**3GPP TSG RAN meeting #105 RP-241742**

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

Status Report to TSG

**Title: Status report for New WID: Non-Terrestrial Networks (NTN) for NR Phase 3;**

**rapporteur: Thales, CATT**

**Agenda item:** **9.3.2.2**

|  |  |
| --- | --- |
| **WI / SI Name** | Rel-19 Non-Terrestrial Networks (NTN) for NR Phase 3 |
| included in this status report | Study Item: No | Core part: Yes | Performance part:Yes | Testing part:No |
| **Acronym** | NR\_NTN\_Ph3 |
| **Unique ID** | 1020097 |
| **TSG Tdoc of latest approved WI/SI description (if any)** | RP-241667 |
| **Target Completion Date****(indicate if changed)** | Study Item: N/A | Core part: 09/2025 | Performance part: 03/2026 | Testing part:  |
| **Overall Completion level** | Study Item: N/A  | Core part: Overall: 45%RAN1: 40%RAN2: 50%RAN3: 60%RAN4: 50% | Performance Part: Overall: 0%RAN4: 0% | Testing part:  |

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

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

**Source:**

|  |  |
| --- | --- |
| **Leading WG** | RAN2 |
| **Rapporteur** | **Name** | Nicolas Chuberre |
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# 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.*

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# 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

2.1.1.1 Decisions during RAN1#118

**2.1.1.1.1 NR-NTN downlink coverage enhancement**

**Observation**

Based on the results of DL coverage evaluation at system level collected from different sources, it is observed that extending the default value of SSB periodicity (different from 20ms) in NTN with LEO600km satellite parameter sets where the beam footprint diameter is 50 km, is beneficial in terms of reduction of common control channel overhead, when targeting a full coverage of 1058 beam footprints:

1. With Set 1-1 FR1 and Set 1-3 FR1, the common messages (SSB, SIB1) overhead is around 40% assuming 5 MHz BW when SSB/SIB1 periodicity of 20ms is in use, this overhead ratio could be reduced to less than 14% when 160ms SSB/SIB1 periodicity is used.
2. With Set 1-2 FR1, the common message (SSB, SIB1) overhead is greater than 100% assuming 5 MHz BW when SSB/SIB1 periodicity of 20ms is in use, this overhead could be reduced to around 25.8% when 640ms SSB/SIB1 periodicity is used.
3. Note: the overhead of SIB19 was included in some of the results
4. Note: an observation when SSB/SIB1 periodicity is 320 ms will be discussed and added to the observation

Agreement

As part of the NTN DL coverage enhancements at both system level and link level, RAN1 to consider:

1. Extending the periodicity of the half frames with SS/PBCH blocks assumed by UE during initial access.
	1. Default value[s] with extended periodicity assumed by NTN UE for initial access can be:
		1. One [or more] values from the list {40ms, 80 ms, 160 ms, 320ms, 640ms}
2. Potential enhancements for transmitting the DL common channels using a wider beam footprint, while DL/UL dedicated channels (incl. PRACH) may be transmitted using a narrower beam footprint
3. Link-level enhancements for the following channels:
4. PDCCH
5. PDSCH with Msg 4
6. PDSCH with SIB1/SIB19.
	1. Note: link-level enhancements for PDSCH with SIB1/SIB19 may be applicable to other SIBs, without additional specification impact.
7. Note: the above does not imply that all the channels above will be enhanced, but all of them should be considered based on this agreement

**2.1.1.1.2 Support of RedCap and eRedCap UEs with NR NTN operating in FR1-NTN bands**

Agreement

The collision case 3 (Semi-statically configured DL reception collides with semi-statically configured UL transmission) can’t be assumed as error case. When the collision happens at UE side for collision case 3, one of the following options on priority rules is supported.

1. Option A: the priority of keeping one direction and overriding another direction is based on different use cases (e.g. the collision happening in different channel types or different scheduling cases) without network signalling
	1. It is not precluded that some or all use cases are left to UE implementation regarding whether DL reception or UL transmission is dropped
	2. Note: it is not precluded that the same direction is prioritized for all different use cases
2. Option B: network indicates the priority configuration to the UE
	1. It is not precluded that some use cases are left to UE implementation regarding whether DL reception or UL transmission is dropped
	2. It is not precluded to define default rules, if necessary

Agreement

To mitigate the collisions of case3 and case4, the following TA reporting enhancements for Rel-19 NTN HD-FDD (e)Redcap UE can be further studied:

1. Finer TA report granularity
2. Smaller TA offset threshold
3. Trigger a TA report when the collision is detected at the UE
4. TA reporting with a new triggering mechanism from gNB
5. TA drifting rate reporting

Note: The benefit, complexity, power consumption and signaling overhead of each scheme is to be further investigated.

Note: other solutions can also be studied

**2.1.1.1.3 NR-NTN uplink capacity/throughput enhancement**

Agreement

At least one of the OCC techniques when PUSCH repetitions are used will be specified:

1. Inter-slot time-domain OCC with OCC length 2
2. Inter-slot time-domain OCC with OCC length 2 and 4
3. Intra-symbol pre-DFT-s OCC (comb-like structure as in PUCCH format 4) with OCC length 2
4. Intra-symbol pre-DFT-s OCC (comb-like structure as in PUCCH format 4) with OCC length 2 and 4
5. Note: combination of techniques is not precluded
6. PUSCH repetition Type B is not considered

**Conclusion**

Multiplexing of 8 UEs with PUSCH OCC is not discussed in RAN1 until the work for multiplexing of less than 8 UEs has been completed.

#### 2.1.2 Remaining Open issues

Definition of necessary physical layer features enabling

1. NR-NTN downlink coverage enhancement covering both GSO and NGSO constellations operating in FR1-NTN or FR2-NTN
2. Support of RedCap and eRedCap UEs with NR NTN operating in FR1-NTN bands
3. NR-NTN uplink capacity/throughput enhancement

## 2.2 RAN2

#### 2.2.1 Agreements

2.2.1.1 Decisions during RAN2#127

**2.2.1.1.1 Downlink coverage enhancement**

Agreements:

1. From RAN2 point of view, if the SSB periodicity is no larger than 160ms, there is no RAN2 impact on SSB configuration (there might still be impacts on DTX aspects)

2. From RAN2 point of view, If the SSB periodicity is larger than 160ms, for example ssb-PeriodicityServingCell, measurement gap periodicity, SMTC configuration, ssb-Periodicity-r17 for NonCellDefiningSSB-r17 may need to be extended. And the field description of nAndPagingFrameOffset may need to be enhanced to consider the SSB periodicity higher than 160ms.

3. RAN2 can further consider SMTC impacts due to beam-hopping / larger SSB periodicity

4. If there is a need to bar pre-Rel19 NTN UEs from accessing a cell operating with DL coverage enhancement (e.g. because of extreme SSB periodicity) the existing NTN bar bit can be used. FFS about the behaviour for Rel-19 UEs not supporting DL coverage enhancement when the existing NTN bar bit is set.

**2.1.1.1.2 Uplink capacity/throughput enhancement**

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**2.1.1.1.3 Support of Broadcast**

Agreements:

1. The intended broadcast service area is defined by a geographical area represented by a (set of) referenceLocation and radius or by a (set of) polygon(s).

2. RAN2 understands that the expected UE behavior is that when the UE is not in any intended service area of its interested broadcast services, the UE may not need to (re)acquire up-to-date MCCH. FFS on solutions

3. For an MBS broadcast service intended for a certain area, a R19 UE supporting the feature should not establish MRB(s) for the MBS session associated to the intended area when it is outside the intended area (capture this in Stage 2)

4. For an MBS broadcast service intended for a certain area, a R19 UE supporting the feature may initiate the broadcast MRB establishment procedure when UE is inside the intended area; the UE may initiate the broadcast MRB release procedure when UE leaves the intended area (capture this in stage 3)

**2.1.1.1.4 Support of Regenerative payload**

Agreements:

1. RAN2 confirms the understanding that legacy UEs should be supported in a regenerative payload scenario.

2. Send an LS to RAN1 and RAN4 asking whether in a regenerative payload scenario it would be a problem to stick to 0 as the minimum possible value for ta-Common or whether we should e.g. introduce negative values for ta-Common. Also indicate that in any case legacy UEs would have to rely on existing signalling and then on a minimum value equal to 0.

3. RAN2 understanding is that for regenerative payload existing RACH-less HO could be applied directly, no further Uu enhancement is needed.

4. We do not optimize UE power saving for SDT procedure in regenerative payload architecture

#### 2.2.2 Remaining Open issues

Definition of necessary access layer features enabling

1. NR-NTN downlink coverage enhancement covering both GSO and NGSO constellations operating in FR1-NTN or FR2-NTN
2. NR-NTN uplink capacity/throughput enhancement
3. Support of Broadcast
4. Support of regenerative payload

## 2.3 RAN3

#### 2.3.1 Agreements

2.3.1.1 Decisions during RAN3#125

**2.3.1.1.1 Support MBS Broadcast service**

**Mapped Cell ID(s) could be used to describe the intended MBS service area for NTN**

Agreed TP to stage 2 BL CR:

R3-244813 (TP to BL CR for TS 38.300) Support of MBS broadcast service

**2.3.1.1.2 Support of Regenerative payload**

**Option 2 NG Removal/Setup can be used for Regenerative Payload NG interface management.**

**RAN3 assumes that current mechanisms to support UEs performing RRC connection resume and RRC connection re-establishment may be reused in regenerative payload architecture, subject to implementation and deployment.**

**RAN3 assumes that during the feeder link switch, AMF is not changed for the UEs. Whether there has any standard impact needs to be further checked.**

#### 2.3.2 Remaining Open issues

Definition of necessary RAN architecture enhancements enabling

**Support of Broadcast:**

* The other options can be further checked, e.g. GNSS description.

**Support of regenerative payload:**

* Stage 2 and stage 3 to capture the NG removal procedure.
* The other issues/enhancements to Xn/NG, if any, to be further discussed, e.g. Support of NG Suspend/Resume, Supported TAI list update over NG, feeder link switch, potential Xn enhancement for mobility, etc..

## 2.4 RAN4

#### 2.4.1 Agreements

2.4.1.1 Decisions during RAN4#112

**2.4.1.1.1 UE RF requirements**

**Agreement**: As baseline

1. n256: 0.5 dB tightening

**Agreement:** Further study NR NTN UE simultaneous operation with GNSS considering e.g.

1. Operating bands with UL close to GNSS frequencies (n254, n255)
2. Emissions on GNSS frequencies
3. Whether transmission gaps enabling successful GNSS reception are present
4. Potential impact on field performance
5. Potential need for specification updates, e.g. frequency error

**Agreement:**

1. Include information in specification suffix clause on suffix applicability on FR1-NTN, FR2-NTN or both, with RedCap being applicable to FR1-NTN
2. Use suffix I for RedCap, if accepted by MCC
3. Add a clause on max output power for RedCap indicating RedCap supports only PC3, similar to TN spec 38.101-1 clause 6.2I.1

**Agreement:**

1. Continue evaluation on potential UE RF specification impact
	1. As starting point, no UE RF impact at least from inter-symbol OCC scheme

Documents agreed

1. R4-2411355 Updated work plan for NR\_NTN\_Ph3 CATT, Thales
2. R4-2413527 Way Forward for [112][311] NR\_NTN\_Ph3\_UE\_RF Qualcomm

**2.4.1.1.2 SAN RF requirements**

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**Agreement 1:** No RF requirement defined for the transient time for beam switching.

**Agreement 2:** To reduce the system impact, transient time could occur:

1. During the cyclic prefix of the one OFDM symbol for active beam;
2. During the non-active time of a beam.

**NOTE 1:** The transient time may include the beam switching delay and/or beam reshaping time of the beam

**NOTE 2:** The non-active time means there is no control/data transmitting or receiving for one beam.

**Agreement:** The worst-case beam switching time is based on the analogue implementation and is estimated as < 100ns (TR 38.817-02), this is based on the assumption of pre-configured beam switching parameters and semi-dynamic allocation of beams.

**Agreement:** The current working assumption is maintained: PA always on, phase shift pre-reconfiguration to perform beam-hopping. The SAN beams hopping pattern are semi-statically configured in advance, the phase shift coefficients are pre-loaded in advance.

**Agreement:** Common current understanding is that (at least for now) there is no RF requirements impact by the beam switching delay of phase array antenna. However, this can be further discussed if other issue is identified, such as different condition for beamforming or SAN beam allocation and configuration.

**Agreement:** At least for now, synchronisation accuracy between ground gNB and satellite payload for transparent architecture are implementation-specific because Feederlinks are not considered as part of RAN4 work in Rel-19.

**NOTE:** Whether the baseband can properly time the command to the phase shifter in advance is an implementation issue. The Feederlink used for NTN communication is not currently specified by 3GPP and therefore the requirement to properly time the phase shifter in advance is not necessary.

**Agreement:** Discussion with respect to UE RedCap to be moved to NR\_NTN\_Ph3\_UE\_RF.

**NOTE:** With respect to additional operating bands for Redcap for FR1-NTN as independent feature, RAN1 is making changes to PHY-layer and therefore release-independence from Rel-17 is not possible for all of RedCap. It can be discussed whether it should be release independent from Rel-19.

**Agreement:** No RAN4 SAN RF requirements impact foreseen for Rel-19 NTN Phase-3 WI Objectives 3 broadcast service.

Documents agreed or endorsed

1. R4-2413517 Way Forward for [112][310] NR\_NTN\_Ph3\_General\_SAN\_RF Thales

**2.4.1.1.3 RRM requirements**

**Objective#3: Signaling of the intended service area of a broadcast service (e.g. MBS broadcast) via NR NTN**

**<Agreements>**

1. For objective#3, there is no RRM impact.

**Objective#4: Support of regenerative payload**

**<Agreements>**

     The existing requirements for NR NTN can be a baseline and it can be revisited based on agreements from other groups.

**Objective#5: Support of (e)RedCap UEs with NR FR1-NTN**

**<Agreements>**

1. For RRM requirements, the operating band of (e)Redcap UE with FR1-NTN bands include all of the following NR-NTN FR1-NTN bands:
	1. n256, n255 and n254 defined in Table 5.2-1 in TS 38.108.
2. For RRM requirements, RAN4 shall only study the FDD operation and no TDD discussion in NR NTN scenario.

**<Agreements>**

1. For RRM requirements, the satellite types considered for (e)Redcap UE with FR1-NTN bands include both GSO and Non-GSO.

**<Agreements>**

1. GNSS capabilities and simultaneous GNSS and NR-NTN operation is supported for (e)Redcap UE with FR1-NTN.

**<Agreements>**

1. FR2 related requirements shall not be defined for (e)RedCap UE with FR1-NTN bands.
2. The requirements defined for both NTN and (e)RedCap UE requirements should be defined for (e)RedCap UE with FR1-NTN bands, including the following:
	1. Cell Re-selection for RRC\_IDLE state mobility
	2. Cell Re-selection for RRC\_INACTIVE state mobility
	3. NR Handover
		1. NR FR1 - NR FR1 RACH-based Handover
	4. RRC Connection Mobility Control
		1. SA: RRC Re-establishment
		2. Random access
		3. SA: RRC Connection Release with Redirection
	5. Timing
		1. UE transmit timing
		2. UE timer accuracy
		3. Timing advance
	6. Signalling characteristics
		1. Radio Link Monitoring
		2. Link Recovery Procedures
		3. Active BWP switch delay
		4. Active TCI state switching delay
		5. UE-specific CBW change
	7. Measurement Procedure
		1. General measurement requirement
		2. NR intra-frequency measurements
		3. NR inter-frequency measurements
		4. L1-RSRP measurements for Reporting
3. For the requirements that have only been defined for NTN, RAN4 to define the following FR1-NTN requirements for (e)Redcap:
	1. NR SAN Satellite switching with re-synchronization
	2. Pathloss reference signal switching delay
	3. Network verified UE location
4. For the requirements that have only been defined for (e)Redcap and not been defined for FR1-NTN, RAN4 NOT to define the following requirements for NTN (e)RedCap in Rel-19:
	1. NR measurements for positioning in RRC\_INACTIVE state
	2. NR Handover to other RATs
		1. Note: For NTN (e)RedCap, it refers to, for example, NTN to E-UTRA handover
	3. RRC connection release with redirection to E-UTRAN
	4. deriveSSB-IndexFromCell tolerance
	5. Uplink spatial relation switch delay
	6. Inter-RAT measurements in idle/inactive/connected mode
	7. PRS-RSRPP measurements
	8. NR measurements with autonomous gaps

**<Agreements>**

1. For RRM requirements, the number of Rx considered for (e)Redcap UE with FR1-NTN bands support include both 1Rx and 2Rx.
2. RAN4 should define separate sets of RRM requirements for 1Rx and 2 Rx (e)Redcap UE, if needed.
	1. As baseline, follow the same principle for (e)RedCap UE in TN network.
3. For 2Rx (e)RedCap UEs with FR1-NTN: Reuse the existing requirements for NTN as a baseline.
4. Meanwhile, consider the following difference between 2Rx (e)RedCap and non-RedCap UE:
	1. The number of searchers
	2. Others if any

**<Agreements>**

1. RAN4 to consider the impact of HD-FDD for (e)Redcap UE with FR1-NTN.
	1. The TN HD-FDD related requirements and applicable conditions defined for (e)RedCap UE can be used as a starting point, and RAN4 take into account NTN specific aspects if any.

**<Agreements>**

1. For (e)RedCap UEs with FR1-NTN, there is no need to define NCD-SSB specific measurement requirements.

**<Agreements>**

1. RAN4 will NOT define the following requirements for (e)RedCap UE with FR1-NTN:
	1. BWP specific serving cell MO
	2. RedCap specific initial UL/DL BWP

Documents agreed or endorsed

1. R4-2414037 WF on RRM requirements for Rel-19 NR NTN phase3 CATT

#### 2.4.2 Remaining Open issues

Definition of RF and RRM requirements enabling

1. NR-NTN downlink coverage enhancement covering both GSO and NGSO constellations operating in FR1-NTN or FR2-NTN
2. NR-NTN uplink capacity/throughput enhancement
3. Support of regenerative payload
4. Support of Rel-17 RedCap and Rel-18 eRedCap UEs with NR NTN operating in FR1-NTN bands

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 SA2

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.

# 3. References

## 3.1 RAN1

**RAN1#118 meeting, Maastrich, The Netherlands, August 19-23rd, 2024:**

1. R1-2406439 Work Plan Work plan for Rel-19 NR\_NTN\_Ph3 THALES
2. R1-2407482 other Session notes for 9.11 (Non-Terrestrial Networks for NR Phase 3 and Internet of Things Phase 3) Ad-Hoc Chair (Huawei)
3. R1-2407521 discussion Summary #2 for Reply LS on UL synchronization for contention based Msg3 transmission without Msg1/Msg2 Moderator (ZTE)
4. R1-2407384 discussion Summary for Reply LS on UL synchronization for contention based Msg3 transmission without Msg1/Msg2 Moderator (ZTE)
5. R1-2407118 discussion Discussion on downlink coverage enhancement for NR-NTN CSCN
6. R1-2407132 discussion Operator input to NTN DL Coverage Enhancements Inmarsat, Viasat
7. R1-2407078 discussion Downlink Coverage Enhancements for NR NTN CEWiT
8. R1-2407079 discussion Discussion on NR NTN Downlink Coverage Enhancements CEWiT
9. R1-2407455 LS out Draft Reply LS on DL coverage enhancements CMCC
10. R1-2407456 discussion Moderator’s summary on the discussion of the reply LS on DL coverage enhancements Moderator (CMCC)
11. R1-2407538 LS out Reply LS on DL coverage enhancements RAN1, CMCC
12. R1-2406452 discussion Discussion on NR NTN Downlink Coverage Enhancements IIT, Kharagpur
13. R1-2406434 discussion Discussion on NR NTN Downlink coverage enhancements THALES
14. R1-2406435 discussion FL Summary #1: NR-NTN downlink coverage enhancements THALES
15. R1-2406436 discussion FL Summary #2: NR-NTN downlink coverage enhancements THALES
16. R1-2406437 discussion FL Summary #3: NR-NTN downlink coverage enhancements THALES
17. R1-2406438 discussion FL Summary #4: NR-NTN downlink coverage enhancements THALES
18. R1-2406511 discussion Discussion on downlink coverage enhancement for NR NTN Lenovo
19. R1-2406615 discussion NR-NTN Downlink Coverage Enhancement Panasonic
20. R1-2406592 discussion Discussion on downlink coverage enhancement for NR NTN Baicells
21. R1-2406584 discussion Discussion on NR-NTN downlink coverage enhancement HONOR
22. R1-2406572 discussion NR-NTN downlink coverage enhancement with beam groups Sharp
23. R1-2406554 discussion NR-NTN downlink coverage enhancement NEC
24. R1-2406130 discussion Discussion on DL coverage enhancement for NR NTN ZTE Corporation, Sanechips
25. R1-2406446 discussion Discussion on NR-NTN downlink coverage enhancement LG Electronics
26. R1-2406108 discussion NR-NTN downlink coverage enhancement InterDigital, Inc.
27. R1-2406052 discussion Discussion on DL coverage enhancements for NR-NTN NICT
28. R1-2406003 discussion Discussion on NR-NTN DL coverage enhancement CMCC
29. R1-2405891 discussion Discussions on downlink coverage enhancements for NR NTN Fraunhofer IIS, Fraunhofer HHI
30. R1-2405925 discussion Discussion on NR-NTN downlink coverage enhancement Spreadtrum Communications
31. R1-2405834 discussion On NR-NTN downlink coverage enhancement Ericsson
32. R1-2405838 discussion Discussion on downlink coverage enhancements for NR NTN Huawei, HiSilicon
33. R1-2406863 discussion On NR-NTN Downlink Coverage Enhancement Apple
34. R1-2406777 discussion NR-NTN - downlink coverage enhancement MediaTek Inc.
35. R1-2406229 discussion Discussion on NR-NTN downlink coverage enhancement OPPO
36. R1-2406202 discussion Discussion on NR-NTN downlink coverage enhancement vivo
37. R1-2406670 discussion Discussion on downlink coverage enhancement for NR-NTN Samsung
38. R1-2406738 discussion Discussion on NR-NTN downlink coverage enhancement ETRI
39. R1-2406754 discussion Downlink coverage enhancements for NR over NTN Nokia, Nokia Shanghai Bell
40. R1-2406359 discussion Further consideration on downlink coverage enhancement for NR NTN CATT
41. R1-2406275 discussion Discussion on NR-NTN downlink coverage enhancement Xiaomi
42. R1-2406949 discussion Discussion on DL coverage enhancement for NR-NTN NTT DOCOMO, INC.
43. R1-2407049 discussion Downlink coverage enhancement for NR NTN Qualcomm Incorporated
44. R1-2406900 discussion Discussion on NR-NTN downlink coverage enhancement TCL
45. R1-2406885 discussion Discussion on NR-NTN DL coverage enhancement KT Corp.
46. R1-2406965 discussion Downlink Coverage Enhancement for NR NTN Google Ireland Limited
47. R1-2406898 discussion Discussion on support of RedCap/eRedCap UEs in NTN CAICT
48. R1-2406901 discussion Discussion on HD-FDD Redcap UEs and eRedcap UEs for FR1-NTN TCL
49. R1-2407050 discussion Support of Redcap and eRedcap UEs in NR NTN Qualcomm Incorporated
50. R1-2406950 discussion Discussion on support of RedCap and eRedCap UEs in FR1-NTN NTT DOCOMO, INC.
51. R1-2406276 discussion Discussion on the support of Redcap UE in NR NTN Xiaomi
52. R1-2406360 discussion Discussion on the enhancement of RedCap and eRedCap UEs In NTN CATT
53. R1-2406755 discussion Considerations on (e)RedCap operation in NR over NTN Nokia, Nokia Shanghai Bell
54. R1-2406739 discussion Discussion on HD UEs with NR NTN ETRI
55. R1-2406671 discussion Discussion on support of RedCap and eRedCap UEs with NR NTN operating in FR1-NTN bands Samsung
56. R1-2406203 discussion Discussion on support of RedCap and eRedCap UEs with NR-NTN vivo
57. R1-2406230 discussion Discussion on supporting of RedCap and eRedCap UEs with NR NTN operating in FR1-NTN bands OPPO
58. R1-2406778 discussion NR-NTN - Support of RedCap and eRedCap UEs with NR NTN operating in FR1-NTN bands MediaTek Inc.
59. R1-2406808 discussion On HD-FDD Redcap UEs for NTN Ericsson
60. R1-2406864 discussion On support of RedCap UEs with NR NTN operation Apple
61. R1-2405839 discussion Discussion on HD-FDD RedCap UEs and eRedCap UEs for FR1-NTN Huawei, HiSilicon
62. R1-2405926 discussion Discussion on support of RedCap and eRedCap UEs with NR NTN operating in FR1-NTN bands Spreadtrum Communications
63. R1-2406004 discussion Discussion on the collision issues of HD-FDD Redcap UE in FR1-NTN CMCC
64. R1-2406109 discussion Discussion on half-duplex RedCap issues for NTN FR1 operation InterDigital, Inc.
65. R1-2406100 discussion Discussion on Support of RedCap and eRedCap UEs with NR NTN operating in FR1-NTN bands China Telecom
66. R1-2406447 discussion Discussion on support of (e)RedCap UEs with NR-NTN operating in FR1-NTN bands LG Electronics
67. R1-2406131 discussion Discussion on support of RedCap/eRedCap UEs for NR NTN ZTE Corporation, Sanechips
68. R1-2406585 discussion Discussion on support of RedCap/eRedCap UEs in NR NTN HONOR
69. R1-2407498 discussion Final Summary for Support of RedCap and eRedCap UEs with NR NTN operating in FR1-NTN bands Moderator (CATT)
70. R1-2407140 discussion Views on RedCap for NR-NTN Inmarsat, Viasat
71. R1-2407306 discussion Summary #1 for Support of RedCap and eRedCap UEs with NR NTN operating in FR1-NTN bands Moderator (CATT)
72. R1-2407307 discussion Summary #2 for Support of RedCap and eRedCap UEs with NR NTN operating in FR1-NTN bands Moderator (CATT)
73. R1-2407206 discussion Feature lead summary #1 of AI 9.11.3 on NR-NTN uplink capacity and throughput enhancements Moderator (MediaTek)
74. R1-2407207 discussion Feature lead summary #2 of AI 9.11.3 on NR-NTN uplink capacity and throughput enhancements Moderator (MediaTek)
75. R1-2407208 discussion Feature lead summary #3 of AI 9.11.3 on NR-NTN uplink capacity and throughput enhancements Moderator (MediaTek)
76. R1-2407139 discussion Views on UL Capacity Enhancements for NR-NTN Inmarsat, Viasat
77. R1-2407222 discussion Discussion on NR-NTN uplink capacity/throughput enhancement NTT DOCOMO, INC.
78. R1-2406591 discussion Uplink capacity/throughput enhancement for NR-NTN Panasonic
79. R1-2406555 discussion NR-NTN uplink capacity/throughput enhancement NEC
80. R1-2406513 discussion Discussion on Uplink Capacity/Cell Throughput Enhancement for FR1-NTN Fujitsu
81. R1-2406132 discussion Discussion on UL capacity enhancement for NR NTN ZTE Corporation, Sanechips
82. R1-2406123 discussion On uplink capacity/cell throughput enhancement for NR NTN Ericsson
83. R1-2406448 discussion Discussion on NR-NTN uplink capacity/throughput enhancement LG Electronics
84. R1-2406101 discussion Discussion on NR-NTN uplink enhancement China Telecom
85. R1-2406110 discussion NR-NTN uplink capacity/throughput enhancement InterDigital, Inc.
86. R1-2406005 discussion Discussion on the NR-NTN uplink capacity/throughput enhancements CMCC
87. R1-2406053 discussion Discussion on NR-NTN uplink capacity/throughput enhancement NICT
88. R1-2406079 discussion Discussion on the NR-NTN uplink capacity/throughput enhancements TCL
89. R1-2406080 discussion Discussion on the NR-NTN uplink capacity/throughput enhancements TCL
90. R1-2406076 discussion Discussion on the NR-NTN uplink capacity/throughput enhancements TCL
91. R1-2405927 discussion Discussion on NR-NTN uplink capacity/throughput enhancement Spreadtrum Communications
92. R1-2405840 discussion Discussion on uplink capacity/throughput enhancement for FR1-NTN Huawei, HiSilicon
93. R1-2406865 discussion On NR-NTN Uplink Capacity Enhancement Apple
94. R1-2406802 discussion NR-NTN uplink capacity enhancement Sharp
95. R1-2406779 discussion NR-NTN - uplink capacity/throughput enhancement MediaTek Inc.
96. R1-2406231 discussion Discussion on NR-NTN uplink capacity/throughput enhancement OPPO
97. R1-2406204 discussion Discussion on NR-NTN uplink capacity enhancement vivo
98. R1-2406672 discussion Discussion on uplink capacity/throughput enhancement for NR-NTN Samsung
99. R1-2406740 discussion Discussion on NR-NTN uplink capacity/throughput enhancement ETRI
100. R1-2406756 discussion Uplink capacity enhancement considerations for NR over NTN Nokia, Nokia Shanghai Bell
101. R1-2406757 discussion Discussion on uplink capacity/throughput enhancement for NR-NTN Lenovo
102. R1-2406361 discussion Discussion on UL capacity enhancement for NR NTN CATT
103. R1-2406277 discussion Discussion on NR-NTN PUSCH capacity enhancement Xiaomi
104. R1-2406951 discussion Discussion on NR-NTN uplink capacity/throughput enhancement NTT DOCOMO, INC.
105. R1-2407051 discussion NR-NTN uplink capacity / throughput enhancement Qualcomm Incorporated
106. R1-2406967 discussion Uplink Capacity Enhancement for NR NTN Google Ireland Limited

## 3.2 RAN2

**RAN2#127 meeting, Maastrich, The Netherlands, August 19-23rd, 2024:**

1. R2-2406324 discussion Discussion on Downlink Coverage Enhancements CATT
2. R2-2406246 discussion Further Considerations on DL Coverage Enhancements vivo
3. R2-2406490 discussion Discussion on Downlink Coverage Enhancement Samsung
4. R2-2406550 discussion Discussions on cell DTX during satellite dynamic power sharing Fujitsu
5. R2-2406571 discussion Discussion on the DL coverage enhancement Google
6. R2-2406894 discussion Consideration on downlink coverage enhancement NEC Corporation
7. R2-2406902 discussion Beam management of NR NTN coverage enhancement China Telecom
8. R2-2406591 discussion Discussion on the impact of SSB extension and cell DTXDRX for NTN Beijing Xiaomi Mobile Software
9. R2-2406870 discussion On beam-level DL coverage enhancement in NTN Lenovo
10. R2-2406993 discussion Consideration on downlink coverage enhancements ZTE Corporation, Sanechips
11. R2-2406952 discussion Discussion on Downlink Coverage Enhancements CSCN
12. R2-2407401 discussion Discussion on NTN downlink coverage enhancements NERCDTV
13. R2-2407382 discussion RAN2 Impact on DL coverage enhancements CMCC
14. R2-2407345 discussion Discussion on downlink coverage enhancement HONOR
15. R2-2407306 discussion Discussion on DL coverage enhancements Huawei, HiSilicon, Turkcell
16. R2-2407187 discussion Downlink coverage enhancement for NTN InterDigital
17. R2-2407129 discussion Idle mode considerations for downlink coverage enhancements Nokia, Nokia Shanghai Bell
18. R2-2406638 discussion Discussion on cell DTX Qualcomm Incorporated
19. R2-2406685 discussion DL coverage enhancement in NTN Apple
20. R2-2406765 discussion Discussion on DL coverage enhancement for NTN OPPO
21. R2-2407544 discussion Views on DL Coverage Enhancements for NR-NTN Inmarsat, Viasat
22. R2-2407532 discussion Downlink coverage enhancement SMTC impacts Sequans Communications
23. R2-2407551 discussion DL coverage enhancements Ericsson
24. R2-2407462 discussion Discussion on downlink coverage enhancement LG Electronics Inc.
25. R2-2407545 discussion Views on UL Capacity Enhancements for NR-NTN Inmarsat, Viasat
26. R2-2407453 discussion Support of broadcast service in NTN NERCDTV
27. R2-2407497 discussion Discussion on Support of MBS Broadcasting over NTN access TCL
28. R2-2407473 discussion Discussion on support of broadcast service ITL
29. R2-2406687 discussion Broadcast service support over NTN Apple
30. R2-2406719 discussion Discussion on providing MBS service area in NTN network OPPO
31. R2-2406849 discussion On How To Support MBS in Rel-19 NR NTN Nokia, Nokia Shanghai Bell
32. R2-2406635 discussion MBS broadcast service area information Qualcomm Incorporated
33. R2-2406628 discussion Broadcast service area signaling Sony
34. R2-2406606 discussion Discussion on MBS Broadcast service area signaling THALES
35. R2-2407188 discussion Support for broadcast service in NTN InterDigital
36. R2-2406865 discussion Discussions on handling MRB(s) associated with intended service areas ITRI
37. R2-2407307 discussion Discussion on MBS broadcast over NTN Huawei, HiSilicon, Turkcell
38. R2-2407263 discussion Considerations on MBS in NTN Continental Automotive
39. R2-2407346 discussion Discussion on the support of broadcast service HONOR
40. R2-2407236 discussion Support for broadcast services in NR NTN Ericsson
41. R2-2407415 discussion UE behaviour for MBS related procedures Sharp
42. R2-2407416 discussion Discussion on MBS service support for NR NTN Sharp
43. R2-2407418 discussion Discussion on support of broadcast service in NTN LG Electronics France
44. R2-2406958 discussion Discussions on MBS in Rel-19 NTN TOYOTA Info Technology Center
45. R2-2406994 discussion Consideration on broadcast service ehancements ZTE Corporation, Sanechips
46. R2-2406971 discussion Discussion on MBS broadcast service for NR NTN CMCC
47. R2-2407049 discussion Further details on intended service area for MBS and ETWS NEC
48. R2-2407053 discussion Discussion on the support of broadcast service Xiaomi
49. R2-2406871 discussion On broadcast service area indication in NTN Lenovo
50. R2-2406583 discussion MBService area indication & geoblocking PANASONIC
51. R2-2406903 discussion Signaling design of service area in NR NTN China Telecom
52. R2-2406551 discussion Discussions on supporting broadcast intending to serve partial cell Fujitsu
53. R2-2406491 discussion Discussion on MBS Broadcast Service Area information Samsung
54. R2-2406352 discussion Signalling for the support of MBS broadcast service in NTN ETRI
55. R2-2406247 discussion Further Discussion on MBS Broadcast Provision in NTN vivo
56. R2-2406267 discussion Discussion on MBS service in NTN system CAICT
57. R2-2406323 discussion Discussion on support of broadcast service in NR NTN CATT
58. R2-2406322 discussion Further discussion on regenerative payload CATT
59. R2-2406268 discussion Discussion on NTN regenerative payload CAICT
60. R2-2406248 discussion Discussion on RACH-less Handover with Regeneration Payload vivo
61. R2-2406904 discussion Consideration of essential features supporting in regenerative payload China Telecom
62. R2-2406872 discussion UE location verification in NTN regenerative architecture Lenovo
63. R2-2407054 discussion Discussion on the support of regenerative payload Xiaomi
64. R2-2407016 discussion mobility with regenerative payload NEC
65. R2-2407026 discussion Discussion on RACH-less handover for regenerative payload Transsion Holdings
66. R2-2406972 discussion Considerations on regenerative payload CMCC
67. R2-2406995 discussion Consideration on support of regenerative payload ZTE Corporation, Sanechips
68. R2-2407347 discussion Discussion on regenerative payload HONOR
69. R2-2407264 discussion Considerations on RACH-less handover for regenerative payload Continental Automotive
70. R2-2407260 discussion Regenerative payload for NR NTN Samsung
71. R2-2407308 discussion Discussion on regenerative payload Huawei, HiSilicon, Turkcell
72. R2-2406629 discussion Satellite switch with re-sync in regenerative payload Sony
73. R2-2406636 discussion Discussion on regenerative payload Qualcomm Incorporated
74. R2-2406686 discussion Features support in regenerative payload architecture Apple
75. R2-2406850 discussion Addressing Potential Issues for NTN over Regenerative Architecture Nokia, Nokia Shanghai Bell
76. R2-2406773 discussion Discussion on satellite switch with resynch for regenerative payload OPPO
77. R2-2406744 discussion Discussion on regenerative payload KT Corp.
78. R2-2407498 discussion Discussion on support of NTN regenerative payload architecture TCL
79. R2-2407452 discussion Discussion on time-based measurement initiation for regenerative payload ETRI
80. R2-2407550 discussion Regenerative payload Ericsson
81. R2-2407548 discussion Considerations on RACH-less handover for regenerative payload Continental Automotive

## 3.3 RAN3

**RAN3#125 meeting, Maastrich, The Netherlands, August 19-23rd, 2024:**

1. R3-244031 draftCR (BL CR to 38.300) Support for Regenerative Payload in NR NTN Ericsson, Thales, Deutsche Telekom, Nokia, ESA, CATT, ZTE, Sateliot, Huawei, Dish Networks, Echostar, Eutelsat Group, Xiaomi, Samsung, CMCC, LG Electronics
2. R3-244155 discussion Discussion on NR NTN supporting MBS broadcast service NEC
3. R3-244123 discussion Way forward for MBS Broadcast intended service area discussion THALES
4. R3-244246 discussion Further discussion on support MBS broadcast service for NTN China Telecom
5. R3-244181 other (TP to NTN BL CRs) Support of MBS broadcast service for NR NTN CATT
6. R3-244194 other Support of Broadcast service Xiaomi
7. R3-244288 other (TP for TS38.300) Discussion on Support for NR NTN MBS Broadcast Service Qualcomm Incorporated
8. R3-244325 discussion Support of broadcast service in NTN Lenovo
9. R3-244635 discussion Discussion on Support of MBS Broadcasting over NTN access TCL
10. R3-244568 discussion Discussion on Supporting MBS broadcast service for NR NTN CMCC
11. R3-244552 discussion Discussion on support MBS broadcast service for NR NTN Samsung
12. R3-244342 other (TP to BL CR for TS 38.300) Discussion on the support of MBS Broadcast Service Nokia, Nokia Shanghai Bell
13. R3-244373 discussion Broadcast Service Area for NR NTN Ericsson, SES, ESA
14. R3-244374 other Broadcast Service Area for NR NTN - NGAP Impacts Ericsson, SES, ESA
15. R3-244363 other (TP for TS 38.413 and TS 38.300) Support MBS broadcast service Huawei
16. R3-244468 other Discussion on NTN broadcast service supporting with TP to TS 38.300 and 38413 ZTE Corporation
17. R3-244547 other (TP for TS 38.410) Support for Regenerative Payload in NR NTN Huawei, Nokia, Nokia Shanghai Bell, CATT, CMCC, Ericsson, Qualcomm Incorporated
18. R3-244548 other (TP for BLCR for TS 38.300) Support of regenerative payload Huawei
19. R3-244426 other NG Removal - Stage 2 Description Ericsson, Huawei
20. R3-244462 discussion Further discussion on support of regenerative payload ZTE Corporation
21. R3-244364 other (TP for BLCR for TS 38.300) Support of regenerative payload Huawei
22. R3-244365 other (TP for TS 38.410) Support for Regenerative Payload in NR NTN Huawei, Nokia, Nokia Shanghai Bell, CATT, CMCC, Ericsson
23. R3-244375 discussion Further Discussion on NTN Regenerative Payload Issues in Rel-19 Ericsson, Thales, SES, ESA, Sateliot
24. R3-244343 other (TP to BL CR for TS 38.300) Discussion on the support of Regenerative payload Nokia, Nokia Shanghai Bell
25. R3-244553 discussion Discussion on support of regenerative payload for NR NTN Samsung
26. R3-244569 discussion Discussion on support of regenerative payload for NR NTN CMCC
27. R3-244479 discussion Discussion on N2/S1 connection management LG Electronics Inc.
28. R3-244480 other (TP for NR\_NTN\_Ph3 TS 38.413) LG Electronics Inc.
29. R3-244639 other NG Removal – Stage 2 Description Ericsson, Huawei, Nokia
30. R3-244634 discussion Discussion on NTN regenerative architecture TCL
31. R3-244326 discussion Mobility issues for regenerative payload in NTN Lenovo
32. R3-244289 other (TP for TS 38.300) Discussion on NG Signaling impacts for NR NTN Regenerative Payload Qualcomm Incorporated
33. R3-244195 other (TP for TS 38.300) Support of regenerative payload Xiaomi
34. R3-244182 other (TP to NTN BL CRs) Support of regenerative payload CATT
35. R3-244247 discussion Further discussion on support of regenerative payload China Telecom
36. R3-244200 discussion Discussion on Xn impact for NR NTN regenerative payload NTT DOCOMO INC..
37. R3-244201 discussion Discussion on support of regenerative payload ETRI
38. R3-244108 other (TP for TS 38.413) Introduce NG Removal procedure Nokia, Nokia Shanghai Bell, Huawei, CATT, CMCC, Ericsson, Qualcomm
39. R3-244156 discussion Discussion on NR NTN supporting regenerative NTN NEC
40. R3-244051 discussion Regenerative payload considerations Eutelsat Group

## 3.4 RAN4

**RAN4#112 meeting, Maastrich, The Netherlands, August 19-23rd, 2024:**

1. R4-2411355 Work Plan Updated work plan for NR\_NTN\_Ph3 CATT, Thales
2. R4-2413353 discussion General aspects for NTN NR Phase 3 THALES
3. R4-2412980 other General issue for NTN RedCap Ericsson
4. R4-2412983 other RedCap UE RF impact on HD-FDD Ericsson
5. R4-2412953 discussion Discussion on the remaining issues for Rel-19 NTN RedCap UE Huawei, HiSilicon
6. R4-2412607 discussion Discussion on NTN phase3 RedCap UE RF Samsung
7. R4-2413142 draftCR Draft CR to TS 38.101-5: Addition of RedCap and eRedCap Qualcomm Incorporated
8. R4-2411496 discussion Discussion on NTN (e)Redcap UE RF requirements Spreadtrum Communications
9. R4-2411498 discussion Discussion on UE RF requirements for NTN RedCap Mediatek India Technology Pvt.
10. R4-2411600 discussion Discussion on RF requirement for redcap UE in FR1 NTN band. Xiaomi
11. R4-2411539 discussion UE RF requirement for NTN Redcap and eRedcap Sony
12. R4-2411172 other On NR NTN RedCap UE RF requirements Apple
13. R4-2411069 discussion Discussion on RF requirement for NTN RedCap UE CATT
14. R4-2411862 discussion Discussion on UE RF requirements for NR NTN phase3 ZTE Corporation, Sanechips
15. R4-2411657 discussion RedCap NTN UEs Nokia
16. R4-2412081 discussion Discussion on RF requirements for RedCap and eRedCap UE supporting FR1-NTN in Half Duplex mode vivo
17. R4-2413526 draftCR Draft CR to TS 38.101-5: Addition of RedCap and eRedCap Qualcomm Incorporated
18. R4-2413141 other NR NTN UL capacity enhancements Qualcomm Incorporated
19. R4-2412981 other Other NTN UE RF requirment Ericsson
20. R4-2412982 other SAN RF impact overview Ericsson
21. R4-2412717 discussion Discussion on RF requirements for NTN SAN in Rel-19 ZTE Corporation, Sanechips
22. R4-2413230 discussion Beam switching delay aspects for DL Coverage Enhancements Inmarsat, Viasat
23. R4-2413244 draftCR Draft CR: Introduction of regenerative payload Huawei, HiSilicon
24. R4-2411068 discussion Discussion on transient time for SAN CATT
25. R4-2411618 discussion Initial discussion on RRM core requirements in NTN for NR Phase 3 Xiaomi
26. R4-2411469 discussion Discussion on RRM requirements for NR NTN phase 3 MediaTek inc.
27. R4-2411356 discussion Discussion on RRM requirements for Rel-19 NTN phase3 CATT
28. R4-2411452 discussion On RRM core for R19 NTN Phase 3 Apple
29. R4-2412112 discussion Discussion on RRM impacts on Rel-19 NTN phase 3 Samsung
30. R4-2411686 discussion Discussion on RRM requirements for NTN phase 3 LG Electronics Inc.
31. R4-2411763 discussion (NR\_NTN\_Ph3-Core) Discussion on the RRM requirement for Redcap over NTN CMCC
32. R4-2413231 discussion Beam switching delay aspects for DL Coverage Enhancements Inmarsat, Viasat
33. R4-2413188 discussion (NR\_NTN\_Ph3-Core) Impact on RRM requirements Qualcomm Incorporated
34. R4-2412672 discussion Initial discussion on RRM impacts of R19 NR NTN Huawei, HiSilicon
35. R4-2412601 discussion Consideration on RRM impacts for R19 NR NTN Phase 3 vivo
36. R4-2413042 discussion Discussion on RRM requirements for RedCap NTN and regenerative mode ZTECorporation,Sanechips
37. R4-2412234 discussion Discussion RRM requirements on NTN for NR phase 3 Ericsson
38. R4-2411821 other Topic summary for [112][226] NR\_NTN\_Ph3 Moderator (CATT)
39. R4-2413517 other Way Forward for [112][310] NR\_NTN\_Ph3\_General\_SAN\_RF Thales
40. R4-2413527 other Way Forward for [112][311] NR\_NTN\_Ph3\_UE\_RF Qualcomm
41. R4-2413410 other Topic summary for [112][310] NR\_NTN\_Ph3\_General\_SAN\_RF Moderator (Thales)
42. R4-2413411 other Topic summary for [112][311] NR\_NTN\_Ph3\_UE\_RF Moderator (Qualcomm)

***END***