**3GPP TSG RAN WG1 #121R1-25XXXXX**

**St Julian’s, Malta, May 19th – 23rd, 2025**

Source: Moderator(vivo)

Title: Summary#1 of discussion on E-UTRAN measurement in IoT NTN

Agenda Item: 6

Document for: Discussion and Decision

# Introduction

This feature lead summary aims to collect the views from companies on draft CR on E-UTRAN measurement in IoT NTN :

|  |
| --- |
| **Release 18 IoT-NTN**  R1-2503346 Draft CR on E-UTRAN measurement in IoT NTN vivo, Ericsson  R1-2504640 Draft CR on E-UTRAN measurement in IoT NTN Huawei, HiSilicon |

**1st round discussion**: since we have online schedule on Monday afternoon, please provide your feedback before **Monday 14:30(local time)**

# [open]1st round Discussion

## Companies’ contributions summary

[1][2] provides draft CR to reflect RAN4 agreements in LS R1-2503212(R4-2504718):

* RAN4 confirms that E-UTRAN measurement of DL RS Tx power is supported for IoT-NTN.
* RAN4 confirms that E-UTRAN measurements of received interference power and thermal noise power are supported for IoT-NTN.
* The reference point for E-UTRAN measurement of DL RS Tx power for SAN types defined in clause 4.3 in TS 36.108 is:
  + for SAN type 1-H: the TAB connectors(Transceiver Array Boundary connectors),
  + for SAN type 1-O: the RIB (Radiated Interface Boundary).
* The reference point for E-UTRAN measurement of received interference power and thermal noise power for SAN types defined in clause 4.3 in TS 36.108 is:
  + for SAN type 1-H: the TAB connectors(Transceiver Array Boundary connectors),
  + for SAN type 1-O: the RIB (Radiated Interface Boundary).

From the moderator's point of view, both CRs propose similar changes. The main differences are that [1] adds the abbreviations for ‘NTN’ and ‘SAN’ in clause 3.3, includes references to NTN-related reference points in clause 5.2, and the placement of the text clarifying the reference points for IoT NTN differs slightly. For example, in [1], the additions appear at the end of legacy text, whereas in [2], they are inserted after the text describing the reference points for TN.

Based on this, the moderator suggests that RAN1 proceed with the draft CR in [1] as below.

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | | | | | |
| ***Title:*** | DRAFT CR on E-UTRAN measurement in IoT NTN | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Source to WG:*** | vivo, Ericsson | | | | | | | | | |
| ***Source to TSG:*** | R1 | | | | | | | | | |
|  |  | | | | | | | | | |
| ***Work item code:*** | IoT\_NTN\_enh-Core | | | | |  | ***Date:*** | | | 2025-05-09 |
|  |  | | | |  | |  | | |  |
| ***Category:*** | **F** |  | | | | | ***Release:*** | | | Rel-18 |
|  | *Use one of the following categories:* ***F*** *(correction)* ***A*** *(mirror corresponding to a change in an earlier release)* ***B*** *(addition of feature),* ***C*** *(functional modification of feature)* ***D*** *(editorial modification)*  Detailed explanations of the above categories can be found in 3GPP [TR 21.900](http://www.3gpp.org/ftp/Specs/html-info/21900.htm). | | | | | | | | *Use one of the following releases: Rel-8 (Release 8) Rel-9 (Release 9) Rel-10 (Release 10) Rel-11 (Release 11) … Rel-17 (Release 17) Rel-18 (Release 18) Rel-19 (Release 19)  Rel-20 (Release 20)* | |
|  |  | | | | | | | | | |
| ***Reason for change:*** | | According to LS R1-2503212(R4-2504718), RAN4 made the following agreement on measurement quantities for IoT NTN.   * RAN4 confirms that E-UTRAN measurement of DL RS Tx power is supported for IoT-NTN. * RAN4 confirms that E-UTRAN measurements of received interference power and thermal noise power are supported for IoT-NTN. * The reference point for E-UTRAN measurement of DL RS Tx power for SAN types defined in clause 4.3 in TS 36.108 is:   + for SAN type 1-H: the TAB connectors(Transceiver Array Boundary connectors),   + for SAN type 1-O: the RIB (Radiated Interface Boundary). * The reference point for E-UTRAN measurement of received interference power and thermal noise power for SAN types defined in clause 4.3 in TS 36.108 is:   + for SAN type 1-H: the TAB connectors(Transceiver Array Boundary connectors),   + for SAN type 1-O: the RIB (Radiated Interface Boundary).   However, the reference points for DL RS transmit power, received interference power, and thermal noise power for IoT NTN are not specified in TS 36.214. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Summary of change:*** | | Specify the reference points for DL RS Tx power, received interference power and thermal noise power for IoT NTN, and add a reference to TS 36.108 for IoT NTN. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Consequences if not approved:*** | | DL RS Tx power, received interference power and thermal noise power for IoT NTN are not supported. | | | | | | | | |
|  | |  | | | | | | | | |
| ***Clauses affected:*** | | 2, 3.3, 5.2, 5.2.1, 5.2.2, 5.2.3 | | | | | | | | |
|  | |  | | | | | | | | |
|  | | **Y** | **N** |  | | | |  | | |
| ***Other specs*** | |  | **X** | Other core specifications | | | | TS/TR ... CR ... | | |
| ***affected:*** | |  | **X** | Test specifications | | | | TS/TR ... CR ... | | |
| ***(show related CRs)*** | |  | **X** | O&M Specifications | | | | TS/TR ... CR ... | | |
|  | |  | | | | | | | | |
| ***Other comments:*** | |  | | | | | | | | |
|  | |  | | | | | | | | |
| ***This CR's revision history:*** | |  | | | | | | | | |

# 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non‑specific.

- For a specific reference, subsequent revisions do not apply.

- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TR 21.905: "Vocabulary for 3GPP Specifications".

[2] 3GPP TS 36.201: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical Layer – General Description ".

[3] 3GPP TS 36.211: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical channels and modulation".

[4] 3GPP TS 36.212: "Evolved Universal Terrestrial Radio Access (E-UTRA); Multiplexing and channel coding ".

[5] 3GPP TS 36.213: "Evolved Universal Terrestrial Radio Access (E-UTRA); Physical layer procedures ".

[6] 3GPP TS 36.321: "Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification".

[7] 3GPP TS 36.331: "Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification ".

[8] 3GPP2 CS.0005-D v1.0 "Upper Layer (Layer 3) Signaling Standard for CDMA2000 Spread Spectrum Systems Release D".

[9] 3GPP2 CS.0024-A v3.0 "cdma2000 High Rate Packet Data Air Interface Specification"

[10] 3GPP TS 36.104: "Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) radio transmission and reception ".

[11] 3GPP TS 36.355: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol (LPP)"

[12] 3GPP TS 36.455: "Evolved Universal Terrestrial Radio Access (E-UTRA); LTE Positioning Protocol A (LPPa)"

[13] 3GPP TS 36.459: "Evolved Universal Terrestrial Radio Access (E-UTRA); SLm Application Protocol (SLmAP)"

[14] 3GPP TS 36.111: "Evolved Universal Terrestrial Radio Access (E-UTRA); Location Measurement Unit (LMU) performance specification; Network Based Positioning Systems in E-UTRAN"

[15] IEEE 802.11, Part 11: "Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) specifications, IEEE Std.".

[16] 3GPP TS 36.304: "Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode ".

[17] 3GPP TS 38.213: "NR; Physical layer procedures for control".

[18] 3GPP TS 38.133: "NR; Requirements for support of radio resource management".

[19] 3GPP TS 37.105: "Active Antenna System (AAS) Base Station (BS) transmission and reception".

[20] 3GPP TS 36.108: "Evolved Universal Terrestrial Radio Access (E-UTRA); Satellite Access Node radio transmission and reception".

## 3.3 Abbreviations

For the purposes of the present document, the abbreviations given in TR 21.905 [1] and the following apply. An abbreviation defined in the present document takes precedence over the definition of the same abbreviation, if any, in TR 21.905 [1].

1x RTT CDMA2000 1x Radio Transmission Technology

CPICH Common Pilot Channel

E-SMLC Enhanced Serving Mobile Location Centre

E-UTRA Evolved UTRA

E-UTRAN Evolved UTRAN

FDD Frequency Division Duplex

GNSS Global Navigation Satellite System

GSM Global System for Mobile communication

HRPD CDMA2000 High Rate Packet Data

LMU Location Measurement Unit

NTN Non-Terrestrial Network

P-CCPCH Primary Common Control Physical Channel

RSCP Received Signal Code Power

RSRP Reference Signal Received Power

RSRQ Reference Signal Received Quality

RSSI Received Signal Strength Indicator

RSTD Reference Signal Time Difference

SAN Satellite Access Node

SRS Sounding Reference Signal

TDD Time Division Duplex

UTRA Universal Terrestrial Radio Access

UTRAN Universal Terrestrial Radio Access Network

## 5.2 E-UTRAN measurement abilities

The structure of the table defining a E-UTRAN measurement quantity is shown below.

|  |  |
| --- | --- |
| **Column field** | Comment |
| **Definition** | Contains the definition of the measurement. |

The term "antenna connector" used in this clause to define the reference point for the E-UTRAN measurements refers to the "BS antenna connector" test port A and test port B as described in [10]. The term "antenna connector" refers to Rx or Tx antenna connector as described in the respective measurement definitions.

For NTN, the reference points are described in the respective measurement definitions.

### 5.2.1 DL RS TX power

|  |  |
| --- | --- |
| **Definition** | Downlink reference signal transmit power is determined for a considered cell as the linear average over the power contributions (in [W]) of the resource elements that carry cell-specific reference signals which are transmitted by the eNode B within its operating system bandwidth.  For DL RS TX power determination the cell-specific reference signals R0 and if available R1 according TS 36.211 [3] can be used.  The reference point for the DL RS TX power measurement shall be the TX antenna connector.  For NTN, the reference point for the DL RS TX power measurement shall be  - the TAB connectors(Transceiver Array Boundary connectors) for SAN type 1-H defined in clause 4.3 in TS 36.108 [20],  - the RIB (Radiated Interface Boundary) for SAN type 1-O defined in clause 4.3 in TS 36.108 [20]. |

### 5.2.2 Received Interference Power

|  |  |
| --- | --- |
| **Definition** | The uplink received interference power, including thermal noise, within one physical resource block's bandwidth of resource elements as defined in TS 36.211 [3]. The reported value shall contain a set of Received Interference Powers of physical resource blocks  as defined in TS 36.211 [3]. The reference point for the measurement shall be the RX antenna connector. In case of receiver diversity, the reported value shall be linear average of the power in the diversity branches.  For NTN, the reference point for the Received Interference Power measurement shall be  - the TAB connectors(Transceiver Array Boundary connectors) for SAN type 1-H defined in clause 4.3 in TS 36.108 [20],  - the RIB (Radiated Interface Boundary) for SAN type 1-O defined in clause 4.3 in TS 36.108 [20]. |

### 5.2.3 Thermal noise power

|  |  |
| --- | --- |
| **Definition** | The uplink thermal noise power within the UL system bandwidth consisting of  resource blocks as defined in [3]. It is defined as (No x *W*), where No denotes the white noise power spectral density on the uplink carrier frequency and denotes the UL system bandwidth. The measurement is optionally reported together with the Received Interference Power measurement, it shall be determined over the same time period as the Received Interference Power measurement. The reference point for the measurement shall be the RX antenna connector. In case of receiver diversity, the reported value shall be linear average of the power in the diversity branches.  For NTN, the reference point for the Thermal noise power measurement shall be  - the TAB connectors(Transceiver Array Boundary connectors) for SAN type 1-H defined in clause 4.3 in TS 36.108 [20],  - the RIB (Radiated Interface Boundary) for SAN type 1-O defined in clause 4.3 in TS 36.108 [20]. |

## Collection of Companies’ views

According to the analysis above, companies are invited to provide their views on the following questions:

**Q1: Do you agree with draft CR in [1] for R18 IoT NTN?**

Companies are invited to provide their views on the questions in the following Table.

|  |  |  |
| --- | --- | --- |
| **Company** | **(Y/N)** | **comments** |
| OPPO |  | An alternative but much easier solution is to draw a RAN1 conclusion (captured in chairman notes):  Suggested Conclusion:  From RAN1 perspective, for IoT NTN, the antenna connector in RAN1 specification reflects to the TAB connector.  With this conclusion, we can avoid to have CR. |
| Ericsson | Y | In essence both draft CRs reflect in TS 36.214 the feedback received from the RAN4 LS, and from that perspective both draft CRs are ok. However, there are some additional corrections to be performed in [2] (E.g., “ME” should be unticked in the cover page, there are typos to be corrected in the reason for change e.g., “… which measurements in clause 5.2 of TS36.214 ~~is~~ are applicable for IoT”, and missing abbreviation “SAN” in clause 3.3). Therefore, we prefer the draft CR in [1]. |
|  |  |  |

# Monday online

# Reference

[1] R1-2503346 Draft CR on E-UTRAN measurement in IoT NTN vivo, Ericsson

[2] R1-2504640 Draft CR on E-UTRAN measurement in IoT NTN Huawei, HiSilicon