be aligned with 331. |
| Sony | We support OPPO’s modification. |
| Nokia, NSB | Similarly as discussed in the other thread, we agree that DCI 0\_1 and 1\_1 should also be usable with FBE. We support OPPO’s proposal. |

# 7. Conclusions

TBA

# References