**3GPP TSG RAN meeting #90-e RP-202XXX**

**Electronic Meeting, December 7 - 11, 2020**

## Status Report to TSG

**Agenda item:** 10.6.1 Study on NB-IoTeMTC support for Non-Terrestrial Networks (NTN) [RAN1 SI: FS\_LTE\_NBIOT\_eMTC\_NTN]

|  |  |
| --- | --- |
| **WI / SI Name** |  |
| included in this status report | Study Item: No | Core part: Yes | Performance part:Yes | Testing part:- |
| **Acronym** |  |
| **Unique ID** |  |
| **TSG Tdoc of latest approved WI/SI description (if any)** |  |
| **Target Completion Date****(indicate if changed)** | Study Item: - | Core part: 06/2021 | Performance part: 12/2021 | Testing part: - |
| **Overall Completion level** | Study Item: Overall: 10%RAN1: 10%RAN2: 10% | Core part:  | Performance Part:  | Testing part: - |

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** | RAN1 |
| **Rapporteur** | **Name** | Gilles Charbit |
| **Company** | MediaTek |
| **Email** | Gilles.charbit@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#103-e, October 26 – November 13 2020, e-meeting**

[General]

* (FS\_LTE\_NBIOT\_eMTC\_NTN; leading WG: RAN1; REL-17; SID: [RP-193235](http://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_86/Docs/RP-193235.zip))
* The Release-17 IoT NTN Study work plan submitted in R1-200909 in RAN1#103e for information for RAN1 and RAN2 work.
* Time budget: 0 TU (Per RP agreement, this item will start by email, there will be no on-line discussion)
* Tdoc Limitation: 1 tdoc per Agenda Item
* Email max expectation: 1 threads
* TDocs submitted in Agenda Item 8.15.1 were formally handled in email discussions [103-e-NR-NB\_IoT\_eMTC\_NTN] Email discussion/approval on scenarios applicable to NB-IoT/eMTC for NTN
* TDocs submitted to Agenda Item 8.15.2 were not formally handled.

Agreements in email discussion [103-e-NR-NB\_IoT\_eMTC\_NTN] Email discussion/approval on scenarios applicable to NB-IoT/eMTC for NTN:

* IoT NTN scenarios A, B, and C are included in the study as shown below:

|  |  |
| --- | --- |
| **NTN Configurations**  | **Transparent satellite** |
| GEO based non-terrestrial access network  | Scenario A |
| LEO based non-terrestrial access network generating steerable beams (altitude 1200 km and 600km) | Scenario B |
| LEO based non-terrestrial access network generating fixed beams whose footprints move with the satellite (altitude 1200 km and 600km) | Scenario C |

* The following IoT NTN reference scenario parameters are agreed:

|  |  |  |
| --- | --- | --- |
| Scenarios | GEO based non-terrestrial access network - scenario A  | LEO based non-terrestrial access network -Scenario B & C |
| Orbit type | station keeping a nominally fixed position in terms of elevation/azimuth with respect to a given earth point  | circular orbiting at low altitude around the earth |
| Altitude | 35,786 km | 600 km 1,200 km  |
| Frequency Range  (service link) | < 6 GHz (e.g. 2 GHz in S band)  |
| Device channel Bandwidth  (service link) (NOTE 7) | * NB-IoT 180 kHz (DL), Up to 180 kHz with all permissible smaller resource allocations 12\*15 kHz, 6\*15 kHz, 3\*15 kHz, 1\*15 kHz, 1\*3.75 kHz
* eMTC: 1080 kHz (DL), Up to 1080 kHz with all permissible smaller resource allocations , including 2\*180 kHz, 180 kHz, 2\*15 kHz or 3\*15 kHz or 6\*15 kHz  (UL)
 |
| Payload | Transparent type | Transparent Type |
| Earth-fixed beams | Yes | Scenario B:  Yes (steerable beams), see NOTE 1Scenario C: No  (the beams move with the satellite) |
| Max beam foot print size (edge to edge) regardless of the elevation angle | 3500 km (NOTE 3) | 1000 km  (NOTE 2) |
| Min Elevation angle for both sat-gateway and C-IoT device | 10° for service link and 10° for feeder link | 10° for service link and 10° for feeder link |
| Max distance between satellite and C-IoT device at min elevation angle  |  40,581 km  |  1,932 km (600 km altitude)  3,131 km (1,200 km altitude)  |
| Max Round Trip Delay (propagation delay only)  |  541.46ms (service and feeder links) | 25.77 ms (600km) (service and feeder links)41.77 ms (1200km) (service and feeder links) |
| Max differential delay within a cell  | 10.3 ms | 3.12 ms and 3.18 ms for respectively 600km and 1200km |
| Max Doppler shift (earth fixed user equipment) (NOTE 6) | 0.93 ppm | 24 ppm (600km)  21ppm(1200km)   |
| Max Doppler shift variation (earth fixed user equipment)  (NOTE 6) | 0.000 045 ppm/s  |   0.27 ppm/s  (600km)   0.13 ppm/s  (1200km)  |
| C-IoT device motion on the earth | Min 0 km/s (stationary device), max 120 km/h  | Min 0 km/s (stationary device), max 120 km/h |
| C-IoT device antenna types | Omnidirectional antenna with 0 dBi TX antenna gain and 0 dBi RX antenna gain  (NOTE 4)  |
| C-IoT device max Tx power | UE power class 3 with up to 200 mW (23dBm), UE power class 5 with up to 100 mW (20 dBm)  |
| C-IoT device Noise Figure | Omnidirectional antenna: 7 dB or 9 dB  (NOTE 5) |
| Service link | 3GPP defined Narrow Band IoT and eMTC |

NOTE 1:    Each satellite has the capability to steer beams **towards fixed points on earth** using beamforming techniques. This is applicable for a period of time corresponding to the visibility time of the satellite.

NOTE 2:   This beam size refers to the Nadir pointing of the satellite.

NOTE 3: The Maximum beam foot print size for GEO is based on current state of the art GEO High Throughput systems, assuming either spot beams at the edge of coverage (low elevation) or a single wide-beam.

NOTE 4: The use of a Circular polarized antenna is optional.

NOTE 5: Same Noise Figure of 7 dB as in Release 16 TR 38.821 or 9 dB as in Release 12 TR 36.888  for device can be assumed for link budget. The noise figure is device vendor implementation specific.

NOTE 6: Max Doppler shift and Max Doppler shift variation in the absence of any device pre-compensation of satellite Doppler shift on the service link.

NOTE 7: System bandwidth is FFS

#### Remaining Open issues

* **First Objective**
* Identify scenarios applicable to NB-IoT/eMTC including
	+ Cube Satellite scenario and parameters
	+ Link budget
* **Second Objective**
* Aspects related to random access procedure/signals
* Mechanisms for time/frequency adjustment including Timing Advance, and UL frequency compensation indication
* Timing offset related to scheduling and HARQ-ACK feedback

## 2.2 RAN2

#### 2.2.1 Agreements

* **RAN2#112-e, October 26 – November 13 2020, e-meeting**

[General]

* (FS\_LTE\_NBIOT\_eMTC\_NTN; leading WG: RAN1; REL-17; SID: [RP-193235](http://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_86/Docs/RP-193235.zip))
* The Release-17 IoT NTN Study work plan submitted in R1-200909 in RAN1#103e for information for RAN1 and RAN2 work.
* Time budget: 0 TU (Per RP agreement, this item will start by email, there will be no on-line discussion)
* Tdoc Limitation: 2 tdocs
* Email max expectation: 2 threads
* Initial focus will be to clarify scope more detailed than in the SID, i.e. Start identifying the extent parts of “NR over NTN” TR can be re-used or not re-used for NB-IoT/eMTC support for NTN. Scenarios in the WID and as defined by RAN1 possibly complemented by RAN2 can be assumed.

DECISIONS on offline discussion [AT112-e][034][IoT-NTN] Scenarios

* [034] For 2.4.1-2, the proposed way forward to include the table 1 as reference scenarios for IoT NTN study in a TP for TR 36.763 is agreed
* [034] IoT NTN scenarios A, B, and C are in the scope of the study
* [034] For 2.4.1-3, the proposed way forward is to include the table including NTN IoT Device Densities for the use case of fixed devices in a TP for TR36.763 is agreed, where the values in the table are directly from TR 38.821 as agreed for IoT connectivity in Rel-16 NR NTN SI, Including the three Notes.
* [034] For 2.4.1-4, Support for EPC is assumed, Support for 5GCN is TBD.

 [034] Comment 2.4.1-3: User densities for the use case of moving UEs with max UE speed of 120 km/h can be further discussed in RAN2#113e, if needed.

 [034] Comment - All: The intention is not to pre-empt RAN1 work. If RAN1 have agreed something slightly different, alignment is needed.

RAN2 Rapporteur Note: the Table 1 as reference scenarios for IoT NTN study was captured in the email summary for AI 9.2.1 in R2-200895 Section 2.6 and is the same as that agreed in RAN1#103e as shown in Section 2.1.1 above.

DECISIONS on offline discussion AT112-e][035][IoT-NTN] Applicability of TR 38.821

* [035] 1: The challenges associated with the expiry of MAC timers in NR-NTN remain the same in eMTC/NB-IoT NTN and high RTT of NTN is the primary cause of this.
* [035] 2: An offset will be used to delay (adjust) the start of ra-ResponseWindow and mac-ContentionResolutionTimer in eMTC/NB-IoT NTN, similar to NR-NTN. Further discussion is needed for the SR-Prohibit timer. Offset estimation process and the offset value are FFS.
* [035] 3: It is *assumed* that If the start of the ra-ResponseWindow is accurately compensated and no extension of repetition is required, there is no need to extend the ra-ResponseWindowSize for eMTC over NTN, similar to NR-NTN.
* [035] 4: RAN2 *assumes* that PRACH capacity in eMTC/NB-IoT over NTN will be evaluated to check whether it can support the large cell size of GEO/LEO. However, RAN2 believes this is more of a RAN1 topic and thus recommends companies to submit their contributions in RAN1.
* [035] 5: RAN2 should wait for RAN1’s decision on TA in eMTC/NB-IoT NTN.
* [035] 6: It is FFS whether there is any need to disable HARQ feedback in eMTC/NB-IoT NTN.
* [035] 7: RAN2 *assumes* to reuse NR-NTN agreements as baseline for the starting of HARQ-RTT-Timer and UL-HARQ-RTT-Timer in eMTC/NB-IoT NTN.
* [035] 8: Unlike NR-NTN, as latency is not a critical performance requirement in NB-IoT devices, UL scheduling enhancement for delay reduction is not necessary for NB-IoT over NTN.
* [035] 9: It is FFS if there is any need to extend RLC t-Reordering timer in eMTC/NB-IoT NTN.
* [035] 10: There is no need to extend RLC and PDCP SN length for eMTC/NB-IoT NTN, similar to NR-NTN.
* [035] 11: RAN2 will discuss on providing satellite ephemeris data and other information using System Information (SI) message for eMTC/NB-IoT NTN.
* [035] 12: RAN2 will use cell selection/reselection for NR-NTN as the baseline and discuss further about the detailed solutions in eMTC/NB-IoT NTN.
* [035] 13: RAN2 will discuss the impact of eDRX cycle on cell reselection procedure in eMTC/NB-IoT over NTN.
* [035] 14: RAN2 will use earth-fixed Tracking Area concept of NR-NTN in eMTC/NB-IoT NTN.
* [035] 15: RAN2 should wait until agreements regarding TAU are made in the NR-NTN WI, and use those for eMTC/NB-IoT over NTN, if applicable.
* [035] 16: RAN2 agrees to use Rel-16 RLF-based NB-IoT mobility as a baseline for mobility in NB-IoT over NTN.
* [035] 17: RAN2 will wait until agreements regarding handover, including Conditional Handover, solutions are made in the NR-NTN WI, discuss if it would be beneficial for eMTC over NTN, if adopted.
* [035] 18: RAN2 should wait for RAN1’s input on supporting multiple beams per cell for eMTC/NB-IoT over NTN.

RAN2 Rapporteur Note: Summary of email discussions AT112-e][035][IoT-NTN] Applicability of TR 38.821 in R2-2011275.

#### 2.2.2 Remaining Open issues

* **Second Objective**
* Aspects related to HARQ operation
* General aspects related to timers (e.g. SR, DRX, etc.)
* RAN2 aspects related to idle mode and connected mode mobility
* RLF-based for NB-IoT
* Handover-based for eMTC
* System information enhancements
* Tracking area enhancements

## 2.3 RAN3

#### 2.3.1 Agreements: N/A (RAN3 is not involved in the WI)

#### 2.3.2 Remaining Open issues: N/A

## 2.4 RAN4

#### 2.4.1 Agreements: N/A (RAN4 is not involved in the WI)

#### 2.4.2 Remaining Open issues: N/A

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## 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: N/A

#### 3.1.2 Remaining Open issues with cross-TSG impacts: N/A

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

On-going coordination between SA2 & RAN2/RAN3 via LS about

* How cells would be seen by CN in terms of earth-moving or earth-fixed characteristics
* How RAN would in case of earth-fixed cells, maps the radio component of the cell ?

## 4. References

NOTE: This can be e.g. a list of all related Tdocs in the affected WGs since last TSG, references to LSs, produced TRs/TSs, the work/study item description or status reports of previous TSGs.

## 4.1 RAN1

**RAN1#103-e, October 26 – November 13 2020, e-meeting**

Submitted TDocs to AI 8.15: Study on NB-IoT/eMTC support for Non-Terrestrial Network

* [R1-2007882](file:///C%3A%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_103%5CDocs%5CR1-2007882.zip) NB-IoT Waveform Tests over LEO Satellite OQ Technology
* [R1-2009096](file:///C%3A%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_103%5CDocs%5CR1-2009096.zip) Rel-17 IoT NTN Work Plan MediaTek Inc., Eutelsat

Submitted TDocs to AI 8.15.1: Scenarios applicable to NB-IoT/eMTC

* [R1-2008868](https://www.3gpp.org/ftp/tsg_ran/WG1_RL1/TSGR1_103-e/Inbox/R1-2008868.zip) Email summary discussion on Scenarios applicable to NB-IoT/eMTC, Eutelsat
* [R1-2007572](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2007572.zip) Application scenarios of IoT in NTN, Huawei, HiSilicon
* [R1-2007844](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2007844.zip) Application scenarios discussion on NB-IoT/eMTC, CATT
* [R1-2008038](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2008038.zip) Discussion on scenarios for IoT NTN, CMCC
* [R1-2008199](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2008199.zip) On Scenarios applicable to NB-IoT/eMTC, Samsung
* [R1-2008257](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2008257.zip) Discussion on scenarios applicable to NB-IoT/eMTC OPPO
* [R1-2008815](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2008815.zip) Reference Link-Budget parameters for IoT NTN, Eutelsat
* [R1-2008854](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2008854.zip) Preliminary views on the scenarios and assumption for IoT-NTN, ZTE
* [R1-2009007](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009007.zip) On scenarios for NB-IoT and eMTC NTN, Intel Corporation
* [R1-2009042](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009042.zip) Discussion on the scenarios for NB-IoT/eMTC over NTN Xiaomi
* [R1-2009088](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009088.zip) On scenarios and evaluations for eMTC and NB-IoT based NTN Ericsson
* [R1-2009098](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009098.zip) Discussion on scenarios applicable to NB-IoT over NTN, Sateliot
* [R1-2009114](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009114.zip) Scenarios applicable to NB-IoT/eMTC , Qualcomm
* [R1-2009215](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009215.zip) Observations on NB-IoT/eMTC for NTN scenarios, Nokia, Nokia Shanghai Bell
* [R1-2009235](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009235.zip) Scenarios for support of NB-IoT and eMTC over NTN, Sony
* [R1-2009304](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009304.zip) Discussion on IoT NTN scenarios - link budget MediaTek Inc., Eutelsat

Submitted TDocs to AI 8.15.2 Necessary changes to support NB-IoT and eMTC over satellite

*A placeholder only: contributions may be submitted but will not be formally handled*

* [R1-2007573](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2007573.zip) Solutions to support IoT in NTN, Huawei, HiSilicon
* [R1-2007845](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2007845.zip) Potential enhancements to support NB-IoT and eMTC over satellite, CATT
* [R1-2008039](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2008039.zip) Discussion on enhancements for IoT NTN, CMCC
* [R1-2008200](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2008200.zip) On Necessary changes to support NB-IoT and eMTC over satellite, Samsung
* [R1-2008258](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2008258.zip) Discussion on necessary changes to support NB-IoT/eMTC over NTN, OPPO
* [R1-2008456](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2008456.zip) Potential Enhancement for NB-IoT/eMTC over Satellite, Apple
* [R1-2008855](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2008855.zip) Discussion on enhancements for IoT-NTN, ZTE
* [R1-2008921](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2008921.zip) Enhancement to Support NBIoT and eMTC on NTN, Lenovo, Motorola Mobility
* [R1-2009008](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009008.zip) On enhancements for NB-IoT and eMTC NTN, Intel
* [R1-2009043](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009043.zip) Necessary changes to support NB-IoT and eMTC over satellite, Xiaomi
* [R1-2009089](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009089.zip) An overview of technical aspects in IoT NTN, Ericsson
* [R1-2009095](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009095.zip) Discussion on RAN1 Aspects of IoT NTN, MediaTek, Eutelsat
* [R1-2009115](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009115.zip) Necessary changes to support NB-IoT and eMTC over satellite, Qualcomm
* [R1-2009199](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009199.zip) On necessary changes to support IoT devices in NTN, InterDigital.
* [R1-2009216](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009216.zip) Necessary changes to support NB-IoT and eMTC over satellite, Nokia, Nokia Shanghai Bell
* [R1-2009236](../../../../../../../../../../wanshic/OneDrive%20-%20Qualcomm/Documents/Standards/3GPP%20Standards/Meeting%20Documents/TSGR1_103/Docs/R1-2009236.zip) Considerations for support of NB-IoT and eMTC over NTN, Sony

Submitted TDocs to AI 8.15.3: Others

* [R1-2008259](file:///C%3A%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_103%5CDocs%5CR1-2008259.zip) Discussion on other aspects, OPPO
* [R1-2008320](file:///C%3A%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_103%5CDocs%5CR1-2008320.zip) Other aspects to support IoT in NTN, Huawei, HiSilicon
* [R1-2008856](file:///C%3A%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_103%5CDocs%5CR1-2008856.zip) Discussion on power consumption and NPRACH capacity for NTN, ZTE
* [R1-2009090](file:///C%3A%5Cwanshic%5COneDrive%20-%20Qualcomm%5CDocuments%5CStandards%5C3GPP%20Standards%5CMeeting%20Documents%5CTSGR1_103%5CDocs%5CR1-2009090.zip) On evaluation assumptions for eMTC and NB-IoT based NTN, Ericsson

## 4.2 RAN2

**RAN2#112-e, October 26 – November 13 2020, e-meeting**

Submitted TDocs to AI 9.2.1: Scenarios

* [R2-2008883](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2008883.zip) IoT NTN scenarios and UE density, Eutelsat
* [R2-2009071](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2009071.zip) Consideration on the scenarios for IoT over NTN, ZTE, Sanechips
* [R2-2009114](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2009114.zip) Discussion on scenarios for NB-IoT and eMTC in NTN, OPPO
* [R2-2009267](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2009267.zip) On NB-IoT/eMTC for NTN scenarios and Performance requirements, Nokia, Nokia Shanghai Bel
* [R2-2009449](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2009449.zip) Scenarios and assumption for IoT NTN, Qualcomm
* [R2-2009589](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2009589.zip) Discussion on scenarios for NB-IoT and eMTC NTN, Xiaomi
* [R2-2010237](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2010237.zip) NTN IoT scope, scenarios, architecture, and requirements, Ericsson
* [R2-2010287](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2010287.zip) Discussion on NTN scenarios for NB-IoT, Huawei, HiSilicon
* [R2-2008975](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Inbox/R2-2008975.zip) Summary #1 of 9.2.1 IoT NTN Scenarios, Eutelsat

Submitted TDocs to AI 9.2.2: Applicability of TR 38.821

* [R2-2008899](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2008899.zip) On User-Plane Timers in NB-IoT based NTN MediaTek
* [R2-2008900](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2008900.zip) On Disabling HARQ in NB-IoT based NTN MediaTek
* [R2-2009072](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2009072.zip) Consideration on the applicability of NR NTN to IoT over NTN, ZTE
* [R2-2009113](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2009113.zip) Discussion on NB-Io/eMTC support for NTN, OPPO
* [R2-2009450](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2009450.zip) Applicability of NR NTN SI and WI solutions, Qualcomm
* [R2-2009591](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2009591.zip) Initial discussion on NB-IoT and eMTC NTN, Xiaomi
* [R2-2009988](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2009988.zip) IoT features and applicability of NR NTN solutions for IoT over NTN, Nokia, Nokia Shanghai Bell
* [R2-2010247](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2010247.zip) Applicability of NR NTN to NB-IoT/LTE-M UEs that support NTN, Ericsson
* [R2-2010288](file:///D%3A%5CDocuments%5C3GPP%5Ctsg_ran%5CWG2%5CTSGR2_112-e%5CDocs%5CR2-2010288.zip) Discussion on applicability of TR 38.821 to NTN NB-IoT, Huawei, HiSilicon
* [R2-2011275](https://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_112-e/Inbox/R2-2011275.zip) [IoT-NTN] Applicability of TR 38.821 on eMTC/NB-IoT based NTN, MediaTek

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