3GPP TSG-RAN WG2 #110-e R2-2005830

Electronic Meeting, June 1-12, 2020

Agenda Item: 7.1.6

Source: Qualcomm

Title: [AT110-e][410][eMTC] ASN.1 review for eMTC (Phase 2) – Preliminary report

Document for: Discussion, Decision

# 1 Introduction

This document is the report of the following email discussion:

* [AT110-e][410][eMTC] R16 ASN.1 Review (Qualcomm)

Scope: Remaining RIL issues (TBD)

Intended outcome: Report in R2-2005830

Deadline: Friday, June 5th 10:00 UTC

This document summarizes the discussion on LTE ASN.1 issues specific to Rel-16 eMTC from phase 2 RILs in v65. (See R2-200xx ASN.1 review file and/or R2-200xx spreadsheet of RILs.)

# 2 Discussion

As a starting point, following tables are populated with the RILs (from phase 2 only).

## 2.1 RIL issues not for discussion unless flagged

The following table shows the RILS with the status from RRC/spec rapporteur currently set to PropAgree, PropReject, and PropNoAct. They are intended to be agreed in block unless they are flagged via email or by comment in this document, in which case they will move to the discussion section.

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| **ID** | **Work Item** | **Class** | **TDoc** | **Status** | **Proposed Conclusion** | **Description** | **Proposed Change** | **Comments**  **Companies are requested to input their views on this column** | **Proposed conclusion (from email discussion)**  **Column to be used by email rapporteur.** |
| H814 | eMTC | 2 | None | PropAgree | v54, as suggested | why e2?. this represents a number should be n2, n4… |  | Qualcomm v33: The values were inspired from SPS, similar to the field name was inspired from SPS: implicitReleaseAfter ENUMERATED {e2, e3, e4, e8}. Qualcomm v46: Also it was exactly as your proposed change in H113. But ok to change to nX, nY | [rapp]: captured in eMTC RRC CR v0. |

**Proposal 1: [H814] update status to ConcAgree.**

## 2.2 RIL issues for discussion

Following table shows the RILs to be discussed in eMTC ASN.1 review. Companies are requested to add their comments in the “Comments” column.

NOTE 1: Keep in mind the current “status” and “proposed conclusion” column while providing your comment, i.e., comments should take these as baseline conclusion, where available.

NOTE 2: If you are unable to see the whole table, change the display to “draft” or “web layout” from “view” menu option.

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| **ID** | **Work Item** | **Class** | **TDoc** | **Status** | **Proposed Conclusion** | **Description** | **Proposed Change** | **Comments**  **Companies are requested to input their views on this column** | **Proposed conclusion (from email discussion)**  **Column to be used by email rapporteur.** |
| Q605 | eMTC | 3 | R2-2004627 /R2-2004634 | DiscMeet | v55: discuss in meeting whether Rel-15 CR is agreeable. | WI open issue. RAN2 has agreed “Early implementation of relaxed serving cell measurement by Rel-15 UEs when configured with WUS is permitted. FFS whether to agree in TEI15.” | Introduce this field from Rel-15 (add as wus-Config-v15xy in rel-15 AEG with a rel-15 CR, mirror in rel-16, and remove from current AEG). CRs will be submitted as indicated in [Tdoc]. | Qualcomm v55: proposal is to agree Rel-15 CR and merge Rel16 draftCR to eMTC RRC CR.  Huawei: This is discussed in [401]. wait for the offline to conclude  rapp-v1: ok |  |
| Q607 | eMTC | 3 | None | DiscMeet | v61: discuss with other eMTC-specific ASN.1 issues | This is signalling of upto 29 bits. Networks may want to reserve whole frequency range corresponding to certain time resources given by periodicityStartPost. To reduce overhead, it is better to make it optional and specify “if absent, whole frequency range is reserved”. | Make resourceReservationFreq optional and clarify “if absent, whole frequency range is reserved”. | ZTE comment: we think there has the case that whole frequency range is reserved, so we are fine with the proposed change.  Huawei: We think it is extremely unlikely that the whole frequency range will be reserved for large bandwidth so the saving will not big as indicated. On the other hand, we think it is possible to configure DL time domain reservation only, so we are not quite sure what the best ‘default’ is.  rapp-v1: Based on above comments, proposed change seems agreeable as there is no proposal for what the default should be otherwise.  Ericsson: We also think there are cases where only time domain reservation needs to be done. For that to work, the default should be full frequency range (i.e. both freq and time resources need to be reserved). Thus agree with proposed change.  Rapp-v2: propose to change to ConcAgree |  |
| H817 | eMTC | 4 | None | DiscMeet | v54: To be discussed with other remaining capability issues | WI Open issue: TS 36.306: Editor’s note: In RRC the 4 PUR capabilities are part of MAC parameters for eMTC, but are part of general parameters for NB-IoT. Need to align one way or another. |  | rapp-v1: UE capabilities added to RRC CR v1. Comments are welcome directly there.  Huawei: UE capabilities are discussed in [409] and comments are better provided there as this impact both 36.306 and 36.331 and often requires alignment between NB-IoT and eMTC. |  |
| H818 | eMTC | 3 | None | DiscMail | v55: discuss in context of eMTC RRC CR | The six capabilities agreed at RAN2#109e for coexistence with NR are missing. |  | rapp-v1: UE capabilities added to RRC CR v1. Comments are welcome directly there.  Huawei: UE capabilities are discussed in [409] and comments are better provided there as this impact both 36.306 and 36.331 and often requires alignment between NB-IoT and eMTC. |  |
| H820 | eMTC | 4 | None | DiscMeet | v54: To be discussed with other remaining capability issues. | WI Open issue: TS 36.306: Editor's note: Field names need to be aligned across TS 36.331 and TS 36.306. See Also NB-IoT (RIL#852) |  | rapp-v1: UE capabilities added to RRC CR v1. Comments are welcome directly there.  Huawei: UE capabilities are discussed in [409] and comments are better provided there as this impact both 36.306 and 36.331 and often requires alignment between NB-IoT and eMTC. |  |
| H821 | eMTC | 4 | None | DiscMeet | v54: To be discussed with other remaining capability issues | RAN2#108 agreed that Rel-15 WUS and Rel-16 Group WUS are not supported for eMTC UEs in RRC\_INACTIVE. | Clarify in the field description. Clarifcation is TS 36.304 also needed. | rapp-v1: Being discussed as part of offline-311. Wait for the conclusion there. If this is clarified in 300 and/or 304, no change is needed in 331.  Huawei: we wtill think it will be good to clarify in the capability that it is related to Paging in RRC\_IDLE as we may extended the feature to RRC-INACTIVE in a further release. |  |
| Z606 | eMTC | 3 | None | ~~ConcReject~~  DiscMeet | v33: resolved in WI CR  Flagged | The current subPRB-Allocation-r16 is defined in ce-ModeB, that is not aligned with description of the related RAN1 parameter ce-PUSCH-SubPRB-Config “When the UE supports the “PUSCH sub-PRB allocation in CE mode A/B” feature, the PUR configuration includes whether the feature is enabled or disabled”. So this parameter needs to be moved out of ce-ModeB. Moreover, there has no sub PRB configuration in PUR-Config, so we assume even this feature is enabled by subPRB-Allocation-r16, it cannot be used for PUR. R15 sub-PRB configuration is provided in dedicated signalling so it also cannot be used by UE in IDLE. Therefore, we suggest to provide sub-PRB configuration in PUR configuration and this can be used as implicit enable indication. | PUR-PUSCH-Config-r16 ::= SEQUENCE {  pur-GrantInfo-r16 CHOICE {  ce-ModeA SEQUENCE {  numRUs-r16 BIT STRING (SIZE(2)),  prb-AllocationInfo-r16 BIT STRING (SIZE(10)),  mcs-r16 BIT STRING (SIZE(4)),  numRepetitions-r16 BIT STRING (SIZE(3))  },  ce-ModeB SEQUENCE {  subPRB-Allocation-r16 BOOLEAN,  numRUs-r16 BOOLEAN,  prb-AllocationInfo-r16 BIT STRING (SIZE(8)),  mcs-r16 BIT STRING (SIZE(4)),  numRepetitions-r16 BIT STRING (SIZE(3))  }  } OPTIONAL, -- Need ON  pur-PUSCH-FreqHopping-r16 BOOLEAN,  p0-UE-PUSCH-r16 INTEGER (-8..7),  alpha-r16 Alpha-r12,  pusch-CyclicShift-r16 ENUMERATED {n0, n6},  pusch-NB-MaxTBS-r16 BOOLEAN,  locationCE-ModeB-r16 INTEGER (0..5)  }   |  | | --- | | ***locationCE-ModeB***  PRB location within the narrowband when PUSCH sub-PRB resource allocation is used in PUR grant for CE mode B. | | Rap: It seems QC assumes that current signalling is sufficient:  ModeA: codepoint 00 of num-Rus-r16 indicates full-PRB and other values indicated subPRB, and  ModeB: 1 bit flag subPRB-Allocation-r16 in DCI indicates this.  Hence the parameter is not common in the current ASN.1. Furhermore, whether the feature is enabled/disabled for CE Mode A or B is clear from the CHOICE value of pur-GrantInfo-r16 set to ce-ModeA or ce-ModeB. It does not make sense to include the GRANT for BOTH mode A and B at the same time. Then, there is no point of including subPRB info for Mode B if grant is actually for mode A (or vice versa)  [ZTE]: Flag: Previously, Z606 suggests to additionally add some sub-PRB configuration. QC assumes that current signalling is sufficient. After further check with RAN1, we think *locationCE-ModeB* is still needed.  As this info is not part of DCI, we put it outside the pur-GrantInfo and explicitly mention it’s for ce-ModeB only in the field description.  rapp-v1: Ok, after further checking, the issue as described makes sense. The field should be added. However suggested change should be as follows (where the Cond also implicitly means this is only for CE Mode-B):  ENUMERATED {n0, n6},  pusch-NB-MaxTBS-r16 BOOLEAN,  locationCE-ModeB-r16 INTEGER (0..5) OPTIONAL -- Cond SubPRB  }  ***locationCE-ModeB***  PRB location within the narrowband when PUSCH sub-PRB resource allocation is enabled for PUR grant in CE mode B.  *SubPRB:* This field is optionally present, need ON, if subPRB-Allocation is set to TRUE; otherwise the field is not present and UE shall delete any existing value for this field.  Rapp-v2: propose to change to ConcAgree |  |
| E904 | eMTC/NB-IoT | 4 | None | ~~PropAgree~~ | v54: Change to Class 4. Ghange as suggested | Not sure why there is a reference to TS 36.321 in field description of newUE-Identity (also in other places, -NB versions)? There is no special handling captured in TS 36.321 for this case, it is a normal C-RNTI used in RRC\_CONNECTED. | Remove references to TS 36.321 from newUE-Identity-r16 field descriptions here and in other locations. | Huawei: v54: this also applies to NB-IoT and should be class 4  Huawei: Flag: same change applies to RRCConnectionSetup. not captured in eMTC CR v0  Rapp-v1: done  Rapp-v2: propose to change to ConcAgree | [rapp]: captured in eMTC RRC CR v1. |
| B100 | LTE\_eMTC5-Core, NB\_IOTenh3-Core | 2 | None | ~~PropAgree~~ | v50: As suggested | E134 for 38.331 was agreed, i.e. to use non-critical extension on message level (in this case in the extension addition group in SIB4) and introduce “parallel list” with the new field. Reason: extension of list elements in SIB should not use “…” as it costs pprox.. 3 bytes per list element. The same should be adopted here for rss-MeasPowerBias-r16 as well. | Introduce rss-MeasPowerBias-r16 by a parallel list as shown below. | Huawei: Flag: Fine with the RIL and its implementation in eMTC RRC CR v0  We are wondering if we should follow the same approach for the MT-EDT indication in the paging record as the situation is similar.  rapp-v1: Agree the suggestion about mt-EDT makes sense, but there is another field *accessType* along with mt-EDT which would also benefit from same changes. I have flagged this for general ASN.1 session (see offline 206). | [rapp]: captured in eMTC RRC CR v0. |
| H822 | eMTC | 4 | None | ~~PropAgree~~ | v54. Changed to class 4. as suggested and/or (aslo NB-IoT) | RAN2#108 agreed that for NB-IoT and eMTC, the existing capability wakeUpSignalMinGap-eDRX-r15 also applies to Rel-16 WUS. | The UE shall also indicate support of WUS or GWUS for paging | Qualcomm v39: Agree. We assume “or” above means “and/or”  Huawei: Flag: The proposed resolution was to use ‘and/or’ as suggested by Qualcomm. Howerv only ‘or’ is captured in the eMTC CR v0  Rapp-v1: change to “and/or” is not needed, “or” is sufficient (which means and/or). Earlier comment was only to be sure we are on the same page.  Rapp-v2: propose to change to ConcAgree | [rapp]: captured in eMTC RRC CR v0. |
| Z620 | eMTC | 3 | None |  |  | In the *pur-GrantInfo* definition, the length of mcs is 4 bits:  pur-GrantInfo-r16 CHOICE {  ce-ModeA SEQUENCE {  numRUs-r16 BIT STRING (SIZE(2)),  prb-AllocationInfo-r16 BIT STRING (SIZE(10)),  mcs-r16 BIT STRING (SIZE(4)),  numRepetitions-r16 BIT STRING (SIZE(3))  },  ce-ModeB SEQUENCE {  subPRB-Allocation-r16 BOOLEAN,  numRUs-r16 BOOLEAN,  prb-AllocationInfo-r16 BIT STRING (SIZE(8)),  mcs-r16 BIT STRING (SIZE(4)),  numRepetitions-r16 BIT STRING (SIZE(3))  }  } OPTIONAL, -- Need ON  The field description for mcs-r16 is as following:  ***pur-GrantInfo***  *Indicates UL grant for transmission using PUR. ……. mcs indicates DCI field for PUSCH modulation and coding scheme, see TS 36.213 [23] clause 8.6. numRepetitions indicates DCI field for PUSCH repetition number, see TS 36.213 [23] clause 8.0.*  *…….*  While in the physical layer spec, it mentions:  *DCI:*  *- Modulation and coding scheme – 3 or 4 bits as defined in subclause 8.6 of [3]. The 3-bit field applies when the format 6-0A DCI uses sub-PRB resource allocation, otherwise the 4-bit field applies.*  That means if sub-PRB resource allocation is used, only 3 out of the 4 bits are valid. But from higher layer signalling perspective, it’s not clear which three bits are valid (or invalid). | It’s suggested to add explicitly description about which bits out of 4 bits are valid in the sub-PRB resource allocation case:  ***pur-GrantInfo***  *Indicates UL grant for transmission using PUR. ……. mcs indicates DCI field for PUSCH modulation and coding scheme, see TS 36.213 [23] clause 8.6* (if sub-PRB resource allocation is used, only the rightmost 3 bits are valid). *numRepetitions indicates DCI field for PUSCH repetition number, see TS 36.213 [23] clause 8.0.*  …….  Note: the reason why we say “if sub-PRB resource allocation is used” but not “if subPRB-Allocation is set to TRUE” is that, this change is applied to both ce-ModeA and ce-ModeB, while for ce-Mode A, the use of sub-PRB resource allocation is implicitly indicated by numRU. |  |  |
| Z621 | eMTC | 3 | None |  |  | In the *pur-GrantInfo* definition, the length of *prb-AllocationInfo* for ce-ModeA is 10 bits or 8 bits:  pur-GrantInfo-r16 CHOICE {  ce-ModeA SEQUENCE {  numRUs-r16 BIT STRING (SIZE(2)),  prb-AllocationInfo-r16 BIT STRING (SIZE(10)),  mcs-r16 BIT STRING (SIZE(4)),  numRepetitions-r16 BIT STRING (SIZE(3))  },  ce-ModeB SEQUENCE {  subPRB-Allocation-r16 BOOLEAN,  numRUs-r16 BOOLEAN,  prb-AllocationInfo-r16 BIT STRING (SIZE(8)),  mcs-r16 BIT STRING (SIZE(4)),  numRepetitions-r16 BIT STRING (SIZE(3))  }  } OPTIONAL, -- Need ON  Per our understanding for physical layer spec, with different parameter configurations, it’s possible only part of bits in *prb-AllocationInfo* are valid. Even how to determine valid bits would mainly refer to RAN1 spec, we think it’s still need clarification in order to avoid any confusion. | It’s suggested to add roughly clarification about valid bits for *prb-AllocationInfo*.  Also there is a typo for the name in field description. A “-” is needed for *prbAllocationInfo* :  ***pur-GrantInfo***  *Indicates UL grant for transmission using PUR. …….* *prb-AllocationInfo indicates DCI field for PUSCH resource block assignment, see TS 36.212 [22], clause 5.3.3.1.10 (CE Mode A) and clause 5.3.3.1.11 (CE Mode B).* UE determines valid bits from the rightmost bit of *prb-AllocationInfo*. *mcs indicates DCI field for PUSCH modulation and coding scheme, see TS 36.213 [23] clause 8.6. numRepetitions indicates DCI field for PUSCH repetition number, see TS 36.213 [23] clause 8.0.*  ……. |  |  |
| H824 | eMTC/NB-IoT | 4 | None |  |  | In 5.3.8.3 Reception of the *RRCConnectionRelease* by the UE, the paragraph below should exclude UE using CP CIoT 5GS optimisation  1> if ASsecurity is not activated and if UE is connected to 5GC:  2> ignore any field included in *RRCConnectionRelease* message except *waitTime*;  2> perform the actions upon leaving RRC\_CONNECTED or RRC\_INACTIVE as specified in 5.3.12 with the release cause '*other'* upon which the procedure ends; |  |  |  |

**Proposal 2: [Q607], [Z606], [E904], [822] Change status to ConcAgree. Exact wording can be discussed in the context of RRC CR.**

## 2.3 RIL issues for discussion in NB-IoT ASN.1 review (for information only)

Following issues are common to NB-IoT and eMTC and will be discussed in NB-IoT ASN.1 review.

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| **ID** | **Work Item** | **Class** | **TDoc** | **Status** | **Proposed Conclusion** | **Description** | **Proposed Change** | **Comments** | **N/A** |
| E906 | eMTC/NBIoT | 4 | None | DiscMeet | v54: Changed to class 4. To be discussed in WI session with other PUR open issues. | Is it clear what configuration will be provided at this step, compared to storing pur-Config? E.g., MAC layer would need to be provided with PUR-RNTI here, the current MAC CR says RNTI is released after PUR occasion. Also some information related to the exact next PUR occasion should be provided. Or is it implicitly assumed these are the configuration provided? | Suggest to be more explicit here, i.e. reference to PUR-RNTI, PUR occasion. To be further discussed in WI, open issues Tdoc will be submitted including further discussion. | Qualcommv46: Agree some discussion and resolution is needed. For example, latest MAC spec CR says: “- when pur-TimeAlignmentTimer configuration is received from upper layers: - start or restart the pur-TimeAlignmentTimer.” Does this mean every PUR occasion the pur TAT restarts? (Given these and some other E90x RILs are joint issues, should class be changed to 4?) Huawei: v54: also think should be class 4 |  |
| E907 | eMTC/NBIoT | 4 | None | DiscMeet | v54: Change to class 4. To be discussed in WI session with other PUR open issues. | For CP solution same as for UP solution, should we be more explicit? See E906 | See E906 | Qualcomm v46: same comment as E906. |  |
| H811 | eMTC | 4 | None | DiscMeet | v54: to be discussed in WI session with other PUR open issues | WI Open issue: For the requested PUR TBS in eMTC and NB-IoT, the minimum value is b328.FFS: other details. Also NB-IoT (RIL#841) |  |  |  |
| H815 | eMTC | 3 | None | DiscMail | v54: To be discussed with other remaining ASN.1 issues | It is not clear what an empty PUR occasion is. Propose to align with NB-IoT ‘Number of consecutive PUR occasions that can be skipped before implicit release of PUR configuration’ |  |  |  |
| H823 | NBIoT/eMTC | 4 | None | DiscMail | v54: To be discussed with other remaining ASN.1 issues | It is not specified which parameters are used in that case. Also NB-IoT (RIL#859) | Clarify in the field description that if the field is absent, the parameters in wus-Config apply |  |  |
| H859 | NBIoT/eMTC | 4 | None | DiscMail | v54: To be discussed with other remaining ASN.1 issues | It is not specified which parameters are used in that case. Also eMTC (RIL#823) | Clarify in the field description that if the field is absent, the parameters in wus-Config apply |  |  |
| H810 | eMTC | 4 | None | DiscMeet | v54: To be discussed in WI session with other PUR open issues | WI Open issue: FFS: 2-level offset need and details for pur-StartTime-r16. Also NB-IoT (RIL#840) |  |  |  |
| H849 | ~~eMTC~~  NB-IoT | 3 | None | PropAgree | v54: as suggested | RRC connection re-establishment also applies to the Control Plane CIoT 5GS optimisation. | Change to EPS/5GS | Qualcomm v39: Agree. But this could be a simple editorial fix in RRC CR discussion.  Huawei: Flag: this is actually NB-IoT specific and would be better captured in the NB-IoT CR.  QC: Ok, was confused by the WI code. (Now moved to 2.3) |  |

# Conclusion

Based on the discussion in the previous sections following is proposed:

**Proposal 1: [H814] update status to ConcAgree.**

**Proposal 2: [Q607], [Z606], [E904], [822] Change status to ConcAgree. Exact wording can be discussed in the context of RRC CR.**

# References

[1] R2-200xx ASN.1 review file, v65

[2] R2-200xx Spreadsheet containing RILs vXX