3GPP RAN WG2 Meeting #117-e R2-2203532

eMeeting February 21st – March 3rd, 2022

Agenda Item: 8.10.2.1.1

Source: InterDigital

Title: Report of [AT117-e][103][NTN] MAC open issues

Document for: Discussion, Decision

# Introduction

This document is intended address a subset of remaining MAC open issues as per the following email discussion guidelines:

**[AT117-e][NTN][103] MAC open issues (InterDigital)**

* **Initial scope: Discuss MAC open issues based on the report in** [**R2-2203424**](file:///C:\Data\3GPP\Extracts\R2-2203424%20Report%20of%20%5bPre117-e%5d%5b103%5d%5bNTN%5d%20MAC%20open%20issues.docx) **and other company contributions in AI 8.10.2.1.1**
* **Initial intended outcome: Summary of the offline discussion with e.g.:**
  + **List of proposals for agreement (if any)**
  + **List of proposals that require online discussions**
  + **List of proposals that should not be pursued (if any)**

Please note the following deadlines:

* Initial deadline (for companies' feedback): **Monday 2022-02-21 1700 UTC**
* Initial deadline (for rapporteur's summary in R2-2203532): Monday 2022-02-21 2000 UTC

Please also note the following chair guidance:

* Proposals marked "for agreement" in R2-2203532 not challenged until Tuesday 2022-02-22 1000 UTC will be declared as agreed via email by the session chair (for the rest the discussion will continue during the GTW session on Tuesday).

# Topics for agreement

Based on pre-meeting discussion and contribution input, the proposals/topics within this section are classified as likely agreeable. Considering the very limited time to gather company input to this discussion (< 24 hours) it is suggested these aspects be the focus of Round 1 discussion, with more controversial topics listed in Section 3 postponed to Round 2.

## [Pre117e] proposals

In pre-meeting discussions [25] and [26], the following proposals have in general received consensus or near consensus support:

## ***Likely Agreeable***

*Proposal 1:        During RA procedure for RRC re-establishment procedure, the UE should trigger TA report if an indication is broadcasted by the target cell’s SI. (consensus in IoT NTN discussion)*

*Proposal 2:        During RA procedure for handover, the UE should trigger TA report if the target cell indicates this in the handover command. (consensus in IoT NTN discussion)*

*Proposal 3:        Other than re-establishment and handover procedure, TA reporting in connected mode is not controlled by enabling/disabling indication in SI. (16/17 in IoT NTN discussion)*

*Proposal 7:        RAN2 understanding: UE failing to acquire sufficiently accurate UE location to be used in the calculation of the full TA should not perform any UL transmission until UE location is within accuracy limits. No RAN2 specification impact. (consensus)*

*Proposal 8:        RAN2 confirms UE-specific TA MAC CE consists of only one field with length 16 bits, which contains the UE estimate of full UE-specific TA. (19/21)*

*Proposal 9:        RAN2 confirms Differential UE-Specific K\_Offset MAC CE consists of only one field with length 8 bits, which contains the Differential UE-Specific K\_Offset. (consensus)*

*Proposal 11:      RAN2 confirms ra-ResponseWindow and msgB-ReponseWindow are not extended in NTN. (consensus)*

*Proposal 12:   UE stops ra-ContentionResolutionTimer upon receiving PDCCH indicating Msg3 retransmission and then starts ra-ContentionResolutionTimer after the end of the Msg3 retransmission plus UE-gNB RTT. Impact to coverage and possible enhancements (e.g. to support MSG3 blind retransmission) can be considered in the Rel-18 NTN coverage enhancement SI. (16/20)*

*Proposal 13: Existing parameter names are updated to: uplinkHARQ-mode, allowedHARQ-mode,  and HARQ mode A/B. (16/19)*

*Proposal 15:     uplinkHARQ-DRX-LCP-mode and allowedHARQ-DRX-LCP, if configured, also apply for SRB1 to SRB3.*

*Proposal 17:      A NOTE is added to MAC CR clarifying that prior to starting drx-HARQ-RTT-TimerUL/DL, latest UE-gNB RTT is used to set timer length.*

*Proposal 19:      MAC does not specify how UE detects a cell originates from a non-terrestrial network. (19/20)*

To avoid repeat discussion, companies are invited to comment on the above proposals *only* if there are serious technical objections. If a company does not comment on a proposal is it implicitely assumed to be acceptable.

**Question 1) If you object to one or more of the above proposal(s), please: 1) Indicate which proposal(s) is unnacceptable; 2) Provide technical justification why the above proposal is unacceptable; and 3) Suggest an alternative acceptable wording (if available).**

**Note: If a company does not comment on a proposal, it is assumed to be aggreable.**

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| **Company** | **Comments** |
| vivo | For proposal 8, we slightly prefer to have Reserved bits in the UE specific TA MAC CE. But we can go with the majority. |
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## Relevant proposals from IoT NTN

Pre-meeting discussion [Pre117-e][011][NTN] addressed remaining User Plane open issues in IoT NTN. Based on discussion outcome, a number of “for agreement” proposals have been labelled as*“(IoT NTN/NR NTN common*)”. Although many of these proposals are to align with NR or have already been captured (i.e., Proposals 1-3 from Section 2.1), The following proposal has not been addressed in NR:

*Proposal 11a: RAN2 to clarify the previous agreement as: Upon reception of configuration or reconfiguration of TA reporting trigger event, if UE has not reported TA to current serving cell before, the UE triggers a TA reporting. (IoT NTN/NR NTN common)*

Companies are invited to comment as to whether this clarification may also apply to NR NTN.

**Question 2) Do you agree with the following proposal?**

***“Proposal: RAN2 to clarify the previous agreement as: Upon reception of configuration or reconfiguration of TA reporting trigger event, if UE has not reported TA to current serving cell before, the UE triggers a TA reporting.”***

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| **Company** | **Agree/Disagree** | **Additional comments** |
| OPPO | Agree |  |
| CATT | Agree |  |
| vivo | Agree |  |
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## Contribution input

In [Post116bis-e][109] discussion, a number of open issues have been listed as “for contribution”. Based on company input, several of these issues seem to have aligned proposals and may be potentially agreeable.

**Note:** To improve readability, proposals relevant to each open issue have been included in an Annex.

### **OI 15:** Repetition transmission based HARQ retransmission

Open issue 15 discusses whether repetition transmission based HARQ retransmission is always allowed and is explicitly indicated via DCI or semi-statically with RRC signalling (as in legacy). This aspect was addressed via contribution, where all contributing companies [1, 9, 10, 12, 14, 17, 21] propose to revise previous agreement to include “*or semi-statically via RRC signalling*”.

**Question 3) Do you agree with the following proposal (which revises previous agreement from RAN2#114e)?**

***“Proposal: Repetition transmission based HARQ retransmission is always allowed and is explicitly indicated via DCI or semi-statically via RRC signalling (as in legacy).”***

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| **Company** | **Agree/Disagree** | **Additional comments** |
| OPPO | Agree |  |
| CATT | Agree |  |
| vivo | Agree |  |
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### **OI 16:** Details of DRX behaviour for SR and CFRA

Open Issue 16 discusses the case that a UE sends an SR, the UE enters Active time to monitor for a response after an offset time has elapsed. This aspect was addressed via contribution, where company input may be generally classified into the following two categories:

**1) Support introduction of an offset** [1, 8, 9, 10, 14, 15, 17, 20, 21]:

Proponents of introducing an offset note that according to current specification, UE enters DRX Active time immediately upon sending an SR. Considering the large RTT in NTN, it would be reasonable to delay the start of Active time to avoid unnecessary PDCCH monitoring [14] and save UE power [1, 8, 9, 10] since the SR response will not arrive until after at least the UE-gNB RTT. [20] and [21] note this solution has already been applied to other timers such *as ra-ContentionResolutionTimer* and *msgB-ReponseWindow.*

Other comments from [10] mention that a configurable offset could be considered to balance power consumption and delay.

**2) Do not support an offset** [3, 11, 12]:

Companies which do not support an offset wonder how this offset can implemented in the specification. [11] notes that considering SR may be retransmitted, does it mean for each SR (re)transmission, the UE enters DRX Active Time after an offset time has elapsed, or the offset is only applied to the first transmission of the SR? They further state that this may be considered an optimization [11], which can be deprioritized in this release [12]. Additionally, [3] mentions that use of an offset may be dependant on HARQ state.

Rapporteur suggests that based on large majority opinion (9/12), RAN2 considers introducing an offset to Active Time after sending SR. Further details to be discussed in Stage 3.

**Question 4a) Do you agree that in NTN, UE enters DRX Active time an offset time after sending SR?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
| OPPO | Disagree | We can understand the motivation is similar to extention of *drx-HARQ-RTT-TimerUL*(*DL)*. However, it is not exactly the same. Based on the current MAC specification, when a SR is sent on PUCCH and is pending, the UE is in DRX Active Time. Since SR may be retransmitted, if introducing an offset to SR triggered DRX Active Time, does it mean for each SR (re)transmission, the UE enters DRX Active Time after an offset time has elapsed, or the offset is only applied to the first transmission of the SR? If the offset is applied for each SR (re)transmission, will the RTT duration after SR retransmssion cancel the Active Time starting from the end of the RTT duration after first SR transmission? Like the highlighted “?” part in below figure.    In any case, we think it would be complicated and have non-trivial specification impact. Moreover, unlike extention of *drx-HARQ-RTT-TimerUL*(*DL),* which is an essential feature for NTN since without this feature, *drx-RetransmissionTimerUL*(DL) needs to be extended, the enhancement to SR triggered DRX Active Time is more like an optimization because in this case DRX Active Time is not controlled by any timer. Due to the limited time left, we prefer not to consider this non-essential enhancement. |
| CATT | Disagree | Similar view with OPPO, as the current specification can work well, this optimation can be postponed. |
| vivo | Agree |  |
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Furthermore, several companies note the length of this offset could be UE-gNB RTT [1, 8, 9, 10, 15, 20, 21] or be network configurable [10]:

**Question 4b) If “Agree” to Q4a), what is the preferred offset duration (for SR case)?**

* **Option 1: UE-gNB RTT**
* **Option 2: Configurable by Network**
* **Option 3: Other, please describe**

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| **Company** | **Preferred option(s)** | **Additional comments** |
| vivo | Option 1 | As UE is in connected state, UE and gNB has common understanding of full TA. Thus, the offset duration can be set as the UE-gNB RTT. |
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Open issue 16 also discussed the case that a UE sends msg3 as response to a RAR message during CFRA, the UE enters Active time when an offset time has elapsed. This aspect was addressed via contribution, where company input may be generally classified into the following two categories:

**1) Support introduction of an offset** [8, 9, 10, 14, 15, 17, 20, 21]:

**2) Do not support an offset** [1, 3, 11, 12]:

Similar arguments are presented as in the SR case (e.g., to avoid unnecessary monitoring) however companies are encouraged to refer to referenced documents for detailed discussion (for example, at least [1] and [17] have a different analysis from SR case).

**Question 5a) Do you agree that in NTN, UE enters DRX Active time an offset time after sending Msg3 in response to RAR message during CFRA?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
| OPPO | Disagree | During CFRA, network can identify the UE via Msg1, so after sending RAR, UE has acquired its TA and network may be able to schedule the subsequent transmission for the UE any time it wants, e.g. before or after receiving Msg3, which depends on network implementation. We think UE should enter DRX Active Time after receiving RAR as legacy, in order to not miss any scheduling from network and to ease network implementation. We think there is no need to introduce an offset for this case. |
| CATT | Disagree | The active time for CFRA is until a PDCCH indicating a new transmission addressed to the C-RNTI after successful reception of a Random Access Response. The PDCCH scheduleing may occur before or after MSG3 transmission, which depends on NW implementation. If an offset is applied, the network cannot shedule before the offset time, restricting the scheduling policies on the network. Since the network may schedule the UE at any time after the RAR for CFRA, an offset should not be introduced in this scenario. |
| vivo | Agree | Our understanding is that the msg3 is the ACK message of RAR. Thus, NW typically will not schedule UE before receiving the msg3. It is reasonable that UE delays to enters DRX active time. |
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Several companies propose possible lengths for this offset, including UE-gNB RTT [8, 9, 10, 15, 20, 21] or being network configurable [10, 17]:

**Question 5b) If “Agree” to Q5a), what is the preferred offset duration (for CFRA case)?**

* **Option 1: UE-gNB RTT**
* **Option 2: Configurable by Network**
* **Option 3: Other, please describe**

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| **Company** | **Preferred option(s)** | **Additional comments** |
| vivo | Option 1 | As UE is in connected state, UE and gNB has common understanding of full TA. Thus, the offset duration can be set as the UE-gNB RTT. |
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### **OI 18:** DL MAC CE execution delay

Open Issue 18 discusses the need to capture the DL MAC CE execution delay by K\_MAC agreed by RAN1, and was addressed via contribution. Although one company [1] states we may need additional RAN1 input, there is a large majority among responding companies [9, 14, 15, 17, 21] that this topic does not need to be addressed in MAC specification.

Rapporteur therefore suggests that, unless explicitly requested by RAN1, DL MAC CE execution delay is not addressed in MAC specification.

**Question 6) Do you agree with that** **DL MAC CE execution delay is not treated in MAC specification?**

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| **Company** | **Agree/Disagree** | **Additional comments** |
| OPPO | Agree | We see no MAC impact. |
| CATT | Agree | DL MAC CE execution delay is defined in PHY. |
| vivo | Agree | In the legacy, the DL MAC CE execution delay is captured in RAN1 spec, which has no RAN2 impact. |
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# To be postponed to [AT117e] Phase 2

The following proposals from [Pre117e][103] and via contributions were inconclusive or require further discussion. Considering the very limited time to gather company input to this discussion (< 24 hours), it is suggested that more controversial topics be postponed to a second round to allow proper evaluation.

## [Pre117e] proposals

*Proposal 4:        RAN2 to further discuss if SR can be triggered when a TA report is triggered and no UL-SCH resources are available, or if RACH can be triggered if SR is triggered but there are no available PUCCH resources.*

*Proposal 5:      “Whether both UE location and/or UE specific TA information are needed in parallel for the purposes of TA reporting” is postponed.*

*Proposal 6:      “Reuse the TA-based trigger event if reporting UE location information for TA reporting purpose in connected mode can be agreed.” is postponed.*

*Proposal 10:      RAN2 to further discuss naming of UE-specific TA MAC CE and Differential UE-Specific K\_Offset MAC CE to ensure alignment with RAN1 specification.*

*Proposal 14:     RAN2 to further discuss “HARQ process 0 carries PUSCH transmission scheduled by RAR or PUSCH payload of MsgA, configuration of HARQ mode and allowedHARQ-DRX-LCP is up to NW implementation, and UE always follows it (no specification impact).”*

*Proposal 16:      RAN2 to further discuss implementation HARQ RTT timer extension.*

*Proposal 18:      RAN2 to further discuss method of configuredGrantTimer extension.*

## Contribution input

### **OI 14:** Additional details for *drx-HARQ-RTT-TimerDL/UL*

Open issue 14 has been addressed by the below contributions, where opinion is generally split between:

1) Existing behaviour needs to be clarified [3, 11, 21]

2) No specification impact is needed [1, 8, 14, 17]

Rapporteur suggests this topic be postponed to a second phase to allow for detailed discussion. Relevant proposals are listed below:

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| **Contribution** | **Relevant proposal(s) – Spec change necessary** | **Company** |
| [3] [R2-2202420](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202420.zip) | **P1:** If UE receive retransmission scheduling for UL/DL HARQ state A during drx-HARQ -RTT-TimerUL/DL is running, drx-HARQ -RTT-TimerUL/DL is restarted. | Spreadtrum |
| [11] [R2-2202999](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202999.zip) | **P1:** If PDCCH indicates a UL transmission for a HARQ process when drx-HARQ-RTT-TimerUL for the corresponding HARQ process is running, UE should stop the drx-HARQ-RTT-TimerUL for the corresponding HARQ process.  **P2:** If PDCCH indicates a DL transmission for a HARQ process when drx-HARQ-RTT-TimerDL for the corresponding HARQ process is running, UE should stop the drx-HARQ-RTT-TimerDL for the corresponding HARQ process. | OPPO |
| [21] [R2-2203482](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203482.zip) | **P1:** In MAC spec, change the “start the drx-HARQ-RTT-TimerUL/DL…” to “start or restart the drx-HARQ-RTT-TimerUL/DL…”. | Ericsson |

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| **Contribution** | **Relevant proposal(s) – No spec change necessary** | **Company** |
| [1] [R2-2202302](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202302.zip) | **P1:** No specs change is needed for UE behaviour related to drx-HARQ-RTT-Timers when PDCCH indicates a UL/DL transmission. | Huawei, HiSilion |
| [9] [R2-2202773](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202773.zip) | **P1:** No additional RAN2 spec impact on drx-HARQ-RTT-TimerDL/UL behaviour for HARQ feedback enabled and UL HARQ state A is needed for NR NTN. | vivo |
| [14] [R2-2203165](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203165.zip) | **P1:** For Open Issue 14, no enhancement is needed for stopping drx-HARQ-RTT-TimerDL for a HARQ PID with HARQ feedback enabled when the downlink assignment for retransmission is received using the HARQ PID while the drx-HARQ-RTT-TimerDL is running.  **P2:** For Open Issue 14, no enhancement is needed for stopping drx-HARQ-RTT-TimerUL for a HARQ PID with UL HARQ state A when the UL grant for retransmission is received using the HARQ PID while the drx-HARQ-RTT-TimerUL is running. | LG |
| [17] [R2-2203256](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203256.zip) | **P1:** For HARQ feedback enabled and UL HARQ state A, it is not necessary to discuss UE DRX behaviour when PDCCH indicates a UL/DL transmission doesn’t consider the case where drx-HARQ-RTT-TimerUL/DL for the corresponding HARQ process has already been running.  **P2:** If further clarification is needed on the legacy behaviour, it should be discussed in Rel-15 as part of the maintenance session. | Nokia, Nokia Shanghai Bell |

### **OI 17:** UL synchronization failure

Open Issue 17 has been addressed by the below contributions. Although detailed procedure varies between contributions, upon validity timer expiry opinion is ***generally*** split between whether the UE should:

1) Be considered out of sync (possibly requiring RACH) [4, 8, 9, 12, 11, 15, 18]

2) Re-aquire SI (with or without flushing HARQ buffers) [1, 5, 8, 19, 20]

3) trigger RLF (immediately or subject to a timer) [7, 14, 20, 21]

Rapporteur suggests this topic be postponed to a second phase to allow for detailed discussion. Relevant proposals are listed below ( “Other” proposals addressing this topic are captured in the Annex):

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| **Contribution** | **Relevant proposal(s) – Out of sync/Trigger RACH** | **Company** |
| [4] [R2-2202421](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202421.zip) | **P1:** When the validate timer expires, UE's action is similar to TAT expiry.  **P2:** When the validate timer expires, UE shall not trigger RA procedure, unless the uplink data arrives.  **P3:** when the validate timer expires, and UE triggers RA procedure in case of uplink data arrival, which SIB X applied for RA procedure is UE implementation. | Spreadtrum |
| [8] [R2-2202613](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202613.zip) | **P3:** It could be up to UE implementation to decide whether to trigger RACH procedure with the new assistance information (e.g. ephemeris, common TA parameters, etc.) carried in the latest SIB information. | CMCC |
| [9] [R2-2202773](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202773.zip) | **P4:** UE considers that it has lost uplink synchronization when the validity timer expires. UE will follow the legacy RACH trigger event to recover from the UL synchronization failure (i.e. UL data arrival when UL synchronisation status is "non-synchronised"). No new trigger for RACH is needed. | vivo |
| [10] [R2-2202972](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202972.zip) | **P3:** UE consider it is out-of-sync when validity Timer expires. | ZTE Corporation, Sanechips |
| [11] [R2-2202999](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202999.zip) | **P4:** Upon expiry of the validity timer, the UE should suspend all resource configuration including PUCCH, SRS, CG, SPS, etc and stop UL transmission.  **P5:** Upon expiry of the validity timer, UE needs to firstly acquire the serving satellite ephemeris data and common TA parameters from SIB, and then trigger a RACH. | OPPO |
| [15] [R2-2203194](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203194.zip) | **P2:** For UL synchronization failure due to the validity timer expiry, UE declares TAT expiry. The legacy behaviour upon TAT expiry is applied with the only exception that RACH procedure is not allowed either. | Xiaomi |
| [18] [R2-2203257](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203257.zip) | **P1:** Upon UL synchronization failure due to the validity timer expiry, UE flushes all HARQ buffers and releases all resource configuration. RACH procedure should be used to recover from UL synchronization loss failure if UE re-acquires the SIB for new assistance info.  **P2:** Whether UE needs to re-acquire the SIB and trigger RACH procedure after the validity timer expiry should follow a legacy RACH trigger event, i.e. DL or UL data arrival during RRC\_CONNECTED when UL synchronisation status is "non-synchronised" due to validity timer expiry. | Nokia, Nokia Shanghai Bell |

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| **Contribution** | **Relevant proposal(s) – Re-aquire SI** | **Company** |
| [1] [R2-2202302](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202302.zip) | **P5:** When SI used for UL synch (pre-compensation) is no longer valid, it is up to UE implementation to re-acquire the required SI. Nothing additional is needed. | Huawei, HiSilicon |
| [5] [R2-2202546](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202546.zip) | **P1:** No special mechanism needs to be developed to handle validity timer expiry.  **P2:** On validity timer expiry, the UE autonomously tunes away and re-acquires valid SIB information (SIBxx). | Apple |
| [8] [R2-2202613](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202613.zip) | **P2:** Upon UL synchronization failure due to the validity timer expiry, UE does not trigger RLF. UE flushes all HARQ buffers, released all resource configuration and re-acquire the SIB. | CMCC |
| [19] [R2-2203298](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203298.zip) | **P1:** When the validity timer is not running and results in the uplink synchronization failure, the MAC entity shall not perform any uplink transmission on the serving cell before UE (re)acquires the required SIB. | Samsung |
| [20] [R2-2203423](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203423.zip) | **P4:** If UE cannot re-aquire SIB prior to validity timer expiry, RAN2 to select between the following options: 1) UE triggers RLF; or 2) UE flushes all HARQ buffers, releases all resource configuration, and re-aquires updated SIB. | InterDigital |

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| **Contribution** | **Relevant proposal(s) – RLF** | **Company** |
| [7] [R2-2202563](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202563.zip) | **P1:** When the UL synchronization validity timer expires, the UE delays the triggering of RLF by a recovery period.  **P2:** RLF is NOT triggered if the UE is able to acquire ephemeris during the recovery period.  **P3:** It is up to the UE to determine the length of the recovery period. | Qualcomm |
| [14] [R2-2203165](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203165.zip) | **P6:** For Open Issue 17, the UE should perform the RLF procedure when the validity timer expires. | LG |
| [20] [R2-2203423](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203423.zip) | **P4:** If UE cannot re-aquire SIB prior to validity timer expiry, RAN2 to select between the following options: 1) UE triggers RLF; or 2) UE flushes all HARQ buffers, releases all resource configuration, and re-aquires updated SIB. | InterDigital |
| [21] [R2-2203482](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203482.zip) | **P7:** If the UEs NTN validity timer expires, the UE shall refrain from all UL transmissions and trigger RLF. | Ericsson |

### **OI 19:** UE location information for purposes of TA reporting

Open Issue 19 has been addressed by the below contributions, where opinion is split between:

1) Supporting UE location information for purposes of TA reporting [2, 17, 20]

2) Not supporting UE location information for purposes of TA reporting [6, 11]

Rapporteur suggests this topic be postponed to a second phase to allow for detailed discussion. Relevant proposals are listed below:

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| **Contribution** | **Relevant proposal(s) – Support location info for TA reporting** | **Company** |
| [2] [R2-2202303](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202303.zip) | **P3:** Support reporting location information for TA reporting purpose and reuse the event-trigger for TA MAC CE reporting. | Huawei, HiSilicon |
| [17] [R2-2203256](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203256.zip) | **P8:** RAN2 to continue the discussions on the open issues to enable the UE location reporting for TA purpose. | Nokia, Nokia Shanghai Bell |
| [20] [R2-2203423](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203423.zip) | **P5:** UE location information can be reported for purposes of UE-specific TA reporting. | InterDigital |

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| **Contribution** | **Relevant proposal(s) – Do not support location info for TA reporting** | **Company** |
| [6] [R2-2202547](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202547.zip) | **P1:** UE location reporting in RRC\_CONNECTED for TA reporting purposes is not agreed for Release 17 NTN feature. | Apple |
| [11] [R2-2202999](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202999.zip) | **P7:** Don’t support UE location information for purpose of TA reporting | OPPO |

# Conclusions

<To be generated based on company input>

# References

1. [R2-2202302](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202302.zip) Discussion on MAC open issues Huawei, HiSilicon
2. [R2-2202303](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202303.zip) Discussion on remaining MAC issues Huawei, HiSilicon
3. [R2-2202420](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202420.zip) Remaining issues on HARQ process in NTN Spreadtrum Communications
4. [R2-2202421](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202421.zip) MAC operation about the validity timer expiry Spreadtrum Communications
5. [R2-2202546](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202546.zip) UL synchronization and validity timer expiry Apple
6. [R2-2202547](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202547.zip) UE location and TA reporting Apple
7. [R2-2202563](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202563.zip) UL synchronization failure in RRC\_CONNECTED Qualcomm Incorporated
8. [R2-2202613](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202613.zip) Considerations on MAC open issues CMCC
9. [R2-2202773](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202773.zip) Remaining MAC Open Issues for NR NTN vivo
10. [R2-2202972](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202972.zip) Consideration on MAC open issues ZTE Corporation, Sanechips
11. [R2-2202999](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202999.zip) Discussion on MAC open issues in NTN OPPO
12. [R2-2203076](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203076.zip) Discussion on Left Open Issues of Other MAC Aspects CATT
13. [R2-2203151](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203151.zip) Discussion on TA reporting ITL
14. [R2-2203165](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203165.zip) Discussion on open issues for MAC aspects LG Electronics Inc.
15. [R2-2203194](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203194.zip) Remaining MAC issues of NR NTN Xiaomi
16. [R2-2203203](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203203.zip) CG enhancements in NTN Sony
17. [R2-2203256](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203256.zip) On left open issues for MAC aspects Nokia, Nokia Shanghai Bell
18. [R2-2203257](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203257.zip) Discussion on Validity timer expiry and restart Nokia, Nokia Shanghai Bell
19. [R2-2203298](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203298.zip) Open issues on MAC aspects Samsung Research America
20. [R2-2203423](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203423.zip) Remaining MAC open issues in NTN InterDigital
21. [R2-2203482](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203482.zip) Remaining MAC issues in NTNs Ericsson
22. [R2-2201739](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Inbox/R2-2201739.zip) Summary of [AT116bis-e][107][NTN] Other MAC issues (InterDigital)
23. [R2-2201849](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Inbox/R2-2201849.zip) Summary of [AT116bis-e][107][NTN] Other MAC issues Phase 2 (InterDigital)
24. [R2-2201900](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_116bis-e/Inbox/R2-2201900.zip) Summary of [Post116bis-e][109][NTN] MAC running CR and list of open issues (InterDigital)
25. [R2-2203424](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203424.zip) Report of [Pre117-e][103][NTN] MAC open issues (InterDigital)
26. [R2-2203160](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203160.zip) Report of [Pre117-e][011][IoT-NTN] User plane Open Issues Input (OPPO)

# Annex: referenced contribution proposals

## Topics for agreement

### **OI 15:** Repetition transmission based HARQ retransmission

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| **Contribution** | **Relevant proposal(s) – Repetition-based HARQ retransmission** | **Company** |
| [1] [R2-2202302](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202302.zip) | **P2:** Repetition based HARQ retransmission is always allowed for both DCI indication case and RRC configuration case (as in legacy). | Huawei, HiSilicon |
| [9] [R2-2202773](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202773.zip) | **P2:** Repetition transmission based HARQ retransmission is always allowed and is explicitly indicated via DCI or semi-statically with RRC signalling (as in legacy). | vivo |
| [10] [R2-2202972](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202972.zip) | **P1:** Repetition transmission based HARQ retransmission is always allowed and is explicitly indicated via DCI or semi-statically with RRC signalling (as in legacy). | ZTE Corporation, Sanechips |
| [12] [R2-2203076](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203076.zip) | **P2:** Repetition transmission based HARQ retransmission is always allowed and is explicitly indicated per HARQ process via DCI or semi-static RRC signaling (as in legacy). | CATT |
| [14] [R2-2203165](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203165.zip) | **P3:** For Open Issue 15, repetition transmission based HARQ retransmission is always allowed and is explicitly indicated per HARQ process via DCI or semi-statically with RRC signalling (as in legacy). | LG |
| [17] [R2-2203256](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203256.zip) | **P3:** RAN2 to confirm all legacy specified retransmission schemes should be supported in NTN. | Nokia, Nokia Shanghai Bell |
| [21] [R2-2203482](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203482.zip) | **P6:** Repetition transmission based HARQ retransmission is always allowed and is explicitly indicated via DCI or semi-statically with RRC signalling (as in legacy). Note, this revises the agreement from RAN2#114e. | Ericsson |

### **OI 16:** Details of DRX behaviour for SR

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| **Contribution** | **Relevant proposal(s) – Introduction of an Offset** | **Company** |
| [1] [R2-2202302](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202302.zip) | **P3:** In NTN, after UE sends an SR, UE enters Active time after one UE-gNB RTT. | Huawei, HiSilicon |
| [8] [R2-2202613](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202613.zip) | **P1:** It is proposed that in the both cases that a UE sends an SR and a UE sends msg3 as response to a RAR message during CFRA, the UE delay entering active time to monitor for a response until an offset(e.g. one RTT at least) time has elapsed. | CMCC |
| [9] [R2-2202773](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202773.zip) | **P3:** For DRX of NTN, in the case that UE sends msg3 as a response to a RAR message during CFRA or sends an SR, UE enters Active time after an offset time has elapsed. The offset time is the UE-specific gNB-UE RTT. | vivo |
| [10] [R2-2202972](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202972.zip) | **P2:** A offset can be optional configured. If configured, it is used to delay the start of active time after sending SR/Msg3 of CFRA otherwise UE-gNB RTT is used. | ZTE Corporation, Sanechips |
| [14] [R2-2203165](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203165.zip) | **P4:** For Open Issue 16, in DRX, the UE enters the Active Time after waiting for the offset if the UE sends the SR. | LG |
| [15] [R2-2203194](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203194.zip) | **P1:** For the case that UE sends a SR and the case that UE receives RAR for CFRA, UE delays the start of active time by UE-gNB RTT. | Xiaomi |
| [17] [R2-2203256](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203256.zip) | **P4:** Offset should be applied to delay the start of the DRX active time after UE sending an SR. | Nokia, Nokia Shanghai Bell |
| [20] [R2-2203423](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203423.zip) | **P1:** In NTN, when a Scheduling Request is sent on PUCCH and is pending UE enters DRX Active Time after UE-gNB RTT. | InterDigital |
| [21] [R2-2203482](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203482.zip) | **P2:** In NTNs, in the case that a UE sends an SR, the UE do not need to enter into Active Time to monitor for a response until after an offset time of UE-gNB RTT has elapsed.  **P3:** Consider replacing “- a Scheduling Request is sent on PUCCH and is pending (as described in clause 5.4.4); or” with “- an offset time To has elapsed after a Scheduling Request is sent on PUCCH and is pending (as described in clause 5.4.4); or” and a text “The offset time To is equal zero except in NTNs where it is equal to the UE-gNB RTT.” | Ericsson |

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| **Contribution** | **Relevant proposal(s) – Do not support offset introduction** | **Company** |
| [3] [R2-2202420](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202420.zip) | **P2:** If UE sends an SR or msg3 during CFRA, and HARQ state B is configured, the UE enters Active time immediately. | Spreadtrum |
| [11] [R2-2202999](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202999.zip) | **P3:** Follow legacy DRX behaviour after sending SR and msg3 for CFRA. | OPPO |
| [12] [R2-2203076](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203076.zip) | **P3:** The enhancement for DRX active time in cases of SR spending and PDCCH schedule after CFRA should be deprioritized in Rel-17. | CATT |

### **OI 16:** Details of DRX behaviour for CFRA

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| **Contribution** | **Relevant proposal(s) – Introduction of an Offset** | **Company** |
| [8] [R2-2202613](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202613.zip) | **P1:** It is proposed that in the both cases that a UE sends an SR and a UE sends msg3 as response to a RAR message during CFRA, the UE delay entering active time to monitor for a response until an offset(e.g. one RTT at least) time has elapsed. | CMCC |
| [9] [R2-2202773](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202773.zip) | **P3:** For DRX of NTN, in the case that UE sends msg3 as a response to a RAR message during CFRA or sends an SR, UE enters Active time after an offset time has elapsed. The offset time is the UE-specific gNB-UE RTT. | vivo |
| [10] [R2-2202972](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202972.zip) | **P2:** A offset can be optional configured. If configured, it is used to delay the start of active time after sending SR/Msg3 of CFRA otherwise UE-gNB RTT is used. | ZTE Corporation, Sanechips |
| [14] [R2-2203165](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203165.zip) | **P5:** For Open Issue 16, in DRX, the UE enters the Active Time after waiting for the offset if the UE sends the Msg3. | LG |
| [15] [R2-2203194](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203194.zip) | **P1:** For the case that UE sends a SR and the case that UE receives RAR for CFRA, UE delays the start of active time by UE-gNB RTT. | Xiaomi |
| [17] [R2-2203256](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203256.zip) | **P5:** Offset should be applied to delay the start of the DRX active time for CFRA after UE receiving RAR.  **P6:** Introduce a network configurable offset to delay the start of the DRX active time for CFRA after UE receiving RAR, in order to balance UE’s power consumption and scheduling latency. | Nokia, Nokia Shanghai Bell |
| [20] [R2-2203423](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203423.zip) | **P2:** In NTN, UE enters DRX Active Time after UE-gNB RTT to monitor for a PDCCH indicating a new transmission addressed to the C-RNTI of the MAC entity after successful reception of a Random Access Response for the Random Access Preamble not selected by the MAC entity among the contention-based Random Access Preamble. | InterDigital |
| [21] [R2-2203482](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203482.zip) | **P4:** In the case that a UE sends Msg3 as response to a RAR message during CFRA, the UE enters Active Time when an offset time of UE-gNB RTT has elapsed.  **P5:** Consider replacing “- a PDCCH indicating a new transmission addressed to the C-RNTI of the MAC entity has not been received after successful reception of a Random Access Response for the Random Access Preamble not selected by the MAC entity among the contention-based Random Access Preamble (as described in clauses 5.1.4 and 5.1.4a).” with “- an offset time To has elapsed and a PDCCH indicating a new transmission addressed to the C-RNTI of the MAC entity has not been received after successful reception of a Random Access Response for the Random Access Preamble not selected by the MAC entity among the contention-based Random Access Preamble (as described in clauses 5.1.4 and 5.1.4a).” and the text indicated in Proposal 3 above. | Ericsson |

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| **Contribution** | **Relevant proposal(s) – Do not support offset introduction** | **Company** |
| [1] [R2-2202302](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202302.zip) | **P4:** In NTN, after UE successfully receives RAR during CFRA, the UE enters Active time as in legacy. | Huawei, HiSilicon |
| [3] [R2-2202420](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202420.zip) | **P2:** If UE sends an SR or msg3 during CFRA, and HARQ state B is configured, the UE enters Active time immediately. | Spreadtrum |
| [11] [R2-2202999](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202999.zip) | **P3:** Follow legacy DRX behaviour after sending SR and msg3 for CFRA | OPPO |
| [12] [R2-2203076](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203076.zip) | **P3:** The enhancement for DRX active time in cases of SR spending and PDCCH schedule after CFRA should be deprioritized in Rel-17. | CATT |

### **OI 18:** DL MAC CE execution delay

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| **Contribution** | **Relevant proposal(s) – Do not treat in MAC spec** | **Company** |
| [9] [R2-2202773](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202773.zip) | **P5:** Do not capture the DL MAC CE execution delay by K\_MAC in RAN2 Specs. | vivo |
| [14] [R2-2203165](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203165.zip) | **P7:** For Open Issue 18, no enhancement is needed for DL MAC CE execution delay. | LG |
| [15] [R2-2203194](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203194.zip) | **P4:** RAN2 to agree not to cover DL MAC CE execution delay in MAC. | Xiaomi |
| [17] [R2-2203256](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203256.zip) | **P7:** There is no need to introduce execution delay caused by K\_mac for DRX Command MAC CE. | Nokia, Nokia Shanghai Bell |
| [21] [R2-2203482](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203482.zip) | **P8:** There is no need to add the DL MAC CE execution delay in NTNs to the MAC spec. | Ericsson |

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| **Contribution** | **Relevant proposal(s) – Wait for RAN1 input** | **Company** |
| [1] [R2-2202302](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202302.zip) | **P6:** Discussion on the need of DL MAC CE execution delay requires more RAN1 input. | Huawei, HiSilicon |

## Topics to be postponed

### **OI 17:** UL synchronization failure

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| **Contribution** | **Relevant proposal(s) – Other relevant proposals** | **Company** |
| [11] [R2-2202999](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2202999.zip) | **P6:** If the UE is not configured with searchSpaceSIB1 or searchSpaceOtherSystemInformation on the active BWP, the UE should switch to initialDownlinkBWP to acquire the serving satellite ephemeris data and common TA parameters. | OPPO |
| [12] [R2-2203076](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203076.zip) | **P1:** Upon UL synchronization failure due to the validity timer expiry, UE does not: trigger RLF, flush all HARQ buffers and release all resource configurations. [ | CATT |
| [15] [R2-2203194](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203194.zip) | **P3:** RAN2 to agree the above changes to MAC for UL synchronization failure. (refer to reference contribution) | Xiaomi |
| [18] [R2-2203257](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203257.zip) | **P3:** The epoch time can be either explicitly/implicitly provided by SIB together with the associated assistance information or indicated by dedicated RRC signalling.  **P4:** RAN2 should discuss how to handle the case where the UE acquires assistance information within the validity duration but the epoch time lies after the expiration of the current validity timer. | Nokia, Nokia Shanghai Bell |
| [20] [R2-2203423](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_117-e/Docs/R2-2203423.zip) | **P3:** NR NTN UE should maintain updated SI used for UL synch throughout connection duration (i.e., UE should re-aquire SIB prior to validity timer expiry). | InterDigital |