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 frequency  b. 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:\\Users\\mtk12330\\Desktop\\2402%20R4_110_Local\\%5b203%5d%5b202%5d%5b224%5d%5b233%5d%5bNTN%20evo%5d\\%5bM233%5d%20R18%20IoT%20NTN%20enh%20-%20Disc1ok\\TDoc%20-%20Core%20Disc\\R4-2402699%20Discussion%20on%20mobility%20requirements%20for%20IoT%20NTN%20enhancements.docx" \l "_Toc159273392) [time-based measurement initiation (e.g. T](file:///C:\\Users\\mtk12330\\Desktop\\2402%20R4_110_Local\\%5b203%5d%5b202%5d%5b224%5d%5b233%5d%5bNTN%20evo%5d\\%5bM233%5d%20R18%20IoT%20NTN%20enh%20-%20Disc1ok\\TDoc%20-%20Core%20Disc\\R4-2402699%20Discussion%20on%20mobility%20requirements%20for%20IoT%20NTN%20enhancements.docx" \l "_Toc159273392)[trigger](file:///C:\\Users\\mtk12330\\Desktop\\2402%20R4_110_Local\\%5b203%5d%5b202%5d%5b224%5d%5b233%5d%5bNTN%20evo%5d\\%5bM233%5d%20R18%20IoT%20NTN%20enh%20-%20Disc1ok\\TDoc%20-%20Core%20Disc\\R4-2402699%20Discussion%20on%20mobility%20requirements%20for%20IoT%20NTN%20enhancements.docx" \l "_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:\\Users\\mtk12330\\Desktop\\2402%20R4_110_Local\\%5b203%5d%5b202%5d%5b224%5d%5b233%5d%5bNTN%20evo%5d\\%5bM233%5d%20R18%20IoT%20NTN%20enh%20-%20Disc1ok\\TDoc%20-%20Core%20Disc\\R4-2402699%20Discussion%20on%20mobility%20requirements%20for%20IoT%20NTN%20enhancements.docx" \l "_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:\Users\mtk12330\Desktop\2402%20R4_110_Local\%5b203%5d%5b202%5d%5b224%5d%5b233%5d%5bNTN%20evo%5d\%5bM233%5d%20R18%20IoT%20NTN%20enh%20-%20Disc1ok\TDoc%20-%20Core%20Disc\R4-2402699%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:\Users\mtk12330\Desktop\2402%20R4_110_Local\%5b203%5d%5b202%5d%5b224%5d%5b233%5d%5bNTN%20evo%5d\%5bM233%5d%20R18%20IoT%20NTN%20enh%20-%20Disc1ok\TDoc%20-%20Core%20Disc\R4-2402699%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:\\Users\\mtk12330\\Desktop\\2402%20R4_110_Local\\%5b203%5d%5b202%5d%5b224%5d%5b233%5d%5bNTN%20evo%5d\\%5bM233%5d%20R18%20IoT%20NTN%20enh%20-%20Disc1ok\\TDoc%20-%20Core%20Disc\\R4-2402699%20Discussion%20on%20mobility%20requirements%20for%20IoT%20NTN%20enhancements.docx" \l "_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:\Users\mtk12330\Desktop\2402%20R4_110_Local\%5b203%5d%5b202%5d%5b224%5d%5b233%5d%5bNTN%20evo%5d\%5bM233%5d%20R18%20IoT%20NTN%20enh%20-%20Disc1ok\TDoc%20-%20Core%20Disc\R4-2402699%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:\Users\mtk12330\Desktop\2402%20R4_110_Local\%5b203%5d%5b202%5d%5b224%5d%5b233%5d%5bNTN%20evo%5d\%5bM233%5d%20R18%20IoT%20NTN%20enh%20-%20Disc1ok\TDoc%20-%20Core%20Disc\R4-2402699%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

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| --- | --- | --- | --- |
| **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 |