

3GPP TSG RAN WG1 #105-e

e-Meeting, May 10th – 27th, 2021

Agenda Item: 6.1

Source: Moderator (ZTE)

Title: [105-e-LTE-6.1CRs-02] Email discussion/approval on R1-2105953 (DCI format N0 when scrambled by SPS C-RNTI) and R1-2105954 (UL index for LTE-M)

1 Introduction

This document provides discussion on DCI format N0 for R15 NB-IoT and UL index for R13 MTC:

[105-e-LTE-6.1CRs-02] Email discussion/approval on R1-2105953 (DCI format N0 when scrambled by SPS C-RNTI) and R1-2105954 (UL index for LTE-M) by May 24 - Youjun (ZTE)

2 Discussion

Issue 1: R1-2105953 Correction on DCI format N0 when scrambled by SPS C-RNTI

Reason for change:

In TS36.212, besides C-RNTI, the field, HARQ process number field in DCI format N0, also exists when the higher layer parameter is enabled and the corresponding DCI is mapped onto the UE specific search space given by the SPS C-RNTI. However, the corresponding description is missing in the spec.

Summary of change:

For ‘HARQ process number’ field in DCI format N0, add the “or SPS C-RNTI” after “UE specific search space given by the C-RNTI” for format N0.

Consequences if not approved:

The conditions for fields present is not correct.

Proposed CR to TS36.212 based on issue 1

6.4.3.1 DCI Format N0

<Unchanged parts are omitted>

DCI format N0 is used for the scheduling of NPUSCH in one UL cell.

The following information is transmitted by means of the DCI format N0:

- Flag for format N0/format N1 differentiation – 1 bit, where value 0 indicates format N0 and value 1 indicates format N1
- Subcarrier indication – 6 bits as defined in clause 16.5.1.1 of [3]
- Resource assignment – 3 bits as defined in clause 16.5.1.1 of [3]
- Scheduling delay – 2 bits as defined in clause 16.5.1 of [3]
- Modulation and coding scheme – 4 bits as defined in clause 16.5.1.2 of [3]
- Redundancy version – 1 bit as defined in clause 16.5.1.2 of [3]
- Repetition number – 3 bits as defined in clause 16.5.1.1 of [3]
- New data indicator – 1 bit
- DCI subframe repetition number – 2 bits as defined in clause 16.6 in [3]
- HARQ process number – 1 bit. This field can only be present if 2 HARQ processes are configured and the corresponding DCI format is mapped onto the UE specific search space given by the C-RNTI or SPS C-RNTI as defined in [3].

<Unchanged parts are omitted>

Q1: Do you support the CR in R1-2105953? if no, please provide explanation.

Feedback Form 1: Comments on issue 1

1 – Qualcomm Incorporated

This change is not needed. There is no "UE specific search space given by the SPS C-RNTI". According to TS 36.213, the UE specific search space (except the PUR one) is always given by the C-RNTI. You can clearly see this in Table 16.5.1-5: the "NPDCCH configured by SPS C-RNTI" is actually mapped to the "UE specific by C-RNTI" search space.

2 – Ericsson LM

As pointed out by Qualcomm, this CR is not needed, since there is no "UE-specific search space given by the SPS C-RNTI". Note that the DCI formats for LTE and LTE-M use the same formulation (i.e. without mentioning SPS C-RNTI).

3 – Lenovo (Beijing) Ltd

We share the the similar view as QC and E///, there are two UE-specific SS defined in TS36.213 (UE SS given by C-RNTI and UE SS given by PUR-RNTI in sec16.6), although it semms the two UE SS aren't related to C-RNTI/PUR-RNTI. This is from LTE, LTE UE SS parameter Y_k is deteremined by C-RNTI as in TS36.213 section 9.1.1.

4 – ZTE Corporation

The similar description about SPS C-RNTI is also observed in LTE. However, if we have the consensus that no confusion would be caused, we can follow the majority.

5 – HUAWEI TECHNOLOGIES Co. Ltd.

We share the same view with QC/Ericsson/Lenovo, there's only USS given by C-RNTI or PUR-RNTI in 36.213, DCIs scrambled with other RNTIs are just mapped on the two USS.

Issue 2: R1-2105954 Correction on UL index for LTE-M

Reason for change:

In TS36.212, 5.1.1.1, 7.2.1, 8 and 8.4 of TS36.213 are the citation for the UL index. However, the UL index related description for BL/CE UE is not found and not needed in 7.2.1, 8 and 8.4 of TS36.213. Moreover, the UL index description for BL/CE UE can be found in 8.0 of TS36.213 and the corresponding citation is missing.

Summary of change:

Change the citation for UL index from '5.1.1.1, 7.2.1, 8 and 8.4' to '5.1.1.1 and 8.0'.

Consequences if not approved:

The citation 7.2.1, 8 and 8.4 for the UL index is not correct and the citation 8.0 for the UL index is missing.

Proposed CR to TS36.212 based on issue 2

5.3.3.1.10 Format 6-0A

<Unchanged parts are omitted>

- Modulation and coding scheme – 4 bits as defined in clause 8.6 of [3]
- Repetition number – 2 bits as defined in clause 8.0 of [3]
- HARQ process number – 3 bits
- New data indicator – 1 bit
- Redundancy version – 2 bits
- TPC command for scheduled PUSCH – 2 bits as defined in clause 5.1.1.1 of [3]
- UL index – 2 bits as defined in clauses 5.1.1.1, ~~7.2.1, 8~~ and 8.4~~0~~ of [3] (this field is present only for TDD operation with uplink-downlink configuration 0)
- Downlink Assignment Index (DAI) – 2 bits as defined in clause 7.3 of [3] (This field is present only for cases with TDD primary cell and either TDD operation with uplink-downlink configurations 1-6 or FDD operation. This field is reserved when the configured maximum repetition number is larger than 1 for MPDCCH, or when the higher layer parameter *csi-NumRepetitionCE-r13* indicates more than one subframe)

<Unchanged parts are omitted>

Q1: Do you support the CR in R1-2105954? if no, please provide explanation.

Feedback Form 2: Comments on issue 2

1 – Ericsson LM

Please consider changing the title to "Correction of document reference for UL index for LTE-MTC TDD" in order to avoid giving the impression that something is broken in Rel-13 LTE-MTC and to make it clear that the CR only concerns TDD.

Also, the comma sign in "clauses 5.1.1.1, and 8" can be removed.

2 – Ericsson LM

In my previous comment, I meant to write that the comma sign in "clauses 5.1.1.1, and 8.0" can be removed.

Thinking a bit further about this, perhaps it can be questioned whether this is a correction so essential that we need to go back and change Rel-13. The current specification refers to clause 8, which I guess can be said to include clause 8.0. So perhaps we can leave the specification as is in Rel-13 and only make a correction in Rel-16 or Rel-17.

3 – Qualcomm Incorporated

We agree with Ericsson that this correction is mostly editorial. We would be OK with correcting this in Rel-16, but going back to Rel-13 seems excessive.

4 – Lenovo (Beijing) Ltd

This is the editorial issue. we agree E///'s comment on removing the comma sign. Either CR for Rel.16 only or back to Rel.13 is fine to us.

5 – ZTE Corporation

It is fine to change the title as "Correction of document reference for UL index for LTE-MTC TDD" and the comma sign in "clauses 5.1.1.1, and 8.0" is gonna to be removed.

Additionally, as you see, the current specification refers to clause 8, however, the clause 8 and clause 8.0 are the different clause if we check the specification, which indicates the different description. so we'd better to use the correct one.

Moreover, the citation of 7.2.1, 8 and 8.4 for UL index is totally wrong since the UL index description is nowhere to be found in these clauses. so we'd better to delete the wrong citation.

It is understood that we shall try to avoid the impact on legacy release. But this mistake is obvious and no impact on the legacy products. So we suggest to make a correction from release 13 to address this obvious mistake. Also, we have no strong view on this point if we have the consensus.

6 – Classon Consulting

[for FUTUREWEI]

I did some archaeology on the old specs to see why these references are in 36.212. For eMTC, it goes back to the Anaheim meeting in 2015. If you are interested the very first version of the 36.212 spec in R1-157323 endorsed in that meeting did not have a 6-0A DCI format, but rather supported 6-0A functionality in Format

0, which contains the UL index field and these cross references to 36.213. When the next update of 36.213 was created in R1-157924, 6-0 was introduced with the fields included. It still took some time to stabilize eMTC as we all know, but since eMTC in 36.213 is mixed in with "regular" LTE it made sense that people trying to understand UL index usage in eMTC would also be looking at the same sections. Even if (as in 7.2.1) the mention of BL/CE UE and UL index is just to say it doesn't apply to BL/CE UEs, it could be useful.

When I checked these 36.213 sections for "UL index" I found it in 5.1.1.1, 7.2.1, 8 (actually 8.0, but 8 is used for the whole section), but not in 8.4. The cross references for UL index were expanded between rel 8 (which had 5.1.1 and 8) and the initial version 9.0.0 of rel-9 (where 7.2.1 and 8.4 were added). That is before my time as editor so I am not really sure why. If 8.4 is incorrect, it is incorrect in Format 0 and all DCI formats which inherited the field.

Do we need to fix these? Clearly there is no implementation issue so not an essential correction, just an editorial. Section 8 was always used to be inclusive of 8.0, so no need for that. 7.2.1 mentions "non-BL/CE UE" so that also is not a big issue. For me, anyway, it comes down to what to do about the 8.4 cross reference. If the reference is incorrect for UL index then we can consider to remove it for all DCI formats in an editorial CR. No need to go back earlier than rel-16. It could even be handled in the first version of Rel-17, though less trackable that way.

7 – HUAWEI TECHNOLOGIES Co. Ltd.

We don't think this is essential either, as it introduces no ambiguity between UE/eNB and no issue for behaviors. It's just an editorial change. We are also fine to handle it when Rel-17 CRs are to be prepared, going back to Rel-13 seems rather excessive.

3 Summary of first round

Regarding the issue 1 raised in R1-2105953, most companies have the consensus that we do not need the correction since there's only USS given by C-RNTI or PUR-RNTI. So the moderator suggest to follow the majority opinion and have the following potential conclusion.

Potential conclusion: No need to address the SPS C-RNTI issue raised in R1-2105953.

Regarding issue 2 raised in R1-2105954, most companies think it is an editorial issue and no need to go back to R13. According to the majority opinions, the moderator suggest to make a correction in R16 in this meeting to address this issue.

Moderator proposal: A correction in R16 on the issue raised in R1-2105954 is handled.

And the following CR is considered:

5.3.3.1.10 Format 6-0A

<Unchanged parts are omitted>

- UL index – 2 bits as defined in clauses 5.1.1.1, ~~7.2.1, 8~~ and 8.4₀ of [3] (this field is present only for TDD operation with uplink-downlink configuration 0)

<Unchanged parts are omitted>

Note: the CR title is changed as "Correction of document reference for UL index for LTE-MTC TDD" and the comma sign in "clauses 5.1.1.1, and 8.0" is removed as above.

Please provide your comments on the moderator proposal and proposed CR

Feedback Form 3: Comments on proposed CR and proposal

1 – Classon Consulting

[for FUTUREWEI]

It seems our comment was ignored. This is not an essential correction. It is OK to still reference 7.2.1 and 8. For 8.4, it is used since rel-9 and should not only be corrected in only this DCI format. So, we do not support this CR.

2 – Ericsson LM

Perhaps we can make a note in the meeting minutes that the 36.212 editor can take care of changing the reference to 8.4 in an upcoming update for Rel-16 or Rel-17.

3 – ZTE Corporation

[as moderator]

According to the comments from 6 different companies, 2 of them are expected to deal with this only in R17 and 4 of them are OK to deal with this from R16. This summary proposal is made based on the majority opinions as mentioned by the moderator.

Additionally, as we know, in 6.2.1, the issue, that UL index is conflicting with the multi-TB scheduling is under discussion. To solve the problem regarding UL index completely and obtain a correct understanding of UL index, the citation problem can be dealt in R16 .

4 Conclusion

According to the discussion, for issue 1 in R1-2105953, most companies have the consensus that we do not need the correction since there's only USS given by C-RNTI or PUR-RNTI. Therefore, the following conclusion is made:

conclusion: No need to address the SPS C-RNTI issue raised in R1-2105953.

For issue 2 raised in R1-2105954, most companies think it is an editorial issue and no need to go back to R13. According to discussion by email, not only for UL index reference in DCI format 6-0A, but also for other several different DCI formats, it agreed to make corrections in R16 as a cat. F CR. Based on this, we have the final CR R1-2106297 with CR number 0366 to address the UL index citation issue.