3GPP TSG RAN WG1 #108-e R1-22abcde

e-Meeting, February 21 – March 3, 2022

**Agenda item: 7.1**

**Source: Moderator (Nokia)**

**Title: [108-e-NR-CRs-02] Issue#3 SPS PDSCH activation and PUCCH resource selection for the 1st SPS PDSCH**

**WI: NR\_newRAT-Core**

**Document for: Discussion and Decision**

# 1 Introduction

This document is a summary of the discussion related to the RAN1#108 AI 7.1 issue #2 handled in the following email thread:

[108-e-NR-CRs-02] Issue#3 SPS PDSCH activation and PUCCH resource selection for the 1st SPS PDSCH by March 1 – Karri (Nokia)

* Relevant tdocs: [R1-2201027](../../Docs/R1-2201027.zip), [R1-2201028](../../Docs/R1-2201028.zip), [R1-2201385](../../Docs/R1-2201385.zip), [R1-2202116](../../Docs/R1-2202116.zip), [R1-2201656](../../Docs/R1-2201656.zip)

The following Tdocs address the issue

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| **TDoc#** | **Tdoc title** | **Source** |
| [R1-2201027](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Docs/R1-2201027.zip) | SPS PDSCH activation and PUCCH resource selection for the 1st SPS PDSCH | Nokia, Nokia Shanghai Bell |
| [R1-2201028](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Docs/R1-2201028.zip) | Draft 38.213 CR on SPS PDSCH activation and PUCCH resource selection for the 1st SPS PDSCH | Nokia, Nokia Shanghai Bell |
| [R1-2201385](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Docs/R1-2201385.zip) | Clarification on PUCCH resource determination for the first SPS PDSCH | ZTE |
| [R1-2202116](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Docs/R1-2202116.zip) | Clarification on HARQ-ACK PUCCH resource for SPS PDSCH | Qualcomm Incorporated |
| [R1-2201656](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Docs/R1-2201656.zip) | Clarification on HARQ-ACK for SPS PDSCH (Originally submitted to AI 7.2.5) | Ericsson |

# 2 Summary of the issue raised in the Tdoc

Exact proposals of the documents:

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| **TDoc#** | **Proposal** |
| [R1-2201027](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Docs/R1-2201027.zip)  [R1-2201028](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Docs/R1-2201028.zip) | **Proposal 1**: based on the above two observations, conclude that the 1st SPS-PDSCH after receiving the activation DCI is considered as SPS-PDSCH, and the PUCCH handling follows the *SPS-Config*. The PUCCH-related fields in the SPS-PDSCH activation DCI are ignored.  **Proposal 2:** Agree to the following clarification to TS 38.213 v15.14.0 and v16.8.0. A corresponding draft CR to Rel-15 is provided in [R1-2201028]:  If a UE transmits HARQ-ACK information corresponding only to a PDSCH reception without a corresponding PDCCH, a PUCCH resource for corresponding PUCCH transmission with HARQ-ACK information is provided by *n1PUCCH-AN*. A PDCCH carrying a DL SPS activation is not considered to correspond to any of the SPS PDSCHs. |
| [R1-2201385](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Docs/R1-2201385.zip) | Proposal 1: The PUCCH resource corresponding to the HARQ-ACK for the first SPS PDSCH associated with an activation DCI is determined by DCI. |
| [R1-2202116](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Docs/R1-2202116.zip) | *Proposal 1:* Capture the following as a conclusion in RAN1 Chairman’s notes   * PUCCH resource indicated by PRI in activation DCI is used to feedback HARQ-ACK for the first SPS PDSCH activated by activation DCI |
| [R1-2201656](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_108-e/Docs/R1-2201656.zip" \t "_parent) | [Observation 1 For HARQ-ACK codebook construction and PUCCH resource determination of Case (A), there is no differentiation of first SPS PDSCH after activation DCI and subsequent SPS PDSCH.](file:///C:\Users\krantaah\AppData\Local\Temp\7zO8A612123\R1-2201656%20Clarification%20on%20HARQ-ACK%20for%20SPS%20PDSCH.docx#_Toc95486078)  [Observation 2 For HARQ-ACK codebook construction and PUCCH resource determination of Case (B), there is no differentiation of first SPS PDSCH after activation DCI and subsequent SPS PDSCH.](file:///C:\Users\krantaah\AppData\Local\Temp\7zO8A612123\R1-2201656%20Clarification%20on%20HARQ-ACK%20for%20SPS%20PDSCH.docx#_Toc95486079)  Correspondingly, we propose that RAN1 endorses the following conclusion for avoid future confusion.  **Proposed Conclusion:** For HARQ-ACK codebook construction and PUCCH resource determination, there is no differentiation of first SPS PDSCH after activation DCI and subsequent SPS PDSCH, regardless of if there are HARQ-ACK bits for dynamically scheduled PDSCH in the same (sub-)slot. |

# 3 Discussion

# 3.1 Round 1

The issues raised by the documents illustrates the different understandings of the SPS-PDSCH activation DCI and whether it should be considered to correspond to the first SPS-PDSCH or not, i.e. is the 1st PDSCH after the DL SPS activation

* a “normal” dynamically granted PDSCH that was scheduled with the PDCCH carrying the DL SPS activation message, or
* an SPS-PDSCH like all the subsequent SPS-PDSCH, and has no corresponding PDCCH.

This defines the way the HARQ-ACK is transmitted for the 1st SPS-PDSCH.

**The issue:** should the PUCCH transmitting the HARQ-ACK in response to the first PDSCH triggered by an DL SPS activation DCI be considered as:

1. PUCCH corresponding to an SPS-PDSCH (following the RRC *SPS-Config*): 1027/1028, 1656
2. PUCCH corresponding to of a dynamically granted PDSCH (ignoring the RRC *SPS-Config)*: 1385, 2116

**Moderator proposes to take the discussion in two steps**

* Step 1: Agree on one of the interpretations:
* Step 2: Agree on the RAN1 action (A CR, a RAN1 conclusion)

**Please provide company comments to the table below**

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| **Company** | **Comment** |
| Ericsson | We support moderator’s two-steps approach.  For Step 1, our understanding of the specification is that the 1st DL SPS PDSCH and other DL SPS PDSCHs with respect to the corresponding HARQ-ACK, codebook construction and eventually PUCCH resource are treated the same (justifications available in our contribution). |
| Fujitsu | The two-step approach proposed by the moderator looks good. Interpretation 1) is our understanding and support the justification in 1027 and 1656 |
| NTT DOCOMO | OK with the two-steps approach.  Regarding interpretation, our interpretation is 2nd one; i.e. HARQ feedback for the initial SPS PDSCH is handled as one of dynamic scheduling, for PUCCH resource determination perspective.   * a) Why spec editor uses the wording is for this interpretation. * b) When activation DCI schedules corresponding PUCCH transmission as “the last DCI”, NW needs to consider the HARQ-ACK payload size. 2nd interpretation can allocate appropriate PUCCH resource, but 1st one cannot. * c) From codebook construction perspective, there is no issue like b); thus the initial SPS PDSCH is handled as a normal SPS PDSCH. * d) Misalignment to Rel-16 SPS should be discussed in Rel-16 URLLC WI after fixing this discussion. Here this is clarification for Rel-15 spec, so Rel-16 URLLC spec should not be considered in this discussion. * e) The current Rel-15 spec text is the following. Clearly 2nd one is correct in our reading.  |  | | --- | | For a PUCCH transmission with HARQ-ACK information, a UE determines a PUCCH resource after determining a set of PUCCH resources for  HARQ-ACK information bits, as described in Clause 9.2.1. The PUCCH resource determination is based on a PUCCH resource indicator field [5, TS 38.212] in a last DCI format 1\_0 or DCI format 1\_1, among the DCI formats 1\_0 or DCI formats 1\_1 that have a value of a PDSCH-to-HARQ\_feedback timing indicator field indicating a same slot for the PUCCH transmission, that the UE detects and for which the UE transmits corresponding HARQ-ACK information in the PUCCH where, for PUCCH resource determination, detected DCI formats are first indexed in an ascending order across serving cells indexes for a same PDCCH monitoring occasion and are then indexed in an ascending order across PDCCH monitoring occasion indexes.  ...  If a UE transmits HARQ-ACK information corresponding only to a PDSCH reception without a corresponding PDCCH, a PUCCH resource for corresponding PUCCH transmission with HARQ-ACK information is provided by *n1PUCCH-AN*. | |
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