**3GPP TSG-RAN WG4 Meeting # 104-e R4-2214159**

**Electronic Meeting, 15– 26 August 2022**

**Agenda item:** 12.5.6

**Source:** Moderator (MediaTek inc.)

**Title:** Email discussion summary for [104-e][239] LTE\_NBeMTC\_NTN\_RRM

**Document for:** Information

# Introduction

This document is the email discussion summary for RRM requirements for NB-IoT/eMTC core & perf. requirements for NTN (AI 12.5.5), including the following topics covered

* 12.5.5 RRM core requirements

List of candidate target of email discussion for 1st round and 2nd round

* 1st round: Decide on the scope, priority, options and tentative agreement to be discussed in the 2nd round. Conclude issues with strict consensus, if any.
* 2nd round: Conclude the issues identified in the 1st round.

Contact information

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| --- | --- | --- |
| **Company** | **Name** | **Email address** |
| MediaTek | Hsuanli Lin | Hsuanli.Lin@mediatek.com |
| Nokia | Erika Almeida | Erika.almeida@nokia.com |
| Qualcomm | CH Park | chparkqc@qti.qualcomm.com |

Note:

1. Please add your contact information in above table once you make comments on this email thread.
2. If multiple delegates from the same company make comments on single email thread, please add you name as suffix after company name when make comments i.e. Company A (XX, XX)

# Topic #1: General

*Main technical topic overview. The structure can be done based on sub-agenda basis.*

## Companies’ contributions summary

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2212404**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212404.zip) | MediaTek inc. | Proposal 1: The following aspects/features are not relevant for NB-IoT/eMTC UE served by SAN and therefore should not be used in RRM requirements for NB-IoT/eMTC UE served by SAN:* **TDD related aspects**
* **Positioning requirements**

Proposal 2: The RRM requirements for autonomous gap for CGI reading are not applicable for NB-IoT/eMTC UE served by SAN. Proposal 3: The requirements apply provided that serving and all neighbour satellites on the same layer are of same satellite type (LEO or GEO). Proposal 4: Follow TN section structure as in TS 36.133 in general and use suffix “A” for satellite access requirement.Proposal 5: NB1 and NB2 UE share the same requirement for UE category NB-IoT for Satellite Access, unless specified otherwise.Proposal 6: Agree on the initial CR structure as proposed.Proposal 7: For GEO, the existing TN requirements related to DRX/eDRX, HD-FDD can be re-used as baseline. Proposal 8: For LEO/NGSO, the existing TN requirements related to DRX/eDRX, HD-FDD can be re-used as baseline. FFS the applicability of DRX/eDRX cycle length and PTW length.Observation 1: The UE capability on “Segmented UL transmission” are applicable to NB NGSO (NPUSCH), M1 GEO/NGSO (PUSCH/PUCCH) but not for NB GEO. Proposal 9: Segmented UL transmission can be covered by NTN UE transmit timing requirements, i.e. Te\_NTN. FFS whether and how to capture in RAN4. Proposal 10: The following UE capability, introduced in RAN4 R17 NR NTN, are not applicable for LTE IoT in Rel-18: * **25-1 Parallel measurements on multiple SMTC-s for a single frequency carrier**
* **25-3 Parallel measurements with multiple measurement gaps**
* **25-4 Enhanced RRM requirements for measurements in IDLE and INACTIVE modes**
* **25-6 Relaxed cell reselection on GEO**

Proposal 11: For NB in IDLE, the existing TN requirements of UE measurement capability of monitoring on number carriers apply, as in 4.6.2.8 in TS 38.133* **Depending on UE capability, an intra-frequency carrier.**
* **Depending on UE capability, at least 2 inter-frequency carriers.**

Proposal 12: For M1, the existing TN requirements of UE measurement capability of monitoring on number carriers apply* **Depending on UE capability, 2 FDD E-UTRA inter-frequency carriers, and**
* **Depending on UE capability, 2 TDD E-UTRA inter-frequency carriers.**
* **the number of NTN and TN carriers UE needs to monitor is 5 including serving CC**

Proposal 13: For both NB and M1 in NGSO, the number of target satellites UE needs to monitor per carrier is 2 including serving LEO satellite. Proposal 14: For NB-IoT/eMTC cell re-selection requirement, * **For GEO,**
	+ **For NB, the existing TN requirements apply, as in 4.6.2**
	+ **For M1, the exiting TN requirements apply, as in 4.7.2.1/4.7.2.2**

Proposal 15: For NB-IoT/eMTC cell re-selection requirement, * **For NGSO,**
	+ **the existing delay requirements (Tdetect, Tmeasure, Tevaluate) can be scaled up by** *KSatellite*
		- **where** *KSatellite* **is the number NGSO satellites and is can assume** *KSatellite* =[2]**for intra-frequency measurement in IDLE mode and** *KSatellite* =1**for inter-frequency measurement in IDLE mode.**
	+ **For Normal Cover, the exiting TN requirement can be the baseline.**
	+ **For Enhanced Coverage intra-/inter-frequency measurement, the existing TN requirement on Tmeasure, Tevaluate can be the baseline. FFS the cell detection time (Tdetect).**
	+ **cell stop serving time based cell reselection can be further considered for Quasi-Earth Fixed satellites**

Observation 2: In current 38.133 NR NTN, the maximum interruption in paging reception is extended if the target cell belongs to a different satellite than the current one and the target cell’s satellite is non-GEO.Proposal 16: For NB, the maximum interruption in paging reception for NTN cell reselection shall not exceed * **TSI-NB1-NC/EC + 100 ms,**
	+ **the target cell’s satellite is GEO, or**
	+ **the target cell’s satellite is NGSO and the target cell belongs to the same satellite as the current one**
	+ **Note: same as the existing TN requirement, as in 4.6.2.7/4.6.2.7A**
* **TSI-NB1-NC/EC + [250] ms,**
	+ **the target cell’s satellite is NGSO and the target cell belongs to the different satellite as the current one**

Proposal 17: For M1, the maximum interruption in paging reception for NTN cell reselection shall not exceed * **TSI-EUTRA-M1-NC/EC + 50 ms,**
	+ **the target cell’s satellite is GEO, or**
	+ **the target cell’s satellite is NGSO and the target cell belongs to the same satellite as the current one**
	+ **Note: same as the existing TN requirement, as in 4.7.2.1.5/4.7.2.2.5**
* **TSI-EUTRA-M1-NC/EC + [125] ms, if**
	+ **the target cell’s satellite is NGSO and the target cell belongs to the different satellite as the current one**

Proposal 18: If the cell stop time (i.e., *t-serve*) is applicable, and the time span between SIB broadcasting cell stop time and the cell stop time is less than Ttrigger, longer interruption is expected.Proposal 19: For M1, the existing TN requirements of channel quality report for in idle mode apply, as in 4.7.3.Proposal 20: For WUS receptions, * **For NB, the existing TN requirements apply, as in 4.6.2.9.**
* **For M1, the existing TN requirements apply, as in 4.7.2.3.**

Proposal 21: For Transmission using preconfigured uplink resources (PUR), * **For NB, the existing TN requirements apply, as in 4.6.3.**
* **For M1, the existing TN requirements apply, as in 4.7.4.**

Proposal 22: For M1, the existing requirements of E-UTRAN Handover for Cat-M1 UE apply, as in 5.5. Proposal 23: For Random Access,* **For NB, the existing TN requirements apply, as in 6.6**
* **For M1, the existing TN requirements apply, as in 6.2.3**
* **If UE specific TA reporting is enabled and applicable, UE shall be able to report information about UE specific timing advance during a Random Access procedure as specified in TS 36.321[17].**

Proposal 24: For RRC Re-establishment,* **For NB, the existing TN requirements apply, as in 6.5**
* **For M1, the existing TN requirements apply, as in 6.7**

Proposal 25: For RRC Connection Release with Redirection,* **For NB, the existing TN requirements apply, as in 6.9**
* **For M1, the existing TN requirements apply, as in 6.8**

**Proposal 26: For IoT NTN, Te\_NTN is extended by [17] Ts,*** **For NB, Te\_NTN: 80+ [17] = [97] Ts.**
* **For M1 CE Mode A, Te\_NTN: 24+[17] = [41] Ts**
* **For M1 CE Mode B, Te\_NTN: 48+[17] =[65] Ts**

**Proposal 27: For gradual timing adjustment, the reference timing shall be (*N*TA *+ N*TA-offset *+ N*TA,common *+ N*TA,UE-specific)*×*Tc before the downlink timing of the reference cell. Clarify the adjustment with “apart from a change of NTA,UE-specific and NTA,common”****Proposal 28: For gradual timing adjustment, the legacy values of Tq /Tp  are applicable to Tq\_NTN /Tp\_NTN.**Proposal 29: UE Timer accuracy,* **For NB, the existing TN requirements apply, as in 7.21**
* **For M1, the existing TN requirements apply, as in 7.27**

Proposal 30: For Timing Advance adjustment accuracy,* **Existing NB TN (accuracy) requirements apply, as in 7.22**
* **Existing M1 TN (accuracy) requirements apply, as in 7.28**
* **Clarify the adjustment of timing with “apart from a change of NTA,UE-specific and NTA,common between the preceding uplink transmission and the current transmission”**

Proposal 31: For RLM,* **For NB, the existing TN requirements apply for GEO and NGSO, as in 7.23**
* **For M1,**
	+ **For GEO, the existing M1 TN requirements apply, as in 7.19**
	+ **For NGSO, define the RLM requirements based on UE measures on one NGSO satellite at a time, without introducing the UE capability of L1/L3 processing in parallel.**

Observation 3: NB-IoT intra frequency measurements are specified for serving NB-IoT cell.Proposal 32: for intra-frequency measurements,* **For NB, the existing TN intra frequency measurement requirements apply, as in 8.14.2 for Normal Coverage and 8.14.3 for Enhanced Coverage.**
* **For M1 in GEO, the existing M1 TN intra frequency measurement requirements apply, as in 8.13.2.1 for CE mode A and 8.13.3.1 for CE mode B**
* **For M1 in NGSO, the delay requirements are scaled up by the number NGSO satellites.**

Proposal 33: for inter-frequency measurements,* **For M1 in GEO, the existing M1 TN requirements apply, as in 8.13.2.6 for CE mode A and 8.13.3.5 for CE mode B.**
* **For M1 in NGSO, the delay requirements are scaled up by the number NGSO satellites.**

 Proposal 34: for Connected mode channel quality report,* **For NB, the existing TN requirements apply, as in 8.14.4**
* **For M1, the existing TN requirements apply, as in 8.13.2.8 for CE-A, 8.13.3.8 for CE-B**
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| [**R4-2212908**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212908.zip) | Nokia, Nokia Shanghai Bell | 1. The LTE\_IoT\_NTN work item defines several communication scenarios: LEO, GEO and MEO. These scenarios are significantly different, for example, in term of cell-coverage, round trip time, differential delay and max Doppler shift, which might impact on RRM core / Demodulation requirements. Additionally, the WID specifies that requirements for both eMTC and NB-IoT are to be defined.

RAN4 NTN work only considered LEO and GEO scenarios, but the TR 36.763 concluded that the enhancements from the NTN work are applicable to MEO as well.1. RAN4 to develop RRM requirements for LEO and GEO scenarios. If needed, prioritize LEO
2. RAN4 to develop RRM requirements for both eMTC and NB-IoT devices over NTN.
3. RAN4 to consider the following list of requirements in the discussion of the scope of RRM requirements for IoT NTN:

RAN2 has agreed that the UE in discontinuous coverage deployment is not required to perform any cell search. A new SIB32 was defined so that the ephemeris information for discontinuous coverage is shared with the Ues.1. Define the RAN4 requirements based on the assumption that the UE is able to predict the coverage.
2. In IDLE mode or PSM mode, the UEs are not required to perform any cell search while out of coverage in discontinuous coverage.
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| [**R4-2212971**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2212971.zip) | Huawei, HiSilicon | **Observation 1: The cell detection time in enhanced coverage is very long compared with serving time of LEO satellite.****Proposal 1: Discuss whether to define requirements of cell Re-selection for enhanced coverage.****Proposal 2: The cell-stop time based cell reselection should be considered in IoT NTN.****Proposal 3: Do not define location-based cell reselection for IoT NTN.****Observation 2: For relaxed serving cell measurement and evaluation, legacy requirements can be taken as baseline.****Proposal 4: Do not consider positioning requirements for IoT NTN.****Proposal 5: Discuss whether to define RSRP-based TA validation for PUR in IoT NTN.****Proposal 6: Requirements of RRC Re-establishment and RRC release with redirection of TN can apply to IoT NTN.** **Proposal 7: Define Te requirements in the same method as NR NTN where the reference point is defined considering the UE specific TA, and discuss whether to keep the same GNSS estimation accuracy assumption as NR NTN.****Proposal 8: The restriction on UL transmission adjustment shall be updated according to RAN1 LS on per-segment TA pre-compensation.****Proposal 9: Similar as NR NTN, the mobility and measurement requirements for IoT NTN apply provided that valid information for the neighbor/target cell is made available to the UE.****Proposal 10: For eMTC over NTN, define HO requirements by re-using TN HO requirements for NTN as baseline, and define CHO requirements for NTN (no need to consider time or location based CHO).****Proposal 11: For eMTC over NTN, re-use the TN measurement delay requirements for NTN as baseline, and the scaling factor for measurement of multiple LEO satellites should also apply.****Proposal 12: For eMTC over NTN, RAN4 not to define scheduling restriction due to RRM measurement.****Proposal 13: For eMTC over NTN, a single MG is considered for RRM measurement.** |
| [**R4-2213415**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213415.zip) | Ericsson | **Proposal 1:** The general section on terminologies and band groups are updated to contain NTN IoT specific changes. **Proposal 2:** The serving cell evaluation and neighbour cell measurement requirements are reused with following modifications: eDRX and long DRX cycles are excluded when the serving cell coverage is impacted due to satellite movement (e.g. as indicated by Tservice).**Proposal 3:** The NTN paging reception requirements based on type of satellites are reused for NTN IoT. **Proposal 4:** The existing measurement capability requirements are reused for NTN IoT.**Proposal 5:** The principles of defining WUS reception requirements is reused but the required number of repetitions are kept TBD.**Proposal 6:** The UE update the uplink timing for transmitting on PUR using the configured TA command according to TS 36.211 v17.2.0 i.e. transmission of uplink radio frame number  from the UE starts $T\_{TA}=\left(N\_{TA}+N\_{TA,offset}+N\_{TA,adj}^{common}+N\_{TA,adj}^{UE}\right)T\_{s}$**Proposal 7:** The UE assumes TA is valid provided that the following conditions are met, otherwise the UE is considered invalid:* Satellite assistance information (SAI) is valid i.e. T317 has not expired and
* Current time of the UE is at least ΔT seconds earlier than t-Service.

**Proposal 8:** For legacy handovers, the existing HO requirements are reused. For Conditional handovers, new requirements based on corresponding NTN CHO are defined NB-IoT and eMTC. **Proposal 9:** Existing RRC re-establishment requirements are reused for NTN IoT.**Proposal 10:** Existing random access requirements are reused for NTN IoT.**Proposal 11:**  Existing RRC connection release with redirection requirements are reused for NTN IoT.**Proposal 12:** The timing requirements from Rel-17 NTN is used as baseline with some modification to the values to account for the lower BW is needed for NTN IoT. **Proposal 13:** RAN4 shall investigate Doppler shift impact on the overlapping receiving window from multiple inter-frequency satellites on IoT NTN. **Proposal 14:** The UE in DRX shall evaluate the RLM according non-DRX requirements provided that the following conditions are met, otherwise the UE is allowed to evaluate following DRX requirements:* Satellite assistance information (SAI) is valid i.e. T317 has not expired and
* Current time of the UE is at least ΔT seconds earlier than t-Service.

**Proposal 15:** CONNECTED mode serving cell and neighbour cell measurements as introduced in Rel-17 NB-IoT are reused for NTN NB-IoT.**Proposal 16:** CONNECTED mode measurements for serving cell and neighbour cell measurements as introduced in Rel-17 NB-IoT are reused for NTN NB-IoT.**Proposal 17:** NB-IoT/eMTC over NTN requirements are introduced in separate sections. **Proposal 18:** Clarify defining of positioning requirements for NTN IoT is not part of this WI. |
| [**R4-2213745**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_104-e/Docs/R4-2213745.zip) | CMCC | ***Proposal 1: TDD related requirements are not applicable to R17 IOT-NTN.******Proposal 1: TDD related requirements are not applicable to R17 IOT-NTN.******Proposal 2: The reference point for the UE initial transmit timing control requirement*** ***and timing advanced adjustment requirement shall be revised******Proposal 3: Te should be relaxed, the extended value can reuse NTN assumption in each case******Proposal 4: For cell-reselection requirement, when the case of cell stop time is broadcasted and applicable, the UE cell-reselection behavior and other restrictions should be decided and specified.******Proposal 5: The maximum interruption in paging reception should be relaxed under the unknow cell case.*** ***Proposal 6: For eMTC-NTN, if the*** ***measurements of cells belonging to different satellite as the serving cell and performed outside the MG, and UE don’t support parallel measurements capability**** ***For L1 RLM measurements, a scaling factor should be used to account overlapping between L1 resources and SMTC for L3 measurements.***
* ***For L3 measurements, a factor should be introduced to account overlapping between the associated SMTC and L1 resources***
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## Open issues summary

*Before e-Meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### General

#### Issue 1-1-1: Work plan

*Work Plan is proposed in R4-2211799, the RRM part is attached below.*

RRM core & performance requirements part

3GPP RAN4 #104-e meeting (August, 2022, **Core Part**)

* Approve Work plan
* Endorse initial CR structure
* Discuss RRM core part requirements.
1. 3GPP RAN4 #104-bis-e meeting (October, 2022, **Core Part**)
* Discuss RRM core part requirements.
* Initial draft CR(s) on core part in TS38.133
1. 3GPP RAN4 #105-e meeting (November, 2022, **Core Part**)
* finalize RRM core part and the corresponding final CR(s) on core part in TS38.133
1. 3GPP RAN4 #106 meeting (Feb., 2023, **Performance part**)
* Work split on test cases CR responsible companies.
1. 3GPP RAN4 #106-bis meeting (April, 2023, **Performance part**)
* Initial draft CR(s) on test cases in TS38.133.
1. 3GPP RAN4 #107 meeting (May, 2023, **Performance part**)
* Finalization on test cases design.
* Agree CR(s) on test cases in TS38.133.
* Proposals
	+ Option 1: RAN4 to endorse the work plan for NB-IoT/eMTC for NTN as presented in R4-2211799.
* Recommended WF
	+ Option 1. Please provide your comments below.

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| **Company** | **Comments** |
| Nokia | In general we are OK with the work plan, except for the Initial draft CRs on meeting R4 #104bis. We think that agreements / work split discussions are needed for the first version of the draft CRs.  |

#### Issue 1-1-2: WI scope

* Background: the WID states following:“NOTE: Rel-17 IoT NTN specifications do not cover non-NTN NB-IoT/eMTC functionality defined later than Rel-16.”
* Proposals
	+ Proposal 1: RAN4 to develop RRM requirements for LEO and GEO scenarios. If needed, prioritize LEO (Nokia)
	+ Proposal 2: RAN4 to develop RRM requirements for both eMTC and NB-IoT devices over NTN. (Nokia)
	+ Proposal 3: CONNECTED mode measurements for serving cell and neighbour cell measurements as introduced in Rel-17 NB-IoT are reused for NTN NB-IoT. (Ericsson)
* Moderator’s understanding is the CONNECTED mode neighbour cell measurements introduced in Rel-17 NB-IoT is out of the scope of this WI.
* Recommended WF
	+ RAN4 to develop RRM requirements for LEO and GEO scenarios.
	+ RAN4 to develop RRM requirements for both eMTC and NB-IoT devices over NTN.

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| **Company** | **Comments** |
| MTK | Agree with the suggested WF.Neighbour cell measurements as introduced in Rel-17 NB-IoT can be considered in the future release.  |
| Nokia | We agree with the recommended WF. RAN2 will work on introducing NB-IoT CONNECTED mode measurements in IoT NTN release 18 (according to WID RP-221806), thus it is out of scope for RAN4 in this WI. |
| Qualcomm | Agree with the moderator’s recommended WF. |

#### Issue 1-1-3: Requirement applicability

* Proposals
* Proposal 1a: Do not consider positioning requirements for IoT NTN (Hauwei)
* Proposal 1b: Clarify defining of positioning requirements for NTN IoT is not part of this WI. (Ericsson)
* Proposal 2: TDD related requirements are not applicable to R17 IOT-NTN. (CMCC)
* Proposal 3: The following aspects/features are not relevant for NB-IoT/eMTC UE served by SAN and therefore should not be used in RRM requirements for NB-IoT/eMTC UE served by SAN: (MTK)
	+ TDD related aspects
	+ Positioning requirements
* Proposal 4: The RRM requirements for autonomous gap for CGI reading are not applicable for NB-IoT/eMTC UE served by SAN. (MTK)
* Proposal 5: The requirements apply provided that serving and all neighbour satellites on the same layer are of same satellite type (LEO or GEO). (MTK)
* Recommended WF
* Do not consider the following requirements/aspects for IoT NTN
	+ TDD related aspects
	+ Positioning requirements
	+ autonomous gap for CGI reading
* The requirements apply provided that serving and all neighbour satellites on the same layer are of same satellite type (LEO or GEO).

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| **Company** | **Comments** |
| MTK | Agree with the suggested WF. |
| Nokia | Partial OK. We would suggest to adjust the wording in the recommended WF to: “Rel-16 NB-IoT/eMTC positioning requirements”Regarding positioning requirements, the eMTC must be able to report a coarse location based on GNSS (approximately 2 km granularity according to coarseLocationInfo element in 36.331), but we agree positioning like OTDOA is out of scope for IoT NTN. |
| Qualcomm | Support the recommended WD. |

#### Issue 1-1-4: RRM requirement list

* Proposals
* Proposal 1: RAN4 to consider the following list of requirements in the discussion of the scope of RRM requirements for IoT NTN (Nokia)

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| Section | NB-IoT | eMTC |
| RRC\_Idle mobility | Yes | Yes |
| Random access | Yes  | Yes |
| Handover |  | Yes |
| RRC Re-establishment | Yes | Yes |
| RRC connection release with redirection | Yes | Yes |
| Radio Link Monitoring | Yes | Yes |
| Timing requirementsTransmit timingTiming Advance | Yes  | Yes |
| Intra-frequency / inter-frequency measurements |  | Yes |

* Recommended WF
	+ Please provide your comments below.

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| **Company** | **Comments** |
| MTK | General fine with Option 1, except NB-IoT also supports intra-frequency measurement on serving cells in CONNECTED mode. We can agree with the following clarification:

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| Section | NB-IoT | eMTC |
| Intra-frequency / inter-frequency measurements | Only measurements on serving cells in CONNECTED mode | Yes |

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| Nokia | We are fine with the clarification of MTK. |
| Qualcomm | Support the recommended WF and agree with the table from MTK. |

#### Issue 1-2-1: Spec structure

* Proposals
* Proposal 1: NB-IoT/eMTC over NTN requirements are introduced in separate sections. (Ericsson)
* Proposal 2: Follow TN section structure as in TS 36.133 in general and use suffix "A" for satellite access requirement (MTK)
* Proposal 3: NB1 and NB2 UE share the same requirement for UE category NB-IoT for Satellite Access, unless specified otherwise. (MTK)
* Recommended WF
	+ Agree on Proposal 1, 2, 3.

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| **Company** | **Comments** |
| MTK | Agree with the suggested WF. |
| Nokia | We are OK with the proposal. |
| Qualcomm | Support the recommended WF. |

#### Issue 1-2-2: initial CR structure

* Proposals
	+ Option 1: initial CR structure as provided in R4-2212404 (MTK)

3.6 General

3.6.1 Applicability of requirements in this specification version

// the following clauses are specific for NB1/NB2 UEs for Satellite Access

4.6.2A Cell Re-selection for UE category NB-IoT for Satellite Access

4.6.3A Requirements for transmission using preconfigured uplink resources for UE category NB-IoT for Satellite Access

6.5A RRC Re-establishment for NB-IoT UEs for Satellite Access

6.6A Random Access for UE category NB-IoT for Satellite Access

6.9A RRC Connection Redirection to Non-anchor Carrier in NB-IoT for Satellite Access

7.20A UE transmit timing for NB-IoT for Satellite Access

7.21A UE timer accuracy for NB-IoT for Satellite Access

7.22A Timing Advance for NB-IoT for Satellite Access

7.23A Radio Link Monitoring for Category NB-IoT for Satellite Access

8.14A Measurements for UE category NB-IoT for Satellite Access

// the following clauses are specific for M1 UEs for Satellite Access

4.7.2A Cell Re-selection for UE category M1 for Satellite Access

4.7.3A Channel quality report for UE Category M1 in idle mode for Satellite Access

4.7.4A Requirements for transmission using preconfigured uplink resources for UE category M1 for Satellite Access

5.5A E-UTRAN Handover for Cat-M1 Ues for Satellite Access

6.2.3A Random Access Requirements for Cat-M1 UEs for Satellite Access

6.7A RRC Re-establishment for Cat-M1 UEs for Satellite Access

6.8A RRC Connection Release with Redirection for Cat-M1 UEs for Satellite Access

7.19A Radio Link Monitoring for UE Category M1 for Satellite Access

7.24A UE transmit timing for Category M1 for Satellite Access

7.27A UE timer accuracy for category M1 for Satellite Access

7.28A Timing Advance for Category M1 for Satellite Access

8.13A Measurements for UE Category M1 for Satellite Access

* Recommended WF
	+ Please provide your comments below.

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| **Company** | **Comments** |
| MTK | Agree with the initial CR structure. |
| Nokia | We are OK with the specification structure |

#### Issue 1-3-1: Band groups and terminologies

* Proposals
	+ Proposal 1: The general section on terminologies and band groups are updated to contain NTN IoT specific changes. (Ericsson)
* Recommended WF
	+ Discuss proposals.

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| **Company** | **Comments** |
| MTK | Agree with Proposal 1. |
| Nokia | Agree to the proposal. |

#### Issue 1-3-2: information for the neighbor/target cell

* Proposals
* Proposal 1: Similar as NR NTN, the mobility and measurement requirements for IoT NTN apply provided that valid information for the neighbor/target cell is made available to the UE. (Hauwei)
* Recommended WF
	+ Proposal 1

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| **Company** | **Comments** |
| MTK | Agree with Proposal 1. |
| Nokia | Ok with the proposal |
| Qualcomm | Agree with Proposal 1. |

#### Issue 1-3-3: measurement capability of monitoring on number of carriers

* Background
	+ For NB in IDLE, the existing TN requirements of UE measurement capability of monitoring on number carriers, as in 4.6.2.8 in TS 38.133
		- Depending on UE capability, an intra-frequency carrier.
		- Depending on UE capability, at least 2 inter-frequency carriers.
	+ For M1, the existing TN requirements of UE measurement capability of monitoring on number carriers
		- Depending on UE capability, 2 FDD E-UTRA inter-frequency carriers, and
		- Depending on UE capability, 2 TDD E-UTRA inter-frequency carriers.
		- the number of NTN and TN carriers UE needs to monitor is 5 including serving CC
* Proposals
	+ Proposal 1: The existing measurement capability requirements are reused for NTN IoT. (Ericsson, MTK)
* Recommended WF
	+ Proposal 1.

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| **Company** | **Comments** |
| MTK | Agree with Proposal 1. |
| Nokia | We are ok with the proposal, considering that it is for monitoring both TN and NTN carriers. |
| Qualcomm | Okay with the proposals. Regarding “TN-NTN” mobility, RAN4 may not need to define something special for that as Rel-17 NR NTN. |

#### Issue 1-3-4: measurement capability on number of NGSO satellites

* Proposals
	+ Proposal 1: For both NB and M1 in NGSO, the number of target satellites UE needs to monitor per carrier is 2 including serving LEO satellite. (MTK)
* Recommended WF
	+ Discuss proposals.

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| **Company** | **Comments** |
| MTK | Agree with Proposal 1. |
| Nokia | Our view is that clarification of this proposal and more discussion is needed. The UE does not monitor satellites, but cells. Is the intention inter-satellite cells i.e. cells not provided by the same satellite as the serving cell? There might be scenarios in which it is relevant to monitor 3 inter-satellites cells in the same carrier. |
| Qualcomm | Agree with Proposal 1, but we want to put “per carrier” in [] for now. |

#### Issue 1-3-5: For NGSO, Doppler shift impact in Multiple NGSO satellites

* Proposals
	+ Proposal 1: RAN4 shall investigate Doppler shift impact on the overlapping receiving window from multiple inter-frequency satellites on IoT NTN. (Ericsson)
	+ Proposal 2: the scaling factor for measurement of multiple LEO satellites should also apply (Huawei)
	+ Proposal 3: For eMTC over NTN, RAN4 not to define scheduling restriction due to RRM measurement. (Huawei)
	+ Proposal 4: For eMTC-NTN, if the measurements of cells belonging to different satellite as the serving cell and performed outside the MG, and UE don’t support parallel measurements capability
		- For L1 RLM measurements, a scaling factor should be used to account overlapping between L1 resources and SMTC for L3 measurements.
		- For L3 measurements, a factor should be introduced to account overlapping between the associated SMTC and L1 resources
* Moderator’s note: In proposal 3, it also mentioned “For eMTC, the measurement is done with MG, so there is no need to define scheduling restriction for RRM measurement”
* Recommended WF
	+ Discuss proposals.

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| **Company** | **Comments** |
| MTK | Agree with P1/P2/P3. On P4 (for eMTC-NTN LEO), since there is no SMTC structure in LTE, and CRS are provided in all subframes.  |
| Nokia | We prefer Proposal 1. We need time to investigate this issue. |
| Qualcomm | P1: “multiple inter-freq” might be only for RRC Idle/Inactive mode for for NB-IoT?P4: Same comment as MTK |

#### Issue 1-3-6: DRX/eDRX, HD-FDD applicability

* Proposals
	+ Proposal 1: (MTK)
		- For GEO, the existing TN requirements related to DRX/eDRX, HD-FDD can be re-used as baseline.
		- For LEO/NGSO, the existing TN requirements related to DRX/eDRX, HD-FDD can be re-used as baseline. FFS the applicability of DRX/eDRX cycle length and PTW length.
* Recommended WF
	+ Discuss proposals.

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| **Company** | **Comments** |
| MTK | Agree with Proposal 1. |
| Nokia | OK |
| Qualcomm | Okay with Proposal 1. |

#### Issue 1-4: RAN1 LS on per-segment TA pre-compensation

* Background:
	+ One incoming LS from RAN1 (R4-2211518) regarding the UL Segmented Transmission for UL synchronization for IoT NTN, and a transmission gap between segments are introduced
	+ The “restriction” in Proposal 2 is refereeing to the following statement
		- *When a repetition period is configured on the uplink for which R>1, the UE shall not adjust the uplink transmission timing autonomously during an ongoing repetition period other than at initial transmission as defined above.*
* Proposals
	+ Proposal 1: Segmented UL transmission can be covered by NTN UE transmit timing requirements, i.e. Te\_NTN. FFS whether and how to capture in RAN4 (MTK)
	+ Proposal 2: The restriction on UL transmission adjustment shall be updated according to RAN1 LS on per-segment TA pre-compensation. (Huawei)
* Recommended WF
	+ Discuss proposals.

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| --- | --- |
| **Company** | **Comments** |
| MTK | Agree with Proposal 1 and 2. |
| Nokia | We support Proposal 2. We kindly ask to consider our discussion paper on this topic: R4-2212909, which is discussed in Thread #240 |
| Qualcomm | Agree with Proposal 1 and 2. Will consider the observations presented in R4-2212909 (Nokia). Besides, the definition of reference timing needs to be further studied, e.g. the first symbol of the segmented UL block or average across symbols in the block. |

#### Issue 1-5: UE capability introduced in R17 NR NTN

* Proposals
	+ Proposal 1: The following UE capability, introduced in RAN4 R17 NR NTN, are not applicable for LTE IoT in Rel-18: (MTK)
	+ 25-1 Parallel measurements on multiple SMTC-s for a single frequency carrier
	+ 25-3 Parallel measurements with multiple measurement gaps
	+ 25-4 Enhanced RRM requirements for measurements in IDLE and INACTIVE modes
	+ 25-6 Relaxed cell reselection on GEO
* Recommended WF
	+ Discuss proposals.

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| **Company** | **Comments** |
| MTK | Agree with Proposal 1. |
| Nokia | We are OK with the proposal.  |
| Qualcomm | Okay with the first three bullets. FFS on FG#25-6 for now. |

### IDLE state mobility requirements

#### Issue 2-1: Discontinuous Coverage

* Proposals
	+ Proposal 1: Define the RAN4 requirements based on the assumption that the UE is able to predict the coverage. (Nokia)
	+ Proposal 2: In IDLE mode or PSM mode, the UEs are not required to perform any cell search while out of coverage in discontinuous coverage. (Nokia)
* Recommended WF
	+ Discuss proposals.

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| --- | --- |
| **Company** | **Comments** |
| MTK | Agree with Proposal 1 and 2. The Discontinuous coverage specific requirement can be FFS.  |
| Nokia | We are ok to keep the details FFS |
| Qualcomm | In principle, okay with proposals. But whether and how to define the requirement is FFS. |

#### Issue 2-2-1: GEO, cell re-selection

* Proposals
	+ Proposal 1: For GEO, the existing TN requirements apply (MTK)
		- For NB, as in 4.6.2
		- For M1, as in 4.7.2.1/4.7.2.2
* Recommended WF
	+ Discuss proposals.

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| * **Company**
 | **Comments** |
| MTK | Agree with Proposal 1. |
| Nokia | OK |
| Qualcomm | Okay with Proposal 1. |

#### Issue 2-2-1: NGSO, cell re-selection

* Proposals
	+ Proposal 1: The serving cell evaluation and neighbour cell measurement requirements are reused with following modifications: eDRX and long DRX cycles are excluded when the serving cell coverage is impacted due to satellite movement (e.g. as indicated by Tservice). (Ericsson)
	+ Proposal 2: For Normal coverage, the exiting TN requirement can be the baseline (MTK)
		- the existing delay requirements (Tdetect, Tmeasure, Tevaluate) can be scaled up by *KSatellite,* where *KSatellite* is the number NGSO satellites and is can assume *KSatellite* =[2]for intra-frequency measurement in IDLE mode and *KSatellite* =1for inter-frequency measurement in IDLE mode.
* Recommended WF
	+ Discuss proposals.

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| * **Company**
 | **Comments** |
| MTK | Agree with Proposal 2. On P1, does it propose eDRX and long DRX are not appliable if Tservice is configured or also for LEO case in general? Our understanding is the cell detection time on neighboring cell in Enhance Coverage would be too long, but other cases seems ok.  |
| Nokia | We agree with proposal 1 in the sense that NGSO satellite movement must be considered, because cell availability time may be short compared to detection, measurement and evaluation time requirements.For proposal 2, we think that more discussion is needed, based on the outcome of issue 1-3-4. |
| Qualcomm | More discussion.For Proposal 1, at less FFS on GEO scenario. |

#### Issue 2-2-2: NGSO, cell-stop time based cell reselection

* Proposals
	+ Proposal 1: The cell-stop time based cell reselection should be considered in IoT NTN. (Huawei, MTK)
	+ Proposal 1a: For cell-reselection requirement, when the case of cell stop time is broadcasted and applicable, the UE cell-reselection behavior and other restrictions should be decided and specified (CMCC)
* Recommended WF
	+ RAN4 to specify cell-stop time based cell reselection in IoT NTN

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| **Company** | **Comments** |
| MTK | Agree with the suggested WF. |
| Nokia | OK to consider t-Service (time quasi-EFC stops serving an area), but RAN4 also needs to consider the t-ServiceStart (SIB32) for discontinuous coverage (defining when quasi-EFC starts serving an area).We propose that the Recommended WF is changed to:RAN4 to specify cell-stop and t-ServiceStart time based cell reselection in IoT NTN |
| Qualcomm | Agree with the recommended WF. |

#### Issue 2-2-3: NGSO, location-based cell reselection

* Proposals
	+ Proposal 1: Do not define location-based cell reselection for IoT NTN. (Huawei)
* Recommended WF
	+ Proposal 1.

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| **Company** | **Comments** |
| MTK | Agree with Proposal 1. Our understanding is this is not introduced by RAN2. |
| Nokia  | Ok |
| Qualcomm | Okay with Proposal 1. |

#### Issue 2-2-4: NGSO, cell Re-selection in Enhanced Coverage

* Proposals
	+ Proposal 1: Discuss whether to define requirements of cell Re-selection for enhanced coverage. (Huawei)
	+ Proposal 2: For Enhanced Coverage intra-/inter-frequency measurement, the existing TN requirement on Tmeasure, Tevaluate can be the baseline. FFS the cell detection time (Tdetect). (MTK)
* Moderator’s note: the major concern in Proposal 1 is on NGSO/LEO.
* Recommended WF
	+ Discuss proposals.

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| **Company** | **Comments** |
| MTK | Our understanding is the cell detection time on neighboring cell in Enhance Coverage would be too long, but serving cell measurements and Tmeas./Teval. seems ok. And the Discontinuous coverage specific modification can be FFS.  |
| Nokia | We prefer to have requirements in this case, and can agree to Proposal 2 to discuss detection time, when considering NGSO movement and short availability time. |
| Qualcomm | Share the same comment as MTK. |

#### Issue 2-3-1: Maximum interruption in paging reception

* Proposals
	+ Proposal 1: The NTN paging reception requirements based on type of satellites are reused for NTN IoT. (Ericsson)
	+ Proposal 1a: (MTK)
		- For NB, the maximum interruption in paging reception for NTN cell reselection shall not exceed
			* TSI-NB1-NC/EC + 100 ms,
				+ the target cell’s satellite is GEO, or
				+ the target cell’s satellite is NGSO and the target cell belongs to the same satellite as the current one
				+ Note: same as the existing TN requirement, as in 4.6.2.7/4.6.2.7A
			* TSI-NB1-NC/EC + [250] ms,
				+ the target cell’s satellite is NGSO and the target cell belongs to the different satellite as the current one
		- For M1, the maximum interruption in paging reception for NTN cell reselection shall not exceed
			* TSI-EUTRA-M1-NC/EC + 50 ms,
				+ the target cell’s satellite is GEO, or
				+ the target cell’s satellite is NGSO and the target cell belongs to the same satellite as the current one
				+ Note: same as the existing TN requirement, as in 4.7.2.1.5/4.7.2.2.5
			* TSI-EUTRA-M1-NC/EC + [125] ms, if
				+ the target cell’s satellite is NGSO and the target cell belongs to the different satellite as the current one
* Recommended WF
	+ Discuss proposals.

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| --- | --- |
| **Company** | **Comments** |
| MTK | Agree with Proposal 1 and 1a. Proposal 1a provides details for Proposal 1. |
| Nokia | We believe that more discussion is needed for this issue |
| Qualcomm | Needs more time. FFS for now. |

#### Issue 2-3-2: Maximum interruption in paging reception – longer interruption

* Background: in R17 NR NTN, unknown cell is defined time span between SIB broadcasting cell stop time and the cell stop time is less than Ttrigger.
* Proposals
	+ Proposal 1: The maximum interruption in paging reception should be relaxed under the unknow cell case (CMCC)
	+ Proposal 2: If the cell stop time (i.e., t-serve) is applicable, and the time span between SIB broadcasting cell stop time and the cell stop time is less than Ttrigger, longer interruption is expected. (MTK)
* Recommended WF
	+ Discuss proposals.

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| **Company** | **Comments** |
| MTK | Agree with Proposal 2. The intention is not to define the explicit requirement for the unknown case, as it is now discussing in R17 NR NTN, and we still need to note the longer interruption is expected.  |
| Nokia | More discussion is needed |
| Qualcomm | Okay with Proposal 2. |

#### Issue 2-4: Channel quality report for UE Category M1 in idle mode

* Proposals
	+ Proposal 1: For M1, the existing TN requirements of channel quality report for in idle mode apply, as in 4.7.3. (MTK)
* Recommended WF
	+ Discuss proposals.

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| **Company** | **Comments** |
| MTK | Agree with Proposal 1. |
| Nokia | Ok |
| Qualcomm | Okay for GEO. For LEO, may need some discussion regarding which specific time instance the CQR corresponds to. |

#### Issue 2-5: WUS receptions

* Proposals
	+ Proposal 1: The principles of defining WUS reception requirements is reused but the required number of repetitions are kept TBD. (Ericsson)
	+ Proposal 2: the existing TN requirements apply (MTK)
		- For NB, as in 4.6.2.9.
		- For M1, as in 4.7.2.3.
* Recommended WF
	+ Discuss proposals.

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| **Company** | **Comments** |
| MTK | Fine with Proposal 1. |
| Nokia | Fine with Proposal 1 |
| Qualcomm | Okay with Proposal 1. |

#### Issue 2-6: Transmission using preconfigured uplink resources (PUR)

* Proposals
	+ Proposal 1: Discuss whether to define RSRP-based TA validation for PUR in IoT NTN. (Huawei)
	+ Proposal 2: The UE update the uplink timing for transmitting on PUR using the configured TA command according to TS 36.211 v17.2.0 i.e. transmission of uplink radio frame number  from the UE starts $T\_{TA}=\left(N\_{TA}+N\_{TA,offset}+N\_{TA,adj}^{common}+N\_{TA,adj}^{UE}\right)T\_{s}$ (Ericsson)
	+ Proposal 3: The UE assumes TA is valid provided that the following conditions are met, otherwise the UE is considered invalid: (Ericsson)
		- Satellite assistance information (SAI) is valid i.e. T317 has not expired and
		- Current time of the UE is at least ΔT seconds earlier than t-Service.
	+ Proposal 4: the existing TN requirements apply (MTK)
		- For NB, as in 4.6.3.
		- For M1, as in 4.7.4.
* Recommended WF
	+ Discuss proposals.

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| **Company** | **Comments** |
| XXX | On P1, we think the legacy RSRP-bsed TA validation can be the baseline and it’s fine to consider some modification.Proposal 2 is fine. Proposal 3 is ok in general. But how to determine ΔT?The existing TN requirements can be used as baseline with modifications as suggested. |
| Nokia | We propose to postpone the discussion until the general uplink transmission timing has been discussed |
| Qualcomm | We would like to investigate the whole framework of PUR in NTN because UE should be able to derive the propagation delay directly based on GNSS info and ephemeris info. And it is unclear if applying the previously provided TA to UL even after UE autonomous TA update is needed. |

### CONNECTED state mobility requirements

#### Issue 3-1: RRC Re-establishment and RRC release with redirection

* Proposals
	+ Proposal 1: Requirements of RRC Re-establishment and RRC release with redirection of TN can apply to IoT NTN. (Huawei, MTK, Ericsson)
* Recommended WF
	+ Proposal 1.

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| **Company** | **Comments** |
| MTK | Agree with Proposal 1. |
| Qualcomm | FFS for now. |

#### Issue 3-2: Random Access

* Proposals
	+ Proposal 1: Existing random access requirements are reused for NTN IoT. (Ericsson, MTK)
		- Proposal 1a: (MTK)
			* For NB, the existing TN requirements apply, as in 6.6
			* For M1, the existing TN requirements apply, as in 6.2.3
	+ Proposal 2: If UE specific TA reporting is enabled and applicable, UE shall be able to report information about UE specific timing advance during a Random Access procedure as specified in TS 36.321[17]. (MTK)
* Recommended WF
	+ Proposal 1.

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| **Company** | **Comments** |
| MTK | Agree with Proposal 1 and 2. |
| Nokia | OK to proposals. Reporting of UE-specific TA is important for eNB scheduling decisions. |
| Qualcomm | In principle, agree. Do we still need to consider non-anchor carrier based RA for NB-IoT in NTN? |

#### Issue 3-3: M1, E-UTRAN Handover

* Proposals
	+ Proposal 1: For legacy handovers, the existing HO requirements are reused. (Ericsson, MTK, Huawei)
		- Proposal 1a: For eMTC over NTN, define HO requirements by re-using TN HO requirements for NTN as baseline (Huawei)
		- Proposal 1b: For M1, the existing requirements of E-UTRAN Handover for Cat-M1 UE apply, as in 5.5 (MTK)
* Recommended WF
	+ For eMTC (M1) over NTN, define E-UTRAN Handover requirements by re-using TN HO requirements for NTN as baseline

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| **Company** | **Comments** |
| MTK | Agree with the suggested WF. |
| Nokia | OK to use TN as baseline, but RAN4 need to consider the RAN2 agreement concerning UE may need to measure GNSS during handover to obtain new GNSS validity duration. |
| Qualcomm | Agree with “baseline” in the recommended WF. |

#### Issue 3-4: M1, CHO requirements

* Proposals
	+ Proposal 1: define CHO requirements for NTN (no need to consider time or location based CHO) (Huawei)
	+ Proposal 2: new requirements based on corresponding NTN CHO are defined NB-IoT and eMTC (Ericsson)
* Recommended WF
	+ Discuss proposals.

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| **Company** | **Comments** |
| MTC | We notice that legacy CHO requirement was not introduced even for Terrestrial IoT. Thus we think the new IoT CHO requirements should be introduced in the legacy Terrestrial IoT first, then we can consider it for IoT NTN.On P2, NB-IoT has no HO requirement in our understanding. For eMTC CHO IoT, same comment as above.  |
| Nokia | OK to define basic CHO. The location/time enhancements are treated by RAN2 in release 18. |
| Qualcomm | Similar view as MTK and Nokia.NB-IoT does not support HO.Whether we want to define CHO even for TN is a separate topic. For now, FFS. |

### Timing requirements and RLM

#### Issue 4-1-1: UE transmit timing (Te) requirement

* Proposals
	+ Proposal 1: Define Te requirements in the same method as NR NTN where the reference point is defined considering the UE specific TA (Huawei, CMCC)
	+ Proposal 2: discuss whether to keep the same GNSS estimation accuracy assumption as NR NTN. (Huawei)
	+ Proposal 3: The timing requirements from Rel-17 NTN is used as baseline with some modification to the values to account for the lower BW is needed for NTN IoT (Ericsson)
	+ Proposal 4: Te should be relaxed, the extended value can reuse NTN assumption in each case
	+ Proposal 5: For IoT NTN, Te\_NTN is extended by [17] Ts (MTK)
	+ For NB, Te\_NTN: 80+ [17] = [97] Ts.
	+ For M1 CE Mode A, Te\_NTN: 24+[17] = [41] Ts
	+ For M1 CE Mode B, Te\_NTN: 48+[17] =[65] Ts
* Recommended WF
	+ the reference point is defined considering the UE specific TA
	+ Te is relaxed by considering GNSS estimation accuracy
	+ Discuss whether to keep the same GNSS estimation accuracy assumption as NR NTN in the 1st round

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| **Company** | **Comments** |
| MTK | Agree with the suggested WF and we think the same GNSS estimation accuracy assumption as NR NTN can be assumed, as the current Te is large enough.  |
| Nokia | Agree the reference point has to consider the UE-specific TA. Do not agree to extend the Te, because it makes configuration of segment duration even more challenging (see discussion in R4-2212909).  |
| Qualcomm | Needs more investigation. |

#### Issue 4-1-2: Gradual timing adjustment

* Proposals
	+ Proposal 1: For gradual timing adjustment, the reference timing shall be (*N*TA *+ N*TA-offset *+ N*TA,common *+ N*TA,UE-specific)*×*Tc before the downlink timing of the reference cell. Clarify the adjustment with "apart from a change of NTA,UE-specific and NTA,common" (MTK)
	+ Proposal 2: the legacy values of Tq /Tp  are applicable to Tq\_NTN /Tp\_NTN. (MTK)
* Recommended WF
	+ Discuss the proposals

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| **Company** | **Comments** |
| MTK | Agree with the Proposal 1 and Proposal 2.  |
| Nokia | Agree with the proposals.The definitions of N\_TA,UE-specific and N\_TA,common including when the UE needs to update the values must be defined by 3GPP, but they should not be part of the accumulated time adjustments covered by the legacy gradual timing adjustment requirements. We suggest to refer to this NR NTN document for a definition R4-2212853  |
| Qualcomm | In principle, agree.Needs further study about the impact of “segmented UL transmission.” There can be a little more aspect that needs to be taken into account compared to NR NTN. |

#### Issue 4-2: UE Timer accuracy

* Proposals
	+ Proposal 1: the existing TN requirements apply. (MTK)
		- For NB, as in 7.21
		- For M1, as in 7.27
* Recommended WF
	+ Proposal 1.

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| **Company** | **Comments** |
| MTK | Agree with the Proposal 1  |

#### Issue 4-3: Timing Advance adjustment accuracy

* Proposals
	+ Proposal 1a: The reference point for timing advanced adjustment requirement shall be revised
	+ Proposal 1b: the existing TN requirements apply, and clarify the adjustment of timing with "apart from a change of NTA,UE-specific and NTA,common between the preceding uplink transmission and the current transmission” (MTK)
		- For NB, as in 7.22
		- For M1, as in 7.28
* Recommended WF
	+ Discuss proposals.

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| **Company** | **Comments** |
| MTK | Agree with the Proposal 1b, which covers Proposal 1a and follows the same wording as in NR NTN spec.  |
| Nokia | OK, please also note our comment on N\_TA,UE-specific and N\_TA,common for issue 4-1-2 |
| Qualcomm | Agree with Proposal 1b. However, it should not preclude any other change at this point. There can be additional changes due to “segmented UL transmission.” |

#### Issue 4-4: RLM

* Proposals
	+ Proposal 1: The UE in DRX shall evaluate the RLM according non-DRX requirements provided that the following conditions are met, otherwise the UE is allowed to evaluate following DRX requirements: (Ericssion)
		- Satellite assistance information (SAI) is valid i.e. T317 has not expired and
		- Current time of the UE is at least ΔT seconds earlier than t-Service.
	+ Proposal 2: (MTK)
		- For NB GEO and NGSO, the existing TN requirements apply, as in 7.23
		- For M1 GEO, the existing TN requirements apply, as in 7.19
		- For M1 NGSO, define the RLM requirements based on UE measures on one NGSO satellite at a time, without introducing the UE capability of L1/L3 processing in parallel.
* Recommended WF
	+ Discuss proposals.

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| **Company** | **Comments** |
| MTK | Agree with the Proposal 2. Proposal 1 is fine, if t-Service is provided and applicable for quasi-fixed NGSO scenario.  |
| Nokia | For GEO, we believe that the existing TN requirements apply. For NGSO we are OK to consider the satellite assistance information and t-Service. |
| Qualcomm | In principle okay with Proposal 2. |

### Measurement requirements

#### Issue 5-1-1: NB, Measurement requirement

* Proposals
	+ Proposal 1: existing TN intra frequency measurement requirements apply (MTK)
		- as in 8.14.2 for Normal Coverage and 8.14.3 for Enhanced Coverage.
* Recommended WF
	+ Proposal 1.

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| **Company** | **Comments** |
| MTK | Agree with the Proposal 1.  |
| Nokia | Agree to proposal 1 |
| Qualcomm | Okay with Proposal 1. |

#### Issue 5-1-2: M1, Measurement requirement

* Proposals
	+ Proposal 1: eMTC over NTN, re-use the TN measurement delay requirements for NTN as baseline, and the scaling factor for measurement of multiple LEO satellites should also apply. (Huawei, MTK)
		- Proposal 1a: (MTK)
			* For M1 in GEO, the existing M1 TN intra frequency measurement requirements apply, as in 8.13.2.1 for CE mode A and 8.13.3.1 for CE mode B
			* For M1 in NGSO, the delay requirements are scaled up by the number NGSO satellites.
			* For M1 in GEO, the existing M1 TN requirements apply, as in 8.13.2.6 for CE mode A and 8.13.3.5 for CE mode B.
			* For M1 in NGSO, the delay requirements are scaled up by the number NGSO satellites.
* Recommended WF
	+ Proposal 1.

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| **Company** | **Comments** |
| MTK | Agree with the Proposal 1 and 1a.  |
| Qualcomm | Okay with Proposal 1. |

#### Issue 5-2: M1, Measurement Gap

* Proposals
	+ Proposal 1: For eMTC over NTN, a single MG is considered for RRM measurement. (Huawei)
* Recommended WF
	+ Proposal 1.

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| **Company** | **Comments** |
| MTK | Agree with the Proposal 1.  |
| Qualcomm | Okay with Proposal 1. |

#### Issue 5-3: Connected mode channel quality report

* Proposals
	+ Proposal 1: existing TN requirements apply (MTK)
		- For NB, as in 8.14.4
		- For M1, as in 8.13.2.8 for CE-A, 8.13.3.8 for CE-B
* Recommended WF
	+ Discuss proposals.

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| **Company** | **Comments** |
| MTK | Agree with the Proposal 1.  |
| Qualcomm | Okay for GEO. For LEO, may need some discussion regarding which specific time instance the CQR corresponds to. |

## Companies views’ collection for 1st round

### CRs/TPs comments collection

*For close-to-finalize WIs and maintenance work, comments collections can be arranged for TPs and CRs. For ongoing WIs, suggest to focus on open issues discussion on 1st round.*

|  |  |
| --- | --- |
| **CR/TP number** | **Comments collection** |
| XXX | Company A |
| Company B |
|  |
| YYY | Company A |
| Company B |
|  |

## Summary for 1st round

### Open issues

*Moderator tries to summarize discussion status for 1st round, list all the identified open issues and tentative agreements or candidate options and suggestion for 2nd round i.e. WF assignment.*

|  |  |
| --- | --- |
|  | **Status summary**  |
| **Sub-topic #1** | *Tentative agreements:**Candidate options:**Recommendations for 2nd round:* |

### CRs/TPs

*Moderator tries to summarize discussion status for 1st round and provides recommendation on CRs/TPs Status update*

*Note: The tdoc decisions shall be provided in Section 3 and this table is optional in case moderators would like to provide additional information.*

|  |  |
| --- | --- |
| **CR/TP number** | **CRs/TPs Status update recommendation**  |
| XXX | *Based on 1st round of comments collection, moderator can recommend the next steps such as “agreeable”, “to be revised”* |

## Discussion on 2nd round (if applicable)

# Recommendations for Tdocs

## 1st round

**New tdocs**

|  |  |  |  |
| --- | --- | --- | --- |
| **New Tdoc number** | **Title** | **Source** | **Comments** |
|  | WF on … | YYY |  |
|  | LS on … | ZZZ | To: RAN\_X; Cc: RAN\_Y |
|  |  |  |  |

**Existing tdocs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-22xxxxx |  | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics incl. existing and new tdocs.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. For new LS documents, please include information on To/Cc WGs in the comments column
4. Do not include hyper-links in the documents

## 2nd round

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Tdoc number** | **Revised to** | **Title** | **Source** | **Recommendation**  | **Comments** |
| R4-22xxxxx |  | CR on … | XXX | Agreeable, Revised, Merged, Postponed, Not Pursued |  |
| R4-22xxxxx |  | WF on … | YYY | Agreeable, Revised, Noted |  |
| R4-22xxxxx |  | LS on … | ZZZ | Agreeable, Revised, Noted |  |
|  |  |  |  |  |  |

Notes:

1. Please include the summary of recommendations for all tdocs across all sub-topics.
2. For the Recommendation column please include one of the following:
	1. CRs/TPs: Agreeable, Revised, Merged, Postponed, Not Pursued
	2. Other documents: Agreeable, Revised, Noted
3. Do not include hyper-links in the documents