3GPP TSG-RAN WG2 #131 R2-250xxxx

**Bangalore, India, 25-29 August 2025**

**Agenda Item: 8.17**

**Source: Toyota ITC**

**Title: IoT- NTN TDD open issues in MAC CR (Toyota ITC)**

**WID/SID: IoT\_NTN\_TDD**

**Document for: Discussion and Decision**

# 1 Introduction

This document includes a list of open issues related to MAC for IoT-NTN TDD Rel-19 WI [1], according to the following email discussion:

* [Post130][312][IoT NTN TDD] MAC CR (Toyota)

Scope: discuss the running MAC CR

Intended outcome: Endorsed CR and list of remaining open issues

**Deadline:** Long

Please provide your input no later than August 7th, 08:00 UTC.

# 2 Contact information

Please provide your contact information in the table below.

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| --- | --- | --- |
| **Company** | **Name** | **Email** |
| Toyota ITC | Claude Arzelier  Kai-Erik Sunell | [claude.arzelier@toyota.com](mailto:claude.arzelier@toyota.com)  [erik.sunell@toyota.com](mailto:erik.sunell@toyota.com) |
| Thales | Flavien Ronteix Jacquet | [Flavien.ronteix-jacquet@thalesaleniaspace.com](mailto:Flavien.ronteix-jacquet@thalesaleniaspace.com) |
| Iridium | Ryan Bright | [ryan.bright@iridium.com](mailto:ryan.bright@iridium.com) |
| ZTE | Zhihong Qiu | qiu.zhihong@zte.com.cn |
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# 3 Issues

## 3.1 Issue 1

In the random access reception subclause in subclause 5.1.4, the subframes between preamble transmission and RA Response Window in NB-IoT are defined in Table 5.1.4-1 as below:

Table 5.1.4-1: Subframes between preamble transmission and RA Response Window in NB-IoT

|  |  |  |  |
| --- | --- | --- | --- |
| TDD/FDD mode | Preamble format | Number of NPRACH repetitions | X |
| FDD | 0 or 1 | >= 64 | 41 |
| FDD | 0 or 1 | < 64 | 4 |
| FDD | 2 | >= 16 | 41 |
| FDD | 2 | < 16 | 4 |
| TDD | Any | Any | 4 |

It needs to be confirmed if the number of NPRACH repetitions ‘Any’ applies to IoT-NTN TDD mode.

Proposal: The number of NPRACH repetitions ‘Any’ applies to IoT-NTN TDD mode. Companies to provide their views on this. In case of disagreement, please provide suggestion.

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| --- | --- |
| **Company** | **Comments on the proposal for issue 1** |
| Thales | The number of NPRACH repetitions would be limited because of the number usable subframes. So the system would limit the number of NPRACH repetition. The IoT NTN follows the FDD frame structure and RAN1 has the following agreement : “NPRACH format 2 is not supported in NB-IoT NTN TDD.” , so format 0 or 1 FDD may be applicable to IoT NTN TDD. No strong view otherwise. |
| Iridium | Agree with Thales comments, IoT NTN TDD are applicable to FDD preamble format 0 or 1 |
| ZTE | We understand IoT TDD is based on FDD frame structure, therefore only the preamble format defined for FDD will be used. Furthermore, considering RAN1’s agreements that format 2 is not considered, then only FDD format 1/0 is applicable. |
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## **Rapporteur view:** All company opinions were converging. Proposal is to use the FDD preamble format 0 or 1 for IoT-NTN TDD mode.

## 3.2 Issue 2

In the random access reception subclause in subclause 5.1.4, for NB-IoT UEs operating in TDD mode, the RA-RNTI associated with the PRACH in which the Random Access Preamble is transmitted, is computed as:

RA-RNTI = 1 + floor(SFN\_id/4) + 256\*(H-SFN mod 2)

where SFN\_id is the index of the first radio frame of the specified PRACH and H-SFN is the index of the first hyper frame of the specified PRACH. The PDCCH transmission and the PRACH resource are on the same carrier.

It needs to be confirmed if this formula applies to IoT-NTN TDD mode.

Option 1: The formula above for the RA-RNTI associated with the PRACH in which the Random Access Preamble is transmitted is correct.

Option 2: The formula above for the RA-RNTI associated with the PRACH in which the Random Access Preamble is transmitted needs to be updated..

Proposal: Companies to provide their views between option 1 and option 2. In case of option 2, please provide suggestion.

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| --- | --- |
| **Company** | **Opinion between Option 1 or Option 2** |
| Thales | RAN2 agreement : “In IoT-NTN TDD mode the same formula as for RA-RNTI calculation for FDD is reused”. So the formula to be applied would be RA-RNTI=1 + floor(SFN\_id/4) + 256\*carrier\_id without the H-SFN value (to be confirmed). |
| Iridium | Agree with Thales, RA-RNTI for FDD should be used |
| ZTE | Agree with Thales. |
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**Rapporteur view:** All company opinions were converging. Proposal is to use the FDD RA-RNTI for IoT-NTN TDD mode.

## 3.3 Issue 3

The PRACH Mask Index values are defined in Table 7.3-1 in subclause 7.3 as follows:

Table 7.3-1: PRACH Mask Index values

|  |  |  |
| --- | --- | --- |
| PRACH Mask Index | Allowed PRACH (FDD) | Allowed PRACH (TDD) |
| 0 | All | All |
| 1 | PRACH Resource Index 0 | PRACH Resource Index 0 |
| 2 | PRACH Resource Index 1 | PRACH Resource Index 1 |
| 3 | PRACH Resource Index 2 | PRACH Resource Index 2 |
| 4 | PRACH Resource Index 3 | PRACH Resource Index 3 |
| 5 | PRACH Resource Index 4 | PRACH Resource Index 4 |
| 6 | PRACH Resource Index 5 | PRACH Resource Index 5 |
| 7 | PRACH Resource Index 6 | Reserved |
| 8 | PRACH Resource Index 7 | Reserved |
| 9 | PRACH Resource Index 8 | Reserved |
| 10 | PRACH Resource Index 9 | Reserved |
| 11 | Every, in the time domain, even PRACH opportunity  1st PRACH Resource Index in subframe | Every, in the time domain, even PRACH opportunity  1st PRACH Resource Index in subframe |
| 12 | Every, in the time domain, odd PRACH opportunity  1st PRACH Resource Index in subframe | Every, in the time domain, odd PRACH opportunity  1st PRACH Resource Index in subframe |
| 13 | Reserved | 1st PRACH Resource Index in subframe |
| 14 | Reserved | 2nd PRACH Resource Index in subframe |
| 15 | Reserved | 3rd PRACH Resource Index in subframe |

It needs to be confirmed if the Allowed PRACH values defined for TDD apply to IoT-NTN TDD mode.

Option 1: The Allowed PRACH values defined for TDD apply to IoT-NTN TDD mode.

Option 2: The Allowed PRACH values defined for TDD apply need to be updated for IoT-NTN TDD mode.

Proposal: Companies to provide their views between option 1 and option 2. In case of option 2, please provide suggestion.

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| **Company** | **Opinion between Option 1 or Option 2** |
| Thales | For IoT NTN TDD, it seems we re-use FDD framing and for NPRACH, RAN1 introduced new periodicities that are described in TS 36.331 |
| Iridium | Allowed PRACH values for FDD should apply to IoT NTN TDD |
| ZTE | Same view as Thales, as a principle FDD values are used. |
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**Rapporteur view:** All company opinions were converging. Proposal is to use the FDD allowed PRACH vales for IoT-NTN TDD mode.

# 4 Summary

Based on the discussion above, the above proposals were made.

# 5 References

[1] RP-243293, “Revised WID for the introduction of IoT NTN TDD mode”, Iridium Satellite LLC, RAN#106, Madrid, Spain, December 2024.