3GPP TSG-RAN WG2 #113bis-e electronic R2-210xxxx

Electronic Meeting, 12th – 20th April, 2021

Agenda Item: 6.1.4.3

Source: Intel Corporation

Title: [AT113bis-e][023][NR16] Summary of UE Caps (Intel)

Document for: Discussion, Decision

# 1 Introduction

This contribution summarizes the following discussion:

* [AT113bis-e][023][NR16] UE caps (Intel)

Scope: Treat R2-2102868, R2-2103734, R2-2103764, R2-2102879, R2-2103137, R2-2103669,

Phase 1, determine agreeable parts, Phase 2, for agreeable parts Work on CRs.

Intended outcome: Report and Agreed-in-principle CRs, if any

Deadline:

  Initial deadline for companies’ comments (Phase 1): **Wednesday April 14 1000 UTC**

  Deadline for CR finalization (Phase 2): **Monday April 19 1800 UTC**

The following documents are treated in this discussion:

R2-2102868 Miscellaneous corrections to Rel-16 UE capabilities Intel Corporation CR Rel-16 38.306 16.4.0 0541 - F LTE\_NR\_DC\_CA\_enh

R2-2103734 UE Feature list for NR Rel-16 Intel Corporation CR Rel-16 38.822 15.0.1 0004 - B TEI16

R2-2102879 Correction on Capability of two PUCCH transmission OPPO CR Rel-16 38.306 16.4.0 0542 - F NR\_L1enh\_URLLC-Core

R2-2103137 Correction on IAB in TS 38.306 ZTE, Sanechips CR Rel-16 38.306 16.4.0 0546 - F NR\_IAB-Core

R2-2103669 Support of MAC subheaders with one-octet eLCID field Lenovo, Motorola Mobility discussion Rel-16 TEI16

R2-2103764 Correction to Multi-PUSCH UL grant Ericsson CR Rel-16 38.306 16.4.0 0556 - F NR\_unlic-Core

Contact person(s) for each participating company:

|  |  |
| --- | --- |
| Company | Contact Name, Email |
| Intel | Seau.s.lim@intel.com |
| Lenovo | hchoi5@lenovo.com |
| Huawei, HiSilicon | kuangyiru@huawei.com |
| Qualcomm Incorporated | mkitazoe@qti.qualcomm.com |
| Ericsson | lian.araujo@ericsson.com |
| vivo | ming.wen@vivo.com |
| Samsung | seungri.jin@samsung.com |
| CATT | erlin.zeng@catt.cn |
| ZTE | li.wenting@zte.com.cn |
| Nokia | [amaanat.ali@nokia.com](mailto:amaanat.ali@nokia.com) |
| OPPO | duzhongda@oppo.com |

# 2 Discussion

## 2.1 Phase 1: Intended to determine agreeable parts

The proposals listed in this subsection 2.1 are extracted from CRs to facilitate the discussion and follow the numbering of the corresponding TDoc from which they were extracted (i.e. they do not represent actual proposals from this TDoc, which should be listed in subsection 2.2).

### 2.1.1 Miscellaneous corrections to Rel-16 UE capabilities

In R2-2102868, the following are provided in the reasons for change and summary of change respectively:

1. Missing prerequisite in the field description of bwp-SwitchingMultiCCs-r16 as highlighted in R4 9-1:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 9-1 | BWP switching on multiple CCs RRM requirements | Incremental delay for BWP switch processing on additional CCs in timer/DCI based simultaneous BWP switching on multiple CCs | RAN1 feature 6-2, 6-3, 6-4 specified in TR 38.822 | For component 2), the candidate values are:   * {100us, 200us} for UE indicates type1 in bwp-SwitchingDelay * {200us, 400us, 800us, 1000us} for UE indicates type 2 in bwp-SwitchingDelay   The total BWP switching delay will be captured in TS38.133  UE needs to indicate either of the candidate values in case it supports CA | Optional with capability signalling |

1. Add the prerequisite to the bwp-SwitchingMultiCCs-r16

**Q1 Do companies agree to the proposed changes in the CR? For companies agreeing to the proposed changes, please also comment on the contents of the CR, if any.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Intel | Yes (Proponent) |  |
| Lenovo | Yes | Further minor editorial issues can be fixed in the rapporteur CR:   * In the description of extendedDiscardTimer-r16, extendedT-PollRetransmit-r16, extendedT-StatusProhibit-r16 the reference to TS 38.331 [2] needs to be corrected to [9]. * In the description of spatialRelationsSRS-Pos-r16 the entry in „FR1-FR2 DIFF“ should say „FR2 only“. As result, we wonder whether the sentence „It is only applicable for FR2,“ can be removed. |
| Huawei, HiSilicon | Yes |  |
| MediaTek | Yes |  |
| Qualcomm Incorporated | Yes |  |
| Ericsson | Yes | We agree with the intention, one could capture this by changing the M column from “No” to “CY” and describe instead as:  “It is mandatory to report either type1-r16 or type2-r16 for a UE which supports CA.  This seems more in line with previous similar changes. |
| Nokia | Yes |  |
| vivo | Yes |  |
| Samsung | Yes |  |
| CATT | Yes |  |
| ZTE | Yes |  |
| OPPO | Yes |  |

***Rapporteur’s summary:***

*12 companies responded to the question and all companies agreed to the proposed change. One company think that it would be aligned with existing change if the change is captured by changing the M column from “No” to “CY” and describe the condition as “It is mandatory to report either type1-r16 or type2-r16 for a UE which supports CA.“ This seems acceptable from Rapporteur’s point of view. Also another company spotted other minor editorial issues.*

***Proposal#1:*** *Agree to pursue the CR in R2-2102868. Capture the change by changing the M column from “No” to “CY” and describe the condition as “It is mandatory to report either type1-r16 or type2-r16 for a UE which supports CA.“. Also include the following minor editorial issues. Further detailed comments to the CRs, if any, can be discussed in Phase 2*

* *In the description of extendedDiscardTimer-r16, extendedT-PollRetransmit-r16, extendedT-StatusProhibit-r16 the reference to TS 38.331 [2] needs to be corrected to [9].*
* *In the description of spatialRelationsSRS-Pos-r16 the entry in „FR1-FR2 DIFF“ should say „FR2 only“. As result, we wonder whether the sentence „It is only applicable for FR2,“ can be removed.*

### 2.1.2 Correction on Capability of two PUCCH transmission

In R2-2102879, the following are provided in the reason for change and the summary of change, respectively on corrections on the field description of the capability of 2 PUCCH transmission:

1. In twoPUCCH-TypeX-r16 (X=1,2,5,6,7), it did not mention in what time granularity where the two PUCCH should be supported.
2. In twoPUCCH-TypeX-r16 (X=2, 7), it did not mention the “consecurtive symbols” for supporting the two PUCCH. Without this restriction, it is logically wrong since there would be no missing case left for twoPUCCH-TypeX-r16 (X=4, 11) which is supposed to support the non-consecutive case on top of X=2,7.
3. In twoPUCCH-TypeX-r16 (X=3,4), it is wrong to use the plural, since it is for a single codebook.
4. In twoPUCCH-TypeX-r16 (X=5,6,8,10), it is for two codebooks where one of the two is sub-slot based codebook, but did not mention the other codebook is slot or sub-slot based codebook. Considering that they are all dependent on 11-4, which is for “Two HARQ-ACK codebooks with up to one sub-slot based HARQ-ACK codebook (i.e. slot-based + slot-based, or slot-based + sub-slot based) simultaneously constructed for supporting HARQ-ACK codebooks with different priorities at a UE”, it can be derived that they are for slot-based + sub-slot-based case.
5. In twoPUCCH-Type8-r16, it is for two codebooks, but the number “two” is missing.
6. In twoPUCCH-Type10-r16, it is for the others cases not covered by In twoPUCCH-Type5/7-r16, but type10 is for 2\*7-symbol case + 1 sub-slot based and 1 slot-based codebook case, while type5 is for 7\*2-symbol case, and type7 is for two sub-slot based case, so there are no overlapping case.
7. In twoPUCCH-Type11-r16, it is for the others cases not covered by In twoPUCCH-Type6/8-r16, but type11 is for 2 sub-slot based codebook case, while type6/8 are for 1 sub-slot based and 1 slot-based codebook, so no overlapping.
8. In twoPUCCH-TypeX-r16 (X=1,2,5,6,7), add “in the same subslot” to restrict the time granularity where the two PUCCH should be supported.
9. In twoPUCCH-TypeX-r16 (X=2, 7), add the restriction of “consecurtive symbols” for supporting the two PUCCH.
10. In twoPUCCH-TypeX-r16 (X=3,4), change the plural to singular.
11. In twoPUCCH-TypeX-r16 (X=5,6,8,10), add the restriction that they are for two codebooks where one of the two is sub-slot based codebook, and the other is slot based codebook.
12. In twoPUCCH-Type8-r16, clarify it is for “two” codebooks.
13. Correct that type10 is to cover the missing case in type6 and type8.
14. Correct that type11 is to cover the missing case in type7 and type9.

**Q2.1 Do companies agree with the proposed changes in the CRs? For companies agreeing to the proposed changes, please also comment on the contents of the CR, if any.**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Intel | Postpone the CR | Our understanding is that these changes are also discussed in RAN1, it will be good if these changes are first reflected in the RAN 1 feature list. Hence we propose to wait for the feature list updates from RAN1 before making any changes. |
| Huawei, HiSilicon | Postpone the CR | We undersrtand RAN1 is discussing this issue, so we can wait for RAN1 conclusion. |
| Qualcomm Incorpoated | No | The current text captures what RAN1 has indicated in their feature list. If any change, RAN1 should tell us. |
| Ericsson |  | We are fine to postpone the CRs according to what was suggested by Intel. |
| Nokia | Postpone until RAN1 concludes | We checked with RAN1 colleagues, 90% of the editorial change are fine but not sure where "consecutive symbols" came frome - it requires RAN1 discussion (a similar CR has been submitted to RAN1) and we should wait for RAN1 to conclude. |
| vivo | Postpone the CR |  |
| Samsung | Postpone the CR |  |
| CATT | Postpone the CR |  |
| ZTE |  | We agree with the intention of this CR and can follow majorities’ view |
| OPPO (Qianxi) | suggest to move this to Phase-2 | we understand companies preference on relying on R1 progress.  So far, R1 has already agreed on the following aspects  Agreement:   * For FG 11-3c, FG 11-3d, FG 11-4d and FG 11-4e, add “in the same subslot” to restrict the time granularity where the two PUCCH should be supported   Agreement:   * For FG 11-3e and FG 11-3f, change the plural to singular   Agreement:   * For 11-4f, clarify it is for “two” codebooks   And probably the others can be concluded before this weekend.  So moving this to Phase-2 would be a safer way to handle this issue, no need for extra delay if there is already RAN1 conclusion. |

***Rapporteur’s summary:***

*10 companies responded to the question. All companies are fine to postpone the CRs and wait for the updated R1 feature list from RAN1. The CR can be agreed once the same changes have been done in the R1 feature list. The proponent has shown that some progress has been made in RAN1 related to this. Since this is a bis meeting, there is no hurry to have the CR in this meeting. Hence rapporteur proposes:*

***Proposal#2:*** *Agree to postpone the CR until RAN2 receives the updates of R1 feature list with the changes. CR can still be provided at that point for next meeting.*

### 2.1.3 Correction on IAB in TS 38.306

In R2-2103137, the following are provided in the summary of change:

:

1. Correct “Table 4.2.11.1-1, Table 4.2.11.1-2 and Table 4.2.11.1-3” to “Table 4.2.15.1-1, Table 4.2.15.1-2 and Table 4.2.15.1-3”
2. Correct the title of the table “Table 4.2.11.1-3: RF/RRM mandatory features for IAB-MT” to “Table 4.2.15.1-3: RF/RRM mandatory features for IAB-MT”

The changes are quite editorial and if agreed, should be merged with the rapporteur miscellaneous correction CR R2-2102868.

**Q3 Do companies agree with the proposed changes in the CR? For companies agreeing to the proposed changes, please also comment on the contents of the CR, if any. Should it be merged with rapporteur miscellaneous correction CR?**

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **Yes/No** | **Merged with Rapp’s misc correction CR** R2-2102868 | **Comments** |
| Intel | Yes | Yes |  |
| Lenovo | Yes | Yes |  |
| Huawei, HiSilicon | Yes | Yes |  |
| Qualcomm Incorporated | Yes | Yes |  |
| Ericsson | Yes | Yes |  |
| Nokia | Yes | Yes | Purely editorial |
| vivo | Yes | Yes | The coversheet may need to be updated. The category of the CR should be D (editorial modification) instead of F. |
| Samsung | Yes | Yes | purely editorial/correcting typos |
| CATT | Yes | Yes |  |
| ZTE | Yes | Yes |  |
|  |  |  |  |

***Rapporteur’s summary:***

*10 companies responded to the question. All agreed to the proposed changes in the CR. Since the changes are editorial, companies also agreed to merge it with the update of R2-2102868 (and the final version of R2-2102868).*

***Proposal#3:*** *Agree to the changes in R2-2103137 which will be merged into the update of R2-2102868.*

### 2.1.4 Support of MAC subheaders with one-octet eLCID field

In R2-2103669, it discusses the options for specifying the conditionally mandatory support of the new MAC subheaders with one-octet eLCID field:

:

**Option 1: Introduction as a conditionally mandatory feature**

The MAC subheaders with one-octet eLCID is specified as a conditionally mandatory feature in TS 38.306, clause 6 with below description.

| **Features** | **Condition** |
| --- | --- |
| MAC subheaders with one-octet eLCID field | It is mandatory to support MAC subheaders with one-octet eLCID field for UEs supporting MAC CEs using extended LCID values as specified in TS 38.321 [8]. |

**Option 2: Introduction of a new capability bit**

1. Introduce in TS 38.331 the capability ***lcid-Extension-r16*** in IE *UE-NR-Capability* as part of IE *MAC-ParametersCommon*.
2. Introduce in TS 38.306 the below description of the capability ***lcid-Extension-r16*** in 4.2.15.6 MAC Parameters.

| **Definitions for parameters** | **Per** | **M** | **FDD-TDD**  **DIFF** | **FR1-FR2**  **DIFF** |
| --- | --- | --- | --- | --- |
| ***lcid-Extension-r16***  Indicates whether the UE supports the MAC subheaders with one-octet eLCID field, as specified in TS 38.321 [8]. A UE shall set this field if it supports MAC CEs using extended LCID values. | UE | CY | No | No |

From rapporteur point of view, conditional mandatory feature is normally introduced in Clause 6 in TS38.306 and hence think that Option 1 is sufficient.

**Q4.1 Do companies agree with Option 1 or 2?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Option 1 or Option 2** | **Comments** |
| Intel | Option 1 | Agree with the rapporteur’s view |
| Lenovo | Option 1 | Proponent and option 1 looks sufficient. |
| Huawei, HiSilicon | Option 1 | Agree with the rapporteur’s view. |
| MediaTek | Option 2 | We somehow think explict capability bit is more clear but option 1 would also be accetable to us. |
| Qualcomm Incorporated | Neither | It is sufficiently clear from MAC specification that eLCID is necessary sinalling format the UE must support for a given MAC-CE. |
| Ericsson | Option 1 |  |
| Nokia | Option 1 | Conditionally mandatory for the UE(s) supporting the features that require the eLCID seems to be fine. |
| vivo | Option 1 |  |
| Samsung | Option 1 |  |
| CATT | Option 1 |  |
| ZTE | Option 1 |  |
| OPPO | Option 1 |  |

***Rapporteur’s summary:***

*12 companies responded to the question. 10 companies think that Option 1 (i.e. introduce Conditionally mandatory for the UE(s) supporting the features that require the eLCID) is sufficient. 1 company thinks that a Option 2 (introduce explicit capability) is clearer but would be ok with Option 1 while another company think that neither options are needed since it is sufficiently clear from MAC spec that eLCID is necessary signalling format. Rapporteur thinks that by introducing conditional mandatory for the UE(s) supporting the features that require the eLCID also aligns with MAC spec, it is proposed that Option 1 is adopted and Option 1 is also the majority view.*

***Proposal#4:*** *Agree to go with Option 1 (i.e. introduce Conditionally mandatory for the UE(s) supporting the features that require the eLCID). This will be introduced into the update of R2-2102868.*

### 2.1.5 Correction to Multi-PUSCH UL grant

R2-2103764 has the following reason for change:

:

In RAN1 feature list (R1-2102006), the NR unlicensed features defined per band that are applicable only to unlicensed bands have the following notes (or similar):

“the signaling is per band but is only expected for a band where shared spectrum channel access must be used”;

For the cases where a feature is also applicable to frequency bands that does not require shared spectrum access, no further restriction was captured in the RAN1 feature list.

Consequently, Multi-PUSCH UL grant should be considered as also applicable to frequency bands that do not require shared spectrum access, since it does not contain any restriction in each description in RAN1 feature list (R1-2102006).

The changes are quite editorial and if agreed, should be merged with the rapporteur miscellaneous correction CR.

**Q5.1 Do companies agree with the proposed changes in the CRs? For companies agreeing to the proposed changes, please also comment on the contents of the CR, if any. Also should it be merged with rapporteur miscellaneous correction CR?**

|  |  |  |  |
| --- | --- | --- | --- |
| **Company** | **Yes/No** | **Merged with Rapp’s misc correction CRs** | **Comments** |
| Intel | Yes | Yes |  |
| Huawei, HiSilicon | Yes | Yes |  |
| MediaTek | Yes | Yes |  |
| Qualcomm Incorporated | Yes | Yes |  |
| Ericsson | Yes | Fine if companies prefer to merge it |  |
| Nokia | Yes | Yes |  |
| vivo | Yes | Yes |  |
| Samsung |  |  | It seems not discussed in RAN1, so either we should ask it to RAN1 or it should be restricted to the shared spectrum only (to be in a safe side). |
| CATT | Yes | Yes |  |
| ZTE | Yes (some comments) | Yes | We also want to confirm whether the similar clarification are also needed for the feature 10-8/11/15/16/20a, for that these capabilities are also per band and also do not require shared spectrum access |
| OPPO | Yes | Yes |  |

***Rapporteur’s summary:***

*11 companies responded to the question. All except one company agreed to the proposed changes in the CR. The company that didn’t agree thinks that it is not discussed in RAN1 and hence safer to restrict to unlicensed band. Rapporteur has checked the RAN1 discussion on this (thanks to Intel’s RAN1) and found the following in RAN1 agreement in RAN1#101-e which confirm that multi-PUSCH UL grant capability (FG10-17) is indeed applicable also to licensed band:*

Agreements:

* Type of FG10-17 is “Per band”
* ~~FFS: FG10-17 is only for unlicensed bands~~
* “TBD” is removed from prerequisite feature groups for FG10-17

Agreements:

* FG10-17 is also applicable to licensed bands

*Since the changes are quite editorial, companies also agreed to merge it with the update of R2-2102868 (and the final version of R2-2102868). The same editorial changes (i.e. adding ‘a’ between ‘to’ and ‘frequency’) will also be applied to 10-8/11//20a. Note 10-15/16 are already corrected in R2-2103764.*

***Proposal#5:*** *Agree to the changes in R2-2103764 which will be merged into the update of R2-2102868. The same editorial changes (i.e. adding ‘a’ between ‘to’ and ‘frequency’) will also be applied to the capability corresponding to R1 FG 10-8/11//20a.*

### 2.1.6 Rel-16 UE feature list CR

R2-2103734 contains the Rel-16 UE feature from RAN1, RAN2 and RAN4. It incorporated the latest updated Ran1 feature list (R1-2102006) as well as the latest RAN4 feature list (R4-2103367).

**Q1 Do companies agree to the proposed changes in the CR?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| Intel | Yes (Proponent) |  |
| Lenovo |  | We have spotted some issues:   * References: there are some issues with the references specified:   + References [6] and [8] are not used.   + 2-18: reference [4] to TS 38.101-3 needs to be removed. Can think of introducing new reference for 38.101-3 but think this is unnecessary.   + 16-x RAN2: reference [8] to 38.321 needs to be corrected to [10]; reference [9] to 38.331 needs to be corrected to [2].   + 18-10: reference [5] to 38.133 needs to be removed. Can think of introducing new reference for 38.133 but think this is unnecessary.   + 24-10: reference [15] for 36.306 needs to be corrected to [14]. * 22-8c: “3-5a” should be removed from “Prerequisite FGs” (was an issue in the RAN1 feature list itself). * 22-10: in 38.331 the candidate values were specified as {mode2, mode3}. |
| Qualcomm Incorparated | Yes |  |
| Ericsson | Yes | We are in general fine with the CR. But we would like to clarify one aspect: since once agreed, there should be no further updates, and this is bis meeting, one could postpone the CR for now which may then account for further updates in the UE feature list once agreed next meeting. This would increase the completness of the TR, but fine if companies prefer to agree on it in this meeting. |
| Nokia | Yes | No additional comments from our side |
| vivo | Yes | We are generally fine with the CR, editorial issues can be fixed in phase 2 via CR review. |
| Samsung | Yes |  |
| CATT |  | Agree with Ericsson comments. |
| ZTE | Yes |  |
|  |  |  |

**For companies agreeing to the proposed changes, please also comment on the contents of the CR, if any.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Company** | **Feature no.** | **Comment raised** | **Proposals** | **Rapporteur’s resolution** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

***Rapporteur’s summary:***

*9 companies responded to the question. All agreed to the proposed changes in the CR. One company thinks that it is a bis meeting, the CR can be postponed for now which may then account for further updates in the UE feature list once agreed next meeting. From the rapporteur pov, RAN2 can agree the CR in principle in this meeting and any updates from the R1 and R4 feature lists from this meeting or any companies‘ comments can still be incorporated on top of the in principle CR for the next meeting.*

***Proposal#6:*** *Agree to pursue the CR in R2-2103734. Further detailed comments to the CR, if any, can be discussed in Phase 2*

## 2.2 Phase 2: Intended to progress discussion on agreeable parts

Based on the rapporteur’s summary, the following provides the proposals for each topic:

2.1.1 Miscellaneous corrections to Rel-16 UE capabilities

***Proposal#1:*** *Agree to pursue the CR in R2-2102868. Capture the change by changing the M column from “No” to “CY” and describe the condition as “It is mandatory to report either type1-r16 or type2-r16 for a UE which supports CA.“. Also include the following minor editorial issues. Further detailed comments to the CRs, if any, can be discussed in Phase 2*

* *In the description of extendedDiscardTimer-r16, extendedT-PollRetransmit-r16, extendedT-StatusProhibit-r16 the reference to TS 38.331 [2] needs to be corrected to [9].*
* *In the description of spatialRelationsSRS-Pos-r16 the entry in „FR1-FR2 DIFF“ should say „FR2 only“. As result, we wonder whether the sentence „It is only applicable for FR2,“ can be removed.*

2.1.2 Correction on Capability of two PUCCH transmission

***Proposal#2:*** *Agree to postpone the CR until RAN2 receives the updates of R1 feature list with the changes. CR can still be provided at that point for next meeting.*

2.1.3 Correction on IAB in TS 38.306

***Proposal#3:*** *Agree to the changes in R2-2103137 which will be merged into the update of R2-2102868.*

2.1.4 Support of MAC subheaders with one-octet eLCID field

***Proposal#4:*** *Agree to go with Option 1 (i.e. introduce Conditionally mandatory for the UE(s) supporting the features that require the eLCID). This will be introduced into the update of R2-2102868.*

2.1.5 Correction to Multi-PUSCH UL grant

***Proposal#5:*** *Agree to the changes in R2-2103764 which will be merged into the update of R2-2102868. The same editorial changes (i.e. adding ‘a’ between ‘to’ and ‘frequency’) will also be applied to the capability corresponding to R1 FG 10-8/11//20a.*

2.1.6 Rel-16 UE feature list CR

***Proposal#6:*** *Agree to pursue the CR in R2-2103734. Further detailed comments to the CR, if any, can be discussed in Phase 2*

# 3 Conclusion

- To be updated after discussion on Phase 1 -