3GPP TSG RAN WG1 #106-e Tdoc R1-2108452

e-Meeting, August 16th – 27th, 2021

Agenda Item: 7.2.5

Source: Moderator (Ericsson)

Title: Summary of email discussion [106-e-NR-L1enh-URLLC-02] Sub-slot Based HARQ-ACK Feedback for MAC CE Activation/deactivation

Document for: Discussion, Decision

# 1 Introduction

This contribution provides the summary for the following email discussion in RAN1#106-e:

[106-e-NR-L1enh-URLLC-02] Issue#6: Sub-slot Based HARQ-ACK Feedback for MAC CE Activation/deactivation by August 20 – Yufei (Ericsson)

In the following, the background information is provided in Section 2. Section 3 captures the detailed email discussions. Section 4 summarizes the outcome of the email discussion.

# 2 Background

R1-2106374 (TS38.213, Rel-16, CR#0244, Cat. F) was endorsed in RAN1#105-e for section 9 of 38.213 V16.5.0:

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| 9 UE procedure for reporting control information  In the remaining of this Clause, if a UE is provided *subslotLength-ForPUCCH*, a slot for an associated PUCCH resource of a PUCCH transmission with HARQ-ACK information includes a number of symbols indicated by *subslotLength-ForPUCCH*. |

The intention of the above CR is to clarify that a slot is interpreted as sub-slot for a PUCCH transmission with HARQ-ACK when sub-slot is configured for the UE. This prevent a slot to be interpreted as a sub-slot for PUCCH carrying other types of UCI, e.g., SR and CSI.

The introduction of sub-slot based PUCCH transmission is not intended to change the effective time for MAC CE, even when sub-slot-based HARQ-ACK is reported for MAC CE. However, when an indicated PDSCH-to-HARQ\_feedback timing i in a DCI format scheduling a PDSCH reception with MAC CE commands is of granularity of sub-slot, the timing for applicability of MAC CE associated actions would be ambiguous due to mixture of parameters with slot-based granularity and sub-slot based granularity used in determining the timing.

The agreement below in RAN1#104-e resolved the above issue for MAC CE based SCell activation/deactivation (see Appendix for the endorsed text proposal):

**Agreement**

* The text proposal for 38.213 is endorsed in R1-2002104 (TS38.213, Rel-16, CR#0197, Cat. F).

However, the followng remaining cases need similar clarifications to ensure proper timing for associated actions:

* Spatial setting of PUCCH in clause 7.2.1 and 9.2.2 of TS38.213
* TCI state activation in clause 10.1 of TS38.213 and clause 5.1.5 of TS38.214
* Activation/deactivation of semi-persistent CSI RS and CSI reporting in clauses 5.2.1.5.2 and 5.2.4 of TS38.214.
* Activation/deactivation of semi-persistent SRS in clause 6.2.1 of TS38.214
* Selection of CSI trigger state for aperiodic CSI-RS or CSI reporitng in clause 5.2.1.5.1 of TS38.214

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| **TS38.213 - Clause 7.2.1**  ….  - If the UE is provided *PUCCH-SpatialRelationInfo*, …. The UE applies the activation command in the first slot that is after slot  where  is the slot where the UE would transmit a PUCCH with HARQ-ACK information for the PDSCH providing the activation command and  is the SCS configuration for the PUCCH  …  - If the UE is provided *pathlossReferenceRSs* and *PUCCH-SpatialRelationInfo*, …. The UE applies the activation command in the first slot that is after slot  where  is the slot where the UE would transmit a PUCCH with HARQ-ACK information for the PDSCH providing the activation command and  is the SCS configuration for the PUCCH |
| **TS38.213 - Clause 9.2.2**  ….  A spatial setting for a PUCCH transmission is provided by *PUCCH-SpatialRelationInfo* …. The UE applies corresponding actions in [11, TS 38.321] and a corresponding setting for a spatial domain filter to transmit PUCCH in the first slot that is after slot  where  is the slot where the UE would transmit a PUCCH with HARQ-ACK information with ACK value corresponding to a PDSCH reception providing the *PUCCH-SpatialRelationInfo* and  is the SCS configuration for the PUCCH |
| **TS38.213 - Clause 10.1**  ….  - if the UE receives a MAC CE activation command for one of the TCI states, the UE applies the activation command in the first slot that is after slot where is the slot where the UE would transmit a PUCCH with HARQ-ACK information for the PDSCH providing the activation command and is the SCS configuration for the PUCCH. The active BWP is defined as the active BWP in the slot when the activation command is applied. |
| **TS38.214 - Clause 5.1.5**  ….  When the UE would transmit a PUCCH with HARQ-ACK information in slot *n* corresponding to the PDSCH carrying the activation command, the indicated mapping between TCI states and codepoints of the DCI field *'Transmission Configuration Indication'* should be applied starting from the first slot that is after slot where *m* is the SCS configuration for the PUCCH. |
| **TS38.214 - Clause 5.2.1.5.2**  ….  For semi-persistent reporting on PUCCH, …. When the UE would transmit a PUCCH with HARQ-ACK information in slot *n* corresponding to the PDSCH carrying the activation command, the indicated semi-persistent Reporting Setting should be applied starting from the first slot that is after slot where ** is the SCS configuration for the PUCCH.  …..  - when a UE receives a deactivation command, as described in clause 6.1.3.12 of [10, TS 38.321], for activated CSI-RS/CSI-IM resource set(s) associated with configured CSI resource setting(s), and when the UE would transmit a PUCCH with HARQ-ACK information in slot *n* corresponding to the PDSCH carrying the deactivation command, the corresponding actions in [10, TS 38.321] and UE assumption on cessation of CSI-RS/CSI-IM transmission corresponding to the deactivated CSI-RS/CSI-IM resource set(s) shall apply starting from the first slot that is after slot where ** is the SCS configuration for the PUCCH. |
| **TS38.214 – Clause 5.2.4**  ….  A UE shall perform semi-persistent CSI reporting on the PUCCH applied starting from the first slot that is after slot when the UE would transmit a PUCCH with HARQ-ACK information in slot *n* corresponding to the PDSCH carrying the activation command described in clause 6.1.3.16 of [10, TS 38.321]where ** is the SCS configuration for the PUCCH. |
| **TS38.214 - Clause 6.2.1**  ….  - when a UE receives an activation command, as described in clause 6.1.3.17 or 6.1.3.36 of [10, TS 38.321], for an SRS resource, and when the UE would transmit a PUCCH with HARQ-ACK information in slot *n* corresponding to the PDSCH carrying the activation command is transmitted in slot *n*, the corresponding actions in [10, TS 38.321] and the UE assumptions on SRS transmission corresponding to the configured SRS resource set shall be applied starting from the first slot that is after slot where ** is the SCS configuration for the PUCCH.  …..  - when a UE receives a deactivation command [10, TS 38.321] for an activated SRS resource set, and when the UE would transmit a PUCCH with HARQ-ACK information in slot *n* corresponding to the PDSCH carrying the deactivation command, the corresponding actions in [10, TS 38.321] and UE assumption on cessation of SRS transmission corresponding to the deactivated SRS resource set shall apply starting from the first slot that is after slot where ** is the SCS configuration for the PUCCH. |
| **TS38.214 - Clause 5.2.1.5.1**  ….  - When the number of configured CSI ….. When the UE would transmit a PUCCH with HARQ-ACK information in slot *n* corresponding to the PDSCH carrying the subselection indication, the corresponding action in [10, TS 38.321] and UE assumption on the mapping of the selected CSI trigger state(s) to the codepoint(s) of DCI CSI request field shall be applied starting from the first slot that is after slot where ** is the SCS configuration for the PUCCH. |

For example, for the issue in TS38.213 section 9.2.2, CATT [2] showed that there can be two understandings of ‘slot *k*’:

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| * Understanding 1: slot *k* is the sub-slot where the UE would transmit ACK * Understanding 2: slot *k* is the slot composed of symbols where the UE would transmit ACK   As an example shown in Figure 1, assuming sub-slot of 7-symbol is configured, if a UE received a MAC CE for spatial setting for a PUCCH transmission in a PDSCH ending in slot *n* and the corresponding HARQ-ACK is transmitted in the first sub-slot in slot *n*+1, then the actions related to spatial setting for a PUCCH transmission should be applied from the second sub-slot in slot *n*+4 according to understanding 1 while from slot *n*+5 according to understanding 2.    Figure 1 Ambiguous timing for spatial setting for a PUCCH transmission |

In [2][3][4], the issue in TS38.213 section 9.2.2 was addressed, and draft CR texts were provided. In [1] all MAC CE related issues were addressed with one umbrella change, instead of changing each section individually. All submitted CR texts [1][2][3][4] have the same intention, which is also aligned with the endorsed CR in R1-2102104:

* For the purpose of timing of applicability of MAC CE based associated actions, a slot with PUCCH transmission with HARQ-ACK information is considered as a slot with symbols as defined in [4, TS 38.211].

# 3 Email Discussions

## 3.1 First Round of Email Discussion

Since all submitted CR texts [1][2][3][4] share the same understanding, which is also aligned with the endorsed CR in R1-2102104, it seems that the following proposals can be agreeable:

**FL Proposal 3.1-1:**

For the purpose of determining the HARQ-ACK timing corresponding to a PDSCH carrying MAC commands [10, 38.321], a slot with PUCCH transmission carrying HARQ-ACK information is considered as a slot with symbols as defined in [4, TS 38.211], irrespective of presence or absence of *subslotLengthForPUCCH* configuration.

**Question 3.1-1.** Please indicate if you can support FL Proposal 3.1-1 above. Please explain your reasoning if you have strong concern of this proposal.

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| **Company** | **Support (Yes/No)** | **Comments** |
| **Apple** | Yes |  |
| **CATT** | Yes |  |
| **vivo** | Yes |  |
| **OPPO** | Yes |  |
| **HW/HiSi** | Yes |  |
| **Nokia, NSB** | Yes |  |
| **Qualcomm** | Yes |  |
| **Intel** | Yes |  |
| **Samsung** | Yes |  |
| **ZTE** | Yes |  |
| **Ericsson** | Yes |  |
| **DOCOMO** | Yes |  |

Regarding the manner of making specification change, [2][3][4] focused on one issue (*PUCCH-SpatialRelationInfo* in 38.213 Section 9.2.2) and provided the CR text for this section. On the other hand, [1] pointed out that there are at least five different MAC actions in the existing specifications (i.e., 38.213, 38.214) that share the same problem, and all need to be addressed. Hence [1] proposed to add umbrella sentence(s) to TS 38.213 section 9 to address all issues at the same time. It also covers all future MAC actions if introduced. In summary, there are two options to provide CR texts.

1. Umbrella sentence(s) are added in TS 38.213 section 9 to address the common issue related to HARQ-ACK timing for PDSCH carrying MAC commands when *subslotLengthForPUCCH* is configured.
2. Identify all affected specifications and sections, then provide CR texts for each section individually to address the issue related to HARQ-ACK timing for PDSCH carrying MAC commands when *subslotLengthForPUCCH* is configured.

Considering that numerous sections in at least two specifications (i.e., 38.213, 38.214) share a common problem, it seems to be more efficient to take Option 1, which is also future proof.

**FL Proposal 3.1-2:**

Umbrella sentence(s) are added in TS 38.213 section 9 to address the common issue related to HARQ-ACK timing for PDSCH carrying MAC commands when *subslotLengthForPUCCH* is configured.

**Question 3.1-2.** Please indicate if you can support FL Proposal 3.1-2 above. Please explain your reasoning if you have strong concern of this proposal.

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| **Company** | **Support (Yes/No)** | **Comments** |
| **Apple** | No | The umbrella sentence to replace slot by subslot is in TS 38.213 Clause 9: “In the remaining of this Clause, if a UE is provided subslotLengthForPUCCH, a slot for an associated PUCCH transmission includes a number of symbols indicated by subslotLengthForPUCCH.” It is clear from the sentence that it should be only applicable to the remaining of Clause 9, and should not apply to Clause 7.2.1 or 10.1. This means that the only place that requires clarification is Clause 9.2.2.  Similarly, for TS 38.214, there is no umbrella sentence in 214 saying that “slot” becomes “sub-slot” when sub-slot is configured, which means “slot” is always a slot. Therefore, we do not see any issue with the current spec.  Given that TS 38.213 Clause 9.2.2 is the only place that we need to address, we prefer Option 2 to directly clarify it. |
| **CATT** | No | We share the same view with Apple that there is no confusion for other cases except the PUCCH spatial relationship setting in TS 38.213 Clause 9.2.2. Therefore, we prefer Option 2. |
| **vivo** | No | We share the same view with Apple and CATT. For the other places, the current spec is correct and clear. Clause 9.2.2 is the only place we need to address. |
| **OPPO** |  | We are ok with both of option 1 and option 2 to address the issue in Clause 9.2.2 and future MAC actions if introduced in section 9. Share similar view with other companies that there seems no confusion for other cases since they do not have quotation to 9.2.3. |
| **HW/HiSi** | No | Agree with Apple, CATT and vivo. |
| **Nokia, NSB** | No | We share the same view with Apple, CATT, vivo & HW/HiSi. |
| **Qualcomm** | Yes | We are fine with the proposal. |
| **Intel** | No | Same view as Apple and others that only the case of PUCCH spatial relation info in 38.213, 9.2.2 needs to be addressed while there should not be an ambiguity for other cases outside of Section 9 of 38.213. |
| **Samsung** |  | There is validity both in the proposal and in the comments made against it. A benefit of the proposal is that it is future proof and a “one stop”/“umbrella” solution (although it may need to be moved to another section). |
| **ZTE** | No | Fine with views from Apple, CATT , vivo, HW, Intel |
| **Ericsson** | Yes  Please read the comment 😊 | I would like to make few clarifications. With respect to the comment below from Apple, then it is not clear to me why we spent so much time to fix clause 4.3 to clarify slot is 14 symbols. We could only fix the issue with k.  Apple: The umbrella sentence to replace slot by subslot is in TS 38.213 Clause 9: “In the remaining of this Clause, if a UE is provided subslotLengthForPUCCH, a slot for an associated PUCCH transmission includes a number of symbols indicated by subslotLengthForPUCCH.” It is clear from the sentence that it should be only applicable to the remaining of Clause 9, and should not apply to Clause 7.2.1 or 10.1. This means that the only place that requires clarification is Clause 9.2.2.  With that experience, I proposed the TP since based on the discussion for 4.3.  In general, I am not in favor of fixing the spec case by case where one can adopt a clean and general solution at one place. If in next Rel, we include in another MAC CE activation in “clause 9”, we have to remember to fix it in that occasion too, etc. and this way of handling the issues, makes maintenance of the spec difficult.  Based on the same principle, I faced similar issue last meeting we had a lengthy discussion to repeat RRC parameters in spec for clarifications if you recall 😊. At the end I had to give in by respecting the group preference.  Just to explain, my thinking behind the proposed CR was that in any spec, 213, 214, etc , when ever it is mentioned HARQ-ACK transmission on PUCCH, it is clear that the procedure for HARQ-ACK transmission is defined in clause 9. ( I hope that answers the question for reference). Then, we can just clarify in clause 9, how to interpret the timing.  As you see my approach and thinking towards the problem was different. I even didn’t see the need to consider the “famous umbrella sentence” 😊 |
| **DOCOMO** | Yes | Option 1 is future-proof as mentioned by Ericsson |

Specifically, the umbrella sentence(s) provided in [1] for TS 38.213 section 9 is as follows.

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| 38.313, section 9  If a UE would transmit a PUCCH with HARQ-ACK information in a slot corresponding to a PDSCH carrying MAC CE commands, the slot with the PUCCH transmission carrying HARQ-ACK information is assumed to consist of symbols as defined in [4, TS 38.211] for the purpose of determining the timing where the corresponding MAC CE actions would be applicable, irrespective of presence or absence of *subslotLengthForPUCCH* configuration. |

For addressing the issue within 38.213 section 9.2.2, [2][3][4] provided the following text proposal.

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| 38.313, section 9.2.2  A spatial setting for a PUCCH transmission is provided by *PUCCH-SpatialRelationInfo* if the UE is configured with a single value for *pucch-SpatialRelationInfoId*; otherwise, if the UE is provided multiple values for *PUCCH-SpatialRelationInfo*, the UE determines a spatial setting for the PUCCH transmission as described in [11, TS 38.321]. The UE applies corresponding actions in [11, TS 38.321] and a corresponding setting for a spatial domain filter to transmit PUCCH in the first slot that is after slot  where  is the slot consisting of  symbols as defined in [4, TS 38.211 where the UE would transmit a PUCCH with HARQ-ACK information with ACK value corresponding to a PDSCH reception providing the *PUCCH-SpatialRelationInfo* and  is the SCS configuration for the PUCCH |

**Question 3.1-3.** If you can support FL Proposal 3.1-2 above (i.e., Option 1), please indicate if you can support the text proposal in [1], or if you prefer an alternative text proposal (please provide). If you do not support FL Proposal 3.1-2 above (i.e., Option 2), please provide the list of specifications and sections where the HARQ-ACK timing corresponding to MAC CE need to be addressed, with the expectation to draft text proposals for each section individually, similar to the one shown above for 38.313 section 9.2.2.

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| **Company** | **Approach to write CR**  **(Option 1 vs Option 2)** | **Comments** |
| **Apple** | Option 2 | As explained above, we think only TS 38.213 Clause 9.2.2 needs to be addressed. |
| **CATT** | Option 2 | Same as Apple. |
| **Vivo** | Option 2 | Same as Apple and CATT. |
| **OPPO** |  | OK with both option 1 and option 2.  If option 2 is adopted, we prefer to add the following change in section 9:  **9. UE procedure for reporting control information**  \*\*\* Unchanged text is omitted \*\*\*  In the remaining of this clause, if a UE is provided *subslotLengthForPUCCH*, a slot for an associated PUCCH resource of a PUCCH transmission with HARQ-ACK information includes a number of symbols indicated by *subslotLengthForPUCCH*, unless stated otherwise.  \*\*\* Unchanged text is omitted \*\*\* |
| **HW/HiSi** | Option 2 | Same as Apple, CATT and vivo. |
| **Nokia, NSB** | Option 2 | We are fine with Option 2, as also stated by Apple, vivo, CATT & HW/HiSi. |
| **Qualcomm** | Option 1 | One generic statement applicable to all scenarios is sufficient. |
| **Intel** | Option 1 | As suggested by Apple. |
| **Samsung** |  | OK with either option. |
| **ZTE** | Option 2 | Only change Clause 9.2.2 |
| **Ericsson** | Option 1 | Please see our previous comment.  Although if the majority prefer an approach based on Option 2, we are fine with that despite differences in style, |
| **DOCOMO** | Option 1 | We are fine with TP [1] |

## 3.2 Second Round of Email Discussion

All companies expressed support of FL Proposal 3.1-1. Thus it is recommended to be agreed.

**Proposed Agreement:**

For the purpose of determining the HARQ-ACK timing corresponding to a PDSCH carrying MAC commands [38.321], a slot with PUCCH transmission carrying HARQ-ACK information is considered as a slot with symbols as defined in [TS 38.211], irrespective of presence or absence of *subslotLengthForPUCCH* configuration.

Regarding the manner to draft CR, companies’ feedback is summarized below.

* (3) Support Option 1: Qualcomm, Ericsson, DOCOMO
* (9) Support Option 2: Apple, CATT, vivo, HW/HiSi, Nokia/NSB, Intel, ZTE
* (2) Fine with both Option 1 and Option 2: OPPO, Samsung

Majority companies support Option 2 with the understanding that the sentence below may cause ‘slot’ to be replaced by ‘subslot’ within the scope of 38.213 Clause 9 only. ‘Slot’ is not replaced by ‘subslot’ outside of 38.213 Clause 9 even if PUCCH carrying HARQ-ACK is described and *subslotLengthForPUCCH* is configured.

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| TS38.213 V16.6.0  9 UE procedure for reporting control information  …  In the remaining of this clause, if a UE is provided *subslotLengthForPUCCH*, a slot for an associated PUCCH resource of a PUCCH transmission with HARQ-ACK information includes a number of symbols indicated by *subslotLengthForPUCCH*. |

Ericsson pointed out that this understanding was not applied when CR for 38.213 Clause 4.3 (R1-2102104) was written, where explicit text was added to provide the meaning of ‘slot’, even though Clause 4.3 was about MAC command and was outside of Clause 9. This is a fair comment. It can be confusing if the specification for PUCCH associated with MAC command have explicit text about ‘slot’ in some places, while no explicit text in other places.

To achieve consistent understanding of the specifications and avoid confusion in the future, the following conclusion is proposed.

**FL Proposal 3.2-1:**

**Proposed Conclusion:**

Unless stated otherwise: outside of TS 38.213 Clause 9, a “slot” consists of symbols as defined in TS 38.211, even if the “slot” is described to have PUCCH transmission carrying HARQ-ACK information, and *subslotLengthForPUCCH* is configured.

**Question 3.2-1.** Please indicate if you can support FL Proposal 3.2-1. Please explain your reasoning if you have strong concern of this proposal.

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| **Company** | **Support (Yes/No)** | **Comments** |
| **Apple** | Yes | We agree with the proposed conclusion, but we think this is true with the current spec text. We do not think an explicit conclusion is necessary, but if it helps, we won’t object to such a conclusion either. |
| **Qualcomm** | Yes, with comments | We suggest making the conclusion a bit more specific by stating that this is about MAC command timeline. |
| **OPPO** | Yes | It seems better with Qualcomm’s suggestion. |
| **DOCOMO** | Yes |  |
| **vivo** | yes |  |
| **HW/HiSi** | yes |  |
| **Ericsson** | yes |  |
| **CATT** | Yes |  |
| **ZTE** | Yes |  |
| **Nokia/NSB (re-added from v015)** |  | But we are puzzled what we are discussing here. Looking at the TP below is the intention:  - no changes to 38.214, as we don’t have the notion of sub-slots in 38.214? This could be fine for us.  - and for 38.213, we approve the TP below?  On the need to agree the conclusion, we share the same opinion with Apple, there seems to be no need to have the conclusion approved, but won’t object either. |
| **Samsung** | Yes | OK with the suggestion from Qualcomm.  For the TP, “unless stated otherwise” statements are convenient but may come at a price that is not worth the convenience and would be good to avoid whenever possible.  Prefer to be specific – e.g. “unless the slot is for a timeline associated with a MAC CE command reception”. |

Considering companies’ feedback, the text proposal below is recommended.

**FL Proposal 3.2-2:** Adopt the text proposal below.

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| ---------------------------------Start of Text Proposal to TS 38.213 v16.6.0-----------------------  4.3 Timing for secondary cell activation / deactivation  With reference to slots for PUCCH transmissions, when a UE receives in a PDSCH an activation command [11, TS 38.321] for a secondary cell ending in slot *n*, the UE applies the corresponding actions in [11, TS 38.321] no later than the minimum requirement defined in [10, TS 38.133] and no earlier than slot , except for the following:  - the actions related to CSI reporting on a serving cell that is active in slot  - the actions related to the *sCellDeactivationTimer* associated with the secondary cell [11, TS 38.321] that the UE applies in slot  - the actions related to CSI reporting on a serving cell which is not active in slot that the UE applies in the earliest slot after  in which the serving cell is active.  The value of  is where slot *n*+*m* is a slot indicated for PUCCH transmission with HARQ-ACK information for the PDSCH reception as described in clause 9.2.3 and  is a number of slots per subframe for the SCS configuration  of the PUCCH transmission as defined in [4, TS 38.211].  With reference to slots for PUCCH transmissions, if a UE receives a deactivation command [11, TS 38.321] for a secondary cell ending in slot , the UE applies the corresponding actions in [11, TS 38.321] no later than the minimum requirement defined in [10, TS 38.133], except for the actions related to CSI reporting on an activated serving cell which the UE applies in slot *.*  \*\*\* Unchanged text is omitted \*\*\*  9 UE procedure for reporting control information  \*\*\* Unchanged text is omitted \*\*\*  In the remaining of this clause, if a UE is provided *subslotLengthForPUCCH*, a slot for an associated PUCCH resource of a PUCCH transmission with HARQ-ACK information includes a number of symbols indicated by *subslotLengthForPUCCH*, unless stated otherwise.  \*\*\* Unchanged text is omitted \*\*\*  9.2.2 PUCCH Formats for UCI transmission  \*\*\* Unchanged text is omitted \*\*\*  A spatial setting for a PUCCH transmission is provided by *PUCCH-SpatialRelationInfo* if the UE is configured with a single value for *pucch-SpatialRelationInfoId*; otherwise, if the UE is provided multiple values for *PUCCH-SpatialRelationInfo*, the UE determines a spatial setting for the PUCCH transmission as described in [11, TS 38.321]. The UE applies corresponding actions in [11, TS 38.321] and a corresponding setting for a spatial domain filter to transmit PUCCH in the first slot that is after slot  where  is the slot where the UE would transmit a PUCCH with HARQ-ACK information with ACK value corresponding to a PDSCH reception providing the *PUCCH-SpatialRelationInfo*, each slot consists of symbols as defined in [4, TS 38.211], and  is the SCS configuration for the PUCCH  \*\*\* Unchanged text is omitted \*\*\*  ---------------------------------End of Text Proposal to TS 38.213 v16.6.0----------------------- |

**Question 3.2-2.** Please indicate if you can support FL Proposal 3.2-2. Please clearly state the your changes to the text proposal, if any.

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| **Company** | **Support (Yes/No)** | **Comments** |
| **Apple** |  | We do not think the first two changes are really necessary/essential, but we understand why the moderator is proposing it. We are fine with either way (having or not having the first two changes). |
| **Qualcomm** |  | It is not clear to us why the first two parts are removed. Is the intention not to mention the meaning of the slot for the MAC command outside of Section 9 of TS 38.213 and rely on the RAN1 conclusion? |
| **OPPO** | Yes |  |
| **DOCOMO** |  | It is not necessary to delete the first two parts. We are OK to go with the text proposal if majority companies support it. |
| **Vivo** |  | We prefer not to delete the first two parts. |
| **HW/HiSi** |  | We also prefer to not delete the first two parts. |
| **Ericsson** |  | Although I prefer the proposed TP by moderator with deletion in 4.3 clause, but if the majority prefers, it is fine not to include that.  However, the majority position is quite confusing. The moderator explained the deletion makes the spec consistent if Option 2 is adopted (based on the motivation for Option 2). Now, it seems the same motivation does not hold. I hope that explains the confusion 😊  Nevertheless, it is fine from our perspective either way. We hope that it does not create questions later on when one implements/reads the spec, e.g. Why in 4.3 it is explicitly stated bla bla and not in other clauses (outside 9 😊) when MAC CE is applied. I hope that explains motivation behind our preference.  Thanks all for the good discussion. |
| **CATT** |  | We also think the first two parts should not be removed. |
| **ZTE** |  | Share the same view with Apple on the first two changes. |
| **Nokia/NSB (re-add from v015)** |  | Agree with Apple, that the first two reversion to Sec. 4.3 of the earlier specs text may not be needed. But to be aligned with the other parts, consistent formulation in parts of the specs would be good and therefore think, if we go for this procedure also the changes to Sec. 4.3 should be there. |
| **Samsung** |  | Agree with Nokia. Also, to repeat the previous comment, prefer to remove the “unless stated otherwise” and spell it out what the “otherwise” is for Rel-16 – i.e. “unless the slot is for a timeline associated with a MAC CE command reception”. |

## 3.3 Third Round of Email Discussion

The discussion in second round indicates that companies’ view are fairly aligned. The debate is about minor points and no difficult technical issue is observed.

Regarding the proposed conclusion in FL Proposal 3.2-1, 10 out 11 companies responded with yes, 1 company raised questions but won’t object either. Comments were made that the context can be made more specific. Considering the companies’ feedback, the following revision is proposed.

**FL Proposal 3.3-1:**

**Proposed Conclusion:**

For the timing associated with MAC CE reception, outside of TS 38.213 Clause 9, a “slot” consists of symbols as defined in TS 38.211, even if the “slot” is described to have PUCCH transmission carrying HARQ-ACK information, and *subslotLengthForPUCCH* is configured.

**Question 3.3-1.** Please indicate if you can support FL Proposal 3.3-1. Please explain your reasoning if you have strong concern of this proposal.

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| **Company** | **Support (Yes/No)** | **Comments** |
| **Samsung** | Yes |  |
| **Apple** | No | We have concern on adding “For the timing associated with MAC CE reception”. It can imply that for cases other than “timing associated with MAC CE reception” this interpretation is no longer true. However, there is no reason “slot” is interpreted differently outside Clause 9. We suggest removing the red text. |
| **Nokia/NSB** | Agree in principle | We do agree with Apple, that the added red part is not needed and may just cause confusion. |
| **CATT** |  | Agree with the comments from Apple. |
| **vivo** |  | Agree with the comments from Apple. |
| **DOCOMO** | Yes | We are fine with either including or not including the red part |
| **Qualcomm** | Yes | The red text clarifies what the conclusion is intended for. |
| **Ericsson** | Yes (comment on red text) | With regard to the red text, we share same reasons as Apple. |

Regarding the text proposal in FL Proposal 3.2-2, the debate is about the changes to 38.213 Section 4.3. Thus **the changes to 38.213 Section 9 are agreeable**.

As explained by Ericsson/Nokia/NSB, changes to Section 4.3 is needed so as to apply the same understanding for timing associated with all types of MAC CE. Consistent formulation in different parts of the specifications is necessary. Since the majority preferred to go with Option 2 (no umbrella sentence to cover all MAC CE), but HARQ-ACK timing texts appear in numerous sections for a variety of MAC CE [1], the text proposal should be written to reflect the consistent understanding for all MAC CE.

Several companies expressed the preference of not removing two phrases in Section 4.3. The argument can be “it is not necessary/essential”. However, one can argue that taking 38.213 and 38.214 as a whole, this change is essential, because the special treatment in Section 4.3 leads to the erroneous understanding that a ‘slot’ in all other sections involving HARQ-ACK timing of MAC CE should be interpreted as *subslotLengthForPUCCH* symbols. The affected sections include:

* Spatial setting of PUCCH in clause 7.2.1 of TS38.213
* TCI state activation in clause 10.1 of TS38.213 and clause 5.1.5 of TS38.214
* Activation/deactivation of semi-persistent CSI RS and CSI reporting in clauses 5.2.1.5.2 and 5.2.4 of TS38.214.
* Activation/deactivation of semi-persistent SRS in clause 6.2.1 of TS38.214
* Selection of CSI trigger state for aperiodic CSI-RS or CSI reporitng in clause 5.2.1.5.1 of TS38.214

Thus FL recommendation is that the **TP to 38.213 in FL Proposal 3.2-2 to be adopted.**

**Question 3.3-2.** Please indicate if you can accept the TP to 38.213 in FL Proposal 3.2-2. Please explain your reasoning if you object to this.

|  |  |  |
| --- | --- | --- |
| **Company** | **Accept TP to 38.213 in FL Proposal 3.2-2 (Yes/No)** | **Comments** |
| **Samsung** |  | Prefer to replace “unless stated otherwise” with “unless the slot is for a timeline associated with a MAC CE command reception” in order to be specific.  However, OK to keep as is if no other support ^^. |
| **Apple** |  | We are fine with the TP, but slightly prefer Samsung’s version to make it more specific. |
| **Nokia/NSB** | Yes | We are fine with only the ‘unless state otherwise’, adding too many specifics may just create issues later on. |
| **CATT** | Yes | We are also fine with the suggestion from Samsung. |
| **vivo** | yes | Same view as Nokia. |
| **DOCOMO** | Yes |  |
| **Qualcomm** | Yes | The proposed text by Samsung is preferred. |
| **Ericsson** | Yes | Either way is OK. |

Please also see further clarification below:

* To Nokia/NSB: yes, the understanding is “no TP to 38.214“.
* To Qualcomm: the proposed conclusion (FL Proposal 3.3-1), if endorsed, can be provided in the cover page of the CR as the reason why two phrases in 38.213 Section 4.3 are deleted.

## 3.4 Fourth Round of Email Discussion

Thanks to companies’ input, the proposed conclusion and TP are stabilizing. FL summarizes the discussion status as follows:

* For the proposed conclusion, “For the timing associated with MAC CE reception” is recommended to deleted according to majority view.
  + 6 companies (Apple, Nokia/NSB, CATT, vivo, Ericsson) prefer deletion, 2 companies (Samsung, QC) prefer keeping the red text, 1 company (DOCOMO) is fine either way.
* For the TP, TP to 38.213 in FL Proposal 3.2-2 is recommended (i.e., no change) considering companies’ input.
  + 7 companies (Nokia/NSB, CATT, vivo, DOCOMO, Qualcomm, Ericsson) can accept TP to 38.213 in FL Proposal 3.2-2. Furthermore, 3 companies (Samsung, Apple, QC)) (slightly) prefer to replace “unless stated otherwise” with “unless the slot is for a timeline associated with a MAC CE command reception”. 2 company (CATT, Ericsson) are fine either way.
  + The phrase “unless stated otherwise” was from OPPO contribution [3], and has been emphasized a couple of times by OPPO during email discussion. Thus FL understand that 8 companies prefer or can accept “unless stated otherwise”.
  + Since this is editorial in nature, FL suggest to go with majority view and keep the phrase “unless stated otherwise”.

Accordingly, the following are recommended for approval.

**Proposed Agreement:**

For the purpose of determining the HARQ-ACK timing corresponding to a PDSCH carrying MAC commands [38.321], a slot with PUCCH transmission carrying HARQ-ACK information is considered as a slot with symbols as defined in [TS 38.211], irrespective of presence or absence of *subslotLengthForPUCCH* configuration.

**FL Proposal 3.4-1:**

**Proposed Conclusion:**

Outside of TS 38.213 Clause 9, a “slot” consists of symbols as defined in TS 38.211, even if the “slot” is described to have PUCCH transmission carrying HARQ-ACK information, and *subslotLengthForPUCCH* is configured.

**FL Proposal 3.4-2:** Adopt the text proposal to TS 38.213 below.

|  |
| --- |
| ---------------------------------Start of Text Proposal to TS 38.213 v16.6.0-----------------------  4.3 Timing for secondary cell activation / deactivation  With reference to slots for PUCCH transmissions, when a UE receives in a PDSCH an activation command [11, TS 38.321] for a secondary cell ending in slot *n*, the UE applies the corresponding actions in [11, TS 38.321] no later than the minimum requirement defined in [10, TS 38.133] and no earlier than slot , except for the following:  - the actions related to CSI reporting on a serving cell that is active in slot  - the actions related to the *sCellDeactivationTimer* associated with the secondary cell [11, TS 38.321] that the UE applies in slot  - the actions related to CSI reporting on a serving cell which is not active in slot that the UE applies in the earliest slot after  in which the serving cell is active.  The value of  is where slot *n*+*m* is a slot indicated for PUCCH transmission with HARQ-ACK information for the PDSCH reception as described in clause 9.2.3 and  is a number of slots per subframe for the SCS configuration  of the PUCCH transmission as defined in [4, TS 38.211].  With reference to slots for PUCCH transmissions, if a UE receives a deactivation command [11, TS 38.321] for a secondary cell ending in slot , the UE applies the corresponding actions in [11, TS 38.321] no later than the minimum requirement defined in [10, TS 38.133], except for the actions related to CSI reporting on an activated serving cell which the UE applies in slot *.*  \*\*\* Unchanged text is omitted \*\*\*  9 UE procedure for reporting control information  \*\*\* Unchanged text is omitted \*\*\*  In the remaining of this clause, if a UE is provided *subslotLengthForPUCCH*, a slot for an associated PUCCH resource of a PUCCH transmission with HARQ-ACK information includes a number of symbols indicated by *subslotLengthForPUCCH*, unless stated otherwise.  \*\*\* Unchanged text is omitted \*\*\*  9.2.2 PUCCH Formats for UCI transmission  \*\*\* Unchanged text is omitted \*\*\*  A spatial setting for a PUCCH transmission is provided by *PUCCH-SpatialRelationInfo* if the UE is configured with a single value for *pucch-SpatialRelationInfoId*; otherwise, if the UE is provided multiple values for *PUCCH-SpatialRelationInfo*, the UE determines a spatial setting for the PUCCH transmission as described in [11, TS 38.321]. The UE applies corresponding actions in [11, TS 38.321] and a corresponding setting for a spatial domain filter to transmit PUCCH in the first slot that is after slot  where  is the slot where the UE would transmit a PUCCH with HARQ-ACK information with ACK value corresponding to a PDSCH reception providing the *PUCCH-SpatialRelationInfo*, each slot consists of symbols as defined in [4, TS 38.211], and  is the SCS configuration for the PUCCH  \*\*\* Unchanged text is omitted \*\*\*  ---------------------------------End of Text Proposal to TS 38.213 v16.6.0----------------------- |

# 4 Outcome of the Email Discussion

The following agreement and conclusion were made to address the issue of HARQ-ACK timing corresponding to a PDSCH carrying MAC commands. For all relevant MAC CE, this avoids a ‘slot’ being mis-interpreted as ‘subslot’ in determining the HARQ-ACK timing when *subslotLengthForPUCCH* is configured.

The correction on sub-slot based HARQ-ACK feedback for MAC CE activation/deactivation is endorsed in R1-2108453 (TS38.213, Rel-16, CR#0254, Cat. F).

**Agreement**

For the purpose of determining the HARQ-ACK timing corresponding to a PDSCH carrying MAC commands [38.321], a slot with PUCCH transmission carrying HARQ-ACK information is considered as a slot with symbols as defined in [TS 38.211], irrespective of presence or absence of *subslotLengthForPUCCH* configuration.

**Conclusion**

Outside of TS 38.213 Clause 9, a “slot” consists of  symbols as defined in TS 38.211, even if the “slot” is described to have PUCCH transmission carrying HARQ-ACK information, and *subslotLengthForPUCCH* is configured.

# References

1. R1-2106674, [Sub-slot Based HARQ-ACK Feedback for MAC CE Activation deactivation](file:///C:\3GPP_RAN1\RAN1_106_e\7.2.5\R1-2106674%20Ericsson%20Sub-slot%20Based%20HARQ-ACK%20Feedback%20for%20MAC%20CE%20Activation%20deactivation.docx), Ericsson, RAN1#106-e, August 2021.
2. R1-2106931, Correction on MAC CE effective time for spatial setting for a PUCCH, CATT, RAN1#106-e, August 2021.
3. R1-2107263, Draft CR on PUCCH spatial setting when subslotLength-ForPUCCH is provided, OPPO, RAN1#106-e, August 2021.
4. R1-2107985, Draft CR on PUCCH spatial relation update, vivo, RAN1#106-e, August 2021.

# Appendix

**Agreement**

The text proposal for 38.213 is endorsed in R1-2102104 (TS38.213, Rel-16, CR#0197, Cat. F).

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| --- |
| 38.213 V16.4.0  4.3 Timing for secondary cell activation / deactivation  With reference to slots for PUCCH transmissions each consisting of symbols as defined in [4, TS 38.211], when a UE receives in a PDSCH an activation command [11, TS 38.321] for a secondary cell ending in slot *n*, the UE applies the corresponding actions in [11, TS 38.321] no later than the minimum requirement defined in [10, TS 38.133] and no earlier than slot , except for the following:  - the actions related to CSI reporting on a serving cell that is active in slot  - the actions related to the *sCellDeactivationTimer* associated with the secondary cell [11, TS 38.321] that the UE applies in slot  - the actions related to CSI reporting on a serving cell which is not active in slot that the UE applies in the earliest slot after  in which the serving cell is active.  The value of  is where slot *n*+*m* is a slot indicated for PUCCH transmission with HARQ-ACK information for the PDSCH reception as described in Clause 9.2.3 and  is a number of slots per subframe for the SCS configuration  of the PUCCH transmission as defined in [4, TS 38.211].  With reference to slots for PUCCH transmissions each consisting of symbols as defined in [4, TS 38.211], if a UE receives a deactivation command [11, TS 38.321] for a secondary cell ending in slot , the UE applies the corresponding actions in [11, TS 38.321] no later than the minimum requirement defined in [10, TS 38.133], except for the actions related to CSI reporting on an activated serving cell which the UE applies in slot *.* |