**3GPP TSG RAN WG1 #100bis-e R1-2003200**

**e-Meeting, 20th – 30th April, 2020**

**Agenda item:** 7.2.11.5

**Source:** Moderator (NTT DOCOMO, INC.)

**Title:** Summary on email discussion [100b-e-NR-UEFeatures-Remaining] NR\_IIoT

**Document for:** Discussion and Decision

1. Introduction

This contribution summarizes the following email discussion in AI 7.2.11 regarding Rel-16 NR UE features.

[100b-e-NR-UEFeatures-Remaining] Email discussion/approval of remaining issues (especially the one identified as low priority items in FL’s summaries) starting no earlier than 4/30 till next meeting – Hiroki (DCM)/Ralf (ATT)

Companies are encouraged to check further updates for UE features list based on R1-2003073 shown below and provide feedback if any. Please note that the target of this email discussion is to reflect agreeable updates rather than solving any controversial discussion point. If there is any controversial discussion point, it should be discussed in the next RAN1 meeting.

Based on the email discussion, further updates on UE features list for NR IIoT were made as shown in section 2.

**The proposal from moderator is to consider the updated UE features list as a baseline for further discussion in next meeting.**

1. NR\_IIoT

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Features | Index | Feature group | Components | Prerequisite feature groups | Need for the gNB to know if the feature is supported | Applicable to the capability signalling exchange between UEs (V2X WI only)”. | **Consequence if the feature is not supported by the UE** | **Type****( 1) Per UE or 2) Per Band or 3) Per BC or 4) Per FS or 5) Per FSPC)** | Need of FDD/TDD differentiation | Need of FR1/FR2 differentiation | Capability interpretation for mixture of FDD/TDD and/or FR1/FR2 | Note | Mandatory/Optional |
| 12. NR\_IIOT | 12-1 | UL intra-UE multiplexing/prioritization of overlapping channel/signals with two priority levels in physical layer | Support intra-UE multiplexing/prioritization of overlapping PUCCH/PUCCH and PUCCH/PUSCH with two priority levels in physical layer (PHY)1. [Configuration of PHY priority level for CG PUSCH and SR, and dynamic indication of priority level for dynamic PUSCH with a single DCI format]
2. Multiplexing/prioritization between UL channels/signals with the same PHY priority level
3. Prioritization between UL channels/signals with different PHY priority levels
4. Additional number of symbols (d1) needed beyond the PUSCH preparation time for cancelling a low priority UL transmission.
5. Additional number of symbols (d2) needed beyond the PUSCH preparation time for scheduling a high priority UL transmission that cancels a low priority UL transmission
 | [11-4] | Yes | N/A |  | [Per UE] | [No] | [No] | [N/A] | Candidate value set for component 4: {0, 1, 2}Candidate value set for component 5: {0, 1, 2}[A UE supporting this feature shall also support the LCP restriction based on DCI priority indication ([*lch-ToGrantPriorityRestriction-r16*]) and intra-UE prioritization in MAC ([*lch-PriorityBasedPrioritization-r16*]).] The relationship between this feature and the feature of up to two HARQ-ACK codebooks of 11-4 and 11-4xshould be further discussed. | Optional with capability signaling |
| 12. NR\_IIOT | [12-1a] | [UL priority indication in DCI with mixed DCI formats] | [UL priority indication in DCI with DCI format 0\_1 and 0\_2] | 12-1 and 11-1TBD | Yes | N/A | FFS | Per UE | [No] | [No] | [N/A]  |  | Optional with capability signalling |
| 12. NR\_IIOT | 12-2 | Multiple SPS configurations | 1. Support of up to 8 configured SPS configurations in a BWP of a serving cell and up to [16] configured SPS configurations in a cell group, including separate RRC parameters and separate activation/release for different SPS configurations
2. The max number of active SPS configurations in a BWP of a serving cell
3. The max number of active SPS configurations across all serving cells
4. The related HARQ-ACK enhancements to support multiple active SPS configurations
 | 5-18 DL SPS  | Yes | N/A |  | [Per UE] | [No] | [No] | [N/A] | Component-2, candidate value set is {1, 2, …, 8}Component-3, candidate value set is [{2, …, [16]}] | Optional with capability signaling |
| 12. NR\_IIOT | 12-2a | Joint release in a DCI for two or more SPS configurations for a given BWP of a serving cell | 1. M<=4 bits indication in the Release DCI is used for indicating which SPS configuration(s) is/are released, where the association between each state indicated by the indication and the SPS configuration(s) is

• Up to 2^M states are higher layer configurable, where each of the state can be mapped to a single or multiple SPS configurations to be released• In case of no higher layer configured state(s), separate release is used where the release corresponds to the SPS configuration index indicated by the indication1. The related HARQ-ACK enhancements to support joint release
 | 12-2  | Yes | N/A |  | [Per UE] | [No] | [No] | [N/A] |  | Optional with capability signaling |
| 12. NR\_IIOT | 12-3 | SPS release by DCI format 1\_1 | Support of SPS release by DCI format 1\_1 | 5-18 DL SPS | Yes | N/A |  | [Per UE] | [No] | [No] | [TBD] | [A UE supporting this FG and 11-1 (DCI format 0\_2/1\_2) shall also support FG12-3a (SPS release by DCI format 1\_2).] | Optional with capability signaling |
| 12. NR\_IIOT | 12-3a | SPS release by DCI format 1\_2 | Support of SPS release by DCI format 1\_2 | 5-18 DL SPS and 11-1  | Yes | N/A |  | [Per UE] | [No] | [No] | [TBD] |  | Optional with capability signaling |
| 12. NR\_IIOT | 12-5 | Configuration of aggregation factor per SPS configuration | Support of configurable PDSCH aggregation factor ({1, 2, 4, 8}) per DL SPS configuration | 5-18 DL SPS | Yes | N/A |  | [Per UE] | [No] | [No] | [N/A] |  | Optional with capability signaling |
| 12. NR\_IIOT | 12-6  | Support of SPS periodicity shorter than 10 ms | Support of SPS periodicity shorter than 10 ms | 5-18 DL SPS | Yes | N/A |  | [Per UE] | [No] | [No] | [N/A]  |  | Optional with capability signalling |

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| --- | --- |
| Company | Comment |
| Nokia, NSB | 12-1: Ok to remove brackets from “[with a single DCI format]” in components description. OK to remove brackets from the notes relation to MAC feature. 11-4 should be a pre-requisite FG (to resolve the open issue in notes section).12-1a: Ok to remove the brackets from the FG name & component. 12-2: OK to remove brackets in component description (this is aligned with RAN2 decision). 12-3: Ok to remove brackets from the notes. Reporting type for all FGs in this table can be per UE, no xDD/FRy differentiation. |
| Qualcomm | **12-1:*** Update the text before the first component to “Support intra-UE multiplexing/prioritization of overlapping PUCCH/PUCCH and PUCCH/PUSCH with two priority levels in physical layer. This is to indicate that CGCG and DGCG PUSCH collision handling is not under this FG yet as these topics were not discussed so far in RAN1. In fact, there is a note on the Chairman’s notes for the “Others” AI (for the whole duration of the WI) as copied below. Hence, the agreements in the UCI enhancement AI cannot be directly generalized to collision handling for CGCG and DGCG PUSCH collision handling. These scenarios should be separately discussed first, and if agreed, the details of the associated UE capabilities to be discussed later.

*Including other aspects led by RAN2 (with RAN1 as secondary) as in* [*RP-192324*](http://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_85/Docs/RP-192324.zip)*, e.g., addressing resource conflicts between dynamic grant (DG) and configured grant (CG) PUSCH and conflicts involving multiple CGs, support for multiple simultaneous active semi-persistent scheduling (SPS) configurations for a given BWP of a UE, support for TSC message periodicities with non-integer multiple of NR supported CG/SPS periodicities, support for shorter SPS periodicities than the existing ones, etc.** Component 1 is not clear as it does not refer to the PUCCH priority. This component needs more discussion.
* The signaling type should be FSPC
* Based on the proposed signaling type, there is no need for TDD/FDD or FR1/FR2 differentiation. No need for interpretation either.
* The first note about the relation to the MAC based features should be removed.

**12-1a:** This row should be included as per one of the RAN1 agreements to have a dynamic switch of the priority using a single DCI format as an optional feature if the UE is configured with DCI format 0\_1 and 0\_2.* The type of signaling should be FSPC
* Based on the proposed type, there is no need for TDD/FDD, FR1/FR2 differentiation or interpretation.
* In the note column, add the following: “For a UE supporting this feature, one DCI format indicates low priority level and one DCI format indicates high priority level.”

**12-2:*** In component 1, replace 32 by 16.
* The signaling type should be per band.
* Based on the proposed signaling type, there is no need for TDD/FDD or FR1/FR2 differentiation. No need for interpretation either.
* In the note column, the upper bound for component 3 is 16.
* Also, for component 3, add the following note: “Total number in FR1 is not greater than X value reported for FR1. Total number in FR2 is not greater than X value reported for FR2. Total number across FR1 and FR2 is not greater than the larger of the FR1 and FR2 values.”

**12-2a:** * The signaling type should be per band.
* Based on the proposed signaling type, there is no need for TDD/FDD or FR1/FR2 differentiation. No need for interpretation either.

**12-3:** * The signaling type should be per band.
* Based on the proposed signaling type, there is no need for TDD/FDD or FR1/FR2 differentiation. No need for interpretation either.
* The statement in the Note column should be removed.

**12-3a:*** The signaling type should be per band.
* Based on the proposed signaling type, there is no need for TDD/FDD or FR1/FR2 differentiation. No need for interpretation either.

**12-5:** * The signaling type should be per band.
* Based on the proposed signaling type, there is no need for TDD/FDD or FR1/FR2 differentiation. No need for interpretation either.

**12-6:*** The signaling type should be per band.
* Based on the proposed signaling type, there is no need for TDD/FDD or FR1/FR2 differentiation. No need for interpretation either.
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| Moderator (NTT DOCOMO) | Based on feedbacks, following further updates may be agreeable.* 12-1
	+ Remove bracket from “[with a single DCI format]” in component 1 description, but add bracket to whole component 1 description
	+ Update the text before the first component to “Support intra-UE multiplexing/prioritization of overlapping PUCCH/PUCCH and PUCCH/PUSCH with two priority levels in physical layer”
* 12-2
	+ Remove bracket from “[and up to 32 configured SPS configurations in a cell group,]” in components description, and replace 32 by [16] (as well as for max candidate value of component 3)
	+ Add the following note: “Total number in FR1 is not greater than X value reported for FR1. Total number in FR2 is not greater than X value reported for FR2. Total number across FR1 and FR2 is not greater than the larger of the FR1 and FR2 values.” for component 3

Also, candidate values descriptions can be moved from “mandatory/optional” column to “note” column.Other discussion points should be discussed in next meeting. |
| Intel | **12-1:*** Brackets around “with single DCI format” can be removed
* Need further discussion on whether FG 11-4 should be a pre-requisite or not
* In the Note column, modify as: A UE supporting this feature shall also support ~~the LCP restriction based on DCI priority indication ([~~*~~lch-ToGrantPriorityRestriction-r16~~*~~]) and~~ intra-UE prioritization in MAC ([*lch-PriorityBasedPrioritization-r16*]). Technical reason below:
	+ The support of LCP restriction based on DCI priority requires support of 12-1 as a pre-requisite, and this dependency is sufficient. A UE reporting support of FG #12-1 should not be mandated to also support DCI indication based LCP restriction.
* Reporting should be FS
* No xDD/FRx differentiation

**12-1a:*** Keep the FG with following updates
* Update the component description to avoid ambiguities and align with RAN1 agreement: **“Dynamic indication of high or low priority for PUSCH in DCI scheduling the PUSCH** **when configured to monitor both sets of DCI formats 0\_1/1\_1 and 0\_2/1\_2 in a BWP** ~~UL priority indication in DCI with DCI format 0\_1 and 0\_2~~”.
* Pre-requisites should be FGs 11-1 and 12-1
* Reporting should be FS
* No xDD/FRx differentiation

**12-2:*** Pre-requisite should be FG 5-18
* Per-UE
* No xDD/FRx differentiation
* **Remove the newly added note for component 3) as it is not applicable for per-UE reporting type.**

**12-2a:*** Pre-requisite should be FG 12-2
* Per-UE
* No xDD/FRx differentiation

**12-3:*** Pre-requisite should be FG 5-18
* Per-UE
* No xDD/FRx differentiation
* Text in Notes column should be removed

**12-3a:*** Pre-requisite should be FGs 5-18 and 11-1
* Per-UE
* No xDD/FRx differentiation

**12-5:*** Pre-requisite should be FGs 5-18
* Per-UE
* No xDD/FRx differentiation

**12-6:*** Pre-requisite should be FGs 5-18
* Per-UE
* No xDD/FRx differentiation
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| Moderator (NTT DOCOMO, INC.) | Based on feedbacks, following further updates were made.* [11-4] is added as prerequisite FG for 12-1
* Clarify that both 11-1 and 12-1 are prerequisite FGs for 12-1a (not just one of them)
* Clarify that both 11-1 and 5-18 are prerequisite FGs for 12-3a (not just one of them)
* Remove [TBD] in prerequisite FG column except for FGs within brackets
* Remove newly added note for component 3 of FG12-2
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