**3GPP T****SG-RAN WG2 Meeting #119bis-e R2-220xxxx**

**E-Meeting: October 10-19, 2022**

**Agenda item: 6.10.5**

**Source: MediaTek Inc**

**Title: [offline-116] [NR NTN] UE capabilities**

**Document for: Discussion and Decision**

# 1. Introduction

This document provides the summary for the following email discussion.

* [AT119bis-e][116][NR NTN] UE capabilities (Mediatek)

Initial scope: Discuss proposals in AI 6.10.5

Initial intended outcome: Summary of the offline discussion with e.g.:

* List of proposals for agreement (if any)
* List of proposals that require online discussions
* List of proposals that should not be pursued (if any)

Deadline (for companies' feedback): **Thursday 2022-10-13 18:00 UTC**

Deadline (for rapporteur's summary in R2-2210859): Thursday 2022-10-13 22:00 UTC

Proposals marked "for agreement" in R2-2210859 not challenged until Friday 2022-10-14 10:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online).

# 2. Reference CRs and Tdocs

The following CRs and Tdocs are discussed here:

|  |  |  |  |
| --- | --- | --- | --- |
| # | **Tdoc Number** | **Title** | Source Company |
| [1] | [R2-2209540](file:///C:\Data\3GPP\Extracts\38331_CR3493_(Rel-17)_R2-2209540%20IOT%20bit%20for%20inter%20satellite%20measurement_v1.docx) | IOT bit for inter satellite measurement (38.331) | MediaTek |
| [2] | [R2-2209541](file:///C:\Data\3GPP\Extracts\38306_CR0807_(Rel-17)_R2-2209541%20IOT%20bit%20for%20inter%20satellite%20measurement_v1.docx) | IOT bit for inter satellite measurement (38.306) | MediaTek |
| [3] | [R2-2209801](file:///C:\Data\3GPP\Extracts\R2-2209801_Capability%20of%20the%20UE%20coarse%20location%20report_v0.doc) | Capability of the UE coarse location report Apple | Apple |
| [4] | [R2-2209802](file:///C:\Data\3GPP\Extracts\R2-2209802_Clarification%20on%20the%20support%20of%20DCCA%20in%20NTN%20network_v0.doc) | Clarification on the support of DCCA in NTN network | Apple |

# 3. Discussion

**3.1 IOT bit Capability for Inter-satellite Measurement**

In R2-2209540 [1] it is justified that LEO satellite deployment for NR NTN will take few years. During this initial deployment phase, the number of LEO satellites could be less with possible coverage discontinuity between two successive LEO satellites. Thus, it is not expected that the inter-operability testing (IOT) test availability for inter-satellite mobility can be ready over a short time. Hence, it is suggested in R2-2209540 [1] to add an IOT bit, “*interSatMeas-r17*” in MeasAndMobParametersCommon of 38.331, to indicate whether the inter-satellite measurement is supported. This will avoid any unsuccessful testing of UE due to absence of neighbour satellite.

MeasAndMobParametersCommon ::= SEQUENCE {

…

[[

interSatMeas-r17 ENUMERATED {supported} OPTIONAL

]]

}

Similarly, it is suggested in R2-2209541 [2] to include a mandatory UE capability “*interSatMeas-r17*” in 38.306. This capability will indicate

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Definitions for parameters*** | Per | M | FDD-TDD DIFF | FR1-FR2 DIFF |
| ***interSatMeas-r17***  Indicates whether the UE supports inter-satellite measurement as specified in TS 38.331 [9]. | UE | Yes | No | No |

Based on the above discussion and justifications, the rapporteur would like to ask the following question:

**Question 1: Do companies agree that a** **capability *interSatMeas-r17* should be included in 38.331 and in 38.306?**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| # | Company | *interSatMeas-r17* Capability in 38.331 | *interSatMeas-r17* Capability in 38.306 | Comments |
| Agree/Disagree | Agree/Disagree |
|  | Intel | Agree | Partially agree | It should be CY for column “M”, as it’s only mandatory for NTN-capable UEs. We suggest to add one sentence like “It’s mandatory to support inter-satellite measurement if the UE supports *nonTerrestrialNetwork-r17*.” |
|  | MediaTek | Agree | Agree | This will avoid any unsuccessful testing of UE due to absence of neighbour satellite |
|  | Qualcomm | Agree | Agree | Agree with Intel. Suggestion is  interSatMeas-r17  Indicates whether the UE supports inter-satellite measurement as specified in TS 38.331 [9]. It is mandated if the UE supports *nonTerrestrialNetwork-r17*.” |
|  | Lenovo | Agree | Partially agree | Agree with Intel. |
|  | Huawei, HiSilicon | Disagree | Disagree | Firstly we wonder whether there is any related RAN4 discussion and need to understand the background, as pointed out by several companies during online.  From our perspective, inter-satellite mobility is a quite fundamental feature. If inter-satellite measurement is not considered, SMTC related enhancements (e.g., multiple SMTCs, SMTC adjustment, propagation delay reporting) and gap enhancements are not needed.  And if the inter-satellite mobility is not supported, the service continuity cannot be guaranteed, as one satellite only serves a limited time. |
|  | OPPO | Agree | Partially agree | Agree with Intel. |
|  | Xiaomi | Agree | Partially agree | Agree with Intel |
|  | Ericsson | Disagree | Disagree | We understand this new capability is not a fix but a new feature. Thus, it is out of scope of maintenance. Regarding technical aspects: although mobility in GSO will happen rarely, this feature can result in a limitation. Additionally, UE is agnostic of whether the detected SSB comes from the same satellite or a new satellite. |
|  | ZTE | Disagree | Disagree | Share similar understanding with HW and Ericsson that this is new capability is a new feature and there is no background information for it.  Also, as highlighted by other companies. Such feature would result in limitation in mobility and application of a lot of features which have been introduced for inter-satellite mobility. |
|  | Samsung | Agree | Partially agree | Agree with Intel |

**Rapporteur Summary**:

7/10 companies agree to introduce the “interSatMeas-r17 Capability” in 38.331. 3 companies, Huawei, Ericsson and ZTE disagree. Regarding including this capability in 38.306, only 2 companies agree, 5 companies partially agree, and 3 companies disagree. Most companies which disagree either consider it a new capability with no background information. Companies have also raised issue regarding whether there has been any related discussion in RAN4.

The proponent and rapporteur has mentioned in the justification that during this initial deployment phase, the number of LEO satellites could be less with possible coverage discontinuity between two successive LEO satellites. Thus, it is not expected that the inter-operability testing (IOT) test availability for inter-satellite mobility can be ready over a short time. Hence, it is suggested in R2-2209540 [1] to add an IOT bit, “interSatMeas-r17” to indicate whether the inter-satellite measurement is supported. Hence, based on this, the rapporteur suggests to discuss this issue online or in next meeting.

**Proposal 1 (7/10): RAN2 to further discuss regarding the capability interSatMeas-r17 for 38.331 and in 38.306.**

**3.2 UE Capability for Coarse Location Report**

On the other hand, R2-2209801 [3] suggests that although UE coarse location report is the R17 NTN specific procedure, but the corresponding UE capability is missing. Therefore, the UE AS capability for this feature needs to be added, and the per UE granularity design is sufficient. Based on this, the rapporteur asks the following question:

**Question 2: Do companies agree to** **introduce the UE specific capability for the UE coarse location report?**

|  |  |  |  |
| --- | --- | --- | --- |
| # | Company | Agree/Disagree | Comments |
|  | Intel | Disagree | Coarse location reporting is used to support initial selection of AMF at RAN, we think it’s necessary for NTN-capable UE to support. We suggest to add the corresponding description in the field description of *nonTerrestrialNetwork-r17*. E.g.,  ***nonTerrestrialNetwork-r17***  Indicates whether the UE supports NR NTN access. If the UE indicates this capability the UE shall support the following NTN essential features, e.g., timer extension in MAC/RLC/PDCP layers and RACH adaptation to handle long RTT, coarse location reporting, acquiring NTN specific SIB and more than one TAC per PLMN broadcast in one cell. |
|  | Thales |  | This capability is mandatory for all NTN-capable UE |
|  | MediaTek | No strong view | If “user consent” has already been used, not sure if it is needed. |
|  | Qualcomm | Disagree | UE capability for it is not necessary. |
|  | Lenovo | No strong view | Agree with MediaTek |
|  | Huawei, HiSilicon | Disagree | Agree with Intel |
|  | OPPO | No need for any capability update | “user consent” is sufficient for optionality. Meanwhile, do not agree that coarse location reporting is mandatory because UE does not report coarse location if user consent is not there. |
|  | Xiaomi | No strong view | We think the UE with GNSS capability always support to calculate the coarse location, so the capability is not needed, however, we don’t agree that coarse location reporting is mandatory since the user consent has introduced. |
|  | Ericsson | Agree  (See comment) | Two new capabilities should be added to facilitate backwards compatibility. One capability with signalling for periodic coarse location which is an optional feature, and another capability without signalling for event-triggered coarse location which is a mandatory feature. |
|  | ZTE | Disagree | As pointed out by Intel, coarse location report is supported by all the NTN-capable UEs and UE would report it when there is user consent.  Also to point out that user consent is different from UE capability and we should not mix up the two concepts as it is always possible that the UE has such capability but there is no user consent. |
|  | Samsung | Disagree | Agree with Intel |

**Rapporteur Summary**: Only 1 company (Ericsson) agree for this change, 6 companies disagree, and 3 companies have “no strong view”. Hence, based on the majority the rapporteur suggests not to pursue this change.

**Proposal 2 (6/7): The changes in R2-2209801, regarding introducing tUE specific capability for the UE coarse location report, are not pursued.**

If the answer to Question 2 is “yes”, the UE should support the report via both 1) UEinformationRequest and Response procedure and 2) UE measurement configuration and report procedure. Based on this, the rapporteur asks the following question:

**Question 3: Do the companies agree that if UE specific capability for the UE coarse location report is introduced, the UE should support the report via both 1) UEinformationRequest and Response procedure and 2) UE measurement configuration and report procedure?**

|  |  |  |  |
| --- | --- | --- | --- |
| # | Company | Agree/Disagree | Comments |
|  | Ericsson | Disagree | Please refer to our comment to Q2. |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**Rapporteur Summary**:

**As all except one company didn’t agree to Question 2, this question is not pursued further.**

**3.3 On DC/CA Support in NR-NTN**

R2-2209802 [4] mentions that according to the RAN2#118 offline-109 discussion, the majority (11/12) agreed with this clarification and agreed to clarify it in stag-2 spec. However, the clarification was not agreed because one company thought it was unnecessary to be captured in the spec. Hence, R2-2209802 [4] suggests capturing, in Chairman notes, that CA and DC are not supported in NTN network.

**Question 4: Do companies agree that RAN2 needs to capture, in Chairman Notes, that CA and DC are not supported in NTN network?**

|  |  |  |  |
| --- | --- | --- | --- |
| # | Company | Agree/Disagree | Comments |
|  | Intel | Agree | The wording could be “Carrier Aggregation and Dual Connectivity are not supported in Rel-17 NR NTN”. Since current abbreviation “DC” may also refer to discontinuous coverage. |
|  | Thales | Agree |  |
|  | MediaTek | Agree |  |
|  | Qualcomm | Agree | We should capture in stage 2. |
|  | Lenovo | Agree | Agree with Intel, need to differentiate “Dual Connectivity” and “Discontinuous Coverage” |
|  | Huawei, HiSilicon | Agree |  |
|  | OPPO | Agree |  |
|  | Xiaomi | Agree |  |
|  | Ericsson | Disagree | The same criteria as in the previous offline still holds. RAN2 has not captured any other features that are not supported in NTN. We think it should not be different for CA/DC. |
|  | ZTE | Disagree | Same view as Ericsson |
|  | Samsung | Agree |  |

**Rapporteur Summary**:

(9/11) companies agree that RAN2 needs to capture, in Chairman Notes, that CA and DC are not supported in NTN network. Ericsson and ZTE disagree as RAN2 has not captured any other features that are not supported in NTN.

Based on the majority the rapporteur suggests capturing it and/or discussing it.

**Proposal 3 (9/11): RAN2 captures in Chairman Notes that CA and DC are not supported in NTN**

# 4. Conclusion

Based on the majority companies’ views the rapporteur suggests the following proposals for discussions and agreements:

**For Agreements**

**Proposal 2 (6/7): The changes in R2-2209801, regarding introducing tUE specific capability for the UE coarse location report, are not pursued.**

**Proposal 3 (9/11): RAN2 captures in Chairman Notes that CA and DC are not supported in NTN**

**For Further Discussion**

**Proposal 1 (7/10): RAN2 to further discuss regarding the capability interSatMeas-r17 for 38.331 and in 38.306.**