3GPP TSG-RAN WG4 Meeting # 111 R4-2408024

Fukuoka, JP, 20 May – 24 May 2024

**Agenda item:** 8.3.5

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

**Title:** Topic summary for [111][227] IoT\_NTN\_enh

**Document for:** Information

# Introduction

*Briefly introduce background, the scope of this summary (e.g. list of treated agenda items).*

This document is the topic summary for RRM requirements for R18 IoT (Internet of Things) NTN (non-terrestrial network) enhancements, including the following topics covered

* Topic#1: RRM core requirements (AI 8.3.2)
* Topic#2: RRM performance requirements (AI 8.3.3)

Recommended issues for online discussion:

* 1-1-1, 1-1-2, 1-1-3, 1-1-4, 1-2-1
* Note: no discussion paper in performance part.

# Topic #1: RRM core requirements (AI 8.3.2)

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

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [**R4-2407936**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407936.zip) | CMCC | *Proposal 1: For earth-fixed scenario, introduce the ‘expected serving time’ as an evaluation factor for cell re-selection. For one cell, ‘expected serving time’ is the time period between the current time to the ‘t-service’ for this cell. Specifically:** *UE shall perform ranking of all cells that fulfil the cell selection criterion S*
* *UE perform cell re-selection to the cell with the longest ‘expected serving time’ among the cells whose R value is within XdB of the R value of the highest ranked cell.*
	+ *The XdB can be configured by network.*
 |
| [**R4-2408516**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408516.zip) | Nokia | Proposal 1: When the UE is configured with eDRX cycle, and the GNSS-MG is larger than the eDRX cycle, the requirements applicable right after the GNSS-MG shall be corresponding to a DRX cycle of [1.28] s.Proposal 2: When a UE starts inter-frequency neighbor cell measurements based on time-based measurement initiation (e.g. Ttrigger before t-service), and the inter-frequency neighbor cells associated to the same satellite are also configured with t-Service, then the UE is not required to measure these cells.Proposal 3: When t-service is reached, and the UE has initiated measurements based on time-based measurement initiation, the UE shall immediately perform cell reselection ignoring any previous measurement on the serving cell.Proposal 4: When a UE starts intra-frequency neighbor cell measurements based on time-based measurement initiation (e.g. Ttrigger before t-service), the UE is allowed to apply relaxed measurement settings on the serving cell measurements when the following side conditions are met:a. When skipping serving cell measurements reduces the value of Ksatellite (i.e. no neighbor cell is configured for measurements in the same satellite as the serving cell) in this frequencyb. The S-Criterion is still met by the serving cell, according to the most recent measurements on the serving cell. |
| [**R4-2408574**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408574.zip) | Huawei, HiSilicon | Observation 1: Skipping serving cell measurement may break the UE behaviour as defined in RAN2 spec.Observation 2: UE is required to evaluate serving cell every DRX without scaling no matter whether there is intra-frequency neighbour cell measurement in different satellites.Proposal 1: Regarding the serving cell measurement before t-Service, RAN4 to considering following two options:* Option 1: Update the definition of Ksatellite that serving satellite without target neighbour cell shall not be counted in Ksatellite.
* Option 2: Keep the requirements as it is, which means UE is allowed relaxed neighbour cell measurement when the serving satellite does not have target neighbour cell.

Observation 3: NW can remove the satellite ID from SIB3 and SIB5 if NW think there is no need to measurement any neighbour cell in the same satellite. |

## Open issues summary

*Before f2f meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### RRM core requirements

### Sub-Topic 1-1: Time-based measurement initiation in IDLE mode

#### Issue 1-1-1: Serving cell measurement before *t-service*

Proposals:

* [Proposal 1 (Nokia): When a UE starts intra-frequency neighbor cell measurements based on](file:///C%3A%5C%5CUsers%5C%5Cmtk12330%5C%5CDesktop%5C%5C2402%20R4_110_Local%5C%5C%5B203%5D%5B202%5D%5B224%5D%5B233%5D%5BNTN%20evo%5D%5C%5C%5BM233%5D%20R18%20IoT%20NTN%20enh%20-%20Disc1ok%5C%5CTDoc%20-%20Core%20Disc%5C%5CR4-2402699%20Discussion%20on%20mobility%20requirements%20for%20IoT%20NTN%20enhancements.docx%22%20%5Cl%20%22_Toc159273392) [time-based measurement initiation (e.g. T](file:///C%3A%5C%5CUsers%5C%5Cmtk12330%5C%5CDesktop%5C%5C2402%20R4_110_Local%5C%5C%5B203%5D%5B202%5D%5B224%5D%5B233%5D%5BNTN%20evo%5D%5C%5C%5BM233%5D%20R18%20IoT%20NTN%20enh%20-%20Disc1ok%5C%5CTDoc%20-%20Core%20Disc%5C%5CR4-2402699%20Discussion%20on%20mobility%20requirements%20for%20IoT%20NTN%20enhancements.docx%22%20%5Cl%20%22_Toc159273392)[trigger](file:///C%3A%5C%5CUsers%5C%5Cmtk12330%5C%5CDesktop%5C%5C2402%20R4_110_Local%5C%5C%5B203%5D%5B202%5D%5B224%5D%5B233%5D%5BNTN%20evo%5D%5C%5C%5BM233%5D%20R18%20IoT%20NTN%20enh%20-%20Disc1ok%5C%5CTDoc%20-%20Core%20Disc%5C%5CR4-2402699%20Discussion%20on%20mobility%20requirements%20for%20IoT%20NTN%20enhancements.docx%22%20%5Cl%20%22_Toc159273392) [before t-service), the UE is allowed to apply relaxed measurement settings on the serving cell measurements when the following side conditions are met:](file:///C%3A%5C%5CUsers%5C%5Cmtk12330%5C%5CDesktop%5C%5C2402%20R4_110_Local%5C%5C%5B203%5D%5B202%5D%5B224%5D%5B233%5D%5BNTN%20evo%5D%5C%5C%5BM233%5D%20R18%20IoT%20NTN%20enh%20-%20Disc1ok%5C%5CTDoc%20-%20Core%20Disc%5C%5CR4-2402699%20Discussion%20on%20mobility%20requirements%20for%20IoT%20NTN%20enhancements.docx%22%20%5Cl%20%22_Toc159273392)

[a. When skipping serving cell measurements reduces the value of Ksatellite (i.e. no neighbor cell is configured for measurements in the same satellite as the serving cell) in this frequency](file:///C%3A%5CUsers%5Cmtk12330%5CDesktop%5C2402%20R4_110_Local%5C%5B203%5D%5B202%5D%5B224%5D%5B233%5D%5BNTN%20evo%5D%5C%5BM233%5D%20R18%20IoT%20NTN%20enh%20-%20Disc1ok%5CTDoc%20-%20Core%20Disc%5CR4-2402699%20Discussion%20on%20mobility%20requirements%20for%20IoT%20NTN%20enhancements.docx#_Toc159273393)

[b. The S-Criterion is still met by the serving cell, according to the most recent measurements on the serving cell.](file:///C%3A%5CUsers%5Cmtk12330%5CDesktop%5C2402%20R4_110_Local%5C%5B203%5D%5B202%5D%5B224%5D%5B233%5D%5BNTN%20evo%5D%5C%5BM233%5D%20R18%20IoT%20NTN%20enh%20-%20Disc1ok%5CTDoc%20-%20Core%20Disc%5CR4-2402699%20Discussion%20on%20mobility%20requirements%20for%20IoT%20NTN%20enhancements.docx#_Toc159273394)

* [Proposal 2 (Huawei): Regarding the serving cell measurement before t-Service, RAN4 to considering following two options:](file:///C%3A%5C%5CUsers%5C%5Cmtk12330%5C%5CDesktop%5C%5C2402%20R4_110_Local%5C%5C%5B203%5D%5B202%5D%5B224%5D%5B233%5D%5BNTN%20evo%5D%5C%5C%5BM233%5D%20R18%20IoT%20NTN%20enh%20-%20Disc1ok%5C%5CTDoc%20-%20Core%20Disc%5C%5CR4-2402699%20Discussion%20on%20mobility%20requirements%20for%20IoT%20NTN%20enhancements.docx%22%20%5Cl%20%22_Toc159273392)
	+ Option 1: Update the definition of Ksatellite that serving satellite without target neighbour cell shall not be counted in Ksatellite.
	+ Option 2: Keep the requirements as it is, which means UE is allowed relaxed neighbour cell measurement when the serving satellite does not have target neighbour cell.

Recommended WF: Check whether Option 1 of Proposal 2 is acceptable?

#### Issue 1-1-2: Measurement on inter-frequency neighbor cells associated to the same satellite

Proposals:

* [Proposal 1 (Nokia): When a UE starts inter-frequency neighbor cell measurements based on time-based measurement initiation (e.g. Ttrigger before t-service), and the inter-frequency neighbor cells associated to the same satellite are also configured with t-Service, then the UE is not required to measure these cells.](file:///C%3A%5CUsers%5Cmtk12330%5CDesktop%5C2402%20R4_110_Local%5C%5B203%5D%5B202%5D%5B224%5D%5B233%5D%5BNTN%20evo%5D%5C%5BM233%5D%20R18%20IoT%20NTN%20enh%20-%20Disc1ok%5CTDoc%20-%20Core%20Disc%5CR4-2402699%20Discussion%20on%20mobility%20requirements%20for%20IoT%20NTN%20enhancements.docx#_Toc159273396)
* Proposal 2: no specification change is needed.

Recommended WF: Discuss Proposal.

#### Issue 1-1-3: Cell re-selection with the longest “expected serving time” before *t-service*

Proposals:

* Proposal 1 (CMCC): For earth-fixed scenario, introduce the ‘expected serving time’ as an evaluation factor for cell re-selection. For one cell, ‘expected serving time’ is the time period between the current time to the ‘t-service’ for this cell. Specifically:
	+ UE shall perform ranking of all cells that fulfil the cell selection criterion S
	+ UE perform cell re-selection to the cell with the longest ‘expected serving time’ among the cells whose R value is within XdB of the R value of the highest ranked cell.
		- The XdB can be configured by network.
* Proposal 2: no specification change is needed.

Recommended WF: Discuss Proposal.

#### Issue 1-1-4: Cell reselection when *t-service* is reached

Proposals:

* [Proposal 1 (Nokia): When t-service is reached, and the UE has initiated measurements based on time-based measurement initiation, the UE shall immediately perform cell reselection ignoring any previous measurement on the serving cell.](file:///C%3A%5CUsers%5Cmtk12330%5CDesktop%5C2402%20R4_110_Local%5C%5B203%5D%5B202%5D%5B224%5D%5B233%5D%5BNTN%20evo%5D%5C%5BM233%5D%20R18%20IoT%20NTN%20enh%20-%20Disc1ok%5CTDoc%20-%20Core%20Disc%5CR4-2402699%20Discussion%20on%20mobility%20requirements%20for%20IoT%20NTN%20enhancements.docx#_Toc159273396)
* Proposal 2: no specification change is needed.

Recommended WF: Discuss Proposal.

### Sub-Topic 1-2: Measurements with GNSS-MGs

#### Issue 1-2-1: Measurements with GNSS-MGs and eDRX

Proposals:

* Proposal 1 (Nokia): When the UE is configured with eDRX cycle, and the GNSS-MG is larger than the eDRX cycle, the requirements applicable right after the GNSS-MG shall be corresponding to a DRX cycle of [1.28] s.
* Proposal 2: no specification change is needed.

Recommended WF:

* Discuss Proposal.

### RRM core part draft CRs

|  |  |  |  |
| --- | --- | --- | --- |
| **T-doc number** | **Title** | **Source** | **Note** |
| [**R4-2408517**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408517.zip) | CR on 36.133 on applicability of requirements upon GNSS-MG duration | Nokia |  |
| [**R4-2408575**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408575.zip) | Draft CR on core requirements maintenance for R18 IoT NTN enh | Huawei, HiSilicon |  |
| [**R4-2407205**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407205.zip) | Big CR to TS 36.133 on core requirement maintenance for IoT NTN enhancements | MediaTek inc. | Big CR |

# Topic #2: RRM performance requirements (AI 8.3.3)

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

## Companies’ contributions summary

*Moderator’s Note: No discussion paper submitted*

## Open issues summary

*Before f2f meeting, moderators shall summarize list of open issues, candidate options and possible WF (if applicable) based on companies’ contributions.*

### RRM perf part draft CRs

|  |  |  |  |
| --- | --- | --- | --- |
| **T-doc number** | **Title** | **Source** | **Note** |
| [**R4-2407201**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407201.zip) | Correction on unit of k-Offset/k-Mac for SIB31/SIB33 | MediaTek inc. |  |
| [**R4-2407203**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407203.zip) | CR on updating annex B for NTN bands | MediaTek inc. |  |
| [**R4-2407202**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407202.zip) | Add NGSO test configuration for NB-IoT/eMTC | MediaTek inc. | Adding NGSO |
| [**R4-2407937**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407937.zip) | (IoT\_NTN\_enh-Perf) draftCR to TS 36.133 Introduction of the NGSO test configuration for measurmenet procedure and performance TC for Cat-M1 UE | CMCC | Adding NGSO  |
| [**R4-2407938**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407938.zip) | (IoT\_NTN\_enh-Perf) draftCR to TS 36.133 Introduce of cell re-selection test cases for Cat-M1 UE | CMCC | M1, revised TC |
| **[R4-2408518](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408518.zip)** | DraftCR on 36.133 Test Cases for location-based triggering of intra-frequency measurements for Cat-M1 devices | Nokia | M1, new TC  |
| **[R4-2408519](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408519.zip)** | DraftCR on 36.133 Test Cases for time-based triggering of interfrequency measurements for Cat-M1 devices | Nokia | M1, new TC  |
| [**R4-2408520**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408520.zip) | DraftCR to TS 36.133 on test cases for intra-frequency measurements with time-based triggering for Cat-M1 devices | Nokia | M1, new TC  |
| [**R4-2409294**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409294.zip) | Draft CR on TC for eMTC for R18 IoT NTN enh | Huawei, HiSilicon | M1, new TC  |
| [**R4-2407206**](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407206.zip) | Big CR to TS 36.133 on performance requirements for IoT NTN enhancements | MediaTek inc. | Big CR |