**3GPP TSG-RAN2 Meeting #116bis-e R2-2201660**

**Online, November 1 – 11, 2021**

**Agenda Item: 9.2.4**

**Source: Huawei**

**Title: [Pre116bis][016][IOT-NTN] Summary of 9.2.4 Control Plane Impact (Huawei)**

**Document for: Discussion and decision**

# Introduction

This document summarises the contributions submitted to AI 9.2.4 Control Plane Impact:

# Discussion

## TAC removal

The following proposals are made in documents [1] - [18]:

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| Tdoc | Proposals |
| [R2-2200254](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200254.zip) [2] | Proposal 2 System information modification procedure is used to inform TAC removals. |
| [R2-2200673](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200673.zip) [8] | Proposal 1: System Information update notification procedure is not used to inform TAC update on TAC removal.  Proposal 2: Additional parameters are not included in system Information related to TA list management for IoT-NTN. |
| [R2-2200693](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200693.zip) [9] | Proposal 1: System information update notification procedure is used to inform TAC removals.   * Enhancement should be considered for stationary eMTC/NB-IoT UEs to avoid frequent signaling reception caused by TAC removals. |
| [R2-2200699](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200699.zip) [10] | Proposal 4: System information update notification procedure is used to inform TAC removal in IoT NTN. |
| [R2-2200714](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200714.zip) [11] | Proposal 1: From network perspective, whether system modification procedure is used to inform UEs of TAC removal or not is based on the network implementation.  Proposal 2: From UE perspective, UE can use legacy TAU procedure to require the new TAC. |
| [R2-2200871](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200871.zip) [13] | Proposal 1: it is proposed to prefer the implicit manner to let the UE be aware of the network stops broadcasting a TAC.  Proposal 2: The possible approach is as follows   * The UE only to receive and decode a SI update information for TAU when it’s position is changing, i.e. a stationary UE can ignore the a SI update information for TAU; * CN only paging the UE according to the TAC mapping to the UE’s actual geographical location, not the TAs advertised in the SIB; meanwhile, the UE can determine whether to update the TA to CN via deriving the overlapped TA from at least two TA lists in SIB advertised in different time occasions. |
| [R2-2201197](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201197.zip) [15] | Proposal 1: TAC updates, including TAC additions /removals/change is not explicitly informed to the UE (i.e., System information update notification procedure is not used for this purpose.).  Proposal 2: UE (with high mobility) check the TAC list regularly after UE has been in the cell for certain time. |
| [R2-2201455](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201455.zip) [16] | Proposal 1: UE does not need to be informed about TAC removals. UEs can by implementation check SIB1 from time to time, e.g. before the PTW or every [X] seconds. |
| [R2-2201548](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201548.zip) [17] | Proposal 1: Introduce TAC validity timer that triggers the UE to re-acquire system information.  Proposal 2: The TAC validity timer may be provided per TAC.  Proposal 3: Discuss how to avoid many UEs triggering TAU simultaneously upon TAC expiry.  Proposal 4: TAC validity timer is an optional IE, and if not present the regular SI update mechanism can be used for TAC removal. |

Documents [9], [10], [13] propose that the System information update notification procedure is used to inform the UE of TAC removal and documents [9] and [13] propose to introduce enhancements for stationary UEs.

Documents [2], [8], [15], [16] and [17] propose that the System information update notification procedure is not used to inform the UE of TAC removal. Documents [15] and [16] propose that it can be left to the mobile UEs to check SIB1 from time to time while document [17] propose to introduce TAC validity timers that trigger UE to reacquire SIB1

Document [11] proposes that it can be left to the eNB implementation to use the System information update notification procedure and if not used it can be left to UE implementation.

Rapporteur notes that all documents agree that the notification of TAC removal is only beneficial for the purpose of paging and for mobile UEs (which represent a small portion of the UEs) and that is has negative impacts on stationary UEs, for which additional enhancements are needed.

Based on the above, the rapporteur proposes:

**Proposal 1**: It is up to the eNB implementation to use the System information update notification procedure to inform the UE of TAC removal and it is up to the UE implementation to check occasionally SIB1 for TAC removal. No additional mechanism is needed.

## Preventing non-NTN capable UEs to try and access a NTN cell

The following proposals are made in documents [1] - [18]:

|  |  |
| --- | --- |
| Tdoc | Proposals |
| [R2-2200673](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200673.zip) [8] | Proposal 3: Differentiation for access control of terrestrial IoT device and NTN device via system information is not considered in Rel-17. |
| [R2-2200693](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200693.zip) [9] | Proposal 2: At least for release 17, the applicable frequency of NTN cell is assumed to be different with that for TN cell, and no special specification effort is needed to prevent legacy/non-NTN capable UE from accessing NTN cell from RAN2 perspective. |
| [R2-2200699](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200699.zip) [10] | Proposal 5: Wait for RAN4 definition for IoT NTN frequency band(s) to decide whether to introduce a new barring bit for IoT NTN. |
| [R2-2200714](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200714.zip) [11] | Proposal 3: The legacy barring bit can be used to block all UEs including legacy UEs and IoT NTN capable UEs and there is no need to introduce a new barring bit for the IoT NTN capable UEs. |
| [R2-2200871](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200871.zip) [13] | Proposal 6: RAN2 can confirm that to use the legacy barring bit to block legacy UEs which can be ignored by NTN-capable UEs, and to introduce a new barring bit for the IoT NTN cell to block NTN-capable UEs when needed, which is similar to the barring bit design is Rel-16 NPN |
| [R2-2201455](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201455.zip) [16] | Proposal 4: If it can be guaranteed that IOT NTN will always be deployed in NTN specific bands and that no TN band will ever be defined/ signaled as overlapping band (i.e. in multibandInfoList), then the frequencyIndicator in SIB1 is enough to prevent a to prevent a TN only UE to try and access a NTN cell. Otherwise a mechanism is needed. |
| [R2-2201600](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201600.zip) [18] | Proposal 15 A UE that supports NTN ignores the cellBarred parameter provided in SIB1 and checks a parameter introduced to indicate the barring status for UEs that support NTN instead. |

There are mixed views on the need for a separate mechanism to bar non-NTN capable UEs and NTN capable UEs to access a NTN cell. All documents share the view that it depends on which bands IOT NTN will be deployed, which is RAN4 expertise.

Thus, the rapporteur proposes to send a LS to RAN4.

**Proposal 2**: Send a LS to RAN4 asking if IOT NTN will always be deployed in NTN specific bands.

## UL synchronisation

The following proposals are made in documents [1] - [18]:

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| --- | --- | --- |
| Tdoc | | Proposals |
| [R2-2200254](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200254.zip) [2] | | Proposal 3 Upon expiry of the validity timer, UE re-acquires the SIB and triggers RACH procedure to recover from UL out of synchronization.  Proposal 5 UE reports the information associated with this valid duration to the network in the UEAssistanceInformation message. |
| [R2-2200273](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200273.zip) [3] | Proposal 1 RAN2 agree to specify UL synchronization recovery procedure.  Proposal 2 When UL synchronization validity timer expires, UE declares TAT expiry.  Proposal 3 Following TAT expiry, UE applies the legacy procedure, i.e. flush HARQ buffer, release PUCCH/SRS/CG/dedicated SR resources.  Proposal 4 When UL synchronization validity timer is not running, UE needs to ensure having a valid version of MIB, SIB1 and the new SIB that carries ephemeris and common TA parameters.  Proposal 5 For connected UE, when UL synchronization validity timer is not running, UE is not required to receive DL transmissions other than system information.  Proposal 6 If UE is not being able to acquire the ephemeris and common TA, UE moves to idle mode.  Proposal 7 RAN2 to confirm that only for the case that epoch time is implicitly provided by SIB, network does not know when UE starts the UL synchronization timer.  Proposal 8 Network can configure UE whether to provide UL synchronization timer information.  Proposal 9 If configured by network to provide UL synchronization timer information, and if epoch time is implicitly provided by SIB, UE in connected mode transmits to the network UL synchronization timer information if UE did not transmit UL synchronization timer information.  Proposal 10 If configured by network to provide UL synchronization timer information, and if epoch time is implicitly provided by SIB, UE in connected mode transmits to the network UL synchronization timer information after restarting UL synchronization timer.  Proposal 11 For the content of UL synchronization timer report, UE reports the remaining time before UL synchronization timer expiry. UEAssistanceInformation message can be used to carry the report. | |
| [R2-2200441](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200441.zip) [4] | | Proposal 1 A new RLF timer (e.g., t317) is started when the UL synchronization validity timer expires.  Proposal 2 The new RLF timer (e.g., t317) is stopped if the UE acquires ephemeris and starts UL synchronization validity timer.  Proposal 3 RLF is triggered upon expiry of the new RLF timer (e.g., t317). |
| [R2-2200624](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200624.zip) [7] | | Proposal 1: On expiry of UL validity timer, the UE will trigger RLF, re-acquire the ephemeris and perform RRC Connection Re-establishment. |
| [R2-2200673](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200673.zip) [8] | | Proposal 4: RAN2 to confirm it is UE’s implementation to decide when to read the SIB in RRC\_IDLE state in order to restart the validity timer before the validity duration from the previous SIB reading expires.  Proposal 6: RAN2 to confirm if there is no common understanding on validity time status between UE and eNB, it will cause scheduling failure after expiration of the validity timer.  Proposal 7: There should be a common understanding on validity timer status between UE and network, which should be specified in IoT NTN even for sporadic short transmission. The eNB must know whether the UE is within the validity duration or whether the validity timer has expired or is about to expire soon at the UE side.  Proposal 8: RAN2 to discuss how UE reports the validity timer status to network to ensure a common understanding of the validity timer between UE and network.  Proposal 9: To save power and resource consumption, once the validity timer has expired, UE should remain in RRC Connected mode. The UE can therefore read the new ephemeris data for UL synchronisation and report it to the network (e.g. via CFRA as indicated by PDCCH order or CBRA initiated by UE). |
| [R2-2200699](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200699.zip) [10] | | Proposal 2: For LEO, IoT UE needs to acquire the new SIB before UE triggers RACH.  Proposal 3b: IoT UE should check the valid new SIB every time it initiates a RRC establishment procedure.  Proposal 7: UE reporting of validity timer status is not introduced.  Proposal 8: For IoT NTN, after validity timer expires, the UE re-acquires the SIB and triggers RACH procedure to recover from UL out of synchronization. |
| [R2-2201455](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201455.zip) [16] | | Proposal 5: UE is required to acquire the SIB containing the parameters for UL synchronisation before access (establishment, resumption and re-establishment).  Proposal 6: UE starts a new “UL validity timer” (TXXX) when reading the SIB with the configured timer validity duration at the epoch time of the assistance information.  Proposal 7: Upon “UL validity timer’ (TXXX) expiry, UE triggers RLF.  Proposal 8: There is no need for the UE to report that the validity timer for UL synchronisation is about to expire. |
| [R2-2201600](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201600.zip) [18] | | Proposal 13 NTN UE should read NTN-specific SIB before accessing the cell.  Proposal 18 Expiry of the validity timer does not trigger RLF and Connection re-establishment.  Proposal 19 The expiry of the uplink validity timer triggers a separate timer where the UE shall attempt to read the ephemeris and common TA. Upon expiry of this timer the UE goes to RLF and if UE successfully acquires the ephemeris and common TA, the validity timer is re-started and the UE can continue using uplink resources. During the timer the UE is not allowed to use uplink resources.  Proposal 20 RAN2 to discuss where the validity timer is modelled – RRC or MAC. |

Handling of UL synchronisation validity timer.

The majority of companies [2], [3], [4], [8], [10], [18] propose to introduce a recovery procedure for loss of UL synchronisation in RRC\_CONNECTED mode, the motivation being to avoid triggering RRC connection re-establishment and the associated signalling overhead and additional power consumption. However, there are a lot of different views on the actual details, e.g. need to report the UE validity timer to the NW, UE actions when synchronisation is lost, modelling, need for a RACH procedure after recovery of UL synchronisation...

Two companies [7], [16] propose not to introduce a recovery procedure for loss of UL synchronisation in RRC\_CONNECTED mode and triggers RRC Connection Re-establishment instead, the motivation being that it is simple and that loss of UL synchronisation for the use case of sporadic short transmission is an abnormal case that does not need to be optimised.

The rapporteur thinks that having a recovery procedure in connected mode is beneficial but it is not essential for the system to work. Considering the timeline for the WI, the rapporteur has the following proposals:

**Proposal 3a**: UE triggers RLF and performs RRC connection Re-establishment upon loss of UL synchronisation. No additional mechanism is needed.

**Proposal 3b**: If proposal 3a cannot be agreed, RAN2 to discuss the details of the handling of the UL synchronisation validity timer and recovery procedure

Acquisition of the UL synchronisation parameters

Documents [3] ad [8] propose that it is up to UE when to acquire the UL synchronisation parameters and that the UE can access the cell as long as the UL synchronisation validity timer is running. Documents [10], [16] and [18] propose that the UE shall acquire the NTN specific SIB before accessing the cell.

Rapporteur thinks that the UL synchronisation validity timer applies to the UL synchronisation and TA common parameters for use in RRC\_CONNECTED mode. Reading the NTN specific SIB just before access will minimise the risk of the validity timer expiring during the connection, avoiding the need for recovery.

**Proposal 4**: UE acquires the NTN specific SIB before accessing the cell.

## GNSS fix

The following proposals are made in documents [1] - [18]:

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| Tdoc | Proposals |
| [R2-2200254](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200254.zip) [2] | Proposal 4 UE reports GNSS validity duration X together with the epoch time when the GNSS validity timer is started.  Proposal 6 RAN2 to discuss whether UE can autonomously go back to idle mode, or it should be the network to release UE to idle mode if GNSS becomes outdated.  Proposal 7 Send LS to RAN1 and inform RAN1 of RAN2’s understanding if that is different from RAN1 agreements. |
| [R2-2200273](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200273.zip) [3] | Proposal 12 When GNSS becomes outdated, UE first declares RLF and then moves to idle mode. When declaring RLF, UE stores the RLF information (e.g. PLMN, PCI, measurement results) in VarRLF-Report, set connectionFailureType to rlf, set rlf-Cause to GNSS outdated, but does not initiate RRC connection r-eestablishment procedure.  Proposal 13 When GNSS becomes outdated, UE moves to idle mode with release cause GNSS outdated.  Proposal 14 Network can configure UE whether to provide GNSS validity duration.  Proposal 15 UEAssistanceInformation message is used for reporting GNSS validity duration X. |
| [R2-2200442](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200442.zip) [5] | Proposal 1 Introduce a RRC controlled GNSS validity timer. The value of the timer is determined by the UE.  Proposal 2 Define a delay period for moving to RRC\_IDLE upon expiry of the GNSS validity timer if UE did not receive RRC connection release message prior to expiry of the GNSS validity timer.  Proposal 3 Define a shorter range for the remaining GNSS validity timer report.  Proposal 4 The UE reports the remaining time of the GNSS validity timer using DCQR and AS RAI MAC CE. |
| [R2-2200622](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200622.zip) [6] | Proposal 1: RAN2 will include RAN1 agreement [1] that IoT-NTN enabled UE in RRC\_CONNECTED should go back to idle mode and re-acquire a GNSS position fix if GNSS becomes outdated and update the specifications. |
| [R2-2200673](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200673.zip) [8] | Proposal 10: UE should report the GNSS valid duration in Msg3/Msg5 or subsequent UL RRC messages.  Proposal 11: For UE in RRC Connected mode, the GNSS validity should be kept in order to complete the data transmission before the UE go back to idle state. |
| [R2-2200699](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200699.zip) [10] | Proposal 9: A RLF is triggered after GNSS becomes outdated.  Proposal 10: No need to introduce reporting for GNSS validity duration. |
| [R2-2201455](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201455.zip) [16] | Proposal 9: UE is required to acquire a new GNSS fix before access (establishment, resumption and re-establishment).  Proposal 10: When acquiring a new GNSS fix, the UE starts a new “GNSS fix validity timer” (TYYY) with the validity duration of the GNSS fix determined by UE implementation.  Proposal 11: Upon “GNSS fix validity timer’ (TYYY) expiry, UE triggers RLF.  Proposal 12: There is no need for the UE to report to the network the GNSS validity duration. |
| [R2-2201600](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201600.zip) [18] | Proposal 21 RAN2 to discuss what aspects of GNSS validity that should be left to UE or network implementation.  Proposal 22 GNSS validity duration is reported via RRC. |

The majority of companies [2], [3], [5], [6], [8], [18] propose to introduce reporting of the GNSS validity timer to the eNB and transition to RRC\_IDLE to reacquire a GNSS fix when the fix become outdated. This is aligned with RAN1 agreements and RAN1 LS in R2-2200084. However, there are a lot of different views on the actual details, e.g. whether the UE should actually enter RRC\_IDLE autonomously, wait for some time or wait infinitively to be released by the network, which procedure to use and when to report the GNSS fix to the NW, the intended use of the validity timer in the NW …

Two companies [10], [16] propose to trigger RLF and RRC Connection Re-establishment after having acquired a new GNSS fix, the motivation being that it is simple. The two companies also question the intention of reporting the validity timer to the network.

Considering the timeline for the WI and that many aspects of the GNSS validity timer are unclear, the rapporteur has the following proposals:

**Proposal 5a**: UE triggers RLF, reacquires a GNSS fix and performs RRC connection Re-establishment when the GNSS fix becomes outdated in RRC\_CONNECTED mode. No additional mechanism is needed.

**Proposal 5b**: If proposal 5a cannot be agreed, RAN2 to discuss the details of the handling of the GNSS fix validity.

Documents [5] and [16] propose to have a RRC-controlled GNSS validity timer while document [18] assumes this should be left to UE implementation.

**Proposal 6**: RAN2 to discuss whether to introduce a RRC-controlled GNSS validity timer or leave it to UE implementation.

## UE location reporting

The following proposals are made in documents [1] - [18]:

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| --- | --- |
| Tdoc | Proposals |
| [R2-2200254](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200254.zip) [2] | Proposal 8 Don’t support UE location reporting in IoT NTN. |
| [R2-2200673](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200673.zip) [8] | Proposal 12: For UE in RRC Connected mode, eNB can request UE to report its location if the AS security is established and the NTN specific user consent is stored in the eNB.  Proposal 13: For IoT NTN, RRC signalling is used to report UE location. The reported UE location can be used for Cell ID mapping, MME selection and Timing Advance estimation. |
| [R2-2200699](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200699.zip) [10] | Proposal 6: For UE’s location reporting, IoT NTN waits for a further agreement in NR NTN. |
| [R2-2201455](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201455.zip) [16] | Proposal 13: For eMTC, wait for NR to conclude about location reporting and reuse NR agreements.  Proposal 14: For NB-IoT, when using the user plane solution, reporting of UE location in RRCConnectionResumeComplete and RRCConnectionReestablishmentComplete is supported and controlled by an indication in SIB2.  Proposal 15: For NB-IoT, when using the control plane solution, reporting of UE coarse location in RRCConnectionSetupComplete and RRCConnectionReestablishmentComplete is supported and controlled by an indication in SIB2. |
| [R2-2201600](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201600.zip) [18] | Proposal 1 RAN2 to introduce same high-level solution as NR NTN for User Plane CIoT EPS Optimisation devices - coarse location before AS security and full location report after AS security to eNB.  Proposal 2 If AS security cannot be established, RAN2 assumes it would be sufficient to provide coarse location.  Proposal 3 Send LS to RAN3, SA2, SA3 and SA3-LI to inform them about RAN2 agreements location provisioning in IoT NTN.  Proposal 4 All location info (coarse and detailed) is delivered via RRC.  Proposal 5 Coarse location can be provided in RRCConnectionSetupComplete message.  Proposal 6 UE Information Request/Response procedure is used to deliver detailed location information after AS security has been established.  Proposal 7 In UP solution, UE provides the detailed location information in RRCConnectionResumeComplete message.  Proposal 8 RAN2 to discuss whether location information should be sent in the connection re-establishment complete and connection reconfiguration complete message.  Proposal 9 RAN2 to discuss whether location information should be sent during EDT procedure. |

Document [8] proposes to support full location reporting after AS security. Documents [16], [18] propose to support coarse location reporting when AS security cannot be used and full location reporting after AS security. Document [10] propose to wait for NR NTN agreement and document [2] proposes not to support location reporting for IOT NTN as it cannot be supported for NB-IoT CP solution. Document [18] also proposes to inform RAN3/SA2/SA3 of RAM2 agreements

**Proposal 7**: Reporting of coarse location before AS security and full location after AS security is supported in IOT NTN. Send a LS to inform RAN3/SA2/SA3.

All documents support reporting via RRC signalling. Documents [16] and [18] discuss some details of the reporting (procedure, enabling…) and indicate that NR solution may not be suitable for IOT.

**Proposal 8**: Location (coarse and full) is reported via RRC signalling. RAN2 to discuss the signalling details of location reporting in IOT NTN.

## Other

### Handling of NTN specific SIB in RRC\_IDLE

The following proposals are made in documents [1] - [18]:

|  |  |
| --- | --- |
| Tdoc | Proposals |
| [R2-2200673](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200673.zip) [8] | Proposal 5: Change of information not related to ephemeris and common TA parameters can trigger system information notification procedure with additional indication in the paging message itself. |
| [R2-2200699](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200699.zip) [10] | Proposal 1a: For quasi-earth fixed cell, IoT UE needs to acquire the new SIB when UE camps on a cell.  Proposal 1b: For moving cell, IoT UE needn’t to acquire the new SIB when UE camps on a cell.  Proposal 3a: The new SIB is not an essential system information for IoT UE. |
| [R2-2200770](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200770.zip) [12] | Proposal 3: The UE can skip obtaining or decoding the same ephemeris of a satellite/HAP constellation if there is no update. |
| [R2-2201182](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201182.zip) [14] | Proposal 1: NAS mechanisms be used for slowly changing ephemeris, and RRC signaling for rapidly changing ephemeris.  Proposal 2: System information modification procedure is not invoked for ephemeris related SIBs.  Proposal 3: A validity period is used to ensure that the ephemeris information used by the UE is valid. |
| [R2-2201600](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201600.zip) [18] | Proposal 14 Discuss whether RRC\_IDLE NTN UE is required to read NTN-specific SIB. |

**Proposal 9**: RAN2 to discuss whether RRC\_IDLE UE is required to read NTN-specific SIB and whether some mechanism is needed to trigger the UE to reacquire the NTN specific SIB in RRC\_IDLE.

### RRC Connection Release

The following proposals are made in documents [1] - [18]:

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| Tdoc | Proposals |
| [R2-2200714](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200714.zip) [11] | Proposal 4: For the reception of RRC release, RAN2 to discuss the following two options for extending the 1.25s delay for eMTC UEs:  Option 1: 1.25s delay value is extended based on UE-gNB RTT, e.g. 1.25 + N\*UE-gNB RTT.  Option 2: 1.25s delay value is extended to a fix value, e.g. 3.86s |
| [R2-2201600](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201600.zip) [18] | Proposal 10 RRC Connection Release timer is increased from 1.25 s to 2.5 s for BL UEs or UEs in CE operating in NTN. |

**Proposal 10**: RRC Connection Release timer is increased by a fixed value for BL UEs or UEs in CE operating in NTN. FFS value = 2.5 s.

### Miscellaneous

The following proposals are made in documents [1] - [18]:

|  |  |
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| Tdoc | Proposals |
| [R2-2200254](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200254.zip) [2] | Proposal 1 For quasi-earth fixed cell, UE should start measurements on neighbour cells before the serving cell stops covering the current area, regardless of whether legacy Srxlev/Squal condition is met, i.e., serving cell’s Srxlev/Squal is lower than the thresholds. |
| [R2-2200699](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200699.zip) [10] | Proposal 11: RAN2 send response LS to CT1 and include the delay results for IoT NTN. |
| [R2-2200770](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200770.zip) [12] | Proposal 1: RAN2 to consider minimizing the size of ephemeris for serving and neighboring NTN cells in a satellite/HAP constellation.  Proposal 2: For a satellite/HAP constellation, ephemeris of neighboring cells can be indicated as relative values to that of the serving cell. |
| [R2-2200871](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200871.zip) [13] | Proposal 3: it is proposed to introduce the conditional RRC connection re-establishment procedure which configures the procedure triggering condition and target cells to the UE beforehand.  Proposal 4: the conditional RRC connection re-establishment condition setting and execution, can base on the ephemeris information and UE’s location  Proposal 5: the group Re-establishment mechanism as for group HO is required to study for NB-IoT UEs as well. |
| [R2-2201455](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201455.zip) [16] | Proposal 2: In NB-IoT, the list of TACs broadcast in the cell is common to all PLMNs same as in legacy, where all cell access information are common to all PLMNs.  Proposal 3: RAN2 to discuss the maximum of TACs that can be broadcast in a cell in IOT NTN. |
| [R2-2201600](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201600.zip) [18] | Proposal 11 Synchronization related parameters can be implemented as part of NTN-specific SIB.  Proposal 12 Transmission duration parameters can be included as part of the respective channel configuration.  Proposal 16 RAN2 intends to introduce a mechanism to reduce the need to acquire full system information after cell reselection unless UE intends to access the network.  Proposal 17 RAN2 to discuss how to indicate the ID of a cell group where parameters providing essential information are provided with the same configuration. |

Proposal 1 in [2] is already captured in the running 36.304 CR.

Proposal 11 in [10] should be discussed as part of the reply LS to CT1 in AI 9.2.1

Proposals 3, 4 and 5 in [13] have already be excluded at RAN#116 with the agreement ‘No enhancement to R16 RLF and RRC connection Re-establishment procedures are introduced in R17’.

Proposals 2 and 3 in [16] address the signalling of the RAN1 parameters.

**Proposal 11**: Synchronization related parameters are signalled in the NTN specific SIB and the transmission duration parameters in the respective channel configuration.

Proposal 11 and 12 in [18] address the signalling of the TAC parameters.

**Proposal 12:** RAN2 to discuss whether the list of TACs broadcast in the cell is also per PLMN in NB-IoT and discuss the maximum number of TACs that can be broadcast in a cell in IOT NTN.

Proposal 16 and 17 in [18] were discussed at RAN2#116 and seen by most companies as an optimisation not needed in Rel-17. Considering the timeline of the WI, rapporteur proposes it is not considered in R17.

**Proposal 13**: No mechanism to reduce system information acquisition time after cell reselection is introduced in R17.

# Conclusion

TAC removal

**Proposal 1**: It is up to the eNB implementation to use the System information update notification procedure to inform the UE of TAC removal and it is up to the UE implementation to check occasionally SIB1 for TAC removal. No additional mechanism is needed.

Preventing non-NTN capable UEs to try and access a NTN cell

**Proposal 2**: Send a LS to RAN4 asking if IOT NTN will always be deployed in NTN specific bands.

UL synchronisation

**Proposal 3a**: UE triggers RLF and performs RRC connection Re-establishment upon loss of UL synchronisation. No additional mechanism is needed.

**Proposal 3b**: If proposal 3a cannot be agreed, RAN2 to discuss the details of the handling of the UL synchronisation validity timer and recovery procedure.

**Proposal 4**: UE acquires the NTN specific SIB before accessing the cell.

GNSS fix

**Proposal 5a**: UE triggers RLF, reacquires a GNSS fix and performs RRC connection Re-establishment when the GNSS fix becomes outdated in RRC\_CONNECTED mode. No additional mechanism is needed.

**Proposal 5b**: If proposal 5a cannot be agreed, RAN2 to discuss the details of the handling of the GNSS fix validity.

**Proposal 6**: RAN2 to discuss whether to introduce a RRC-controlled GNSS validity timer or leave it to UE implementation.

UE location reporting

**Proposal 7**: Reporting of coarse location before AS security and full location after AS security is supported in IOT NTN. Send a LS to inform RAN3/SA2/SA3.

**Proposal 8**: Location (coarse and full) is reported via RRC signalling. RAN2 to discuss the signalling details of location reporting in IOT NTN.

Other

**Proposal 9**: RAN2 to discuss whether RRC\_IDLE UE is required to read NTN-specific SIB and whether some mechanism is needed to trigger the UE to reacquire the NTN specific SIB in RRC\_IDLE.

**Proposal 10**: RRC Connection Release timer is increased by a fixed value for BL UEs or UEs in CE operating in NTN. FFS value = 2.5 s.

**Proposal 11**: Synchronization related parameters are signalled in the NTN specific SIB and the transmission duration parameters in the respective channel configuration.

**Proposal 12:** RAN2 to discuss whether the list of TACs broadcast in the cell is also per PLMN in NB-IoT and discuss the maximum number of TACs that can be broadcast in a cell in IOT NTN.

**Proposal 13**: No mechanism to reduce system information acquisition time after cell reselection is introduced in R17.

# References

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1. [R2-2200254](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200254.zip) Discussion on CP impact for IoT over NTN OPPO

1. [R2-2200273](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200273.zip) RAN2 aspects of UL sync validity timer and GNSS position validity Xiaomi

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1. [R2-2200442](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200442.zip) Discussion on the GNSS validity duration Qualcomm Incorporated

1. [R2-2200622](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200622.zip) On GNSS Validity Duration in IoT-NTN MediaTek Inc.

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1. [R2-2200714](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200714.zip) Discussion on RRC idle mode issues for IoT NTN Xiaomi

1. [R2-2200770](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2200770.zip) Serving and neighboring ephemeris in system information for IoT NTN Lenovo, Motorola Mobility

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1. [R2-2201182](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201182.zip) Provision of ephemeris Apple

1. [R2-2201197](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201197.zip) Soft TAC update NEC Telecom MODUS Ltd.

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1. [R2-2201548](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201458.zip) TAC validity timer Interdigital, Inc.

1. [R2-2201600](http://ftp.3gpp.org/tsg_ran/WG2_RL2/TSGR2_116bis-e/Docs/R2-2201600.zip) Control plane aspects of IoT NTN Ericsson