**3GPP TSG RAN meeting #105 RP-24xxxx**

**Melbourne, Australia, September 9-12, 2024**

## Status Report to TSG

**Agenda item:** 10.3.1

|  |  |
| --- | --- |
| **WI / SI Name** | Non-Terrestrial Networks (NTN) for Internet of Things (IoT) Phase 3 |
| included in this status report | Study Item:No  | Core part:Yes  | Performance part: Yes | Testing part: No |
| **Acronym** | IoT\_NTN\_Ph3 |
| **Unique ID** | 1020096 |
| **TSG Tdoc of latest approved WI/SI description (if any)** | RP-241624  |
| **Target Completion Date****(indicate if changed)** | Study Item: N/A | Core part:09/2025 | Performance part: 03/2026 | Testing part: N/A |
| **Overall Completion level** | Study Item: N/A | Core part: 30%RAN1: 40%RAN2: 30%RAN3: 15%RAN4: 15% | Performance Part: 0% | Testing part: N/A |

Note: Overall completion level percentage numbers should use one of the colors below:

* xx%: Normal progress, no RAN plenary action needed
* xx%: Progress behind schedule, may need RAN plenary intervention. If so, SR should clearly define requested action
* xx%: Progress critically behind, RAN plenary shall intervene. SR should define requested action

**Source:**

|  |  |
| --- | --- |
| **Leading WG** | RAN WG2 |
| **Rapporteur** | **Name** | Chun-Fan (Felix) Tsai |
| **Company** | MediaTek Inc. |
| **Email** | Chun-Fan.tsai@mediatek.com |

## 1 Work plan related evaluation

|  |  |
| --- | --- |
| **Do you want to modify the time budget for this WI/SI compared to what was endorsed at the last RAN meeting?** | No |

*If you answered No: Then please remove the Excel file from the zip file of this status report.*

*If you answered Yes: Then please fill out the attached Excel template to request a modification of the time budgets for your WI /SI. The Excel table has to be filled out for all affected RAN WGs and up to the target date of the WI/SI. The basis are the endorsed time budgets of the last RAN meeting. Please highlight all changes of the values.
 One time unit (TU) corresponds to ~ 2 hours in the meeting.
 If this status report covers a WI with Core and Performance part, then please have one line for each in the attached Excel table.
 Note: If no Excel table is attached, then this means no time budget change.*

**Additional explanations/motivations for the time budget changes in the attached Excel table:**

## 2. Detailed progress in RAN WGs since last TSG meeting (for all involved WGs)

 NOTE: Agreements and Open issues impacted cross-TSG aspects shall be explicitly highlighted

## 2.1 RAN1

#### 2.1.1 Agreements

**RAN1#118, Aug’24**

Agreement

RAN1 studies whether the following types of UL transmission gap will impact the design of OCC for IoT-NTN when considering e.g. phase continuity

* UL gaps for synchronization (from Rel-13)
* Gaps around NPRACH occasions
* UL timing adjustment gaps and segmentation for IoT-NTN (from Rel-17)
* TDM DMRS that are muted
* Guard periods for 3.75kHz UL transmissions

Agreement

The following combinations are considered for further simulation in RAN1 for 3.75kHz SCS OCC for NPUSCH format 1:

* Option 1: OCC2, Symbol-level, TDM DMRS
* Option 2: OCC2, Symbol-level, CDM DMRS with new pattern
* Option 3: OCC2, Slot-level, TDM DMRS
* Option 4: OCC2, Slot-level, CDM DMRS with legacy pattern
* Option 6: OCC4, Symbol-level, CDM DMRS with new pattern

The following combinations are considered for further simulation in RAN1 for 15kHz SCS OCC for NPUSCH format 1:

* Option 1: OCC2, Symbol-level, TDM DMRS
* Option 3: OCC2, Slot-level, TDM DMRS
* Option 4: OCC2, Slot-level, CDM DMRS with legacy pattern
* Option 5: OCC4, Symbol-level, TDM DMRS
* Option 7: OCC4, Slot -level, TDM DMRS
* Option 8: OCC4, Slot-level, CDM DMRS with legacy pattern

Note 1: For TDM, the legacy DMRS pattern, with DMRS symbols appropriately muted/blanked is used. Companies to report their assumption on whether spreading is applied to the legacy DMRS pattern for 15 kHz SCS.

Note 2: Companies to report DMRS sequence applied.

Agreement

For 3.75kHz SCS, NPUSCH format 1 simulations are performed using an appropriate MCS with SNR at least in the range of -8dB to 0dB.

**RAN1#117, May’24**

Agreement

For 3.75kHz single-tone OCC for NPUSCH format 1, RAN1 supports either symbol-level OCC or slot-level OCC. Other OCC schemes are not pursued.

For 15kHz single-tone OCC for NPUSCH format 1, RAN1 supports either symbol-level OCC or slot-level OCC. Other OCC schemes are not pursued.

Agreement

Inter-repetition OCC for NPRACH is not studied further in RAN1.

Agreement

* For the time-domain DMRS pattern (including blanked DMRS, if any):
	+ For 15kHz single-tone, RAN1 strives to reuse the Rel-17 DMRS pattern
	+ For 3.75kHz single-tone
		- RAN1 studies
			* Rel-17 DMRS pattern
			* A new DMRS pattern
	+ The DMRS overhead (including blanked DMRS, if any) for OCC is the same as for Rel-17

Agreement

The Rel-17 guard period locations and length for NB-IoT 3.75kHz UL slot are preserved when OCC is applied to NPUSCH format 1.

**RAN1#116bis, Apr’24**

Agreement

For the NPUSCH evaluation assumptions, update the DMRS configuration, as follows:

|  |  |  |
| --- | --- | --- |
| DMRS configuration  | For baseline evaluations:OS#4 per slot for 3.75kHzOS#3 per slot for 15kHzFor OCC evaluations:Up to proponent | For baseline evaluations:OS#3 per slot for 15kHzFor OCC evaluations:Up to proponent |

Agreement

At least the following NPRACH OCC schemes are considered by RAN1 for study:

* Intra-symbol group OCC
* Inter-symbol group(s) OCC
* Inter-repetition OCC

Agreement

The study of OCC for NPRACH does not consider NPRACH format 2.

Agreement

The following evaluation assumptions are used for the study of OCC for NPRACH:

|  |  |  |
| --- | --- | --- |
|  | Parameter | value |
| Scenario | Orbit and elevation angle | GEO at 12.5 degrees; LEO600 at 30 degrees |
| Channel and impairments | carrier frequency | 2GHz |
|  | Channel model | NTN-TDL-CThe channels from different UE are independent. |
|  | Frequency error | Uniform random selection from [-0.1 ppm, +0.1 ppm] for all UEsVariation of frequency error is negligible. |
|  | Timing error | Uniform random selection from [-97Ts, +97Ts] for all UEsTiming drift 80us/s for LEO600 and 0 for GEO. |
|  | Power imbalance | Uniformly distributed between +Pimb and -Pimb for all UEsProponent to report the value of Pimb (can be zero) and justification for the chosen value |
| Transmitter | NPRACH format | 1 or 0 |
|  | MIMO scheme | SISO |
|  | Number of repetitions ($N\_{rep}$) | Up to proponent |
|  | OCC length  | Up to proponent |
|  | OCC sequence | Up to proponent |
|  | Number of UE | Up to proponent |
|  | Velocity of UE | 3km/h |
|  | Total NPRACH time / frequency resource utilisation | To be reported by proponent.  |
| KPI | Target detection probability | 99% |
|  | Target false alarm probability | 0.1% |
|  | SNR operating point | Report SNR where target detection probability and false alarm probability are reached for baseline and OCC schemes |

Agreement

OCC multiplexing is not supported between a UE using NPUSCH format 1 with 3.75kHz SCS and another UE using NPUSCH format 1 with 15kHz SCS.

Agreement

For OCC of NPUSCH format 1, RAN1 will not consider multiplexing more than 4 UEs.

Agreement

For single-tone DMRS when OCC is applied to NPUSCH format 1, RAN1 considers at least the following for further study:

* TDM of DMRS. The time domain locations of DMRS for different UEs are different. No OCC is applied for the DMRS of different UEs.
	+ FFS: Detailed mapping
* CDM of DMRS. The time domain locations of DMRS for different UEs are the same. Different OCCs are applied for the DMRS of different UEs.
	+ FFS: Detailed mapping
* Other schemes are not precluded, including combinations of the above

Agreement

For the NPUSCH evaluation assumptions, update the frequency error assumption, as follows.

|  |  |
| --- | --- |
| Frequency error | Uniform random selection from [-0.1 ppm, +0.1 ppm] for all UEsVariation of frequency error is negligible.For GEO, the same frequency error is applied to each subframe of a transport block.For LEO, the same frequency error is applied to each subframe of a segment (if applied in the evaluation). Companies to report their assumption on frequency error across segments. |

**RAN1#116, Feb’24**

Agreements on 9.11.4 IoT-NTN uplink capacity/throughput enhancement

Agreement

For single-tone NPUSCH format 1 transmissions with both 3.75kHz and 15kHz SCS, the following OCC schemes are considered by RAN1 for further study:

* Time domain OCC where OCC spreads across:
	+ Symbol-level
	+ Slot-level
	+ Repetition-level
	+ RV-level

For multi-tone NPUSCH format 1 transmissions, the following OCC schemes are considered by RAN1 for further study:

* Time domain OCC where OCC spreads across:
	+ Symbol-level
	+ Slot-level (including Nslot level)
	+ Repetition-level
	+ RV-level
* Intra-symbol pre-DFT spreading OCC

Agreement

The following evaluation assumptions are used for the study of OCC for NPUSCH format 1:

|  |  |  |
| --- | --- | --- |
|  | Parameter | value |
| scenario | orbit | GEO | LEO600 |
| Elevation angle  | 12.5 degree | 30degree |
| Channel and impairments | carrier frequency | 2GHz |
| Channel model | NTN-TDL-CThe channels from different UE are independent. |
| Frequency error | Uniform random selection from [-0.1 ppm, +0.1 ppm] for all UEsVariation of frequency error is negligible. |
| Timing error | Uniform random selection from [-97Ts, +97Ts] for all UEsTiming drift 80us/s for LEO600 and 0 for GEO. |
| Power imbalance | Uniformly distributed between +Pimb and -Pimb for all UEsProponent to report the value of Pimb (can be zero) and justification for the chosen value |
| transmitter  | SCS | 3.75KHz and 15KHz | 15kHz |
| Number of tones | Single tone  | Single tone and multi tone up to 12 tones |
| Waveform | DFT-s-OFDM |
| Frequency hopping  | w/o frequency hopping |
| MIMO scheme | SISO |
| DMRS configuration  | For baseline evaluations:OS#3 per slot for 3.75kHzOS#4 per slot for 15kHzFor OCC evaluations:Up to proponent | For baseline evaluations:OS#4 per slot for 15kHzFor OCC evaluations:Up to proponent |
| Number of resource unit ($N\_{RU}$)  | Up to proponent | Up to proponent |
| Modulation order $(Q\_{m})$ | Up to proponent | Up to proponent |
| TBS ($I\_{TBS}$) | Up to proponent | Up to proponent |
| Number of repetitions ($N\_{rep}$) | Up to proponent |
| OCC length  | Up to 4 |
| OCC sequence | Up to proponent |
| Number of UE | Up to 4 |
| Velocity of UE | 3km/h |
| receiver | Receiver algorithm | MMSE |
| Channel estimation | Real channel estimation |
| KPI | SNR at 10% BLER | Report for baseline and OCC schemes |
| Aggregated throughput  | Total throughput of up to 4 UEs multiplexed |

#### 2.1.2 Remaining Open issues

Definition of necessary physical layer features enabling

* IoT-NTN uplink capacity/throughput enhancement

## 2.2 RAN2

#### 2.2.1 Agreements

**RAN2#127, Aug’24**

Support of Store & Forward

Agreements:

1. RAN2 adopts the SA2 study conclusions on the possible S&F architectures as the baseline for further discussion (RAN2 will only consider the full CN and spit-MME payload options)

2. RAN2 will consider both single satellite pass and multiple satellite pass scenarios

3. RAN2 will consider both MO and MT data within scope

4. UE is informed whether its serving satellite is currently operating in S&F via System Information broadcast (FFS if we also need a static indication that in general the NW supports the feature)

5. RAN2 does not further discuss whether legacy UEs will always need to be barred in a S&F network, at least not before further progress in SA2 discussion. If there will be a need for this, mechanisms to bar legacy UEs are already in place and no further impact on RAN2 specs in expected.

7. RAN2 agrees there will be a way to bar legacy UEs (using legacy cellBarred and/or cellBarred-NTN bit) and still allow R19 S&F capable UEs. FFS on the exact solution (e.g. new barring bits or whether this is linked to some other indication)

Reduce the necessary signaling to complete an Early Data Transmission

Agreements:

1. RAN2 will continue working on a CB-msg3 EDT-like mechanism

2. RAN2 assumes that a DSA based scheme would not have RAN1 impacts, while RAN2 thinks that a CRDSA based scheme would necessarily have RAN1 impacts

3. In the next meeting continue the comparison (e.g. in terms of packet loss ratio, usage of UL/DL radio resources) between existing CB mechanism (Slotted Aloha) and other mechanisms (DSA, CRDSA, others) and try to decide on which way to go and in case whether/what to ask to RAN1.

4. For DSA and CRDSA, RAN2 can consider in the evaluation how to integrate them with repetition.

**RAN2#126, May’24**

Support of Store & Forward

Agreements:

1. For the uplink/downlink messages transmission for MO, from RAN2 perspective the following steps are taken as baseline for S&F satellite operation (in case only eNB is on the satellite):

 1) The UE sends uplink data signalling to eNB when service link is available and the eNB stores it.

 2) When feeder link is available, the eNB sends the uplink data/NAS signalling to the CN.

 3) The eNB (same or different) receives the downlink data/NAS signalling from the CN and stores it when feeder link is available (and service link is not available).

 4) The eNB (same or different) sends the downlink data/signalling to the UE when service link is available again

2. S&F indication can be provided by SIB (FFS on the details). RAN2 assumes that no NAS indication is needed

3. RAN2 understands legacy UEs may be barred by legacy cellBarred and cellBarredNTN

Reduce the necessary signaling to complete an Early Data Transmission

Agreements:

1. RAN2 focusses the study on contention-based Msg3 transmission to complete an EDT-like transaction (FFS on the details of Msg3. FFS on the procedural steps, e.g. how much we reuse of EDT and PUR procedures. FFS on allocation of resources).
2. RAN2 can continue the discussion on Diversity Slotted ALOHA (DSA) and Contention Resolution Diversity Slotted Aloha (CRDSA) for Msg3-EDT transmissions without msg1/ RAR, evaluating possible impacts on the specification, in the next RAN2 meeting (RAN2 might send an LS to RAN1 later on this)
3. If an IoT NTN UE in IDLE state is to use the new R19 contention-based procedure, the UE needs to verify/update the uplink synchronization (e.g. get GNSS fix, acquire TA) just before sending msg3.

**RAN2#125bis, April’24**

Support of Store & Forward

RAN2 assumptions:

1. S&F implies that at least the full eNB will be onboard
2. An IoT NTN network shall be able to inform UE(s) whether S&F Satellite operation is applied, either via NAS or AS (wait for SA2 progress on this)

3. The S&F satellite operation is common for NB-IoT and eMTC.

4. The S&F satellite operation is applied to both CP solution and UP solution (for the UP solution pending on SA2 conclusions on the architecture)

Reduce the necessary signaling to complete an Early Data Transmission

Agreements:

1. Both NB-IoT and eMTC are within scope of uplink capacity enhancements
2. Both C-plane and U-plane solutions are within scope of uplink capacity enhancements.
3. Only CIoT EPS is within scope of uplink capacity enhancements

#### 2.2.2 Remaining Open issues

* RAN2 impact due to S&F operation
* Detail procedure for EDT-like transmissions without msg1/ RAR

## 2.3 RAN3

#### 2.3.1 Agreements

**RAN3#125, Aug’24**

Agreement:

RAN3 decides to work on Split MME architecture and Full CN on board architecture. Whether eNB only on board architecture is feasible or not can be discussed later

#### 2.3.2 Remaining Open issues

* Further discussion on whether eNB only on board architecture is feasible or not
* Potential standard impact of Split MME architecture and Full CN on board architecture

## 2.4 RAN4

#### 2.4.1 Agreements

**RAN4#112, Aug’24**

RF

# Topic #1: Work plan for Rel-19 IoT\_NTN\_Ph3

**Issue 1-1: Work plan for Rel-19 IoT\_NTN\_Ph3**

* Approve the workplan in R4-2413529

# Topic #2: RF core requirements

NOTE1: Enhancements to enable multiplexing of multiple UEs in a single 3.75 kHz or 15 kHz subcarrier via orthogonal cover codes (OCC) for NPUSCH format 1 and NPRACH.

#### **Issue 2-1:** **UE RF requirement impact for NPUSCH with OCC feature**

* Agreement:
	+ No UE RF requirement impact from symbol-level for NPUSCH
	+ FFS on UE RF requirement impact from slot-level for NPUSCH

#### **Issue 2-2: UE RF requirement impact for NPRACH with OCC feature**

* Agreement:
	+ Wait RAN1 reach conclusions on OCC feature before RAN4 evaluates the UE RF impact.

#### **Issue 2-3: SAN RF requirement impact for NPUSCH/NPRACH with OCC feature**

* Agreement:
	+ Wait RAN1 reach conclusions for OCC feature before RAN4 evaluates the SAN RF impact.

RRM

### Sub-Topic 1-1: RRM impact

The work scope of RRM for Rel-19 IoT NTN is to discuss whether and how to define timing requirements for Msg3 transmission without msg1/ Random Access Response (RAR).

* Note: It can be revisited if the RRM impact from other objectives has been identified.

Besides, the following LS is approved.

* R4-2414114 Reply LS to RAN2 on UL synchronization for contention based Msg3 transmission without Msg1/Msg2, ZTE

#### 2.4.2 Remaining Open issues

* UE RF and SAN RF requirement impact due to OCC feature
* UE RRM requirements due to Msg3 transmission without msg1/ Random Access Response (RAR).

## 2.5 RAN5

#### 2.5.1 Agreements

#### 2.5.2 Remaining Open issues

#### 2.5.3 Remaining Open issues with cross-WG dependencies

## 2.6 RAN6

#### 2.6.1 Agreements

#### 2.6.2 Remaining Open issues

## 3. Detailed progress in SA/CT WGs since last TSG meeting (for all involved WGs)

NOTE: This section only needs to be filled in for WI/SIs where there is a corresponding relevant WI/SI in SA/CT.

## 3.1 SAx/CTs

#### 3.1.1 Agreements with cross-TSG impacts

#### 3.1.2 Remaining Open issues with cross-TSG impacts

NOTE: This section should also flag any critical dependencies that need TSG attention.

## 4. References

List of all related Tdocs in the affected WGs since last TSG.

## 4.1 RAN1

**RAN1#117, Aug’24:**

R1-2405842 Discussion on UL capacity enhancements for IoT NTN Huawei, HiSilicon

R1-2405928 Discussion on IoT-NTN uplink capacity/throughput enhancement Spreadtrum Communications

R1-2406006 Discussion on the IoT -NTN uplink capacity/throughput enhancements CMCC

R1-2406077 Discussion on the IoT-NTN uplink capacity/throughput enhancements TCL

R1-2406111 IoT-NTN uplink capacity/throughput enhancement InterDigital, Inc.

R1-2406133 Discussion on UL capacity enhancement for IoT NTN ZTE Corporation, Sanechips

R1-2406205 Discussion on IoT-NTN uplink capacity enhancement vivo

R1-2406232 Discussion on IoT-NTN uplink capacity/throughput enhancement OPPO

R1-2406278 Discussion on IoT-NTN uplink capacity enhancement Xiaomi

R1-2406362 Discussion on UL capacity enhancement for IoT NTN CATT

R1-2406427 IoT-NTN uplink capacity enhancement Nokia, Nokia Shanghai Bell

R1-2406449 Discussion on IoT-NTN uplink capacity/throughput enhancement LG Electronics

R1-2406512 Discussion on uplink capacity enhancement for IoT NTN Lenovo

R1-2406556 IoT-NTN uplink capacity/throughput enhancement NEC

R1-2406573 IoT NTN OCC methods for NPUSCH and NPRACH Sharp

R1-2406673 Discussion on uplink capacity/throughput enhancement for IoT-NTN Samsung

R1-2406741 Discussion on uplink capacity/throughput enhancement for IoT NTN ETRI

R1-2406780 IoT-NTN - uplink capacity/throughput enhancemen MediaTek Inc.

R1-2406809 On uplink capacity enhancements for IoT-NTN Ericsson

R1-2406866 On IoT-NTN Uplink Capacity Enhancement Apple

R1-2407052 IOT-NTN uplink capacity/throughput enhancement Qualcomm Incorporated

R1-2407138 Views on UL Capacity Enh for IoT-NTN Inmarsat, Viasat

R1-2407297 FL Summary #2 for IoT-NTN Moderator (Sony)

## 4.2 RAN2

**RAN2#127, Aug’24:**

R2-2406240 LS on FS\_5GSAT\_Ph3\_ARCH conclusions (S2-2407350; contact: OPPO) SA2 LS in Rel-19 FS\_5GSAT\_Ph3\_ARCH To:SA3, SA3-LI Cc:RAN2

R2-2406245 Reply LS on FS\_5GSAT\_Ph3\_ARCH conclusions (s3i240477; contact: Tencastle) SA3-LI LS in Rel-19 FS\_5GSAT\_Ph3\_ARCH To:SA2 Cc:SA3, RAN2

R2-2406251 RAN2 Aspect for S&F Operation vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406283 RAN2 aspects of the Store and Forward satellite operation Huawei, HiSilicon, Turkcell discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406326 Discussion on support of store and forward operation CATT discussion IoT\_NTN\_Ph3-Core

R2-2406526 Discussion on information for Store & Forward ASUSTeK discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406536 Considerations on S&F operation from device perspective Telit Communications S.p.A., Novamint, Sateliot, Thales discussion Rel-19 R2-2404979 Revised

R2-2406570 Discussion on the S&F indication Google discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406639 Support of S&F mode operation Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406689 Support of S&F operation in IoT NTN Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406771 Discussion on Store & Forward satellite operation OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406821 RAN2 impact on S&F mode MediaTek Inc. discussion IoT\_NTN\_Ph3-Core R2-2405132

R2-2406874 Store and Forward support in IoT NTN Lenovo discussion Rel-19

R2-2406906 The design of radio interface for IoT NTN Store & Forward China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406967 Discussion on IoT NTN Store and Forward CMCC discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2407018 Support of Store and Forward NEC discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2407027 Discussion on support of Store&Forward Transsion Holdings discussion Rel-19

R2-2407056 Discussion on the support of store and forward Xiaomi discussion

R2-2407075 Radio-Interface Impacts for IoT-NTN SF Operations Nokia, Nokia Shanghai Bell discussion

R2-2407152 Further consideration on S&F operation in IoT NTN ZTE Corporation, Sanechips discussion Rel-19 IoT\_NTN\_Ph3-Core R2-2404882

R2-2407233 AS Security for Store & Forward Satellite Operation SHARP Corporation discussion

R2-2407237 Support for store and forward in IoT NTN Ericsson discussion IoT\_NTN\_Ph3-Core

R2-2407256 On SA2 progress and RAN2 aspects of Store and Forward Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2407353 Discussion on the Store and Forward satellite operation HONOR discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2407487 Considerations on S&F operation from device perspective Telit Communications S.p.A., Novamint, Sateliot, Thales discussion Rel-19 R2-2406536

R2-2407491 Consideration on S&F operation DENSO CORPORATION discussion IoT\_NTN\_Ph3-Core

R2-2407537 Support of Store & Forward Sequans Communications discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406252 Further Discussion on EDT Enhancement for IoT-NTN vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406284 Way forward for RAN2 discussion on UL capacity enhancement Huawei, HiSilicon, Turkcell discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406327 Consideration on the feasibility of RAN2 scope for UL capacity enhancements CATT discussion IoT\_NTN\_Ph3-Core

R2-2406592 Discussion on uplink capacity enhancements for IOT NTN Beijing Xiaomi Mobile Software discussion Rel-19

R2-2406593 Performance of Advanced Random Access Protocols DLR discussion Rel-19

R2-2406640 Discussion on EDT enhancements Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406688 Uplink capacity enhancement in IoT NTN Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406763 Uplink Capacity Enhancement for EDT transaction Spreadtrum Communications discussion Rel-19

R2-2406766 Discussion on enhanced EDT for IoT NTN OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406868 Consideration on UL capacity enhancement for IoT-NTN NEC Corporation. discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406869 Discussion on enhanced EDT MediaTek Inc. discussion IoT\_NTN\_Ph3-Core R2-2405133

R2-2406875 EDT for uplink capacity enhancement in NTN Lenovo discussion Rel-19

R2-2406907 Contention-based Msg3-EDT for IoT NTN capacity enhancement China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2406974 Considerations on uplink capacity enhancement for IoT-NTN CMCC discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2407028 Discussion on uplink capacity enhancement Transsion Holdings discussion Rel-19

R2-2407121 Discussion on Contention Resolution Diversity Slotted ALOHA TOYOTA Info Technology Center other Rel-19 IoT\_NTN\_Ph3-Core

R2-2407139 Msg3 transmission without msg1/RAR Interdigital, Inc. discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2407140 Efficient delivery (reduced overhead) of msg4 / RRCEarlyDataComplete Interdigital, Inc. discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2407153 Further consideration on uplink capacity enhancements in IoT NTN ZTE Corporation, Sanechips discussion Rel-19 IoT\_NTN\_Ph3-Core R2-2404884

R2-2407167 Consideration on UL capacity enhancement for IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2407257 Procedures for uplink capacity enhancements for IoT NTN Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2407502 Discussion on DSA and CRDSA Performance ESA, Eutelsat Group, Viasat, Inmarsat, Novamint, Echostar, Sateliot discussion Rel-19

R2-2407546 Views on UL Capacity Enhancements for IoT-NTN Inmarsat, Viasat discussion Rel-19 NR\_NTN\_Ph3-Core Late

R2-2407552 UL capacity enhancements objectives for IoT NTN Ericsson discussion Rel-19

=> Revised in R2-2407555

R2-2407555 UL capacity enhancements objectives for IoT NTN Ericsson discussion Rel-19

## 4.3 RAN3

**RAN3#125, Aug’24:**

R3-244463 Work Plan for Rel-19 IoT NTN ZTE Corporation, CATT, MediaTek Inc. Work Plan

R3-244464 Initial considerations on support of store and forward satellite operation for IoT NTN ZTE Corporation discussion

R3-244516 Discussion on Support of Store and Forward in NTN THALES, Novamint, Sateliot discussion

R3-244277 Discussion about UE attachment in Store&Forward CATT discussion

R3-244196 Support of Store and Forward on IoT NTN Xiaomi discussion

R3-244245 Support for Store and Forward operation in IoT NTN China Telecom discussion

R3-244287 Discussion on Support for IoT NTN for Regenerative Payload Qualcomm Incorporated discussion

R3-244344 Discussion on the support of Store&Forward Nokia, Nokia Shanghai Bell discussion

R3-244366 Support store and forward for IoT NTN Huawei discussion

R3-244383 Support for Regenerative Payload in IoT NTN Ericsson, Sateliot other

R3-244554 Discussion on support of regenerative payload for IoT NTN Samsung discussion

R3-244570 Discussion on support of IoT NTN CMCC discussion

## 4.4 RAN4

**RAN4#112, Aug’24:**

Work Plan

R4-2413529 Work Plan for Rel-19 IoT NTN, MediaTek inc.

RF

R4-2413530 Way Forward for [112][316] IoT\_NTN\_Ph3, MediaTek inc.

R4-2411471 Discussion on RF requirement impact for IoT NTN phase 3, MediaTek inc.

R4-2412992 IoT NTN UE RF impact, Ericsson

R4-2413143 NTN IoT UL capacity enhancements, Qualcomm Incorporated

RRM

R4-2414039 WF on RRM requirements for R19 IoT NTN Phase 3, MediaTek inc.

R4-2414114 Reply LS to RAN2 on UL synchronization for contention based Msg3 transmission without Msg1/Msg2, ZTE

R4-2411822 Topic summary for [112][227] IoT\_NTN\_Ph3, Moderator (MediaTek)

R4-2411472 Discussion on RRM requirements for IoT NTN phase 3, MediaTek inc.

R4-2411618 Initial discussion on RRM core requirements in NTN for IoT Phase 3, Xiaomi

R4-2411764 (IoT\_NTN\_Ph3-Core) Discussion on LS from RAN2 of Msg3 transmission timing, CMCC

R4-2412207 Discussion on RRM impacts for R19 IoT NTN, Huawei, HiSilicon

R4-2412232 Discussion on RRM requirements on Non-Terrestrial Networks (NTN) for Internet of Things (IoT) Phase 3, Ericsson

R4-2412233 Rreply LS to RAN2 on UL synchronization for contention based Msg3 transmission without Msg1/Msg2, Ericsson

R4-2412602 Consideration on RRM impacts for R19 IoT NTN Phase 3, vivo

R4-2412603 Reply LS on UL synchronization for contention based Msg3 transmission without Msg1/Msg2, vivo

R4-2412865 Reply to RAN2 LS on contention based Msg3 transmission, Nokia

R4-2413187 (IoT\_NTN\_Ph3-Core) Impact on RRM requirements and response to RAN2 LS, Qualcomm Incorporated