**3GPP TSG RAN WG2 #121bis-e *draft R2-2304241***

**Online, 17 – 25 April, 2023**

**Source:** Huawei, HiSilicon

**Title:** Report of [AT121bis-e][101][IoT NTN] CP corrections (Huawei)

**Agenda Item:** 4.2.3

**Document for:** Discussion and decision

# Introduction

This document is a report of the following offline discussion:

* [AT121bis-e][101][IoT NTN] CP corrections (Huawei)

Initial scope: Discuss corrections in 4.2.3 (apart those on location info in RLF Report)

Initial intended outcome: Summary of the offline discussion with list of agreeable corrections/CRs

Deadline for companies' feedback: Friday 2023-04-21 08:00 UTC

Deadline for rapporteur's summary (in R2-2304241): Friday 2023-04-21 10:00 UTC

Proposals marked "for agreement" in R2-2304241 not challenged until Monday 2023-04-24 10:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online).

1. Contact Information

To make it easier to find the contact delegate for potential follow-up questions, delegates are encouraged to provide their contact information in the following table:

|  |  |  |
| --- | --- | --- |
| **Company** | **Name** | **Email** |
| MediaTek | Abhishek Roy | Abhishek.Roy@mediatek.com |
| Qualcomm | Bharat Shrestha | bshrestha@qti.qualcomm.com |
| Google | Ming-Hung Tao | mhtao@google.com |
| OPPO | Haitao Li | lihaitao@oppo.com |
| CATT | Xiangdong Zhang | zhangxiangdong@catt.cn |
| Intel | Tangxun | xun.tang@intel.com |
| Nokia | Srinivasan | Srinivasan.selvaganapathy@nokia.com |
| ZTE | Lu Ting | lu.ting@zte.com.cn |
| Apple | Yuqin Chen | yuqin\_chen@apple.com |
| Lenovo | Xu Min | xumin13@lenovo.com |
| Xiaomi | Xiaolong Li | lixiaolong1@xiaomi.com |
| NEC | Yuhua chen | Yuhua.chen@emea.nec.com |
| Samsung | Jonas Sedin | j.sedin@samsung.com |
| Huawei, HiSilicon | Lili Zheng | zhenglili4@huawei.com |

# Discussion

## Emergency call

R2-2302676 Corrections in TS 36.331 for Supporting Emergency Calls in IoT NTN MediaTek Inc.

**Reasons for change:** “GNSS-ValidityDuration” IE description in 36.331 subsection 6.3.6 mentions the values of GNSS validity duration. However, it does not include value corresponding to emergency service. As eMTC can support emergency services, if the emergency service is ongoing, the value shall be set to infinity.

|  |
| --- |
| *– GNSS-ValidityDuration*  The IE GNSS-ValidityDuration indicates the remaining GNSS validity duration in the UE. Value s10 corresponds to 10 seconds, s20 corresponds to 20 seconds and so on. Value min5 corresponds to 5 minutes, value min10 corresponds to 10 minutes and so on. If the emergency service is ongoing, the value shall be set to infinity. |

**Q1: Do you agree with the above change?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| MediaTek | Yes | We believe this is needed to support emergency services over eMTC-NTN. |
| Qualcomm | see comments | It is already up to UE implementation what value to set, so UE can set infinity if it wants for the emergency call.  Also, we are not sure if emergency service was the use case of Rel-17 IoT NTN work item.  But anyway, if GNSS validity expires, UE’s TA is not correct, and UE is not able to perform any UL transmission, how can emergency service continue? |
| Google | - | We share the same view with QC that this is purely up to UE implementation and shouldn’t have a specification impact. |
| OPPO | No | We think GNSS validity duration is independent of the service that is ongoing and the reported value just reflects the reality. Changing it to “infinity” for emergency service does not help as when it becomes invalid in reality, UE keeps using the invalid GNSS locations will cause failure of UL synchronization and UL interference to the network. Therefore, we think the change is not needed and correct. |
| CATT |  | Share the same view with QC. |
| Intel |  | Agree with QC. The key UE operation should be to re-acquire GNSS coordinates instead, and it could be done by UE implementation. |
| Nokia |  | Setting specific value based on emergency service is upto UE implementation Setting the timer value to larger value for emergency case avoid network forcefully releasing the emergency call earlier. Based on cause network can also postpone the release if needed. So specification changes is not needed |
| ZTE | No | We have similar view as OPPO that GNSS validity duration is independent of the service and the reported value just reflects the reality. Other things can be left to UE implementation. |
| Apple |  | We have the same question as Qualcomm and OPPO.  We are curious about the motivation of the change. Is it to avoid network side releasing UE to RRC idle state (I suppose NW would make use of GNSS-ValidityDuration to release UE context)? |
| Lenovo | See comments | We share the same view with QC that it is up to UE implementation. The GNSS-ValidityDuration, as it is defined, should be the actual value of the remaining GNSS validity duration at UE. |
| Xiaomi | No | Setting the GNSS validity duration to “infinity” for does not help keeping emergency service if the real GNSS is out of date. |
| NEC | No | We failed to understand why GNSS validity duration as a lower layer parameter can be influenced by running service in upper layer. In another word, while GNSS is not valid, UE cannot maintain the connection no matter the service  But fine to leave to UE implementation. |
| Samsung | No | We do not have any similar procedures or exceptions for emergency services. We generally do not specify it in this manner. Potentially this can be harmful to perform the emergency service if the GNSS location is very outdated and the UE still attempts to stay in connected mode instead of going back to idle, performing the GNSS measurement and then coming back to finish the emergency call. |
| Huawei, HiSilicon | No | Agree with OPPO’s comments. |
|  |  |  |

## Cell type indication

R2-2303040 Indication of GSO-NGSO cell type in SIB1 Qualcomm Incorporated

**Reasons for change:** Currently the UE capability ntn-ScenarioSupport-r17 indicates whether the UE supports only NGSO cell or GSO cell or both. However, for example, a UE supporting only NGSO scenario needs to still select a GSO cell, read the SIB1 and additionally read the SIB31. After reading SIB31, the UE has to use ephemeris and calculate the satellite position, i.e., determine the altitude to figure out whether the cell is GSO or NGSO cell and whether it can camp on it. To save power, i.e., not to read SIB31 and use ephemeris, the SIB1 could indicate a cell type such that UE can identify GSO or NGSO from SIB1 and decide whether it can camp on the cell or not.

|  |
| --- |
| SystemInformationBlockType1-v1700-IEs ::= SEQUENCE {  cellAccessRelatedInfo-NTN-r17 SEQUENCE {  cellBarred-NTN-r17 ENUMERATED {barred, notBarred},  plmn-IdentityList-v1700 PLMN-IdentityList-v1700 OPTIONAL -- Need OR  } OPTIONAL, -- Need OR  nonCriticalExtension SystemInformationBlockType1-v17xy-IEs OPTIONAL  }  SystemInformationBlockType1-v17xy-IEs ::= SEQUENCE {  cellType-NTN-r17 ENUMERATED {GSO, NGSO} OPTIONAL, -- Need OR  nonCriticalExtension SEQUENCE {} OPTIONAL  }  <unchanged parts omited>  SystemInformationBlockType1-NB-v1700 ::= SEQUENCE {  cellAccessRelatedInfo-NTN-r17 SEQUENCE {  cellBarred-NTN-r17 ENUMERATED {barred, notBarred},  plmn-IdentityList-v1700 PLMN-IdentityList-NB-v1700 OPTIONAL -- Need OR  } OPTIONAL, -- Need OR  nonCriticalExtension SystemInformationBlockType1-NB-v17xy OPTIONAL  }  SystemInformationBlockType1-NB-v17xy ::= SEQUENCE {  cellType-NTN-r17 ENUMERATED {GSO, NGSO} OPTIONAL, -- Need OR  nonCriticalExtension SEQUENCE {} OPTIONAL  } |

**Q2: Do you agree with the above changes?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| MediaTek | Postpone to Rel-18 | We think this is more of an optimization or improvement. Rel-17 systems can already work (as mentioned by the proponent itself) without it. Hence, we prefer to defer it to Rel-18. |
| Qualcomm | Yes | It is just 1 bit indication, not much change. It would be good to know how we can do it in Rel-18. |
| Google | Postpone to Rel-18 | We understand the intention and think it is a valid concern, but would also like to avoid having inconsistent UE behaviour in the same release. Hence we prefer to postpone it o Rel-18. |
| OPPO | No | Considering the frozen of Rel-17, it is too late and not an essential enhancement. |
| CATT | Postpone to Rel-18 |  |
| Intel | agree | Ok with this optimization |
| Nokia | No | Not essential correction for Rel-17 as it is optimisation related to system information acquisition |
| ZTE | No | This is not essential correction. |
| Apple |  | Good to have but maybe in Rel-18. |
| Lenovo | Postpone to Rel-18 | Better to discuss this in R18 as an optimization. |
| Xiaomi | No | This is an optimization. |
| NEC | No | Feel too late to add this as a power saving optimization |
| Samsung | No | A very late optimization that we do not think is needed. We think it is probably a major network deployment error if a UE will end up on a frequency of a GSO if the UE does not support GSO, or at best a corner case. |
| Huawei, HiSilicon | No | Agree with others that this is an optimization and not urgent. |
|  |  |  |

## NPRACH preamble descriptions

R2-2303194 Alignment of NPRACH preamble descriptions with RAN1 specification for IoT-NTN parameters Nokia, Nokia Shanghai Bell

**Observation 1: The 36.331 definitions of 4 \* (TCP+TSEQ) and 6 \* (TCP+TSEQ) correspond to one preamble transmission unit as per 36.211 definitions.**

**Observation 2: The 36.331 incorrectly defines the PRACH transmission segment duration unit to be four and six preamble transmissions.**

**Proposal: RAN2 to adopt the TP to TS 36.331 to clarify that the unit of NPRACH-TX-Duration is in terms of preamble repetition unit as defined in TS36.211. The TP is given below.**

|  |
| --- |
| ***NPRACH-ConfigSIB-NB* field descriptions** |
| ***nprach-TxDurationFmt01***  Duration of PRACH segment transmission for PRACH resource format 0 and format 1 in NTN transmission, see TS 36.213 [23]. Unit in duration of one preamble repetition unit, e.g., 4 \* (TCP+TSEQ).  Value *n2* corresponds to the duration of 2 \* preamble transmission, value *n4* corresponds to the duration of 4 \* preambles transmission and so on. |
| ***nprach-TxDurationFmt2***  Duration of PRACH segment transmission for PRACH resource format 2 in NTN transmission, see TS 36.213 [23]. Unit in duration of one preamble repetition unit , e.g., 6 \* (TCP+TSEQ).  Value *n1* corresponds to the duration of 1 \* preamble transmission, value *n2* corresponds to the duration of 2 \* preambles transmission and so on. |

Moderator view:With or without the change, the actual duration of PRACH segment transmission is the same. The change is focused on whether P symbol groups (e.g., 4 \* (TCP+TSEQ) in case of format 0 and format 1) are considered as one repetition unit or P repetition units. If the change is to be adopted, other places mentioning “preamble transmission” in the above field description (e.g. in the descriptions related to n2 and n4) also need to be modified to “preamble repetition unit”.

**Q3: Do you agree with the above changes?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| MediaTek | Yes | This is inline with RAN1 specifications in TS36.211. |
| Qualcomm | See comments | The proposed text is total confusion.  Probably there is no confusion with current text. But to align more with RAN1, then we should just replace everything with preamble transmission unit. We have following suggestion:  ***nprach-TxDurationFmt01***  Duration of PRACH segment transmission for PRACH resource format 0 and format 1 in NTN transmission, see TS 36.213 [23]. Unit in duration of one preamble repetition unit, i.e., 4 \* (TCP+TSEQ).  Value *n2* corresponds to the duration of 2 \* preamble repetition units, value *n4* corresponds to the duration of 4 \* preamble repetition units and so on.  Same change for the other one. |
| Google | Yes with QC’s revision | We think QC’s revision is clearer. |
| OPPO | No | We share the same view as Moderator and the current spec text is correct and clear. No need to change if no confusion. |
| CATT |  | Share the same view of OPPO, but we are ok on the version of QC if update is supported. |
| Intel | No | We share the same view with Moderator. |
| Nokia | Proponent | The term duration of one preamble as per RAN1 definition is the complete duration that includes 4 symbols +CP. And the duration here in the definition expected to make use of one preamble repetition unit. So we think the alignment is needed and the term preamble repetition unit is clearly defined it can be used as unit here We agree with QC revision |
| ZTE | See comments | We also think the previous text is correct.  If more companies are fine to use the term in RAN1, we can consider the suggestion. But we also agree with moderator and QC that the proposed changes are incomplete.  Our wording suggestion is:  …..Value *n2* corresponds to the duration of 2 \* ~~4 \* preamble transmission~~ duration of one preamble repetition unit. |
| Apple |  | We can accept QC’s version. |
| Lenovo | No | We think the current text is clear enough. |
| Xiaomi | Yes | Prefer to align with RAN1 spec. |
| NEC | Yes | Agree with the intention to clarify.  One way is to delete “four”/”six” in “four preamble transmission” and “six preamble transmission”. i.e., keep using preamble transmission but it means P \* (TCP+TSEQ).  Otherwise as advised by moderator, “preamble transmission” need to be modified to “preamble repetition unit” everywhere. |
| Samsung | Yes | Fine with the revisions as suggested by QC and ZTE. |
| Huawei, HiSilicon | No | We think the current text is ok. But can also accept QC’s rewording. |
|  |  |  |

## T317 and T318

R2-2304082 CR to 36.331 on T317 and T318 Huawei, HiSilicon

**Reasons for change:**

1) NR NTN has discussed whether the validity timer is stopped or kept when UE goes to RRC\_IDLE, and agreed in RAN2 #119bis-e to leave it to UE implementation. The advantage of keeping the validity timer running upon entering RRC\_IDLE is that, UE still considers the satellite assistance information as valid, and it can still be utilized for e.g. time/frequency synchronization with the serving cell. The agreement was reflected in 38.331.

In IoT NTN, the maintenance of validity timer in RRC\_IDLE is also up to UE implementation, but in Clause 5.3.12 of TS 36.331 it is unclear whether the UE should keep or stop T317. Besides, T318 is the guard timer for SIB31/SIB31-NB acquisition and is started upon T317 expiry, it should also be made clear how UE handles T318 when entering RRC\_IDLE.

2) SIB31-NB is missing in the T317/T318 descriptions.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5.3.12 UE actions upon leaving RRC\_CONNECTED or RRC\_INACTIVE  Upon leaving RRC\_CONNECTED or RRC\_INACTIVE, the UE shall:  1> reset MAC;  <unchanged parts omited>  1> release the LWIP configuration, if configured, as described in 5.6.17.3;  NOTE: It is left to UE implementation whether to stop T317 or T318, if running, when leaving RRC\_CONNECTED.  <unchanged parts omited>   |  |  |  |  | | --- | --- | --- | --- | | T317  NOTE1 | Start or restart from the subframe indicated by *epochTime* upon reception of *SystemInformationBlockType31* (*SystemInformationBlockType31-NB* in NB-IoT), or upon reception of *RRCConnectionReconfiguration* message for the target cell including *mobilityControlInfo*, or upon conditional reconfiguration execution i.e. when applying a stored *RRCConnectionReconfiguration* message for the target cell including *mobilityControlInfo*. | Stop T317, if it is running, for the source cell upon reception of *RRCConnectionReconfiguration* message including *mobilityControlInfo*, or upon conditional reconfiguration execution i.e. when applying a stored *RRCConnectionReconfiguration* message including *mobilityControlInfo*. | Perform the actions as specified in 5.3.18. | | T318  NOTE1 | Upon starting acquisition of *SystemInformationBlockType31* (*SystemInformationBlockType31-NB* in NB-IoT)in RRC\_CONNECTED | Upon successful acquisition of *SystemInformationBlockType31* (*SystemInformationBlockType31-NB* in NB-IoT) in RRC\_CONNECTED | If security is not activated and the UE is not a NB-IoT UE that supports RRC connection re-establishment for the Control Plane CIoT EPS optimisation: go to RRC\_IDLE else: initiate the connection re-establishment procedure as specified in 5.3.7. | |

**Q4: Do you agree with the above changes?**

|  |  |  |
| --- | --- | --- |
| **Company** | **Yes/No** | **Comments** |
| MediaTek | Yes | Agree with the proponent that is better to align with NR-NTN and leave it on to UE implementation. |
| Qualcomm | Yes |  |
| Google | Yes |  |
| OPPO | Yes with comments | For the NOTE, we don’t think T318 is mentioned as anyway T318 is not used in RRC IDLE mode and we suggest to remove “or T318” in the NOTE. |
| CATT | Yes |  |
| Intel | Yes |  |
| Nokia | No strong view | When UE is in RRC-IDLE mode it is upto UE to acquire system information 31 prior to access instead of running timer for this purpose So we don’t see need for the note We are ok to accept the majority view |
| ZTE | See comments. | We think the discussion related the first change has been repeated for several times and one thing should be noted is that, different from NR-NTN, IoT NTN UE doesn’t need to always keep valid SIB31 in idle mode. Then the justification “*The advantage of keeping the validity timer running upon entering RRC\_IDLE is that, UE still considers the satellite assistance information as valid*” may be not so certain for IoT NTN.  If this change is agreeable, the following clarification should be, if UE want to initiate another RRC connection, even the T317 timer is running in idle mode, UE still needs to acquire SIB31/SIB31-NB immediately before establishing, resuming or re-establishing the RRC connection. |
| Apple | Yes |  |
| Lenovo | Yes | OK to align with NR-NTN |
| Xiaomi | Yes |  |
| NEC | No for first change  Yes for second change | Without NOTE, it also leave it to UE implementation.  And shared the concern from Nokia and ZTE |
| Samsung | No for first,  we can live with second change | For the first change, we totally agree with ZTE that we have specified things in a certain manner different from NR NTN already. With the agreements that we have and for how we have specified T317, this is does not make sense. We agreed that a UE will read SIB31 every time before RRC connection establishment and furthermore, upon T317 expiry we only perform the actions if UE is in connected mode and T318 is not started – the procedures are complete. So it does not make any sense to leave it up to UE implementation, because it has no meaning for the UE. Aligning with NR NTN does not make sense here.  If people still feel that the procedures are unclear, then we can be very explicit and say that T317 and T318 are stopped upon leaving connected mode.  Second change is not needed either as we do not include all of the (-NB) clarifications for other timers to keep this section brief – see T300, T301 etc. If companies really want it, we are fine. |
| Huawei, HiSilicon | Yes | For the first change,  On T317, we all agree that UE can start T317 in RRC\_IDLE but the issue is whether UE needs to maintain T317 in RRC\_IDLE. We think having a valid SIB31 would help RRC\_IDLE maintain time/frequency synchronization with the camped cell. The note is just to clarify that UEs are not mandated to stop the timers when leaving RRC\_CONNECTED.  On T318, it is also acceptable to us to change it to T318 is stopped when leaving RRC\_CONNECTED, but anyway something needs to be clarified in the spec. |
|  |  |  |

# Conclusion

To be completed