**3GPP TSG-RAN WG2 Meeting #121R2-230*xxxx***

 **Athens, Greece, 27th February – 3rd March, 2023**

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| *CR-Form-v12.1* |
| **CHANGE REQUEST** |
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|  | **38.321** | **CR** | **1560** | **rev** | **1** | **Current version:** | **17.3.0** |  |
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| *For* [***HE******LP***](http://www.3gpp.org/3G_Specs/CRs.htm#_blank)*on using this form: comprehensive instructions can be found at* [*http://www.3gpp.org/Change-Requests*](http://www.3gpp.org/Change-Requests)*.* |
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| ***Proposed change affects:*** | UICC apps |  | ME | **X** | Radio Access Network | **X** | Core Network |  |

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| ***Title:***  | Clarification on HARQ feedback transmission after SPS activation |
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| ***Source to WG:*** | LG Electronics Inc., vivo |
| ***Source to TSG:*** | R2 |
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| ***Work item code:*** | NR\_NTN\_solutions-Core |  | ***Date:*** | 2023-02-17 |
|  |  |  |  |  |
| ***Category:*** | **F** |  | ***Release:*** | Rel-17 |
|  | *Use one of the following categories:****F*** *(correction)****A*** *(mirror corresponding to a change in an earlier release)****B*** *(addition of feature),* ***C*** *(functional modification of feature)****D*** *(editorial modification)*Detailed explanations of the above categories canbe found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | *Use one of the following releases:Rel-8 (Release 8)Rel-9 (Release 9)Rel-10 (Release 10)Rel-11 (Release 11)…Rel-15 (Release 15)Rel-16 (Release 16)Rel-17 (Release 17)Rel-18 (Release 18)* |
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| ***Reason for change:*** | **Issue 1:**HARQ feedback for SPS activation may be additionally enabled by the network via RRC configuration *harq-FeedbackEnablingforSPSactive*. According to related field descriptions in TS 38.331, if enabled, UE reports ACK/NACK for the first SPS PDSCH after activation, regardless of if HARQ feedback is enabled or disabled corresponding to the first SPS PDSCH after activation. However, such UE behaviour is missing in the MAC spec.

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| **harq-FeedbackEnablingforSPSactive**If enabled, UE reports ACK/NACK for the first SPS PDSCH after activation, regardless of if HARQ feedback is enabled or disabled corresponding to the first SPS PDSCH after activation. Otherwise, UE follows configuration of HARQ feedback enabled/disabled corresponding to the first SPS PDSCH after activation. |

**Issue 2:**In subclause 5.4.3 of TS 38.321, it is now specified that “… *allowedHARQ-mode* which sets the allowed *uplinkHARQ-mode* for transmission…”. However, the *uplinkHARQ-mode* is a 32-bit bitmap while *allowedHARQ-mode* is an ENUMERATED type parameter*.* Due to the different types of the parameters, it is not correct to say that *allowedHARQ-mode* can be set to include *uplinkHARQ-mode* values. Also, this LCP restriction for HARQ mode should be specified in a similar way following other LCP restriction parameters (e.g. *allowedServingCells, allowedCG-List*, etc.). |
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| ***Summary of change:*** | 1. In section 5.3.2.2, “and the transmission is not the first transmisison after activation of the configured downlink assignment; or” is added to the conition of “if the HARQ process is configured with disabled HARQ feedback”. In addition, a new condition “1> if the HARQ process is configured with disabled HARQ feedback and harq-FeedbackEnablingforSPSactive is configured with disabled:” is added.
2. Change “allowed *uplinkHARQ-mode*” to “allowed HARQ mode” in subclause 5.4.3.1.1 and change “*uplinkHARQ-mode*” to “allowed HARQ mode” in subclause 5.4.3.1.2.

**Impact analysis**Impacted 5G architecture options: NR SAImpacted functionality: HARQ feedback for SPS activationInter-operability: 1. If the network is implemented according to the CR and the UE is not, network may think SPS activation command is not received by UE and then send the SPS activation command again unnecessarily, which may cause additional overhead.2. If the UE is implemented according to the CR and the network is not, the network may receive an ACK/NACK for SPS PDSCH transmission unexpectedly, and may thus misunderstand that the UE misbehaves by not following HARQ feedback disabling configuration. |
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| ***Consequences if not approved:*** | The UE will not send ACK/NACK information for the first SPS PDSCH after activation if the HARQ feedback is disabled regardless of whether harq-FeedbackEnablingforSPSactive is configured with enabled or disabled. |
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| ***Clauses affected:*** | 5.3.2.2, 5.4.3.1.1, 5.4.3.1.2 |
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|  | **Y** | **N** |  |  |
| ***Other specs*** |  | **x** |  Other core specifications  | TS/TR ... CR ...  |
| ***affected:*** |  | **x** |  Test specifications | TS/TR ... CR ...  |
| ***(show related CRs)*** |  | **x** |  O&M Specifications | TS/TR ... CR ...  |
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| ***Other comments:*** |  |
|  |  |
| ***This CR's revision history:*** |  |

*Modified Subclause*

#### 5.3.2.2 HARQ process

When a transmission takes place for the HARQ process, one or two (in case of downlink spatial multiplexing) TBs and the associated HARQ information are received from the HARQ entity.

For each received TB and associated HARQ information, the HARQ process shall:

1> if the NDI, when provided, has been toggled compared to the value of the previous received transmission corresponding to this TB; or

1> if the HARQ process is equal to the broadcast process, and this is the first received transmission for the TB according to the system information schedule indicated by RRC; or

1> if the HARQ process is associated with a transmission indicated with a MCCH-RNTI for MBS broadcast, and this is the first received transmission for the TB according to the MCCH schedule indicated by RRC; or

1> if the HARQ process is associated with a transmission indicated with a G-RNTI for MBS broadcast, and this is the first received transmission for the TB according to the MTCH schedule indicated by RRC or according to the scheduling indicated by DCI as specified in TS 38.214 [7]; or

1> if this is the very first received transmission for this TB (i.e. there is no previous NDI for this TB):

2> consider this transmission to be a new transmission.

1> else:

2> consider this transmission to be a retransmission.

The MAC entity then shall:

1> if this is a new transmission:

2> attempt to decode the received data.

1> else if this is a retransmission:

2> if the data for this TB has not yet been successfully decoded:

3> instruct the physical layer to combine the received data with the data currently in the soft buffer for this TB and attempt to decode the combined data.

1> if the data which the MAC entity attempted to decode was successfully decoded for this TB; or

1> if the data for this TB was successfully decoded before:

2> if the HARQ process is equal to the broadcast process:

3> deliver the decoded MAC PDU to upper layers.

2> else if this is the first successful decoding of the data for this TB:

3> deliver the decoded MAC PDU to the disassembly and demultiplexing entity.

1> else:

2> instruct the physical layer to replace the data in the soft buffer for this TB with the data which the MAC entity attempted to decode.

1> if the HARQ process is associated with a transmission indicated with a Temporary C-RNTI and the Contention Resolution is not yet successful (see clause 5.1.5); or

1> if the HARQ process is associated with a transmission indicated with a MSGB-RNTI and the Random Access procedure is not yet successfully completed (see clause 5.1.4a); or

1> if the HARQ process is equal to the broadcast process; or

1> if the HARQ process is associated with a transmission indicated with a MCCH-RNTI or a G-RNTI for MBS broadcast; or

1> if the HARQ process is associated with a transmission indicated with a G-RNTI or a G-CS-RNTI or a configured downlink assignment for MBS multicast and HARQ feedback is disabled; or

1> if the HARQ process is associated with a transmission indicated with a G-RNTI or a G-CS-RNTI or a configured downlink assignment for MBS multicast and NACK only HARQ feedback is configured and the data for this TB is successfully decoded; or

1> if the *timeAlignmentTimer*, associated with the TAG containing the Serving Cell on which the HARQ feedback is to be transmitted, is stopped or expired and if the *cg-SDT-TimeAlignmentTimer*, if configured, is not running; or

1> if the HARQ process is configured with disabled HARQ feedback and the transmission is not the first transmission after activation of the configured downlink assignment; or

1> if the HARQ process is configured with disabled HARQ feedback and *harq-FeedbackEnablingforSPSactive* is configured with disabled:

2> not instruct the physical layer to generate acknowledgement(s) of the data in this TB.

1> else:

2> instruct the physical layer to generate acknowledgement(s) of the data in this TB.

The MAC entity shall ignore NDI received in all downlink assignments on PDCCH for its Temporary C-RNTI when determining if NDI on PDCCH for its C-RNTI has been toggled compared to the value in the previous transmission.

NOTE: If the MAC entity receives a retransmission with a TB size different from the last TB size signalled for this TB, the UE behavior is left up to UE implementation.

<<<<<<<<<<<<<<<<<<<< Change ends >>>>>>>>>>>>>>>>>>>>

<<<<<<<<<<<<<<<<<<<< Change begins >>>>>>>>>>>>>>>>>>>>

### 5.4.3 Multiplexing and assembly

#### 5.4.3.1 Logical Channel Prioritization

##### 5.4.3.1.1 General

The Logical Channel Prioritization (LCP) procedure is applied whenever a new transmission is performed.

RRC controls the scheduling of uplink data by signalling for each logical channel per MAC entity:

- *priority* where an increasing priority value indicates a lower priority level;

- *prioritisedBitRate* which sets the Prioritized Bit Rate (PBR);

- *bucketSizeDuration* which sets the Bucket Size Duration (BSD).

RRC additionally controls the LCP procedure by configuring mapping restrictions for each logical channel:

- *allowedSCS-List* which sets the allowed Subcarrier Spacing(s) for transmission;

- *maxPUSCH-Duration* which sets the maximum PUSCH duration allowed for transmission;

- *configuredGrantType1Allowed* which sets whether a configured grant Type 1 can be used for transmission;

- *allowedServingCells* which sets the allowed cell(s) for transmission;

- *allowedCG-List* which sets the allowed configured grant(s) for transmission;

- *allowedPHY-PriorityIndex* which sets the allowed PHY priority index(es) of a dynamic grant for transmission;

- *allowedHARQ-mode* which sets the allowed HARQ mode for transmission.

The following UE variable is used for the Logical channel prioritization procedure:

- *Bj* which is maintained for each logical channel *j*.

The MAC entity shall initialize *Bj* of the logical channel to zero when the logical channel is established.

For each logical channel *j*, the MAC entity shall:

1> increment *Bj* by the product PBR × T before every instance of the LCP procedure, where T is the time elapsed since *Bj* was last incremented;

1> if the value of *Bj* is greater than the bucket size (i.e. PBR × BSD):

2> set *Bj* to the bucket size.

NOTE: The exact moment(s) when the UE updates *Bj* between LCP procedures is up to UE implementation, as long as *Bj* is up to date at the time when a grant is processed by LCP.

##### 5.4.3.1.2 Selection of logical channels

The MAC entity shall, when a new transmission is performed:

1> select the logical channels for each UL grant that satisfy all the following conditions:

2> the set of allowed Subcarrier Spacing index values in *allowedSCS-List*, if configured, includes the Subcarrier Spacing index associated to the UL grant; and

2> *maxPUSCH-Duration*, if configured, is larger than or equal to the PUSCH transmission duration associated to the UL grant; and

2> *configuredGrantType1Allowed*, if configured, is set to *true* in case the UL grant is a Configured Grant Type 1; and

2> *allowedServingCells*, if configured, includes the Cell information associated to the UL grant. Does not apply to logical channels associated with a DRB configured with PDCP duplication within the same MAC entity (i.e. CA duplication) when CA duplication is deactivated for this DRB in this MAC entity; and

2> *allowedCG-List*, if configured, includes the configured grant index associated to the UL grant; and

2> *allowedPHY-PriorityIndex*, if configured, includes the priority index (as specified in clause 9 of TS 38.213 [6]) associated to the dynamic UL grant; and

2> *allowedHARQ-mode*, if configured, includes the allowed HARQ mode for the HARQ process associated to the UL grant.

NOTE: The Subcarrier Spacing index, PUSCH transmission duration, Cell information, and priority index are included in Uplink transmission information received from lower layers for the corresponding scheduled uplink transmission.

 *End of the modification*