**3GPP TSG RAN WG1 #111 R1-2212529**

**Toulouse, France, November 14th – 18th, 2022**

Source: NTT DOCOMO, INC.

Title: Session Notes for R17 UE Features 1

Agenda Item: 8.16.1

**Document for:** **Discussion and Decision**

***8.16 Rel-17 UE features***

**8.16.1 UE features topics 1**

*For discussions on Rel-17 UE features for eIIoT & URLLC, RedCap, UE power saving, coverage enhancement, NB-IoT & eMTC, sidelink, MBS, 5G terrestrial broadcast, UL TX switching, SDT.*

[111-R17-UE\_features\_1] To be used for sharing updates on online/offline schedule, details on what is to be discussed in online/offline sessions, tdoc number of the moderator summary for online session, etc – Hiroki (DOCOMO)

R1-2212525 Summary#1 on UE features for NR coverage enhancement Moderator (NTT DOCOMO, INC.)

**Proposal 2-1:**

* Clarify the definition of “per band and per BC” reporting for DMRS bundling features 30-4a/b/c/d/g/h as below.
  + Per band capability indicates that the UE supports the feature when UE is configured with a single UL serving cell.
  + Per BC capability indicates that the UE supports the feature when UE is configured with more than one UL serving cell. The capability per band of the band combination is then given by per band capability.

**R1-2212526** Summary#1 on UE features for NR MBS Moderator (NTT DOCOMO, INC.)

**Agreement:**

Signaling of FG 33-1 is revised to optional without capability signaling.

**Agreement:**

The reporting type of FG 33-1-1 is per FSPC.

Proposal

Update the components for FG 33-3-3 as following:

* Support TDM between one unicast PDSCH and one group-common PDSCH in a slot.
* Support TDM between M (M>1) TDMed unicast PDSCHs and one group-common PDSCH in a slot per CC
* Support TDM among N (N>1) group-common PDSCHs in a slot per CC
* Support TDM between K (K>1) TDMed unicast PDSCHs and L (L>1) TDMed group-common PDSCHs in a slot per CC
* The UE maximum number of TDMed PDSCH receptions capability in a slot per CC is kept as for Rel-15/Rel-16, i.e., {2/4/7} based on UE FG5-11/5-11a/5-11b.
  + Note:  Group-common PDSCH(s) are counted as unicast PDSCH(s).
  + Note: The max number of (M+1), N, (K+L) are determined based on the numbers reported by FG5-11 and/or FG5-11a and/or FG5-11b.
  + Note: up to one broadcast PDSCH is supported in a slot.
* For any two consecutive slots n and n+1, if there are more than 1 broadcast/multicast/unicast PDSCH in either slot, the minimum time separation between starting time of any two broadcast/multicast/unicast PDSCHs within the duration of these slots is 4 OFDM symbol for 30kHz and 7 OFDM symbol for 60kHz

Add the following in the note for FG 33-3-3:

* Candidate value for component 6: require the minimum time separation time{yes, no}

**Agreement:**

Add a component that “Support of Type-2 HARQ-ACK codebook for multicast on PUSCH with max number X of G-RNTIs” to FG33-2a

Add a note that “the value of X should be common across FG33-2a, 33-3-3a and 33-3-3b” to FG33-2a, 33-3-3a and 33-3-3b

Proposal

Modify FG33-3-3a and 3b as below

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 33. NR\_MBS | 33-3-3a | FDM-ed Type-1 and Type-2 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast | 1. Support of FDM-ed Type-1 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and ACK/NACK-based HARQ-ACK for multicast on PUCCH or PUSCH  2. Support of Type-2 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast on PUCCH or PUSCH with max number X of G-RNTIs | 33-3-3c, 33-2e | Yes |  | FFS | Per BC | N/A | N/A |  | Note1: FDM-ed Type-1 HARQ-ACK codebook is generated by concatenating the Type-1 sub-codebook for unicast and the Type-1 sub-codebook for multicast.  Note2: The Type-2 HARQ-ACK codebook is generated by concatenating the Type-2 sub-codebook for unicast and the Type-2 sub-codebook for multicast.  Candidate values of X is {2, 3, 4} with X no larger than max number of G-RNTIs of FG33-2e | Optional with capability signalling |
| 33. NR\_MBS | 33-3-3b | Mode 2 TDM-ed Type-1 and Type-2 HARQ-ACK codebook for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast | 1. Support of Mode 2 TDM-ed Type-1 HARQ-ACK codebook for multiplexing HARQ-ACK for unicast and ACK/NACK-based HARQ-ACK for multicast on PUCCH or PUSCH  2. Support of Type-2 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast on PUCCH or PUSCH with max number X of G-RNTIs | 33-3-3d, 33-2e | Yes |  | FFS | Per BC | N/A | N/A |  | Note1: Mode 2 TDM-ed Type-1 HARQ-ACK codebook is generated based on the union TDRA tables from unicast and multicast and the union of k1 sets from unicast and multicast.  Note2: The Type-2 HARQ-ACK codebook is generated by concatenating the Type-2 sub-codebook for unicast and the Type-2 sub-codebook for multicast.  Candidate values of X is {2, 3, 4} with X no larger than max number of G-RNTIs of FG33-2e | Optional with capability signalling |

Proposal

Add new FGs as below

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 33. NR\_MBS | 33-3-3c | FDM-ed Type-1 and Type-2 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast | 1. Support of FDM-ed Type-1 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and ACK/NACK-based HARQ-ACK for multicast on PUCCH or PUSCH  2. Support of Type-2 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast on PUCCH or PUSCH with 1 G-RNTI | 33-3-2, at least one of {33-2a, 33-4, 33-5-1a, 33-5-1f} | Yes |  | FFS | Per BC | N/A | N/A |  | Note1: FDM-ed Type-1 HARQ-ACK codebook is generated by concatenating the Type-1 sub-codebook for unicast and the Type-1 sub-codebook for multicast.  Note2: The Type-2 HARQ-ACK codebook is generated by concatenating the Type-2 sub-codebook for unicast and the Type-2 sub-codebook for multicast. | Optional with capability signalling |
| 33. NR\_MBS | 33-3-3d | Mode 2 TDM-ed Type-1 and Type-2 HARQ-ACK codebook for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast | 1. Support of Mode 2 TDM-ed Type-1 HARQ-ACK codebook for multiplexing HARQ-ACK for unicast and ACK/NACK-based HARQ-ACK for multicast on PUCCH or PUSCH  2. Support of Type-2 HARQ-ACK codebooks for multiplexing HARQ-ACK for unicast and HARQ-ACK for multicast on PUCCH or PUSCH with 1 G-RNTI | 33-2a or 33-4 or 33-5-1a or 33-5-1f | Yes |  | FFS | Per BC | N/A | N/A |  | Note1: Mode 2 TDM-ed Type-1 HARQ-ACK codebook is generated based on the union TDRA tables from unicast and multicast and the union of k1 sets from unicast and multicast.  Note2: The Type-2 HARQ-ACK codebook is generated by concatenating the Type-2 sub-codebook for unicast and the Type-2 sub-codebook for multicast. | Optional with capability signalling |

**Agreement:**

the reporting type of FG 33-3-5 is per BC

R1-2212756 Summary#2 on UE features for NR MBS Moderator (NTT DOCOMO, INC.)

**(S) High priority proposal 2-9-2:**

* Components of FG 33-4 are revised as
  + Component 1(b): ~~One or~~ multiple TB with NACK-only feedback transmitted in PUCCH by transforming into ACK/NACK bits
  + Add a component “One or multiple TB with NACK-only feedback transmitted in PUSCH by transforming into ACK/NACK bits”

**(S) High priority proposal 2-11-1:**

The feature group name of FG 33-5-1 is revised as “SPS group-common PDSCH for multicast on Pcell”

**(S) High priority proposal 2-14-3:**

Prerequisite FG for FG 33-5-1f is revised to FG 33-5-1a.

**(S) High priority proposal 2-18-1:**

The feature group name of FG 33-5-2 is revised as “Multiple SPS group-common PDSCH configuration on Pcell”.

**(S) High priority proposal 2-18-2:**

Components of FG 33-5-2 are revised as

* Add a component “The total number of SPS configurations for both multicast and unicast in a cell group is no larger than 32”.

**(S) High priority proposal 2-20-1:**

Components of FG 33-5-4 are revised as

* Component 3: The total number of SPS configurations for both multicast and unicast is no larger than 8 in a BWP of a serving cell, and activated SPS group-common PDSCH configurations is no larger than M.

**(S) High priority proposal 2-27-1:**

* Components of FG 33-10 are revised as
  + Component 1: Support~~ed~~ of SP ZP-CSI-RS for group-common PDSCH RE-mapping patterns
  + Component 2: Support~~ed~~ of P ZP-CSI-RS for group-common PDSCH RE-mapping patterns
  + Add a component “Support of AP ZP-CSI-RS for group-common PDSCH RE-mapping patterns”

R1-2212527 Summary#1 on UE features for RedCap Moderator (NTT DOCOMO, INC.)

**Proposed conclusion:**

* FG3-1 requires the support of only one CORESET other than CORESET0 for a BWP even if the BWP does not contain the entire CORESET0
* If UE supports FG3-3, UE can be configured with more than one CORESET other than CORESET0 for a BWP
* UE supporting FG6-1a or FG28-1a can optionally support FG3-3 so that the UE can be configured with more than one CORESET other than CORESET0 for a BWP which does not contain the entire CORESET0

R1-2210986 Remaining issues on Rel-17 UE features (MBS) vivo

R1-2211041 Discussion on UE features for topics 1 ZTE

R1-2211069 Remaining issues for UE features topics 1 Nokia, Nokia Shanghai Bell

R1-2211893 Rel-17 UE features topics set #1 Ericsson

R1-2211968 Discussion on remaining issues regarding Rel-17 RAN1 UE features topics 1 NTT DOCOMO, INC.

R1-2212098 Discussion on Rel-17 UE features topic 1 Qualcomm Incorporated

R1-2212268 Views on UE feature Topic 1 MediaTek Inc.

R1-2212472 Remaining issues for UE features topics 1 Huawei, HiSilicon