**3GPP TSG-RAN WG4 Meeting #111 R4-2410110**

Fukuoka, Japan, 20th – 24th of May, 2024

**Agenda item: 10.15.4**

**Source:** Moderator (THALES)

**Title:** Topic summary for [111][315] NR\_NTN\_Ph3

**Document for:** Information

# Introduction

This document is a summary of the proposals made in the contributions submitted under AI 10.15.1 and AI 10.15.3 for the RAN4#111 meeting.

Please also note the draft TSG-RAN WG4#111 meeting agenda with respect to NTN topic. The Agenda Items (AIs) considered in this Topic summary for [111][315] NR\_NTN\_Ph3-Core are:

-------------------------------------- Items led by other WGs --------------------------------------------------------------

**10.15 Non-Terrestrial Networks (NTN) for NR Phase 3 [NR\_NTN\_Ph3]**

10.15.1 General aspects (work plan) [NR\_NTN\_Ph3-Core]

10.15.2 UE RF requirements [NR\_NTN\_Ph3-Core]

10.15.2.1 RedCap UE RF requirements [NR\_NTN\_Ph3-Core]

10.15.2.2 Other requirements [NR\_NTN\_Ph3-Core]

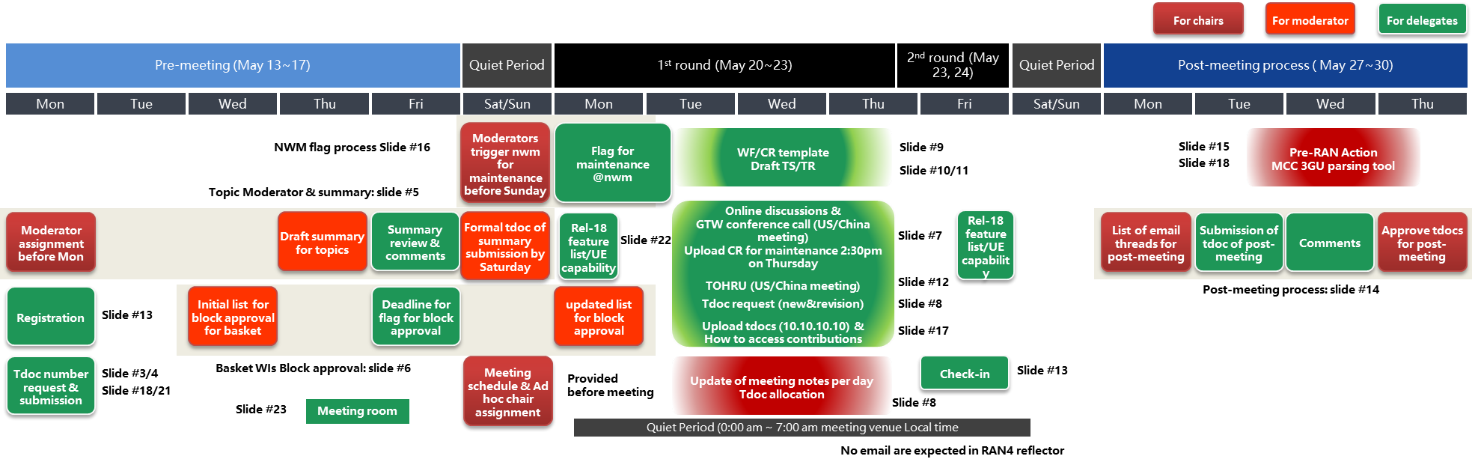
10.15.3 SAN RF requirements [NR\_NTN\_Ph3-Core]

10.15.4 Moderator summary and conclusions [NR\_NTN\_Ph3]

With the following pre-meeting deadlines:

* + Before May 13 (Monday): Session chairs will provide the list of topics with moderator assignments.
  + May 16 (Thursday), 17:00 UTC: Moderators provide the initial summary for a topic.
  + May 17 (Friday), 12:00 UTC: Deadline for companies review of initial summary.
  + May 18 (Saturday), 17:00 UTC: Moderators submit the formal tdoc of summary for a topic.
  + May 19 (Sunday): Session chairs share the initial meeting notes taking moderators summary in consideration.

And the following pre-meeting and meeting schedule:



The following documents are considered for discussion in [111][315] NR\_NTN\_Ph3-Core:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***TDoc Number*** | ***TDoc Type*** | ***Title*** | ***Company/Source*** | ***General Purpose*** | ***Agenda Item*** |
| [R4-2409105](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409105.zip) | other | General issue for NTN RedCap | Ericsson | Approval | 10.15.1 |
| [R4-2409107](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409107.zip) | other | SAN RF impact overview | Ericsson | Approval | 10.15.3 |
| [R4-2409543](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409543.zip) | discussion | Further discussion on regenerative payload introduction in SAN RF specification | Huawei, HiSilicon | Discussion | 10.15.3 |
| [R4-2409544](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409544.zip) | draftCR | Draft CR to TS 38.108: Introduction of regenerative payload | Huawei, HiSilicon | Endorsement | 10.15.3 |
| [R4-2407511](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407511.zip) | other | Discussion on definition of regenerative payload | CATT | Approval | 10.15.3 |
| [R4-2407512](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407512.zip) | CR | CR for TS 38.108, Introduction on definition of NTN regenerative payload | CATT | Endorsement | 10.15.3 |
| [R4-2408071](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408071.zip) | discussion | SAN RF requirements impact under Rel-19 NTN Phase 3 WI | SAMSUNG R&D INSTITUTE JAPAN | Discussion | 10.15.3 |
| [R4-2409622](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409622.zip) | other | Discussion on RF requirements for NTN SAN in Rel-19 | ZTE Corporation, Sanechips | Approval | 10.15.3 |
| [R4-2409787](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409787.zip) | discussion | General aspects for NTN NR Phase 3 | THALES | Information | 10.5.1  -> 10.15.1 |
|  |  |  |  |  |  |

The current list of topics/sub-topics/issues prior to the meeting is:

* **Topic #1:** Topics to address for NR\_NTN\_Ph3-Core

\* Include band definition

* + Sub-topic 1-1: General discussion
    - Issue 1-1-1: RedCap
  + Sub-topic 1-2: Regenerative payload
    - Issue 1-2-1: Figures for regenerative payload
    - Issue 1-2-2: SAN definition update
    - Issue 1-2-3: “Satellite” definition update
    - Issue 1-2-4: Add Clarification Notes in TS 38.108
    - Issue 1-2-5: Alignment of TS 38.101-5 & TS 38.181 with TS 38.108
  + Sub-topic 1-3: DL coverage enhancements for FR1-NTN or FR2-NTN
    - Issue 1-3-1: Cell DTX
    - Issue 1-3-2: RF requirement enhancements for spatial domain techniques
    - Issue 1-3-3: Network energy saving
    - Issue 1-3-4: Network synchronisation
  + Sub-topic 1-4: UL capacity/throughput enhancements for FR1-NTN
    - Issue 1-4-1: OOC
  + Sub-topic 1-5: Broadcast service
    - Issue 1-5-1: RAN4 SAN RF impact
* **Topic #2:** Draft CRs & CRs.
  + Sub-topic 2-1: Draft CRs to TS 38.108 Rel-19
    - Issue 2-1-1: Draft CR(s) for transparent/regenerative payload

# Topic #1: Topics to address for NR\_NTN\_Ph3-Core

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2409105](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409105.zip) | Ericsson | **Proposal-1:** RAN4 discuss if the 38.307 should be updated for RedCap NTN as release independent feature (operating band). |
| [R4-2409107](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409107.zip) | Ericsson | **Observation 2** No data transmission during the beam switching time incurs the system overhead for full load system  **Proposal-1:** No RF impact due to the Cell TX (e.g The NES Cell DTX RF conclusion due to Cell DTX can be reused ) assuming the transient time occurs during the beam OFF status.  **Proposal-2:** RAN4 can send LS to RAN1 to notify if beam switching delay has other value than 0  **Proposal-3:** The network synchronization aspect should be considered for transparent payload together with beam switching delay.  **Proposal-4:** No need to consider the spatial and power domain in Rel-18 NES impact on NTN RF for now. |
| [R4-2409543](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409543.zip) | Huawei, HiSilicon | **Proposal 1:** Add clarification note in the Scope of TS 38.108 Rel-19, clarifying that this version of specification covers both non-regenerative, and regenerative payload options, i.e.:  NOTE: This version of specification supports SAN with non-regenerative payload, as well as SAN with regenerative payload.  **Proposal 2:** Updated satellite and SAN definitions, to align payload terminology and to stick to (non-)regenerative payload.  **Proposal 3:** Keep SAN type 1-H and for SAN type 1-O figures as agnostic to the regenerative/non-regenerative functionality of the SAN.  **Proposal 4:** TS 38.101-5 and TS 38.181 (scope, definitions, SAN figures) to be aligned with modifications related to introduction of regenerative payload in TS 38.108. |
| [R4-2407511](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407511.zip) | CATT | **Proposal 1: The definition of SAN should be updated to include regenerative payload.**  **Proposal 2: The terminologies used for satellite and SAN should be aligned, or both should be included.** |
| [R4-2408071](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408071.zip) | SAMSUNG R&D INSTITUTE JAPAN | **Proposal 1: Companies are encouraged to bring input into RAN1 for evaluation work assumption including beam switching delay instead of RAN4.**  **Proposal 2: Postpone the discussion on objective 1 until sufficient progress made by RAN1.**  **Proposal 3: No SAN RF requirement impact foreseen for objective 2 “Uplink Capacity/Throughput Enhancement for FR1-NTN “.**  **Proposal 4-1: No SAN RF requirement impact for objective 3 “Broadcast service via NR NTN”.**  **Proposal 4-2: No update required for TS 38.108 section 4 “requirements reference points diagrams”.**  **Proposal 5: Update SAN definition in TS 38.108 as following:**  **“Satellite Access Node**: node providing NR user plane and control plane protocol terminations towards NTN Satellite capable UE, and connected via the NG interface to the 5GC. It encompasses a transparent or regenerative NTN payload on board a NTN platform, a gateway and gNB functions.” |
| [R4-2409622](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409622.zip) | ZTE Corporation, Sanechips | **Proposal 1:** capture the following definition and diagrams in the TS 38.108 specification.  **For transparent NTN payload:**  **Satellite Access Node**: node providing NR user plane and control plane protocol terminations towards NTN Satellite capable UE, and connected via the NG interface to the 5GC. It encompass a transparent NTN payload on board a NTN platform, a gateway and gNB functions.  **For regenerative NTN payload:**  **Regenerative Satellite Access Node**: node providing NR user plane and control plane protocol terminations towards NTN Satellite capable UE, and connected via the NG interface to the 5GC. It encompass a regenerative NTN payload on board a NTN platform.  **Proposal 2:** the transition period for cell DTX for FR1-NTN and FR2-NTN is needed. e.g. 10us for FR1-NTN and 3us for FR2-NTN.  **Proposal 3:** regarding beam switching delay for beam hopping, the beam switching delay would be around 100ns. |
| [R4-2409787](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409787.zip) | THALES | **Proposal 1.** For NR NTN Rel-19 DL coverage evaluation, a value of beam steering latency equal to zero at least if SAN phase array antenna is assumed.  **Proposal 2.** Values different from zero beam steering latency can be optionally reported by companies.  **Proposal 3.** Other implementation with analog beam steering technologies are not precluded. Companies to further discuss if analog/digital antenna assumptions and for which FR1/FR2 implementations.  **Proposal 4.** Further discuss remaining issues from Way Forward for [110bis][315] NR\_NTN\_Ph3 (**R4-2406109**):  **Issue 1-3-3: Network energy saving**  **Proposal 1:**   * Network energy saving feature in Rel-18 can be starting point for RF impact analysis for Rel-19 NTN DL coverage enhancement objective. (P1/[R4-2404869](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404869.zip)) * No need to consider the spatial and power domain in Rel-18 NES impact on NTN RF for now. (P3/[R4-2404871](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404871.zip))   **Proposal 2:**   * It’s FFS whether any SAN Tx power requirements for objective 1 with power sharing between satellite beams or different satellite beam patterns/size (i.e. wide or narrow) across the satellite footprint. (O1/R4-2405317)   **UL capacity/throughput Enhancements for FR1-NTN**  **Issue 1-4-1: OCC**  **Proposals:**   * **Wait RAN1 reach conclusions on OCC** feature before RAN4 start to evaluate the RF impact. (P2/[R4-2404869](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404869.zip)) * **RAN4 waits for further progress on RAN1 work items** to identify the RF requirement enhancements needed for NR NTN phase 3 for objective 2 (UL capacity/throughput Enhancements). (P2/[R4-2405082](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405082.zip)) * No **RAN4 SAN RF requirements** impact foreseen for Rel-19 NTN Phase-3 WI Objectives 2 (UL capacity/throughput Enhancements) (O2/R4-2405317)   **Broadcast service**  **Issue 1-5-1:** **RAN4 SAN RF impact**  **Proposals:**   * **No RAN4 SAN RF requirements impact** foreseen for Rel-19 NTN Phase-3 WI **Objectives 3 broadcast service)** (O2/R4-2405317) |
|  |  |  |

### Sub-topic 1-1

*Sub-topic description:* General discussion

**Issue 1-1-1: RedCap**

* Proposals:
  + RAN4 discuss if the 38.307 should be updated for RedCap NTN as release independent feature (operating band). (P1/[R4-2409105](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409105.zip))
* Recommended WF
  + Agree if no controversial discussion
  + If this is agreeable, the following proposal (adding a new Clause 9.2 in TS 38.307) should be further discussed:

## 9.1. Additional NR operating bands for NR NTN in frequency range 1

## 9.2 Additional operating bands for Redcap for NR frequency range 1

Requirements for a Redcap UE for additional operating bands within FR1 of TS 38.101-5 in Rel-P [2] are introduced via this clause.

**Table 9.2 -1: NR NTN RedCap operating band**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Feature | Duplex-mode | Release  independent from |  | Requirements to be fulfilled  (see TS 38.307 of the release in which the band was introduced) |
| Redcap operating band | FDD | Rel-17 |  |  |

### Sub-topic 1-2

*Sub-topic description:* Regenerative payload

**Issue 1-2-1: Figures for regenerative payload**

* Proposals:
  + **Proposal 1:** Keep SAN type 1-H and for SAN type 1-O figures as agnostic to the regenerative/non-regenerative functionality of the SAN. (P3/[R4-2409543](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409543.zip), P1/[R4-2409622](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409622.zip)).
    - **NOTE:** No update required for TS 38.108 section 4 “requirements reference points diagrams”. (P4-2/R4-2408071)
* Recommended WF
  + If no other concerns dvdp RAN4, consider Proposal 1 for agreement.
  + **Moderator note (for clarification of the discussion):** The view of other group different from RAN4 (e.g. RAN3) may be different. (At least some) ground gNB functions should be represented on the right-hand side of the GW, between Feederlink and NTN payload RF, as part of NTN payload.

**Issue 1-2-2: SAN definition update**

* Proposals:
  + **Proposal 1:** **Update SAN definition in TS 38.108 as following:** 
    - * **“Satellite Access Node**: node providing NR user plane and control plane protocol terminations towards NTN Satellite capable UE, and connected via the NG interface to the 5GC. It encompasses a transparent or regenerative NTN payload on board a NTN platform, a gateway and gNB functions.” (P5/[R4-2408071](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408071.zip))
  + **Proposal 2:** **Update SAN definition in TS 38.108 as following:** 
    - **i. For transparent NTN payload:**
      * **Satellite Access Node**: node providing NR user plane and control plane protocol terminations towards NTN Satellite capable UE, and connected via the NG interface to the 5GC. It encompass a transparent NTN payload on board a NTN platform, a gateway and gNB functions. (P1/[R4-2409622](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409622.zip))
    - **ii. For regenerative NTN payload:**
      * **Regenerative Satellite Access Node**: node providing NR user plane and control plane protocol terminations towards NTN Satellite capable UE, and connected via the NG interface to the 5GC. It encompass a regenerative NTN payload on board a NTN platform. (P1/[R4-2409622](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409622.zip))
* Recommended WF
  + The definition of SAN should be updated to include regenerative payload (P1/[R4-2407511](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407511.zip)).Update satellite SAN definition(s), to align payload terminology for non-regenerative/regenerative payload for pre-Rel19/Rel19. (slightly modified from P2/[R4-2409543](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409543.zip))
  + Further discuss Proposals and agree one of them (or a combination of them).

**Issue 1-2-3: “Satellite” definition update**

* Proposals:
  + **Proposal 1: Update “Satellite” definition in TS 38.108 as following:**
    - * **satellite:** A space-borne vehicle embarking a bent pipe payload or a regenerative payload telecommunication transmitter, placed into Low-Earth Orbit (LEO) or Geostationary Earth Orbit (GEO). ([R4-2407511](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407511.zip))
* Recommended WF
  + The terminologies used for satellite and SAN should be aligned, or both should be included. (P2/[R4-2407511](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407511.zip))

**Issue 1-2-4: Add Clarification Notes in TS 38.108**

* Proposals:
  + **Proposal 1:** Add clarification note in the Scope of TS 38.108 Rel-19, clarifying that this version of specification covers both non-regenerative, and regenerative payload options, i.e.:
    - NOTE: This version of specification supports SAN with non-regenerative payload, as well as SAN with regenerative payload. (P2/[R4-2409543](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409543.zip))
* Recommended WF
  + Agree to add a note as well, on top of the definition if no further comments.

**Issue 1-2-5: Alignment of TS 38.101-5 & TS 38.181 with TS 38.108**

* Proposals:
  + **Proposal 1:** TS 38.101-5 and TS 38.181 (scope, definitions, SAN figures) to be aligned with modifications related to introduction of regenerative payload in TS 38.108. (P4/[R4-2409543](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409543.zip))
    - **NOTE:** Please note, that some of the modifications proposed in this Rel-19 discussions are actually applicable to Rel-17 specifications (TS 38.108, TS 38.181, TS 38.101-5). Therefore, related CRs were submitted under Maintenance agendas 4.1 and 4.2 in [6-11].
* Recommended WF
  + Agree with proposal 1

### Sub-topic 1-3

*Sub-topic description:* DL coverage enhancements for FR1-NTN or FR2-NTN

**Issue 1-3-1: Cell DTX**

* Proposals:
  + **Proposal 1**: No RF impact due to the Cell TX (e.g The NES Cell DTX RF conclusion due to Cell DTX can be reused) assuming the transient time occurs during the beam OFF status. (P1/[R4-2409107](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409107.zip))
  + **Proposal 2**: the transition period for cell DTX for FR1-NTN and FR2-NTN is needed. e.g. 10us for FR1-NTN and 3us for FR2-NTN. (P2/[R4-2409622](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409622.zip))
* Recommended WF
  + TBD, differentiate discussion between SAN TS and VSAT TS?
  + Agree if no controversial comments.

**Issue 1-3-2: RF requirements enhancements for spatial domain techniques**

* Proposals:
  + **Proposal 1:** RAN4 can send LS to RAN1 to notify if beam switching delay has other value than 0. (P2/[R4-2409107](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409107.zip))
    - No data transmission during the beam switching time incurs the system overhead for full load system (O2/[R4-2409107](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409107.zip))
  + **Proposal 2: Postpone the discussion on objective 1 (DL Coverage Enhancements) until sufficient progress made by RAN1.** (P2/[R4-2408071](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408071.zip))
    - **NOTE 1:** RAN4 waits for further progress on RAN1 work items to identify the RF requirement enhancements needed for NR NTN phase 3 for objective 1 (DL coverage Enhancements). (P2/[R4-2405082](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405082.zip), O1/R4-2405317)
    - **NOTE 2:** Companies are encouraged to bring input into RAN1 for evaluation work assumption including beam switching delay instead of RAN4.(P1/R4-2408071)
  + **Proposal 3: regarding beam switching delay for beam hopping, the beam switching delay would be around 100ns.** (P3/[R4-2409622](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409622.zip))
* Recommended WF
  + TBD if Proposal 1, Proposal 2, or both (e.g. wait RAN1 and at the same time send to RAN1 a request with respect to what delay assumptions are used for DL coverage enhancements). Companies to decide if Proposal 3 could be agreeable.
  + Companies to decide if RAN1 or RAN4 discussion and if companies should bring input into RAN1 for evaluation work assumption including beam switching delay instead of RAN4.
  + Tentative agreement: For NR NTN Rel-19 DL coverage evaluation, a value of beam steering latency equal to zero at least if SAN phase array antenna is assumed. Values different from zero beam steering latency can be optionally reported by companies.
    - NOTE: Other implementation with analog beam steering technologies are not precluded. Companies to further discuss if analog/digital antenna assumptions and for which FR1/FR2 implementations.
  + **Moderator note 1:** RAN1 agreement seems to be related to “steering latency”, not “switching latency/delay”
    - RAN1 Agreement
      * For NR NTN Rel-19 DL coverage evaluation, a value of beam steering latency equal to 0 at least if phase array antenna is assumed.
      * Values different from 0 can be optionally reported
  + **Moderator note 2:** The RAN1 agreement clearly indicates “Values different from 0 can be optionally reported”
  + **Moderator note 3:** Clarify with proponent if the question is related to FR1 or FR2, or both.

**Issue 1-3-3: Network energy saving**

* Proposals:
  + **Proposal 1:**
    - No need to consider the spatial and power domain in Rel-18 NES impact on NTN RF for now. (P4/[R4-2409107](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409107.zip))
    - Network energy saving feature in Rel-18 can be starting point for RF impact analysis for Rel-19 NTN DL coverage enhancement objective. (P1/[R4-2404869](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404869.zip))
  + **Proposal 2:** Postpone the discussion on objective 1 (DL Coverage Enhancements) until sufficient progress made by RAN1. (P2/[R4-2408071](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408071.zip))
* Recommended WF
  + TBD;
  + **Proposed WF from moderator:** Agree with Proposal 1 if no controversial comments. Add Proposal 2 as a Note.

**Issue 1-3-4: Network synchronisation**

* Proposals:
  + **Proposal 1:** The network synchronization aspect should be considered for transparent payload together with beam switching delay. (P3/[R4-2409107](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409107.zip))
  + **Proposal 2:** Postpone the discussion on objective 1 (DL Coverage Enhancements) until sufficient progress made by RAN1. (P2/[R4-2408071](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408071.zip))
* Recommended WF
  + Agree with Proposals 1/2 if no controversial discussion, add Proposal 2 as a note.

### Sub-topic 1-4

*Sub-topic description:* UL capacity/throughput Enhancements for FR1-NTN

**Issue 1-4-1: OCC**

* Proposals:
  + **Proposal 1:** No SAN RF requirement impact foreseen for objective 2 “Uplink Capacity/Throughput Enhancement for FR1-NTN “. (P3/[R4-2408071](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408071.zip))
  + **Proposal 2: RAN4 waits for further progress on RAN1 work items** to identify the RF requirement enhancements needed for NR NTN phase 3 for objective 2 (UL capacity/throughput Enhancements). (P2/[R4-2405082](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405082.zip))
* Recommended WF
  + TBD

### Sub-topic 1-5

*Sub-topic description:* Broadcast service

**Issue 1-5-1:** **RAN4 SAN RF impact**

* Proposals:
  + No SAN RF requirement impact for objective 3 “Broadcast service via NR NTN”. (P4-1/[R4-2408071](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408071.zip))
* Recommended WF
  + TBD, Agree if no controversial comments.

# Topic #2: Draft CRs & CRs

## Companies’ contributions summary

|  |  |  |
| --- | --- | --- |
| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2409544](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409544.zip) | Huawei, HiSilicon | Draft CR to TS 38.108: Introduction of regenerative payload |
| [R4-2407512](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407512.zip) | CATT | CR for TS 38.108, Introduction on definition of NTN regenerative payload |

## Open issues summary

### Sub-topic 2-1

*Sub-topic description:* This sub-topic is related to the submitted draft CRs

**Issue 2-1-1: Draft CRs to TS 38.108**

* Proposals: Check if the following draft CRs could be endorsed:

|  |  |  |  |
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| **T-doc number** | **Company** | **Title** | **To be Endorsed or Revised?** |
| [R4-2409544](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409544.zip) | Huawei, HiSilicon | Draft CR to TS 38.108: Introduction of regenerative payload |  |
| [R4-2407512](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407512.zip) | CATT | CR for TS 38.108, Introduction on definition of NTN regenerative payload |  |

# Recommendations for Tdocs

**Existing tdocs**

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| **Tdoc number** | **Source** | **Recommendation** | **Comments** |
| [R4-2409544](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409544.zip) | Huawei, HiSilicon | Discuss/Merge with below | Status to be checked in 1st round |
| [R4-2407512](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407512.zip) | CATT | Discuss/Merge with above | Status to be checked in 1st round |

# Annex – submitted documents under [111][315] NR\_NTN\_Ph3-Core

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| **T-doc number** | **Company** | **Proposals / Observations** |
| [R4-2409105](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409105.zip) | Ericsson | Proposal-1: RAN4 discuss if the 38.307 should be updated for RedCap NTN as release independent feature (operating band). 9.1 Additional NR operating bands for NR NTN in frequency range 19.2 Additional operating bands for Redcap for NR frequency range 1 Requirements for a Redcap UE for additional operating bands within FR1 of TS 38.101-5 in Rel-P [2] are introduced via this clause.  **Table 9.2 -1: NR NTN RedCap operating band**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Feature | Duplex-mode | Release  independent from |  | Requirements to be fulfilled  (see TS 38.307 of the release in which the band was introduced) | | Redcap operating band | FDD | Rel-17 |  |  | |
| [R4-2409107](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409107.zip) | Ericsson | Observation 1 The beam switching delay incurs the system overhead for a full load system.  **Observation 2** No data transmission during the beam switching time incurs the system overhead for full load system  Observation 3 For transparent payload, the network synchronization error will advance or delay the beam switching, adding additional time uncertainty for beam switching.  **Proposal-1:** No RF impact due to the Cell TX (e.g The NES Cell DTX RF conclusion due to Cell DTX can be reused ) assuming the transient time occurs during the beam OFF status.  **Proposal-2:** RAN4 can send LS to RAN1 to notify if beam switching delay has other value than 0  **Proposal-3:** The network synchronization aspect should be considered for transparent payload together with beam switching delay.  **Proposal-4:** No need to consider the spatial and power domain in Rel-18 NES impact on NTN RF for now. |
| [R4-2409543](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409543.zip) | Huawei, HiSilicon | **Proposal 1:** Add clarification note in the Scope of TS 38.108 Rel-19, clarifying that this version of specification covers both non-regenerative, and regenerative payload options, i.e.:  NOTE: This version of specification supports SAN with non-regenerative payload, as well as SAN with regenerative payload.  **Proposal 2:** Updated satellite and SAN definitions, to align payload terminology and to stick to (non-)regenerative payload.  **Proposal 3:** Keep SAN type 1-H and for SAN type 1-O figures as agnostic to the regenerative/non-regenerative functionality of the SAN.  Related Draft CR to TS 38.108 was submitted in [5], to provide more concrete ground for further discussion.  Going beyond TS 38.108, it was further observed that some of the above proposed modification will require to be also applied to TS 38.101-5 and TS 38.181 specifications. Therefore, for completeness, we shall reassure that this regenerative payload terminology is solved as package:  **Proposal 4:** TS 38.101-5 and TS 38.181 (scope, definitions, SAN figures) to be aligned with modifications related to introduction of regenerative payload in TS 38.108.  Please note, that some of the modifications proposed in this Rel-19 discussions are actually applicable to Rel-17 specifications (TS 38.108, TS 38.181, TS 38.101-5). Therefore, related CRs were submitted under Maintenance agendas 4.1 and 4.2 in [6-11]. |
| [R4-2409544](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409544.zip) | Huawei, HiSilicon | Draft CR to TS 38.108: Introduction of regenerative payload |
| [R4-2407511](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407511.zip) | CATT | **Proposal 1: The definition of SAN should be updated to include regenerative payload.**  In addition, the terminology used to describe transparent transmission in the definition of SAN / Satellite is slightly confusing as well. As mentioned above, the terminology used to describe transparent transmission in the item “satellite” is “bent pipe”, but for SAN, the terminology is “transparent”. Therefore, we supposed that those terminologies should be aligned, or both included.  **Proposal 2: The terminologies used for satellite and SAN should be aligned, or both should be included.** |
| [R4-2407512](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2407512.zip) | CATT | CR for TS 38.108, Introduction on definition of NTN regenerative payload |
| [R4-2408071](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2408071.zip) | SAMSUNG R&D INSTITUTE JAPAN | **Observation 1: RAN1 still focus on evaluation work with SLS and LLS for objective 1 with associated assumption of satellite antenna parameters.**  **Proposal 1: Companies are encouraged to bring input into RAN1 for evaluation work assumption including beam switching delay instead of RAN4.**  **Proposal 2: Postpone the discussion on objective 1 until sufficient progress made by RAN1.**  **Proposal 3: No SAN RF requirement impact foreseen for objective 2 “Uplink Capacity/Throughput Enhancement for FR1-NTN “.**  **Moderator Note: There were 2 proposals 4:**  **Proposal 4: No SAN RF requirement impact for objective 3 “Broadcast service via NR NTN”.**  **Proposal 4: No update required for TS 38.108 section 4 “requirements reference points diagrams”.**  **Proposal 5: Update SAN definition in TS 38.108 as following:**  **“Satellite Access Node**: node providing NR user plane and control plane protocol terminations towards NTN Satellite capable UE, and connected via the NG interface to the 5GC. It encompasses a transparent or regenerative NTN payload on board a NTN platform, a gateway and gNB functions.” |
| [R4-2409622](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409622.zip) | ZTE Corporation, Sanechips | **Proposal 1**: capture the following definition and diagrams in the TS 38.108 specification.  **For transparent NTN payload:**  **Satellite Access Node**: node providing NR user plane and control plane protocol terminations towards NTN Satellite capable UE, and connected via the NG interface to the 5GC. It encompass a transparent NTN payload on board a NTN platform, a gateway and gNB functions.    Figure 4.3.1-1: Radiated and conducted reference points for *SAN type 1-H*    Figure 4.3.2-1: Radiated reference points for *SAN type 1-O*  **For regenerative NTN payload:**  **Regenerative Satellite Access Node**: node providing NR user plane and control plane protocol terminations towards NTN Satellite capable UE, and connected via the NG interface to the 5GC. It encompass a regenerative NTN payload on board a NTN platform.  **Proposal 2**: the transition period for cell DTX for FR1-NTN and FR2-NTN is needed. e.g. 10us for FR1-NTN and 3us for FR2-NTN.  **Proposal 3**: regarding beam switching delay for beam hopping, the beam switching delay would be around 100ns. |
| [R4-2409787](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_111/Docs/R4-2409787.zip) | THALES | **Proposal 1.** For NR NTN Rel-19 DL coverage evaluation, a value of beam steering latency equal to zero at least if SAN phase array antenna is assumed.  **Proposal 2.** Values different from zero beam steering latency can be optionally reported by companies.  **Proposal 3.** Other implementation with analog beam steering technologies are not precluded. Companies to further discuss if analog/digital antenna assumptions and for which FR1/FR2 implementations.  **Proposal 4.** Further discuss remaining issues from Way Forward for [110bis][315] NR\_NTN\_Ph3 (**R4-2406109**):  **Issue 1-3-3: Network energy saving**  **Proposal 1:**   * Network energy saving feature in Rel-18 can be starting point for RF impact analysis for Rel-19 NTN DL coverage enhancement objective. (P1/[R4-2404869](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404869.zip)) * No need to consider the spatial and power domain in Rel-18 NES impact on NTN RF for now. (P3/[R4-2404871](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404871.zip))   **Proposal 2:**   * It’s FFS whether any SAN Tx power requirements for objective 1 with power sharing between satellite beams or different satellite beam patterns/size (i.e. wide or narrow) across the satellite footprint. (O1/R4-2405317)   **UL capacity/throughput Enhancements for FR1-NTN**  **Issue 1-4-1: OCC**  **Proposals:**   * **Wait RAN1 reach conclusions on OCC** feature before RAN4 start to evaluate the RF impact. (P2/[R4-2404869](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2404869.zip)) * **RAN4 waits for further progress on RAN1 work items** to identify the RF requirement enhancements needed for NR NTN phase 3 for objective 2 (UL capacity/throughput Enhancements). (P2/[R4-2405082](https://www.3gpp.org/ftp/TSG_RAN/WG4_Radio/TSGR4_110bis/Docs/R4-2405082.zip)) * No **RAN4 SAN RF requirements** impact foreseen for Rel-19 NTN Phase-3 WI Objectives 2 (UL capacity/throughput Enhancements) (O2/R4-2405317)   **Broadcast service**  **Issue 1-5-1:** **RAN4 SAN RF impact**  **Proposals:**   * **No RAN4 SAN RF requirements impact** foreseen for Rel-19 NTN Phase-3 WI **Objectives 3 broadcast service)** (O2/R4-2405317) |
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