3GPP TSG-RAN WG2 Meeting #127 R2-2407573

Maastricht, Netherlands, Aug 19th – 23rd, 2024

**Agenda item: 9.3**

**Source: Session Chair (ZTE Corporation)**

**Title: Report from Break-out session on NR-NTN and IoT-NTN**

**Document for: Approval**

Organizational

1. All organization emails and notes will be shared over the following email discussion throughout the meeting:
* [AT127][300] Organizational – NR-NTN and IoT-NTN session

Scope:

* + - Share plans for the meeting and list of ongoing email discussions for the sessions related to NR-NTN and IoT-NTN
		- Share meetings notes and agreements for review and endorsement

Schedule/Plan

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Main room** | **Brk 1 room** | **Brk 2 room** | **Brk 3 room** |
| **Monday**  |
| 09:00 – 10:30 | [**1], [2], [3],** **[7.0] R18 common (Diana)****[7.0.1]****[7.0.2.8] Others (including multi WI issues)****Break out** **@NR151617 UP (Diana)** **[7.5] XR****[7.0.2] Other Rel-18 corrections** | Breakout to start after completion of 7.0.2.8**R1617 SL (Kyeongin)****R18 SL (Kyeongin)** | Breakout to start after completion of 7.0.2.8**NRLTE151617 Pos (Nathan)**NR18 Pos |  |
| 11:00 – 13:00 |
| 14:30 – 16:30 | **[7.0.2] Other Rel-18 corrections cont** | **R18 SL** **R18 feMob** (**Kyeongin)** (if time allows) | **NR18 Pos** |
| 17:00 – 19:00 | **NR18 Network Energy Saving (Diana)** [7.3] All AIs in order | **Rel-18 MUSIM (Erlin)** **NR18 MIMO evo**  | **R1718 Relay** |
| Tuesday  |
| 08:30 – 10:30 | **R18 feMob (Kyeongin)** | **NR19 XR [2] (Dawid):** | **NR18 Pos (Nathan)** |  |
|  |
|  |
| 11:00 – 13:00 | **[7.24] TEI18 (Diana)****[7.0.2]** TBD other Rel-18 topics if  | **R19 Network Energy Saving [1] (Kyeongin)** | **NR SL Relay [1] (Nathan)** |  |
|  14:30 -16:30 | **NR19 AI/ML PHY [2] (Diana)** | **NR18 NTN NR /IoT(Sergio)** - 7.7,1, 7.7.2- 7.6.1, 7.6.2 | **NR18 Cov Enh (Mattias)**All Ais in order**EUTRA&NR151617 (Mattias)**As far as possible in this order (except NTN):4.1, 5.1.1, 5.1.3, 6.1.1, 6.1.3 |  |
| 17:00– 19:00  | **Rel-19 Ambient IoT [2] (Diana)** | **Rel- 19 NR NTN [2]**- 8.8.1- 8.8.6- 8.8.4 | **EUTRA&NR151617 (Mattias)**Continue from above**NR18 eQoE (Dawid)** - R18 QoE corrections**NR 18 MBS (Dawid)**- R18 MBS corrections- MBS TEI18 corrections |  |
| Wednesday |
| 08:30 – 10:30 | **R19 Mob [2] (Kyeongin)** | **NR19 NTN IoT [1]**- 8.9.1- 8.9.2- 8.9.3 | **NR18 Redcap (Mattias)**All Ais in order**EUTRA&NR151617 (Mattias)**Continue from Tuesday maintenance session if needed. |  |
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| 11:00 – 13:00 | **[8.0] General (Rel-19 LSs)** **NR Other (Diana)**[7.25]**TEI18 (Diana)** | **NR19 XR [2] (Dawid):** | **NR17 (Mattias)**NTN corrections**NR18 SONMDT (Mattias)**All Ais in order**NR19 SONMDT [0.5] (Mattias)**8.10.1, 8.10.2, 8.10.5, |  |
| 14:30 – 16:30 | **AI/ML Mobility [2] (Diana)** | **Rel-19 LP-WUS [1](Erlin)**- 8.4.x | **NR18 Pos (Nathan)** |  |
|  |
|  |
|  |
| 17:00 – 19:00 | **AI/ML PHY [2] (Diana)** | **R19 Mob [2] (Kyeongin)** | **R18 IoT NTN (Sergio) (from 17:00 to ~18:00)**7.6.2: issues marked CB Wednesday |  |
|  |
| Thursday |
| 08:30 – 10:30 | **CB Diana TBD****[CB R19 AI/ML PHY]** |  | **R18 NR/IoT NTN CB (Sergio)**- 7.6.2: issues marked CB Thursday- 7.7.2: issues marked CB Thursday **[R19 IoT NTN CB] (from ~9:30)**- 8.9.3 |  |
|  |
| 11:00 – 13:00 | **Rel-19 Ambient IoT [2] (Diana)** |  | **Rel-19 NR NTN [1] (Sergio)**- 8.8.5- 8.8.2- 8.8.4 (if time allows) |  |
| 14:30 – 16:30  | **AI/ML Mobility [2] (Diana)** | CB Kyeongin R161718 SL, R19 NES | **NR19 SBDF [0.5 TUs] (Erlin)**CB Rel-19 LP-WUS (Erlin) |  |
| 17:00 – 19:00 | **CB Diana****Rel-18** | CB Kyeongin R18 feMob, R19 Mob | CB Erlin MUSIM/MIMO |  |
| 19-00 (TBD) | **RAN2 Social Event (TBD)** |  |  |  |
| **Friday**  |
| 08:30 – 10:30 | CB TBDCB Diana R19 AI/ML PHY  |  | CB Sergio (from 09:00)**IoT NTN CB**- issues marked CB Friday**NR NTN CB (both R18 and R19)**- report of [301],[302],[303]- report of [304],[305],[306],[307]- other issues marked CB Friday |  |
| 11:00 – 13:00 | CB Diana@11-12 R19 Ambient IoTNR Others CBsReports from breakout sessionsEoM |  | CB Sergio (until ~12:00 max)**NR NTN CB (both R18 and R19)**- continuation from the session before |
| 14:30 – 16:00 |  |  |  |
| 16:00 – 17:00 |  |  |  |  |

**Breaks**

Morning coffee: 10:30 to 11:00

Lunch: 13:00 to 14:30

Afternoon coffee: 16:30 to 17:00

List and details of [AT127] offline discussions

NOTE: No offline email discussions will be kicked off before Monday Aug 19th, 09:00 local time

* [AT127][301][R18 NR NTN] corrections for satellite switch with re-sync (Qualcomm)

 Scope: Continue the discussion on p1 and p2 in [R2-2406641](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406641%20issue%20on%20PCI%20unchanged.docx)

 Intended outcome: report of offline discussion

 Deadline for companies' feedback: Thursday 2024-08-22 20:00

 Deadline for rapporteur's summary (in R2-2407612): Friday 2024-08-23 08:00

* [AT127][302][R18 NR NTN] absence of validity duration in SIB19 (CATT)

 Scope: Continue the discussion on the actual wording of the change according to option 2 for p2 (starting from the TP in Annex 2)

 Intended outcome: report of offline discussion

 Deadline for companies' feedback: Thursday 2024-08-22 20:00

 Deadline for rapporteur's summary (in R2-2407613): Friday 2024-08-23 08:00

* [AT127][303][R18 NR NTN] Stage 2 text for trigger conditions (Oppo)

 Scope: Continue the discussion on the actual wording of the change for the Stage 2 description on trigger conditions without RSRP-based trigger conditions.

 Intended outcome: report of offline discussion

 Deadline for companies' feedback: Thursday 2024-08-22 20:00

 Deadline for rapporteur's summary (in R2-2407614): Friday 2024-08-23 08:00

* [AT127][304][LTE\_TN\_NR\_NTN\_mob] Stage 2 CR (Samsung)

 Scope: Check the Stage 2 running CR for E-UTRAN to NR NTN mobility

 Intended outcome: Endorsable CR

 Deadline for companies' feedback: Thursday 2024-08-22 20:00

 Deadline for final CR (in R2-2407616): Friday 2024-08-23 08:00

* [AT127][305][LTE\_TN\_NR\_NTN\_mob] RRC CR (CATT)

 Scope: Update the RRC CR for E-UTRAN to NR NTN mobility based on meeting agreements

 Intended outcome: Endorsable CR

 Deadline for companies' feedback: Thursday 2024-08-22 20:00

 Deadline for final CR (in R2-2407617): Friday 2024-08-23 08:00

* [AT127][306][LTE\_TN\_NR\_NTN\_mob] UE capability CR (vivo)

 Scope: Update the UE capability CR for E-UTRAN to NR NTN mobility based on meeting agreements

 Intended outcome: Endorsable CR

 Deadline for companies' feedback: Thursday 2024-08-22 20:00

 Deadline for final CR (in R2-2407618): Friday 2024-08-23 08:00

* [AT127][307][R19 NR NTN] service area information (Apple)

 Scope: Continue the discussion on the options to provide service area information: SIB20 vs MBSBroadcastConfiguration in MCCH

 Intended outcome: report of offline discussion

 Deadline for companies' feedback: Thursday 2024-08-22 20:00

 Deadline for rapporteur's summary (in R2-2407619): Friday 2024-08-23 08:00

## 7.6 IoT NTN enhancements

(IoT\_NTN\_enh-Core; leading WG: RAN1; REL-18; WID: [RP-223519](file:///C%3A%5CData%5C3GPP%5Carchive%5CRAN%5CRAN%2398%5CTdocs%5CRP-223519.zip))

Time budget: 0 TU

Tdoc Limitation: 1 tdocs

### 7.6.1 Organizational

LSs, rapporteur inputs.

Editorials/clarifications should not be included in any tdoc but sent to the WI spec rapporteurs, who can submit a rapporteur CR as part of this AI.

Rapporteur inputs do not count towards the tdoc limitation.

Incoming LSs

R2-2406211 LS on Rel-18 RAN1 UE features list for LTE after RAN1#117 (R1-2405569; contact: NTT DOCOMO, AT&T) RAN1 LS in Rel-18 IoT\_NTN\_enh To:RAN2 Cc:RAN4

* Noted

Rapporteur inputs

[R2-2406938](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406938%2036.321%20CR1588%20R18%20IoT%20NTN.docx) Miscellaneous MAC correction for IoT NTN MediaTek CR Rel-18 36.321 18.2.0 1588 - F IoT\_NTN\_enh-Core

- QC would like to further check this

* Change is agreed
* Revised in R2-2407620 to include other changes agreed this week

R2-2407620 Miscellaneous MAC correction for IoT NTN MediaTek CR Rel-18 36.321 18.2.0 1588 1 F IoT\_NTN\_enh-Core

[R2-2407303](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407303%20Miscellaneous%20corrections%20to%20TS%2036.331%20for%20IoT%20NTN.docx) Miscellaneous corrections to TS 36.331 for IoT NTN Huawei, HiSilicon CR Rel-18 36.331 18.2.0 5049 - F IoT\_NTN\_enh-Core

* Changes are endorsed
* The CR is considered as a basis to include additional RRC changes agreed this week
* Revised in R2-2407615

R2-2407615 Miscellaneous corrections to TS 36.331 for IoT NTN Huawei, HiSilicon CR Rel-18 36.331 18.2.0 5049 1 F IoT\_NTN\_enh-Core

* [Post127][305][R18 IoT NTN] 36.300 CR (Ericsson)

 Scope: Draft a 36.300 CR with meeting agreements

 Intended outcome: Agreed CR

 Deadline for agreed CR (in R2-2407626): short

* [Post127][306][R18 IoT NTN] 36.331 CR (Huawei)

 Scope: update the RRC CR with meeting agreements

 Intended outcome: Agreed CR

 Deadline for agreed CR (in R2-2407615): short

* [Post127][307][R18 IoT NTN] 36.321 CR (Mediatek)

 Scope: update the MAC CR with meeting agreements

 Intended outcome: Agreed CR

 Deadline for agreed CR (in R2-2407620): short

* [Post127][308][R18 IoT NTN] 36.306 CR (Qualcomm)

 Scope: Draft a 36.306 CR based on meeting agreements

 Intended outcome: Agreed CR

 Deadline for agreed CR (in R2-2407627): short

### 7.6.2 Corrections

Corrections for all specifications.

[R2-2406951](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406951%20Discussion%20on%20RRC%20Corrtions%20to%20IoT%20NTN.docx) Discussion on RRC Corrections to IoT NTN MediaTek Inc. discussion Rel-18 36.331 IoT\_NTN\_enh-Core

Proposal 1: Moving the text about T390 expiry in 5.3.3.21 to a new standalone clause.

- HW is fine with this

- ZTE thinks this might not be the only issue: we could also consider the restart of T390. MTK is ok to further discuss this

* Agreed: text about T390 expiry in 5.3.3.21 is moved to a new standalone clause. We can consider additional changes for other similar cases (e.g. T390 restart)

Proposal 2: If T390 expires and a GNSS measurement during the available idle period is in progress, it is up to UE implementation whether to continue the current GNSS measurement using autonomous gaps or start a new GNSS measurement.

- ZTE thinks this is not needed, this should not be up to UE implementation.

- QC thinks that in this case the UE could just continue measuring

- Google supports the proposal

- Nokia thinks nothing should be captured here.

- Samsung thinks that clarifying this would be problematic

* We don’t pursue further clarifications for this.

Proposal 3: RAN2 to discuss the ASN.1 issue of EARFCN value in carrierFreqList of SIB32.

- vivo thinks we should go for a BC change but are ok to follow the majority

- Ericsson prefers to go for the NBC change or at least dummify the current field if we go for the BC one

- MTK prefers option 1

- QC think we should go for a BC change

* We go for a BC change but we need to revise the proposal. Draft a TP in R2-2407791

[R2-2407791](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2407791.zip) RRC Corrections to IoT NTN     MediaTek Inc.  draftCR            Rel-18   36.331 IoT\_NTN\_enh-Core

* Changes are agreed and will be implemented in the RRC rapporteur CR

[R2-2406329](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406329%20Correction%20on%20SIB33.docx) Correction on SIB33 CATT discussion Rel-18 36.331 IoT\_NTN\_enh-Core

Change#1:Under the field description of epochTime of SIB33, clarify that if epochTime is absent in an NTN cell, the UE uses epoch time of the serving cell, but if it is absent in a TN cell, the UE uses the starting time of the DL subframe corresponding to the end of the SI window during which the SI message carrying SIB33(-NB) is transmitted

* Ericsson suggest to change “UE uses” to “epochTime is”
* Change is agreed with the following addition to the epochTime field description: “If this field is absent in TN cell, the epochTime is the starting time of the DL subframe corresponding to the end of the SI window during which the SI message carrying SIB33(-NB) is transmitted.” Align the wording (“UE uses” to “epochTime is”) also in the NR NTN RRC CR
* For validity duration we check in the post meeting CR review

Change#2: Under field description of systemInfoValueTag in SystemInformationBlockType1/MasterInformationBlock-NB, exclude that systemInfoValueTag is used for SIB33/SIB33-NB

* Agreed

[R2-2406450](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406450_draftCR_Miscellaneous%20Correction%20for%20IoT-NTN.docx) Miscellaneous RRC Correction for IoT-NTN vivo draftCR Rel-18 36.331 18.2.0 IoT\_NTN\_enh-Core

1. Add the description that UE stops the timer T318 if it is running in case of HO.

- Samsung thinks in case this is a Rel-17 issue but thinks the current behaviour was intended. Nokia agrees with Samsung and thinks there is no need for further optimizations.

2. Add the description that UE shall stop the periodic reporting in case the leave condition of the event D1/D2 is satisfied.

* Agreed

3. Add clarification on referenceLocation2 separately for event D1 and cond event D1.

* Agreed

4. In clause 7.3.1, clarify the timer T310 is stopped upon expiry of t-Service or being out of the current serving cell coverage in discontinuous coverage scenario.

* Agreed

[R2-2407166](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407166%20Further%20discussion%20on%20T390%20stop%20during%20C-DRX%20inactive%20time.docx) Further discussion on T390 stop and GNSS validity report during C-DRX inactive time Nokia, Nokia Shanghai Bell discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: RAN2 to specify the UE stops timer T390 upon sending the GNSS validity duration report. A text proposal is provided below.

* MTK thinks we already discussed this and we shouldn’t discuss again and in any case it’s impossible to completely align between the NW and the UE. QC agrees
* Ericsson agrees with Nokia
* Google thinks the mismatch can be avoided by UE and also NW implementation, e.g. implementing some grace periods. As a last resort a release indication can be sent to the UE
* Nokia thinks the time mismatch can be up to 2 second and then a real issue
* Not pursued

Proposal 2: The note on UE behavior for GNSS acquisition in an idle/C-DRX inactive period is updated to reflect the reporting of the remaining GNSS validity duration is mandatory. A text proposal is provided below.

* QC thinks we already discussed this. Nokia disagrees
* Ericsson supports this
* HW thinks we can go for p2
* MTK don’t think that always sending RACH is correct but could accept p1 in Ericsson paper
* ZTE thinks we could clarify that the UE should report leaving to UE
* We modify the note as follows:

NOTE: When in RRC\_CONNECTED, if the UE autonomously starts and completes GNSS acquisition using available idle periods, the UE reports the remaining validity duration but it is up to UE implementation whether to stop timeAlignmentTimer and initiate a Random Access procedure.

[R2-2407254](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407254%20Various%20corrections%20to%20IoT%20NTN%20Rel-18.docx) Various corrections for IoT NTN Rel-18 Samsung discussion Rel-18 IoT\_NTN\_enh-Core

* Stage 2

Proposal 1: Agree Stage 2 text proposal in Section 5.1 on measuring NTN cells in a terrestrial network.

- ZTE thinks no description is needed in Stage2

- Ericsson thinks that some minimal description is beneficial and we can work on the TP

* Check in the post meeting Stage 2 CR review

Proposal 2: If none of the satellite IDs for a specific frequency in SIB3/SIB5 are present in SIB33, it is up to UE implementation to measure the frequency.

- HW thinks the current text is sufficiently clear

Proposal 3: Agree Stage 2 correction text proposal.

* Capabilities

Proposal 4: Introduce non-signalled UE capability for a UE to measure an NTN cell using NTN assistance information in idle mode.

- ZTE thinks we don’t have NTN-related non-signalled UE capabilities in Rel-17, e.g. for SIB32 acquisition

Proposal 5: Introduce a signalled UE capability for a UE to measure an NTN cell using NTN assistance information in connected mode.

- Samsung think that it’s essential to have a capability for this, at least for Connected mode.

- QC supports the need for a capability for this, both for the provision of information via dedicated signalling and via SIB33

- HW thinks it could be ok to introduce a capability for the provision of information via dedicated signalling

* We introduce a signalled UE capability indicating whether the UE can be configured via dedicated signalling with NTN assistance information (satellite ID or ephemeris info in MO) to measure an NTN cell in connected mode.
* RAN2 understands that in any case there are no mandatory requirements for a UE to keep an updated version of SIB33 in Connected mode. Come back in the next meeting to check whether we can add another capability for a UE capable of keeping an updated version of SIB33 in Connected mode

Proposal 6: The UE feature to acquire SIB33 in a TN cell indicates that UE is capable of performing measurements of NTN cells using NTN assistance information in a terrestrial cell.

Proposal 7: If P4-P5 is agreed, the capabilities indicate capability to measure NTN cell both in an NTN cell and a terrestrial cell.

* RRC

Proposal 8: Dedicated ephemeris element in measurement object is not allowed for connected mode RRM in IoT NTN. Capture this in 36.331.

* Idle mode

Proposal 9: IoT NTN UE shall disregard NTN distance-based measurement when t-Service is triggered, as in NR NTN.

Proposal 10: Agree 36.304 correction text proposal.

[R2-2407553](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407553%20-%20R18%20IoT%20NTN%20GNSS%20extension.docx) R18 IoT NTN GNSS extension Ericsson discussion Rel-18

Proposal 1 Add “In this case, the UE may compensate TA (see TS 36.211 [7] clause 8) to avoid time misalignment due to changes in the GNSS position.” to the NOTE in MAC spec section 5.4.10.

- Nokia thinks would make things complex. ZTE also agree

Proposal 2 Consider the text proposal below.

- Nokia, vivo, MTK this this is useful

* Include the TP (or a revision of it) in the post meeting CR review

[R2-2406642](file:///C%3A%5CData%5C3GPP%5CExtracts%5C36321_CR1587_%28Rel-18%29_R2-2406642%20HARQ%20disabled.docx) Clarification of note on UL and DL parallel scheduling for NB-IoT Qualcomm Incorporated CR Rel-18 36.321 18.2.0 1587 - F IoT\_NTN\_enh-Core

- Nokia thinks the CR is not needed. Vivo agrees

* Change is agreed in principle but the text should be reworded, e.g. as: “For NB-IoT when HARQ RTT timer has been started for a HARQ process, …”
* Continue the discussion in the post meeting CR review

The note 4 in section 5.7 is clarified that it is only applicable for the case HARQ feedback is enabled.

[R2-2407302](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407302%20Clarification%20on%20scenario%20support.docx) Clarification on scenario support Huawei, HiSilicon CR Rel-18 36.306 18.2.0 1891 - F IoT\_NTN\_enh-Core

Modify the description of ntn-ScenarioSupport-r17 so that it indicates whether the UE supports NTN features other than the GNSS enhancement and HARQ enhancement in GSO or NGSO scenario, to clarify it covers the supported scenarios of all Rel-17 NTN features and all other Rel-18 NTN features except for GNSS/HARQ enhancements.

- QC thinks we don’t necessarily need this CR or in case we can clarify the description of Rel-18 capabilities

* Not pursued
* RAN2 understands that R18 IoT NTN features other than GNSS/HARQ enhancements refer only to ntn-ScenatioSupport-17
* RAN2 understands that GNSS/HARQ enhancements scenario support need to be set consistently with ntn-ScenatioSupport-17 (discuss how to add this clarification in the field description during the CR review)

[R2-2407538](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407538%20GNSS%20correction%20for%20IoT%20NTN.docx) GNSS correction for IoT NTN ZTE Corporation, Sanechips CR Rel-18 36.331 18.2.0 5051 - F IoT\_NTN\_enh-Core

Even for the GNSS measurement during C-DRX, UE is required to trigger remaining GNSS measurement validity duration report when it receives indication that a new GNSS position becomes valid.

- Nokia agrees with the intention but doesn’t think the CR is needed

* Not pursued

## 7.7 NR NTN enhancements

(NR\_NTN\_enh -Core; leading WG: RAN1; REL-18; WID: RP-232669)

Time budget: 0 TU

Tdoc Limitation: 1 tdocs

### 7.7.1 Organizational

LSs, rapporteur inputs.

Editorials/clarifications should not be included in any tdoc but sent to the WI spec rapporteurs, who can submit a rapporteur CR as part of this AI.

Rapporteur inputs do not count towards the tdoc limitation.

Incoming LSs

R2-2406215 Reply LS on Reference Point for SSB-TimeOffset (R1-2405719; contact: Apple) RAN1 LS in Rel-18 NR\_NTN\_enh-Core To:RAN2 Cc:RAN4

* We stick to the UL time synchronization reference point as the Reference point for SSB-TimeOffset
* Noted

[R2-2406229](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406229_R4-2410381.docx) Reply LS on reference point for SSB-TimeOffset (R4-2410381; contact: Apple) RAN4 LS in Rel-18 NR\_NTN\_enh-Core To:RAN2 Cc:RAN1

* Noted

Rapporteur inputs

[R2-2407239](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407239%20-%2038331_CR4935_%28Rel-18%29%20-%20Rapporteur%20Input%20to%20Rel-18%20NR%20NTN.docx) Rapporteur Input to Rel-18 NR NTN Ericsson CR Rel-18 38.331 18.2.0 4935 - D NR\_NTN\_enh-Core

* Change is endorsed
* The CR is considered as a basis to include additional RRC changes agreed this week (changing the category to F)
* Revised in R2-2407611

R2-2407611 Rapporteur Input to Rel-18 NR NTN Ericsson CR Rel-18 38.331 18.2.0 4935 1 F NR\_NTN\_enh-Core

* [Post127][301][R18 NR NTN] 38.300 CR (Thales)

 Scope: Draft a 38.300 based on meeting agreements

 Intended outcome: Agreed CR

 Deadline for agreed CR (in R2-2407621): short

* [Post127][302][R18 NR NTN] 38.331 CR (Ericsson)

 Scope: update the RRC CR with meeting agreements

 Intended outcome: Agreed CR

 Deadline for agreed CR (in R2-2407611): short

* [Post127][303][R18 NR NTN] 38.321 CR (Interdigital)

 Scope: update the MAC CR with meeting agreements

 Intended outcome: Agreed CR

 Deadline for agreed CR (in R2-2407628): short

* [Post127][304][R18 NR NTN] UE Caps CRs (Intel)

 Scope: Draft CRs based on meeting agreements

 Intended outcome: Endorsed CRs

 Deadline for CRs (in R2-2407624 and R2-2407625): very short

### 7.7.2 Corrections

Corrections for all specifications.

Reference Point for SSB-TimeOffset

[R2-2406727](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406727_Clarification%20on%20Reference%20Point%20for%20SSB-TimeOffset_v0.doc) Clarification on Reference Point for SSB-TimeOffset Apple discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: Adopt the UL RP as the reference point of SSB-TimeOffset.

Proposal 2: Capture Proposal 1 in Chairman notes, and no spec change is needed.

[R2-2407482](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407482%20Draft%20CR%2038331%20Clarification%20on%20ssb-TimeOffset.docx) Clarification on the ssb-TimeOffset Google draftCR Rel-18 38.331 18.2.0 F NR\_NTN\_enh-Core

**ssb-TimeOffset**

Indicates the time offset between the SSB from source and target satellite at the uplink time synchronization reference point. It is given in number of subframes. The value is provided based on the assumption that the propagation delay difference from the uplink time synchronization reference point to UE between the source and target satellite equals to 0 ms, and UE can adjust the actual time offset based on the actual propagation delay difference.

- LG agrees with Google that this needs to be clarified in the spec

- Samsung thinks we could merge the proposals from QC and Google

- HW think this change is not needed but also the QC proposal needs a revision, e.g. swapping target with source

- Apple also thinks this is not needed

[R2-2406641](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406641%20issue%20on%20PCI%20unchanged.docx) Discussion on soft satellite switch with re-sync Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1 Based on LS response, keep the reference point of ssb-TimeOffset at ULSRP and clarify the field description of ssb-TimeOffset that the source satellite and target satellite may have its own different ULSRP as below:

Indicates the time offset ~~between the SSB from source and target satellite at the uplink time synchronization reference point~~ between a SSB burst of the target cell at its uplink time synchronization reference point and the SSB burst of the source cell at its uplink time synchronization reference point. It is given in number of subframes.

* Continue in offline 301 to discuss a clarification for ssb-TimeOffset based on the text proposal in p1

Proposal 2 Confirm that there is no impact to running timers (e.g., HARQ RTT timer) due to cell timing change after soft satellite switch with resync. Consider updating NOTE 1 in section 3.1 by adding another example as “due to soft satellite switch with resynchronization” in addition to “due to BWP switching”.

- Ericsson and Apple confirm the understanding but think we don’t need any further clarification

* Continue the discussion in offline 301
* [AT127][301][R18 NR NTN] corrections for satellite switch with re-sync (Qualcomm)

 Scope: Continue the discussion on p1 and p2 in [R2-2406641](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406641%20issue%20on%20PCI%20unchanged.docx)

 Intended outcome: report of offline discussion

 Deadline for companies' feedback: Thursday 2024-08-22 20:00

 Deadline for rapporteur's summary (in R2-2407612): Friday 2024-08-23 08:00

[R2-2407612](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2407612.zip) Report of [AT127][301][R18 NR NTN] corrections for satellite switch with re-sync Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1 The field description of ssb-TimeOffset is updated as “Indicates the time offset of the SSB from target satellite at its uplink time synchronization reference point with respect to the SSB from source satellite at its uplink time synchronization reference point. It is given in number of subframes”.

* Agreed

Proposal 2 Confirm that there is no impact to running timers (e.g., HARQ RTT timer) due to possible cell timing change after soft satellite switch with resync. No further clarification is needed.

* Agreed

Misc changes

[R2-2406328](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406328%20Discussion%20on%20the%20absence%20of%20validity%20duration%20in%20SIB19%20broadcast%20by%20a%20TN%20serving%20cell.docx) Discussion on the absence of validity duration in SIB19 broadcast by a TN serving cell CATT discussion NR\_NTN\_enh-Core

Proposal 1: RAN2 undoes the previous agreement for the case of TN broadcast SIB19 "If the validity duration indicated in SIB19 in TN serving cell is absent, the UE follows R17 behaviour (left to UE implementation) (no spec impact)".

Proposal 2: RAN2 down-selects the following options on the UE behaviour for the case that SIB19 is broadcast by a TN serving cell:

- Option 1: When SIB19 is broadcast in TN serving cell, ntn-UlSyncValidityDuration is mandatory present for neighbour NTN cell;

- Option 2: Clarify that UE determines the validity duration of neighbour cell satellite assistance information, if not configured, based on UE implementation.

- Lenovo thinks that some clarification is needed and thinks that Option 1 has more impacts

- Samsung thinks that the whole reacquisition of SIB19 would be up to UE implementation

- Nokia supports option 2

* We go for option 2 and continue in offline 302 on the actual wording of the change (starting from the TP in Annex 2)

Proposal 3: Based on proposal 1, if option 1 is agreed, adopt the TP in Annex A; if option 2 is agreed, adopt the TP in Annex B.

* [AT127][302][R18 NR NTN] absence of validity duration in SIB19 (CATT)

 Scope: Continue the discussion on the actual wording of the change according to option 2 for p2 (starting from the TP in Annex 2)

 Intended outcome: report of offline discussion

 Deadline for companies' feedback: Thursday 2024-08-22 20:00

 Deadline for rapporteur's summary (in R2-2407613): Friday 2024-08-23 08:00

[R2-2407613](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2407613.zip) Report of [AT127][302][R18 NR NTN] absence of validity duration in SIB19 CATT discussion Rel-18 NR\_NTN\_enh-Core

Proposal: RAN2 adopts the following change in the field description of ntn-UlSyncValidityDuration:

If this field is absent in ntn-Config provided via NTN-NeighCellConfig or SatSwitchWithReSync in an NTN cell, the UE uses validity duration from the serving cell assistance information. If this field is absent in ntn-Config provided via NTN-NeighCellConfig in a TN cell, how the UE sets validity duration is left to UE implementation.

* Agreed

[R2-2406846](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406846%20Addressing%20Various%20Release%2018%20NTN%20Issues.docx) Addressing Various Release 18 NTN Issues Nokia discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: Pursue the changes in section 16.14.3.2.2 of TS 38.300 aimed at removing the location-based trigger for CHO in NTN when satellite hard switching is considered (in line with R2-2404890).

Proposal 2: RAN2 adopts gNB as the reference point of ssb-TimeOffset for both soft and hard satellite switch without PCI change scenarios.

Proposal 3: Agree the NR RRC changes in Annex A.

Proposal 4: Do not change the granularity of softSatelliteSwitchResyncNTN-r18 or hardSatelliteSwitchResyncNTN-r18.

* Agreed (softSatelliteSwitchResyncNTN-r18 and hardSatelliteSwitchResyncNTN-r18 remain defined per UE)

Proposal 5: In case the UE supports softSatelliteSwitchResyncNTN-r18, the UE shall also support parallelMeasurementWithoutRestriction.

- HW thinks we already discussed this, sent an LS to RAN4 and we don’t need to discuss this again

- Ericsson thinks that after agreeing p4 we cannot consider p5, unless we make parallelMeasurementWithoutRestriction mandatory for all the bands

* We only come back to this discussion if further information is received by RAN4

Proposal 6: RAN2 is asked to reconsider the decision made at RAN2#125 regarding PDD during satellite switching.

* We only come back to this discussion if further information is received by RAN4

Proposal 7: In case the UE supports softSatelliteSwitchResyncNTN-r18, the UE shall also support serviceLinkPropDelayDiffReporting-r17.

Proposal 8: If the decision regarding PDD is revised, confirm with RAN4 that service link propagation delay difference (PDD) helps in reducing the scheduling restriction duration during satellite soft-switching with resynchronization.

Proposal 9: If the LS to RAN4 is sent, RAN2 asks how early such measurements, calculations and reporting should be done.

Proposal 10: Adopt the 38.331 and 38.306 Text Proposals in the Annex B and C, respectively.

[R2-2407238](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407238%20-%20Remaining%20open%20issues%20for%20NR%20NTN%20enhancements.docx) Remaining open issues for NR NTN enhancements Ericsson discussion NR\_NTN\_enh-Core

Proposal 1 Satellite switch with resync related capabilities (softSatelliteSwitchResyncNTN and hardSatelliteSwitchResyncNTN) are defined per UE.

Proposal 2 Adopt the following clarification to Stage 2 related to the independent configuration of time or location-based CHO trigger conditions from RSRP-based trigger conditions.

- HW agrees we could fix this but the current proposal is also misleading

- vivo thinks the current spec is ok

- QC also thinks we can live with the existing text (saying “at least...”)

- Oppo and Nokia think that some clarification is needed

* RAN2 agrees that a correction to the existing Stage 2 description is needed and continue in offline 303 to discuss the actual change
* [AT127][303][R18 NR NTN] Stage 2 text for trigger conditions (Oppo)

 Scope: Continue the discussion on the actual wording of the change for the Stage 2 description on trigger conditions without RSRP-based trigger conditions.

 Intended outcome: report of offline discussion

 Deadline for companies' feedback: Thursday 2024-08-22 20:00

 Deadline for rapporteur's summary (in R2-2407614): Friday 2024-08-23 08:00

[R2-2407614](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2407614.zip) Report of [AT127][303][R18 NR NTN] Stage 2 text for trigger conditions Oppo discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: RAN2 adopt the following wording for the stage-2 change.

|  |
| --- |
| Time-based or location-based trigger conditions may be configured independently from the RRM measurement-based trigger conditions for CHO in NTN in some scenarios, e.g., when the service discontinuity gap time length is zero or negligible. ~~at least hard satellite switch case where the service discontinuity gap time length is assumed to be zero or negligible. However, if the service discontinuity gap time length is not zero or negligible, then a time-based or a location-based trigger condition is always configured together with one of the measurement-based trigger conditions (CHO events A3/A4/A5) as defined in TS 38.331 [12].~~ |

* Agreed

[R2-2407255](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407255%20Miscellaneous%20corrections%20to%20NR%20NTN.docx) Miscellaneous corrections to NR NTN Rel-18 Samsung discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: Modify NOTE 3 in Table 6.2.1-2c in TS 38.321 as follows…

- vivo thinks the current spec is ok

- Ericsson and ZTE agree with Samsung proposal to clarify the spec

* Agreed

Proposal 2-1: Allow idle/inactive UE capable of time-based measurement initiation to skip neighbor cell measurement before t-Service if the current serving cell broadcasts satellite switch with resynchronization.

- QC agrees with P2-1 but would like to discuss the wording offline

- LG thinks this is not needed

- Apple supports this

- CATT wonders if we are introducing a new UE behavior (i.e. measurement relaxation). HW also thinks this is an enhancement rather than a relaxation

- ZTE thinks we don’t need to add further clarification. Nokia agrees

- ZTE thinks there is no requirement for this in RAN4 and if we do this we would add more work to RAN4. CMCC agrees

- vivo also think we can wait for RAN4 in case

Proposal 2-2: If Proposal 2-1 is agreed, adopt the TP below…

Proposal 3: Introduce a capability to indicate UE support of dedicated ephemeris and epoch time in measurement object configuration for connected mode RRM measurements.

- vivo thinks we don’t need a specific capability for this and we can link this to the support of event D2. Xiaomi agrees

- Ericsson support this

- QC supports

- HW thinks we don’t need any capability for this

- Samsung thinks the support for this is not only related to D2 support

* The UE will indicate the support for this via a new independent capability.

Proposal 4-1: For a UE in connected mode, it is up to UE implementation whether to perform NTN neighbour cell measurements on a cell included in the measurement configuration but without corresponding satellite information in the measurement configuration or in SIB19.

- HW supports the proposal and the TP

- QC wonders how the UE discriminates TN cell from NTN cell. HW thinks we should no further discuss this aspect

* Agreed

Proposal 4-2: For proposal 4-1, adopt TP as follows:

For a UE in connected mode, it is up to UE implementation whether to perform NTN neighbour cell measurements on a cell included in the measurement configuration but ~~not included in SIB19~~ without corresponding satellite information in measurement configuration or in SIB19.

- Toyota suggest to add a comma before “but”:

For a UE in connected mode, it is up to UE implementation whether to perform NTN neighbour cell measurements on a cell included in the measurement configuration, but ~~not included in SIB19~~ without corresponding satellite information in measurement configuration or in SIB19.

* Agreed

Proposal 5: The UE feature to acquire SIB19 in a TN cell indicates that UE is capable of performing measurements of NTN cells using NTN assistance information in a terrestrial cell.

Proposal 6: A new non-signalled UE capability to receive SIB19 in TN cell in idle/inactive mode (i.e UE capable of measuring NTN cell using NTN assistance information in TN cell) is introduced.

- QC supports p6 but not p7. Also there are no RAN4 requirement for connected mode. Apple agrees

- vivo agrees with QC: for connected mode we can rely on HO

- DT/Inmarsat think this should also be supported in Connected mode

Proposal 7: A new signalled UE capability to receive SIB19 in TN cell in connected mode (i.e UE capable of measuring NTN cell using NTN assistance information in TN cell) is introduced.

- Samsung understands that it’s difficult to agree on this at this stage given the lack of RAN4 requirements for this

- Ericsson supports the proposal

- MTK thinks that if we have a new UE behaviour we should have a new capability. Nokia agrees

- Apple thinks we cannot have a capability without requirements. QC agrees

*Consider the following options:*

*Option 1: A new signalled UE capability to receive SIB19 in TN cell in connected mode is introduced (without any relation to RRM requirements)*

*Option 1a: IOT bit to indicate the capability to receive SIB19 in TN cell in connected mode is introduced???*

*Option 2: RAN2 understands that a Rel-18 UE supporting NTN needs to support SIB19 acquisition in a TN cell???*

*Option 3: A new signalled UE capability to measure NTN cells in a TN cell in connected mode???*

* We go for option 1: A new R18 signalled UE capability to receive SIB19 in TN cell in connected mode is introduced (without any relation to RRM requirements) (can come back to further clarify the capability description in the future)

[R2-2406992](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406992%20Miscellaneous%20corrections%20on%20epochTime.docx) Miscellaneous corrections to epochTime ZTE Corporation, Sanechips CR Rel-18 38.331 18.2.0 4909 - F NR\_NTN\_enh-Core

- Ericsson agrees with the first change (but this requires a Rel17 change as well) and the second but not the third.

* First and second change are agreed and merged into the R18 NR NTN rapporteur CR
* The change to R17 spec for the first change will be merged into the overall R17 RRC rapporteur CR
* The intention of the third change is agreed but we need to work on the actual change in the post meeting RRC CR review

UE capabilities corrections

[R2-2406451](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406451%20Remaining%20Issues%20on%20FR2-NTN%20Support.docx) Remaining Issues on FR2-NTN Support vivo discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: Introduce a new R18 UE capability without signalling for enhanced FR2-NTN bands RRM requirements.

- HW support this

- QC thinks this should be discussed and RAN4 and they should request this

- Ericsson wonders if we can just update the field with FR2 of this idle mode capability. Vivo thinks this would not be so clear

- Samsung thinks this depends on RAN4

- QC prefers to wait

* Come back in the next meeting to check whether we Introduce a new R18 UE capability without signalling for enhanced FR2-NTN bands RRM requirements

Proposal 2: RAN2 sends an LS to check with RAN4 on the introduction of the new R18 UE capability.s

Proposal 3: For 38.306 and 38.331, it is RAN2's understanding that NTN bands within FR2-NTN can be regarded as a FR2-1 band.

- HW thinks this is not needed

Proposal 4: If proposal 2 is agreed, RAN2 sends LS to check with RAN4 whether the understanding is correct.

Proposal 5: Updating the following description of the NTN related UE capabilities to indicate the support of NTN FDD-FR2 bands:

- configuredUL-GrantType1-v1650;

- configuredUL-GrantType2-v1650;

- enhancedSkipUplinkTxConfigured-v1660;

- enhancedSkipUplinkTxDynamic-v1660;

- pusch-RepetitionMultiSlots-v1650;

- pusch-RepetitionTypeA-v16c0;

- rlm-Relaxation-r17;

- bfd-Relaxation-r17.

37.335 corrections

[R2-2406280](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406280%20Correction%20on%20network%20verification%20of%20UE%20location.docx) Correction on network verification of UE location Huawei, HiSilicon, CATT CR Rel-18 37.355 18.2.0 0511 - F NR\_NTN\_enh-Core

- QC thinks the UE would perform the measurement by default, without the need for an explicit request so this would be unnecessary

- CATT indicates that RAN1 has already decide to include this parameter so we need to avoid the mismatch

- ZTE also supports

- Toyota suggests to remove “IE” in tow instances of the new field description

* Revised in R2-2407629 to remove “IE”

R2-2407629 Correction on network verification of UE location Huawei, HiSilicon, CATT CR Rel-18 37.355 18.2.0 0511 1 F NR\_NTN\_enh-Core

* Agreed
* Draft a corresponding LS to RAN1 in R2-2407630

R2-2407630 LS on correction on network verification of UE location CATT LS Rel-18 NR\_NTN\_enh-Core To:RAN1

* [Post127][309][R18 NR NTN] LS to RAN1 (CATT)

 Scope: Draft a LS to RAN1 on correction on network verification of UE location

 Intended outcome: Approved LS

 Deadline for approved LS (in R2-2407630): short

## 8.8 NTN for NR Ph3

(NR\_NTN\_Ph3-Core; leading WG: RAN2; REL-19; WID: RP-241667)

LTE\_TN\_NR\_NTN\_mob, leading WG: RAN2, Rel-19 WID: RP-240924)

Time budget: 2 TU

Tdoc Limitation: 4 tdocs

### 8.8.1 Organizational

LS, Rapporteur input, including workplan, etc.

For the LTE\_TN\_NR\_NTN\_mob WI, including initial draft CRs from the WI spec rapporteurs: draft 36.300 CR (Samsung), draft 36.331 CR (CATT), draft 36.306 CR (Vivo).

Rapporteur inputs do not count towards the tdoc limitation.

Incoming LSs

[R2-2406220](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406220_R3-243954.docx) Reply LS on Support of Regenerative-based Satellite Access (R3-243954; contact: ZTE) RAN3 LS in Rel-19 NR\_NTN\_Ph3-Core To:SA2 Cc:RAN2

* Noted

Rapporteur inputs (for LTE\_TN\_NR\_NTN\_mob WI)

(moved here from 8.8.6)

[R2-2407259](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407259%20Stage%202%20Running%20CR%20for%20E-UTRAN%20to%20NR%20NTN%20mobility.docx) Stage 2 Running CR for E-UTRAN to NR NTN mobility Samsung draftCR Rel-19 36.300 18.2.0 LTE\_TN\_NR\_NTN\_mob-Core

* Check the CR in offline 304
* Revised in R2-2407616

[R2-2407616](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2407616.zip) Stage 2 Running CR for E-UTRAN to NR NTN mobility Samsung draftCR Rel-19 36.300 18.2.0 LTE\_TN\_NR\_NTN\_mob-Core

* Content is endorsed. Can further check in the next meeting whether to put the change elsewhere
* [AT127][304][LTE\_TN\_NR\_NTN\_mob] Stage 2 CR (Samsung)

 Scope: Check the Stage 2 running CR for E-UTRAN to NR NTN mobility

 Intended outcome: Endorsable CR

 Deadline for companies' feedback: Thursday 2024-08-22 20:00

 Deadline for final CR (in R2-2407616): Friday 2024-08-23 08:00

[R2-2406318](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406318%20Open%20issue%20list%20for%20LTE_TN_NR_NTN_mob%20WI.docx) Open issue list for LTE\_TN\_NR\_NTN\_mob WI CATT discussion LTE\_TN\_NR\_NTN\_mob

[Issue 1] Down-selection on the signalling options on how to signal the NR NTN satellite assistance information:

Option 1: Introduce a new SIB to include the NR satellite assistance information.

Option 2: Define new IE for NR satellite assistance information and define separate neighbour satellite information list to provide the NR satellite information in SIB33.

Option 3: Extend the NeighSatelliteInfo defined for IoT NTN to include the parameters needed for NR satellite, and reuse the neighSatelliteInfoList defined in SIB33 to provide either NR or IoT NTN information.

[Issue 2] Whether ntn-PolarizationDL for the NR NTN cell is mandatory or optional.

[Issue 3] Whether to reuse existing SatelliteId-r18 or introduce separate IE for NR satellite ID.

[Issue 4] Whether to reuse existing maxSat-r17 as the maximum number of NR satellites configured (taking into account the signalling option finally agreed).

[Issue 5] Confirmation of the working assumption "We don’t introduce multiple SMTCs in LTE".

[Issue 6] Confirmation of the working assumption "NR NTN cell reselection evaluation is based on RRM measurements as legacy; no spec impact foreseen for EUTRA TN to NR NTN cell".

* Noted

[R2-2406319](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406319%20Introduction%20of%20LTE%20TN%20to%20NR%20NTN%20IDLE%20mode%20mobility%20%28Option%201%29.docx) Introduction of LTE TN to NR NTN IDLE mode mobility (Option 1) CATT draftCR Rel-19 36.331 18.2.0 B LTE\_TN\_NR\_NTN\_mob

[R2-2406320](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406320%20Introduction%20of%20LTE%20TN%20to%20NR%20NTN%20IDLE%20mode%20mobility%20%28Option%202%29.docx) Introduction of LTE TN to NR NTN IDLE mode mobility (Option 2) CATT draftCR Rel-19 36.331 18.2.0 B LTE\_TN\_NR\_NTN\_mob

* Update the CR in offline 305
* Revised in R2-2407617

[R2-2407617](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2407617.zip) Introduction of LTE TN to NR NTN IDLE mode mobility (Option 2) CATT draftCR Rel-19 36.331 18.2.0 B LTE\_TN\_NR\_NTN\_mob

* Endorsed as a baseline. Continue the discussion in the next meeting both on the ASN.1 structure and the field description
* [AT127][305][LTE\_TN\_NR\_NTN\_mob] RRC CR (CATT)

 Scope: Update the RRC CR for E-UTRAN to NR NTN mobility based on meeting agreements

 Intended outcome: Endorsable CR

 Deadline for companies' feedback: Thursday 2024-08-22 20:00

 Deadline for final CR (in R2-2407617): Friday 2024-08-23 08:00

[R2-2407812](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2407812.zip) Summary of [AT127][305][LTE\_TN\_NR\_NTN\_mob] RRC CR CATT disc Rel-19 LTE\_TN\_NR\_NTN\_mob

Proposal 1: RAN2 agrees signaling Alternative 1 to indicate ephemeris data for a satellite supporting both NR NTN and IoT NTN, i.e. introducing a Satellite reference ID that refers to the ephemeris data of an IoT NTN satellite in the existing list neighSatelliteInfoList-r18, and using the "CHOICE" signaling structure including this Satellite reference ID and explicit ephemeris data configuration as the two choices.

* Come back in the next meeting

Proposal 2: RAN2 sticks to the agreement that only duplication of ephemeris data needs to be avoided in the case of same satellite supporting both NR NTN and IoT NTN.

* Come back in the next meeting

[R2-2406321](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406321%20Introduction%20of%20LTE%20TN%20to%20NR%20NTN%20IDLE%20mode%20mobility%20%28Option%203%29.docx) Introduction of LTE TN to NR NTN IDLE mode mobility (Option 3) CATT draftCR Rel-19 36.331 18.2.0 B LTE\_TN\_NR\_NTN\_mob

[R2-2406250](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406250_36.306_Introduction%20of%20LTE%20TN%20to%20NR%20NTN%20Mobility%20UE%20Capability.docx) Introduction of LTE TN to NR NTN Mobility UE Capability vivo draftCR Rel-19 36.306 18.2.0 LTE\_TN\_NR\_NTN\_mob-Core

- Nokia supports the capability but thinks we can modify the wording referring to idle and inactive at the beginning of the sentence: “it is optional for a UE in idle/inactive...”

- QC thinks we should refer to the support of measurements: “… a UE in idle/inactive supports measurement for inter-RAT...”)

- ZTE think we could add a reference to 304

* Update the CR in offline 306 taking into account the comments above
* Revised in R2-2407618

[R2-2407618](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2407618.zip) Introduction of LTE TN to NR NTN Mobility UE Capability vivo draftCR Rel-19 36.306 18.2.0 LTE\_TN\_NR\_NTN\_mob-Core

* Endorsed
* [AT127][306][LTE\_TN\_NR\_NTN\_mob] UE capability CR (vivo)

 Scope: Update the UE capability CR for E-UTRAN to NR NTN mobility based on meeting agreements

 Intended outcome: Endorsable CR

 Deadline for companies' feedback: Thursday 2024-08-22 20:00

 Deadline for final CR (in R2-2407618): Friday 2024-08-23 08:00

WI CR Rapporteurs:

38.300: Thales

38.304: ZTE

38.321: Interdigital

38.331: Ericsson

38.306: Apple

### 8.8.2 Downlink coverage enhancements

Contributions should focus on RAN2 aspects of DL coverage enhancements (e.g. cell level / beam level DTX/DRX mechanism, etc.).

RAN2 impacts due to SSB periodicity extension

[R2-2406591](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406591%20Discussion%20on%20the%20impact%20of%20SSB%20extension%20and%20cell%20DTXDRX%20for%20NTN.doc) Discussion on the impact of SSB extension and cell DTXDRX for NTN Beijing Xiaomi Mobile Software discussion Rel-19

Observation 1: From RAN2 point of view, if the SSB periodicity is no larger than 160ms, there is no RAN2 impact. If the SSB periodicity is larger than 160ms, ssb-PeriodicityServingCell , measurement gap periodicity, SMTC periodcity, ssb-Periodicity-r17 for NonCellDefiningSSB-r17 may need to be extended. And the field description of nAndPagingFrameOffset needs to be enhanced to consider the SSB periodicity higher than 160ms.

* 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)
* 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.

Observation 2: From RAN2 point of view, if the SSB periodicity is not larger than 160ms, there is no impact to legacy UE. If the SSB periodicity is larger than 160ms, the performance of RLF/HO for legacy UE will be degraded and requires RAN4 evaluation. Also the reception of MIB/SIB1 will be degraded.

- Apple agrees in principle but think this is in RAN4 scope. Vivo agrees

- Fraunhofer thinks it’s early to say there is no impact below 160ms. CMCC thinks that the first sentence for RAN2 aspects

Observation 3: From RAN2 point of view, for cell level DTX/DRX, DRX retransmission, SR, and random access procedure will be impacted for legacy UE.

[R2-2407306](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407306%20Discussion%20on%20DL%20coverage%20enhancements.docx) Discussion on DL coverage enhancements Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: RAN2 waits for RAN1 input before further discussion on cell level and beam level Cell DTX/DRX pattern.

Proposal 2: If RAN1 decides to support 320ms for SSB periodicity, RAN2 need to extend the ssb-periodicityServingCell, SSB-MTC, SSB-MTC4-r17 and mgrp to support 320ms.

[R2-2407129](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407129%20Downlink%20coverage%20enhancements.docx) Idle mode considerations for downlink coverage enhancements Nokia, Nokia Shanghai Bell discussion

Proposal 1: Until RAN1 reply has been received, only SSB periodicity extension should be studied in RAN2.

Observation 1: SSB periodicity of 320 will only provide a 96.8% coverage ratio, with little to no DL resources for UE communication.

Observation 2: SSB periodicity of 640 will provide a 100% coverage ratio, with DL resources available for UE communication.

Proposal 2: RAN2 to study a SSB periodicity of up to 640 ms.

Observation 3: Adjusting the SMTC window and measurement gaps e.g. in case of changing SSB frequency will increase the signalling overhead.

Proposal 3: Serving cell provides neighbor cell activity such as SSB pattern information. FFS on state information i.e. whether to include information on when cells and/or beams are on or off. FFS on how to signal i.e. on/off pattern and/or duration, or delta signaling for patterns in case of dynamic configuration.

Proposal 4: Irrespectively of the selected RAN2 solution, RAN2 should strive for a low signaling overhead solution.

Proposal 5: Due to the nature of the configuration complexity, RAN2 include in the study to allow UE implementation to read SSB occasions.

[R2-2407532](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407532_Dowlink%20coverage%20enhancements%20SMTC%20impacts.docx) Downlink coverage enhancement SMTC impacts Sequans Communications discussion Rel-19 NR\_NTN\_Ph3-Core

Observation 1: SSBs needs to be time multiplexed across the satellite footprint over up to 80ms or 320ms range

Observation 2: Existing SMTCs framework is limited to up to 4 SMTCs per frequency layer

Proposal 1: RAN2 to study SMTC impact of SSB time multiplexing across the satellite footprint

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

Proposal 2: Consider extending the NTN SMTC list / define a new list to signal at least all neighbor SMTCs

Observation 3: The UE should ideally consider only SMTCs corresponding to the closest neighbor cells

Proposal 3: Consider broadcast of neighbor cells reference location to allow location-based UE SMTC selection

Observation 4: In connected, NW may not have UE location information needed to configure SMTCs to UE

Observation 5: R18 location-based CHO without associated measurement avoids SMTCs configuration, but adds complexity and may increase handover interruption time

Proposal 4: Consider location-based UE SMTC selection also in connected

Cell/Beam DTX / impact to legacy UEs

[R2-2406490](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406490.docx) Discussion on Downlink Coverage Enhancement Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: The existing NTN bar bit can be used to bar legacy UE from accessing a cell operating with DL coverage enhancement.

* 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.

Proposal 2: Consider to introduce a new bar bit indicate the barring for UE supporting DL coverage enhancement.

Proposal 3: If beams in a cell are in the same state at any time, cell DTX/DRX pattern can be considered, with Rel-18 NES cell DTX/DRX as a baseline.

Proposal 4: If beams in a cell can be in different states at any time, consider to support configuration of multiple DTX/DRX patterns and dynamical activation by NW indication.

[R2-2406952](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406952%20Discussion%20on%20Downlink%20Coverage%20Enhancements.docx) Discussion on Downlink Coverage Enhancements CSCN discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: RAN2 should consider the impact on SSB periodicity extension, e.g. cell search/research, RA process, paging and measurement.

Proposal 2: RAN2 assumes beam level DTX is preferred for downlink coverage enhancements.

Proposal 3: RAN2 needs to wait for reply from RAN1 to determine whether cell/beam level DRX is needed.

[R2-2406993](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406993%20Consideration%20on%20DL%20coverage%20enhancements.doc) Consideration on downlink coverage enhancements ZTE Corporation, Sanechips discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: Introduce cell DTX for beam power sharing for all RRC states, and RAN2 further studies UE behaviors adaption, e.g., on RACH/measurements/RLM, and etc., during (de)activated time of the cell DTX.

Proposal 2: Similar to NES, barred bit can be introduced to prevent UE not supporting cell DTX for beam power sharing (e.g., legacy UEs) from accessing current cell.

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.

[R2-2406246](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406246%20Further%20Considerations%20on%20DL%20Coverage%20Enhancements.docx) Further Considerations on DL Coverage Enhancements vivo discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406324](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406324%20Discussion%20on%20Downlink%20Coverage%20Enhancements.docx) Discussion on Downlink Coverage Enhancements CATT discussion NR\_NTN\_Ph3-Core

[R2-2406550](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406550.doc) Discussions on cell DTX during satellite dynamic power sharing Fujitsu discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406571](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406571%20Discussion%20on%20the%20DL%20coverage%20enhancement.docx) Discussion on the DL coverage enhancement Google discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406638](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406638%20Cell%20DTX.docx) Discussion on cell DTX Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406685](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406685.doc) DL coverage enhancement in NTN Apple discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406765](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406765%20-%20Discussion%20on%20DL%20coverage%20enhancement%20for%20NTN.doc) Discussion on DL coverage enhancement for NTN OPPO discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406870](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406870%20On%20beam-level%20DL%20coverage%20enhancement%20in%20NTN.docx) On beam-level DL coverage enhancement in NTN Lenovo discussion Rel-19

[R2-2406894](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406894%20Consideration%20on%20downlink%20coverage%20enhancement.docx) Consideration on downlink coverage enhancement NEC Corporation discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406902](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406902_Beam%20management%20of%20NR%20NTN%20coverage%20enhancement.doc) Beam management of NR NTN coverage enhancement China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407187](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407187%20%28R19%20NR%20NTN%20WI%20AI%208.8.2%29%20DL%20coverage.docx) Downlink coverage enhancement for NTN InterDigital discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407345](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407345%20Discussion%20on%20downlink%20coverage%20enhancement.docx) Discussion on downlink coverage enhancement HONOR discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407382](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407382%20RAN2%20Impact%20on%20DL%20coverage%20enhancements.docx) RAN2 Impact on DL coverage enhancements CMCC discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407401](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407401%20Discussion%20on%20NTN%20downlink%20coverage%20enhancements.docx) Discussion on NTN downlink coverage enhancements NERCDTV discussion

[R2-2407462](file:///C%3A%5CData%5C3GPP%5CRAN2%5CDocs%5CR2-2407462.zip) Discussion on downlink coverage enhancement LG Electronics Inc. discussion Rel-19

[R2-2407551](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407551%20-%20DL%20coverage%20enhancements.docx) DL coverage enhancements Ericsson discussion Rel-19

Withdrawn?

R2-2407544 Views on DL Coverage Enhancements for NR-NTN Inmarsat, Viasat discussion Rel-19 NR\_NTN\_Ph3-Core Late

### 8.8.3 Uplink Capacity/Throughput Enhancement

No contributions are expected for this AI at this meeting.

Withdrawn?

R2-2407545 Views on UL Capacity Enhancements for NR-NTN Inmarsat, Viasat discussion Rel-19 NR\_NTN\_Ph3-Core Late

### 8.8.4 Support of Broadcast service

Contributions should address the signaling of the intended service area of a broadcast service.

[R2-2406719](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406719%20Discussion%20on%20providing%20MBS%20service%20area%20in%20NTN%20network.docx) Discussion on providing MBS service area in NTN network OPPO discussion Rel-18 NR\_NTN\_Ph3-Core

* Different MBS services in different areas of a NTN cell

Observation 1: if one cell covers a large area, different MBS sessions may be available in different sub-areas.

Proposal 1: RAN2 to agree that different MBS sessions could be associated with different MBS broadcast intended service areas, and such information should be indicated in the system information.

Observation 2: for the NTN network whose satellite footprint consists of one cell or multiple cells, and each of them covers a big area, regarding location dependent broadcast service, more than one contents for the same MBS session could be distributed in each cell.

Proposal 2: RAN2 to agree that, for the location dependent broadcast service, the area session ID of each distinguished content of the MBS session and the associated area range should be provided in the MBS configuration information.

Proposal 3: RAN2 to agree that, to support MBS services/contents in cell area of more than one NTN cells (or portions thereof), only the service area covering portions of cells need to be explicitly indicated.

* Signalling details

Observation 3: It seems that SIB20 informing of the intended service area information does not align with its current functionality carrying the both of the MCCH and MTCH scheduling information.

Observation 4: providing a MCCH configurations per MBS session or, in a further step, per different area session for each location dependent MBS session in the SIB20 will let the UE interested in more than one MBS services needs to monitor more than one MCCHs simultaneously, which brings additional UE operation complexity.

Observation 5: the granularity of the mapping of FSAIs included the SIB21 is only the MBMS session, but not area session.

Proposal 4: RAN2 to agree to embed the intended area information in the MBSBroadcastConfiguration IE transmitted on the MCCH.

- Apple thinks that use of SIB20 is better in terms of power saving

- vivo thinks the possible benefit in terms of power saving is limited and not a justification to go for SIB20

- ZTE thinks legacy UE in any case will not interpret the new information

- Thales agrees with Apple that power saving is important. QC agrees. Interdigital also agrees as there is a benefit if the UE knows the information in advance.

- LGE thinks the UE should anyway decode the MCCH

- Ericsson thinks that if the area information changes then if included in SIB20 all the UEs will be affected (or this case should be excluded from the update procedure)

- HW prefers to have it in MBSBroadcastConfiguration and thinks that proponents of SIB20 have different views on the details, and in some cases their proposals still require acquiring MCCH

- LGE prefers using MBSBroadcastConfiguration. CMCC also.

- Samsung supports Apple view.

- Fujitsu agrees with CATT

* Continue in offline 307 to discuss the use of SIB20 vs MBSBroadcastConfiguration in MCCH

Proposal 5: RAN2 to agree that ETWS in the NTN network could be associated with only certain geographical areas, and such areas could be indicated in SIB6, if the satellite footprint consists of one cell or multiple cells, and each of them covering large area.

Proposal 6: RAN2 to agree to reuse the coverage area information included in the SIB25 to provide the information of the intended area for the MBS services and/or MBS session content for the NTN network in the SIB.

* [AT127][307][R19 NR NTN] service area information (Apple)

 Scope: Continue the discussion on the options to provide service area information: SIB20 vs MBSBroadcastConfiguration in MCCH

 Intended outcome: report of offline discussion

 Deadline for companies' feedback: Thursday 2024-08-22 20:00

 Deadline for rapporteur's summary (in R2-2407619): Friday 2024-08-23 08:00

[R2-2407619](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2407619.zip) Report of [AT127][307][R19 NR NTN] service area information Apple discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: Discuss online whether the expected UE behavior as below can be agreed.

- When UE is not in any intended service area of its interested broadcast services, UE may not need to (re)acquire up-to-date MCCH.

Proposal 2: FFS on solutions.

* 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

[R2-2406687](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406687.doc) Broadcast service support over NTN Apple discussion Rel-19 NR\_NTN\_Ph3-Core

* Signalling details

Proposal 1: It is possible that the broadcast transmission is limited to the intended service area only. And no special handling is needed if UE cannot receive the service inside the intended service area.

Proposal 2: The intended broadcast service area can be defined by a geographical area represented by referenceLocation and radius.

- ZTE thinks we could also consider polygon shapes on top of this. LGE also think we could support other approaches but could live with the majority view.

- Thales think the notion of geographical areas, covering both circles and polygons, is already there and we could adopt something similar also for this. Apple thinks we could rely on the TMGI for differentiating among different countries

- Nokia thinks we don’t need to be too accurate for this

* 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).

Proposal 3: RAN2 to discuss whether to provision multiple intended service areas for one MBS broadcast session in a cell.

Proposal 4: Use SIB20 to provision intended service area for serving cell.

* UE behaviour

Proposal 5: It’s up to UE implementation whether to establish/release MRB when UE enters/leaves the intended service area. In details:

• The UE applies the broadcast MRB establishment procedure to start receiving an MBS session of an MBS broadcast service it is interested in. The procedure may be initiated upon entering an intended service area within an NTN cell providing an MBS broadcast service the UE is interested in.

• The UE applies the broadcast MRB release procedure to stop receiving a session of an MBS broadcast service. The procedure may be initiated upon leaving an intended service area within the NTN cell providing an MBS broadcast service the UE is interested in.

Proposal 6: If UE outside of intended service area receives the broadcast service, RAN group does not enforce any rule for UE to discard the broadcast data (instead it could be left to application layer to handle).

* Service continuity

Proposal 7: Service continuity can be enhanced in two places by considering intended service area.

• In MBSBroadcastConfiguration, the intended service area within each neighbor cell is provided for each MBS broadcast service session.

• In SIB21, the intended service area is provided for each MBS broadcast service session, or for each FSAI (depending on common understanding selected).

[R2-2406635](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406635%20MBS%20broadcast%20in%20NTN.docx) MBS broadcast service area information Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

* Signalling details

Proposal 1 Similar to TN coverage area list, the geographical area list can also be provided as list of reference locations with corresponding cell radius.

Proposal 2 Each MBS broadcast service area in the list additionally includes one or more associated MBS broadcast frequencies or MBS FSAIs. Decide whether to include only MBS broadcast frequency or only MBS FSAIs.

Proposal 3 Extend existing SIB21 for broadcasting the list of MBS broadcast service areas.

* UE behaviour

Proposal 4 In TS 38.331 section 5.9.3.2, “upon entering intended service area” is added as additional condition where the UE may initiate the broadcast MRB establishment procedure.

Proposal 5 In TS 38.331 section 5.9.3.2, “upon leaving intended service area” is added as additional condition where the UE may initiate the broadcast MRB release procedure.

Proposal 6 In TS 38.304 for cell reselection evaluation, UE may prioritize the frequency if the UE is in the geographical Area associated with the frequency and UE is interested in or receiving the MBS service in that frequency.

[R2-2407236](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407236%20-%20Support%20for%20broadcast%20services%20in%20NR%20NTN.docx) Support for broadcast services in NR NTN Ericsson discussion NR\_NTN\_Ph3-Core

* UE behaviour

Proposal 1 A UE does not establish MRB(s) associated with an MBS service limited to an intended service area when it is not located within the area.

Proposal 2 A UE releases its established MRB(s) associated with an MBS service limited to an intended service area when exiting the area.

* Signalling details

Proposal 3 Information about intended broadcast service area is signalled in MBSBroadcastConfiguration.

* ETWS support

Proposal 4 Send an LS to SA1 to clarify the requirements for ETWS primary notification and the possibility to include the intended warning area in NTN.

- QC agrees we need to do it if we want to do something about ETWS

- LGE/vivo also support LS

- Samsung agrees to send the LS but we should ask about requirements without hinting to a precise solution

* Send an LS to SA1 considering the TP in R2-2407236 but modifying the action based on the comments in the meeting.

[R2-2407622](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2407622.zip) LS on requirements for ETWS primary notification Ericsson LS Rel-19 NR\_NTN\_Ph3-Core To:SA1

- Samsung thinks we should only ask about requirements to support geofencing information for ETWS in a NTN cell

* Revised in R2-2407823

[R2-2407823](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2407823.zip) LS on requirements for ETWS primary notification Ericsson LS Rel-19 NR\_NTN\_Ph3-Core To:SA1

* Approved

[R2-2406491](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406491.docx) Discussion on MBS Broadcast Service Area information Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

* Signalling details

Proposal 1: The format of a circle center with a radius is used to indicate a fixed geographic area for an MBS intended service area.

Proposal 2: The format of a circle center with a radius and a reference time is used to indicate a moving geographic area for an MBS intended service area. UE derives the real-time center location based on the corresponding satellite ephemeris.

Proposal 3: A list of geographic areas with each area identified by an area ID is included in SIB20.

Proposal 5: The legacy SIB modification procedure is applied to update the geographic area information in SIB20.

Proposal 4: The mapping between area ID and MBS session ID is included in MBSBroadcastConfiguration message in MCCH, where multiple area IDs can map to an MBS session ID.

Proposal 6: The legacy MCCH modification procedure is applied to update the mapping between area ID and MBS session ID.

* UE behaviour

Proposal 7: For an MBS broadcast service intended for a certain area, UE 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)

- LGE thinks that in this case we should not use a geographical area represented by circles

- QC thinks this would anyway not be applicable for legacy R18 UEs

- Toyota thinks a “should” does not enforce anything for the UE. Samsung agrees and thinks we can put this in Stage 2

* 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)

Proposal 8: For an MBS broadcast service intended for a certain area, broadcast MRB establishment procedure may be initiated when UE is inside the intended area; broadcast MRB release procedure may be initiated when UE leaves the intended area.

- Toyota thinks that we should clarify that the procedure is initiated by the UE, e.g.:

Proposal 8a: For an MBS broadcast service intended for a certain area, the UE 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)

- Nokia thinks we either put some requirements or we better leave it to UE implementation.

- Ericsson think the way this is currently specified takes into account the TN case only but the NTN case is different and we should have some requirements for the UE

* 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)

For an MBS broadcast service intended for a certain area, the UE 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

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)

[R2-2406247](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406247%20Further%20Discussion%20on%20MBS%20Broadcast%20Provision%20in%20NTN.docx) Further Discussion on MBS Broadcast Provision in NTN vivo discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406267](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406267.docx) Discussion on MBS service in NTN system CAICT discussion

[R2-2406323](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406323%20Discussion%20on%20support%20of%20broadcast%20service%20in%20NR%20NTN.docx) Discussion on support of broadcast service in NR NTN CATT discussion NR\_NTN\_Ph3-Core

[R2-2406352](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406352_discussion%20on%20signaling%20for%20the%20support%20of%20broadcast%20service%20in%20NTN.docx) Signalling for the support of MBS broadcast service in NTN ETRI discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406551](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406551.doc) Discussions on supporting broadcast intending to serve partial cell Fujitsu discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406583](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406583_MBService_Area_Indication_%26_Geoblocking.docx) MBService area indication & geoblocking PANASONIC discussion

[R2-2406606](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406606%20Discussion%20on%20intended%20service%20area_v1.docx) Discussion on MBS Broadcast service area signaling THALES discussion Rel-19 NR\_NTN\_Ph3-Core Late

[R2-2406628](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406628.docx) Broadcast service area signaling Sony discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406849](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406849%20On%20How%20To%20Support%20MBS%20in%20Rel-19%20NR%20NTN.docx) On How To Support MBS in Rel-19 NR NTN Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_NTN\_Ph3

[R2-2406865](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406865_NTN_MBS.docx) Discussions on handling MRB(s) associated with intended service areas ITRI discussion NR\_NTN\_Ph3-Core

[R2-2406871](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406871%20On%20broadcast%20service%20area%20indication%20in%20NTN%20%28Revision%20of%20R2-2404798%29.docx) On broadcast service area indication in NTN Lenovo discussion Rel-19

[R2-2406903](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406903_Signalling%20of%20indicating%20service%20area%20in%20NR%20NTN.doc) Signaling design of service area in NR NTN China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406958](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406958.docx) Discussions on MBS in Rel-19 NTN TOYOTA Info Technology Center discussion

[R2-2406971](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406971%20Discussion%20on%20MBS%20broadcast%20service%20for%20NR%20NTN.docx) Discussion on MBS broadcast service for NR NTN CMCC discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406994](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406994%20Consideration%20on%20support%20of%20broadcast%20service.doc) Consideration on broadcast service ehancements ZTE Corporation, Sanechips discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407049](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407049_Further%20details%20on%20intended%20service%20area%20for%20MBS%20and%20ETWS.docx) Further details on intended service area for MBS and ETWS NEC discussion

[R2-2407053](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407053.doc) Discussion on the support of broadcast service Xiaomi discussion

[R2-2407188](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407188%20%28R19%20NR%20NTN%20WI%20AI%208.8.4%29%20Broadcast.docx) Support for broadcast service in NTN InterDigital discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407263](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407263.docx) Considerations on MBS in NTN Continental Automotive discussion Rel-19

[R2-2407307](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407307%20Discussion%20on%20MBS%20broadcast%20over%20NTN.docx) Discussion on MBS broadcast over NTN Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407346](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407346%20Discussion%20on%20the%20support%20of%20broadcast%20service.docx) Discussion on the support of broadcast service HONOR discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407415](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407415-NTN_MBS_UE_procedure.docx) UE behaviour for MBS related procedures Sharp discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407416](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407416_NTN_MBS.docx) Discussion on MBS service support for NR NTN Sharp discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407418](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407418%20%5BNTN%5D%20Discussion%20on%20support%20of%20broadcast%20service%20in%20NTN_final.docx) Discussion on support of broadcast service in NTN LG Electronics France discussion Rel-19 38.331 NR\_NTN\_Ph3-Core

[R2-2407453](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407453%20Support%20of%20broadcast%20service%20in%20NTN.docx) Support of broadcast service in NTN NERCDTV discussion

[R2-2407473](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407473.docx) Discussion on support of broadcast service ITL discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407497](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407497.docx) Discussion on Support of MBS Broadcasting over NTN access TCL discussion

### 8.8.5 Support of regenerative payload

Contributions should focus on the needed updates for Stage 2 description and on whether any existing essential features would be affected - and potentially need any modifications - in a regenerative payload architecture.

[R2-2406972](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406972%20Considerations%20on%20regenerative%20payload.docx) Considerations on regenerative payload CMCC discussion Rel-19 NR\_NTN\_Ph3-Core

* Common TA

Observation 1: Common TA and kmac are already support value zero in current specification.

Proposal 1: For regenerative payload, introduce negative values for ta-Common-r17 in TS 38.331 and up to network configuration, then additional clarification is not needed for both common TA and kmac in stage 2 specification.

- Apple suggested to fix this to 0 and thinks we need to check with RAN1 in case we want to set this to negative values. LG agrees

- Ericsson wonders how to handle legacy UEs in this case. CMCC thinks could apply at least for R19

- CATT thinks we should confirm the understanding that legacy UEs are supported in regenerative payload.

- vivo does not see the strong need for this and in case this would require stage3 updates

- CATT thinks that legacy UEs could be configured with value 0 via existing parameter and a new R19 parameter should be added

- Ericsson thinks we should have done it from the beginning but now we should not do it in order not to have different behaviour for different UEs

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

- QC thinks this is not needed. Ericsson agrees

- IDC thinks this is not needed and it would be bad for some other UEs

- Xiaomi thinks that if we have different values for legacy and R19 UEs then the NW does not know which value the UE applies. HW thinks the NW could use different values for different UEs

* 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.

[R2-2407623](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2407623.zip) LS on common TA in a regenerative payload scenario CMCC LSout Rel-19 NR\_NTN\_Ph3-Core To:RAN1, RAN4

* Approved
* RACH-less HO

Proposal 2: For regenerative payload, existing RACH-less HO could be applied directly, no further enhancement is needed.

- vivo thinks we only need a Stage 2 clarification that inter-gNB RACH-less HO in supported. Lenovo agrees

- Ericsson agrees that no further enhancement is needed

- Nokia is ok not to have enhancement but also don’t want to indicate that everything is supported.

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

- HW thinks the current Stage 2 description restrict to intra-gNB case is a mistake that has to be corrected. Ericsson think this was by design

[R2-2406686](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406686.doc) Features support in regenerative payload architecture Apple discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: Do not optimize UE power saving for SDT procedure in regenerative payload architecture.

* Agreed

Proposal 2: Handover preparation over Xn/ISL needs to be enhanced to support RACH-less HO. Send an LS to RAN3.

Draft LS can be found in Annex.

- Lenovo is ok to inform RAN3

Proposal 3: Capture in the spec that common TA and Kmac shall/should be set to zero for regenerative payload architecture.

[R2-2406850](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406850%20Addressing%20Potential%20Issues%20for%20NTN%20over%20Regenerative%20Architecture.docx) Addressing Potential Issues for NTN over Regenerative Architecture Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_NTN\_Ph3

* RACH-less HO

Observation 9: Target cell may underestimate/overestimate the appropriate time to transmit the UL assignment over PDCCH, which may lead to a waste of resources and increased power consumption at the UE’s side.

Observation 10: In regenerative architecture, target gNB has no means to know when the source gNB will stop serving the area and when the UE will access the cell.

Observation 11: In case of combining RACH-less HO and time-based CHO, the target gNB can better estimate when to transmit the UL assignment since it is aware of the T1-T2 time window.

Observation 12: The RACH less handover feature works for regenerative architecture, while few optimisations are possible, like informing the target gNB when the UE is supposed to be present in the target cell.

Proposal 4: RAN2 to discuss means to reduce target gNB’s uncertainty during RACH-less handover for regenerative architecture. baseline for the satellite switching with regenerative payload.

[R2-2407054](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407054.doc) Discussion on the support of regenerative payload Xiaomi discussion

* RAN paging

Observation 1: The UE cannot receive RAN paging if there is no ISL between the serving cell and the last serving cell of the UE.

Proposal 1: Consider the following two solutions to address RAN paging:

• The RAN notification area only includes cells deployed with the serving satellite.

• The UE performs a RAN update when there is no ISL between the serving cell and the last serving cell of the UE.

- Lenovo wonders in the UE needs to know about the presence of ISL

- Apple thinks we don’t have to worry whether ISL is available or not

- vivo thinks this is in RAN3 scope and we should not discuss this unless asked by Ran3

- Xiaomi is ok to discuss this in RAN3

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

[R2-2406248](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406248%20Discussion%20on%20RACH-less%20Handover%20with%20Regeneration%20Payload.docx) Discussion on RACH-less Handover with Regeneration Payload vivo discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406268](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406268.docx) Discussion on NTN regenerative payload CAICT discussion

[R2-2406322](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406322%20Further%20discussion%20on%20regenerative%20payload.docx) Further discussion on regenerative payload CATT discussion NR\_NTN\_Ph3-Core

[R2-2406629](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406629.docx) Satellite switch with re-sync in regenerative payload Sony discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406636](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406636%20Regenerative%20payload.docx) Discussion on regenerative payload Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 4 After early contention resolution, i.e., after sending HARQ feedback of the message containing only contention resolution MAC CE, a UE waits UE-gNB RTT to monitor the PDCCH for further downlink message.

- Apple wonders if this is a NW implementation issue

* Come back in the next meeting

[R2-2406744](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406744.doc) Discussion on regenerative payload KT Corp. discussion

[R2-2406773](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406773%20regenerative%20payload.doc) Discussion on satellite switch with resynch for regenerative payload OPPO discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406872](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406872%20UE%20location%20verification%20in%20NTN%20regenerative%20architecture.docx) UE location verification in NTN regenerative architecture Lenovo discussion Rel-19

[R2-2406904](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406904_Consideration%20of%20essential%20features%20supporting%20in%20regenerative%20payload.doc) Consideration of essential features supporting in regenerative payload China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406995](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406995%20Consideration%20on%20regenerative%20payload%20support.doc) Consideration on support of regenerative payload ZTE Corporation, Sanechips discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407016](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407016.docx) mobility with regenerative payload NEC discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407026](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407026.doc) Discussion on RACH-less handover for regenerative payload Transsion Holdings discussion Rel-19

[R2-2407260](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407260%20Regenerative%20payload%20for%20NR%20NTN.docx) Regenerative payload for NR NTN Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407264](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407264.docx) Considerations on RACH-less handover for regenerative payload Continental Automotive discussion Rel-19 Revised

[R2-2407308](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407308%20Discussion%20on%20regenerative%20payload.docx) Discussion on regenerative payload Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407347](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407347%20Discussion%20on%20regenerative%20payload.docx) Discussion on regenerative payload HONOR discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407452](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407452%20Discussion%20on%20time-based%20measurement%20initiation%20for%20regenerative%20payload.docx) Discussion on time-based measurement initiation for regenerative payload ETRI discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407498](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407498.docx) Discussion on support of NTN regenerative payload architecture TCL discussion Rel-19

[R2-2407548](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407548.docx) Considerations on RACH-less handover for regenerative payload Continental Automotive discussion Rel-19 [R2-2407264](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407264.docx)

[R2-2407550](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407550%20-%20Regenerative%20payload.docx) Regenerative payload Ericsson discussion Rel-19

### 8.8.6 LTE to NR NTN mobility

Contributions should focus on the remaining issues for the support of idle mode mobility between LTE and NR NTN.

[R2-2406325](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406325%20Conclusion%20on%20remaining%20open%20issues%20for%20LTE%20TN%20to%20NR%20NTN%20IDLE%20mode%20mobility.docx) Conclusion on remaining open issues for LTE TN to NR NTN IDLE mode mobility CATT discussion LTE\_TN\_NR\_NTN\_mob

Option 1: Introduce a new SIB to include the NR satellite assistance information.

Option 2: Define new IE for NR satellite assistance information and define separate neighbour satellite information list to provide the NR satellite information in SIB33.

Option 3: Extend the NeighSatelliteInfo defined for IoT NTN to include the parameters needed for NR satellite, and reuse the neighSatelliteInfoList defined in SIB33 to provide either NR or IoT NTN information.

Observation 1: Signaling Option 1 seems to need some changes specific to eMTC in order to specify the applicability of the new SIBXY introduced.

Proposal 1: RAN2 selects one of the 3 signaling options taking into account the corresponding draft CRs for each option provided in [2][3][4].

* We don’t consider option 1

- QC and LG support option 2. Lenovo also supports

- Samsung thinks option 3 is the natural way of extending and this could allow to signal both NR NTN and IoT NTN if they are on the same satellite, without repeating the ephemeris. Lenovo wonders if this a valid scenario. Nokia wonders the same

- CATT indicates that in the current CR there is a distinction between NR NTN and IoT NTN satellites.

- Inmarsat thinks that the scenario of a satellite supporting both IoT NTN and NR NTN is absolutely realistic

* We go for option 2 (can come back to this if we find serious issue with this)

Proposal 2: The ntn-PolarizationalDL is optional.

* Agreed

Proposal 3: RAN2 down-selects following alternatives to identify the NR satellite assistance information:

- Alternative 1: Reuse the SatelliteId-r18 to identify either an NR satellite or an IoT NTN satellite;

- Alternative 2: Define NR specific satellite ID, e.g. SatelliteId-NR-r19, to identify NR satellite specifically.

- Samsung thinks we can go for Alt1 unless we find problems

* We go for Alt1
* We consider a solution that avoids repeating the ephemeris for a satellite which provides both IoT NTN and NR NTN cells

Proposal 4: If signaling Option1 [2] or Option 2 [3] is adopted, maxSat-r17 (4) is reused for the maximum number of NR satellites.

- QC thinks we should consider the possibility to signal more satellites, e.g. 8

- LGE thinks we could stick to 4. ZTE agrees

- Nokia thinks that the existing number of satellite is sufficient

* Agreed

Proposal 5: RAN2 confirms the working assumption "We don’t introduce multiple SMTCs in LTE".

* RAN2 will not do further work to introduce multiple SMTCs in LTE

Proposal 6: RAN2 confirms below working assumption and confirms no Spec impact to TS 36.304:

- NR NTN cell reselection evaluation is based on RRM measurements as legacy; no spec impact foreseen for EUTRA TN to NR NTN cell.

- LGE supports this

* Agreed

[R2-2407258](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407258%20E-UTRAN%20TN%20to%20NR%20NTN%20mobility.docx) E-UTRAN TN to NR NTN mobility Samsung discussion Rel-19 LTE\_TN\_NR\_NTN\_mob-Core

Proposal 1: RAN2 confirms E-UTRAN TN to NR NTN RRC\_INACTIVE mobility is supported, with the understanding that UE moves to RRC idle upon selecting the NR NTN cell. No spec change.

- vivo agrees but maybe this could be clarified in a capability description (if we have a capability)

* RAN2 confirms that measurements of NR NTN cells for a UE in E-UTRAN TN RRC\_INACTIVE are supported, with the understanding that UE moves to RRC idle upon selecting the NR NTN cell

Proposal 2: Confirm that SIB33 and its ephemeris is used to broadcast NR NTN neighbour cell ephemeris where NeighSatelliteInfo is extended as a parallel list. No new SIB is introduced.

Proposal 3: If NR NTN TA Common parameters in extended NeighSatelliteInfo-v1900 are not present, the UE uses the nta-CommonParameters-r18 in NeighSatelliteInfo-r18.

Proposal 4: RAN2 to consider the benefits on power saving by introducing a distance-based measurement initiation of NR NTN cells in a terrestrial E-UTRA cell. Distance is between stationary reference location and a UE.

- LGE thinks in case this is only for the serving cell, but there is no need for this in LTE

- HW does not support this and think this would expose the eNB location information

[R2-2406637](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406637%20mobility%20LTE%20to%20NR%20NTN.docx) Idle mode mobility from LTE to NR NTN Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1 Define new neighbor satellite list neighSatelliteInfoList-r19 with larger size maxSat-r19 (=8) in SIB33.

Proposal 2 Confirm that multiple satellites associated with the same frequency can have different SMTC offsets.

[R2-2406905](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406905_Remaining%20issues%20of%20LTE%20TN%20to%20NR%20NTN%20mobility.doc) Remaining issues of LTE TN to NR NTN mobility China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: RAN2 select Option2 for NR satellite assistance information: Define new IE for NR satellite assistance information and define separate neighbour satellite information list to provide the NR satellite information in SIB33.

Proposal 2: LTE TN informs the available time duration for NR satellite assistance information. UE only reselects the neighbour NR NTN cell in the available time window.

[R2-2406249](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406249%20Further%20Discussion%20on%20LTE%20TN%20to%20NR%20NTN%20Mobility.docx) Further Discussion on LTE TN to NR NTN Mobility vivo discussion Rel-19 LTE\_TN\_NR\_NTN\_mob-Core

Proposal 5: Introduce a new UE capability without signalling for LTE TN to NR NTN mobility.

* Agreed

Agreements:

1. Define new IE for NR satellite assistance information and define separate neighbour satellite information list to provide the NR satellite information in SIB33.

2. The ntn-PolarizationalDL is optional.

3. Reuse the SatelliteId-r18 to identify either an NR satellite or an IoT NTN satellite

4. Consider a solution that avoids repeating the ephemeris for a satellite which provides both IoT NTN and NR NTN cells

5. maxSat-r17 (4) is reused for the maximum number of NR satellites.

6. RAN2 will not do further work to introduce multiple SMTCs in LTE

7. NR NTN cell reselection evaluation is based on RRM measurements as legacy; no spec impact foreseen for EUTRA TN to NR NTN cell.

8. RAN2 confirms that measurements of NR NTN cells for a UE in E-UTRAN TN RRC\_INACTIVE are supported, with the understanding that UE moves to RRC idle upon selecting the NR NTN cell

9. Introduce a new UE capability without signalling for LTE TN to NR NTN mobility.

[R2-2406745](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406745%20%28R19%20NR%20NTN%20WI%20A8.8.6%29%20LTE%20to%20NR%20NTN%20mobility.doc) Discussion on LTE to NR NTN mobility InterDigital, Inc. discussion Rel-19

[R2-2406774](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406774%20LTE%20to%20NR%20NTN%20mobility.doc) Discussion on LTE to NR NTN idle mode mobility OPPO discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406848](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406848%20On%20the%20Remaining%20Issues%20for%20E-UTRA%20TN%20to%20NR%20NTN%20Mobility%20in%20IDLE%20mode.docx) On the Remaining Issues for E-UTRA TN to NR NTN Mobility in IDLE mode Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_NTN\_Ph3

[R2-2406873](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406873%20NR%20satellite%20assistance%20information%20provisioning%20for%20LTE.docx) NR satellite assistance information provisioning for LTE Lenovo discussion Rel-19

[R2-2406973](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406973%20Considerations%20on%20LTE%20to%20NR%20mobility.docx) Considerations on LTE to NR mobility CMCC discussion Rel-19 LTE\_TN\_NR\_NTN\_mob

[R2-2406996](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406996%20Consideration%20on%20LTE%20to%20NR%20NTN%20mobility.doc) Consideration on idle mode mobility between LTE TN and NR NTN ZTE Corporation, Sanechips discussion Rel-19 LTE\_TN\_NR\_NTN\_mob

[R2-2407017](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407017.docx) LTE TN to NR NTN Idle Mode Mobility NEC discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407036](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407036%20E-UTRA%20TN%20to%20NR%20NTN%20Idle%20mobility.docx) Discussion on cell reselection from E-UTRA TN to NR NTN MediaTek Inc. discussion LTE\_TN\_NR\_NTN\_mob-Core

[R2-2407055](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407055.doc) Discussion on the cell reselection from EUTRA TN to NR NTN Xiaomi discussion

[R2-2407235](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407235%20-%20E-UTRAN%20TN%20to%20NR-NTN%20mobility.docx) E-UTRAN TN to NR-NTN mobility Ericsson discussion LTE\_TN\_NR\_NTN\_mob

[R2-2407309](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407309%20Discussion%20on%20LTE%20TN%20to%20NR%20NTN%20mobility.docx) Discussion on LTE TN to NR NTN mobility Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

Withdrawn?

R2-2407549 Views on LTE to NR-NTN Mobility Inmarsat, Viasat discussion LTE\_TN\_NR\_NTN\_mob Late

## 8.9 IoT NTN Ph3

(IoT\_NTN\_Ph3-Core; leading WG: RAN2; REL-19; WID: RP-241624)

Time budget: 1 TU

Tdoc Limitation: 2 tdocs

### 8.9.1 Organizational

LS, Rapporteur input, including workplan, etc.

Rapporteur inputs do not count towards the tdoc limitation.

Incoming LSs

[R2-2406240](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406240_S2-2407350.docx) LS on FS\_5GSAT\_Ph3\_ARCH conclusions (S2-2407350; contact: OPPO) SA2 LS in Rel-19 FS\_5GSAT\_Ph3\_ARCH To:SA3, SA3-LI Cc:RAN2

* Noted

[R2-2406245](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406245_s3i240477.docx) Reply LS on FS\_5GSAT\_Ph3\_ARCH conclusions (s3i240477; contact: Tencastle) SA3-LI LS in Rel-19 FS\_5GSAT\_Ph3\_ARCH To:SA2 Cc:SA3, RAN2

* Noted

WI CR Rapporteurs:

36.300: Ericsson

36.304: Nokia

36.321: MediaTek

36.331: Huawei

36.306: Qualcomm

### 8.9.2 Support of Store & Forward

Contributions should focus on possible impacts to the radio interface.

[R2-2407237](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407237%20-%20Support%20for%20store%20and%20forward%20in%20IoT%20NTN.docx) Support for store and forward in IoT NTN Ericsson discussion IoT\_NTN\_Ph3-Core

* Architecture

Proposal 1 RAN2 adopts the SA2 study conclusions on the possible S&F architectures as the baseline for further discussion. This reverts the previous agreement to consider a scenario where only the full eNB is onboard the satellite.

- ZTE thinks previous agreement were conditional to the support of eNB only and don’t need to be undone

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

Proposal 2 RAN2 to address general scenarios that may be common for both architectures.

Proposal 3 Consider both single satellite pass and multiple satellite pass scenarios.

* RAN2 will consider both single satellite pass and multiple satellite pass scenarios

Proposal 4 Include both MO and MT data within scope.

* RAN2 will consider both MO and MT data within scope
* S&F Indication

Proposal 5 UE is informed whether its serving satellite is currently operating in S&F mode (without feeder link connectivity) via System Information broadcast.

- Oppo understands that this would be a dynamic indication but wonders if should rather have a static indication

- Nokia thinks the presence of the field could also realize a static indication

- MTK thinks that at least we need a static indication that the NW supports this functionality.

- Telit thinks we need a dynamic indication as this impacts the UE behaviour.

- Google agrees a dynamic indication would be needed

- QC thinks we could remove the part in brackets at least for now: S&F operation could happened without feeder link connectivity or with feeder link connectivity but MME still operating in S&F mode (if this will be possible scenario))

- Telit and CATT don’t think a static indication is needed

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

Proposal 6 UE is informed of the remaining time of the satellite’s current operation mode (normal or S&F) via System Information broadcast.

- Ericsson thinks this could be realized with the introduction of a t-service like parameter

- QC is not sure how this would be used. Samsung agrees the UE behaviour is not clear. CATT agrees

- ZTE is interested in this proposal

- Sequans thinks we need an absolute time. Ericsson confirms this is the intention

- IDC thinks this could be useful

- Telit thinks that if the timer is shorter than t-service this would rather bring additional problems to the NW/system behaviour

- Google thinks an indication could be beneficial also for R19 UUs not supporting S&F operation.

* Come back to this in the next meeting
* Legacy UEs

Proposal 7 Send an LS to SA2 to ask whether UEs that do not support S&F enhancements (legacy or Rel-19) should be barred from a S&F network.

* Info on neighbour satellites

Proposal 8 The UE may be informed of the S&F support status of neighbour and upcoming satellites.

[R2-2407075](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407075-Store-Forward-RAN-Aspects.docx) Radio-Interface Impacts for IoT-NTN SF Operations Nokia, Nokia Shanghai Bell discussion

Proposal 1: RAN2 to revisit the signallng steps agreed in RAN2-126 to reflect the modified CN architecture options agreed in SA2. RAN2 to consider the modified steps provided in section 2.1 as starting point for the signaling procedure changes.

Proposal 2: RAN2 to discuss whether further indication is needed in system-information to indicate the MME Split option.

Proposal 3: RAN2 to confirm multi-satellite operation as basis for further analysis.

Proposal 4: RAN2 to discuss the options for indication of mode transition (from SF to Normal and vice-versa) towards UE.

Proposal 5: RAN2 to investigate access control and scheduling related changes for S&F operation.

Proposal 6: RAN2 to consider paging enhancements in SF mode for delivering ACK for MO Traffic and MT Traffic towards IoT-NTN UE.

Proposal 7: RAN2 to investigate the security context exchange across IoT-NTN nodes in CIoT-UP SF operation and the initial analysis on security impacts for this scenario.

[R2-2406689](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406689.doc) Support of S&F operation in IoT NTN Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1: It is feasible for legacy IoT NTN UE to operate in full CN onboard satellite deployment.

- QC thinks that at initial Attach the MME would take time to check the credentials and would reject the request. Legacy UEs could not handle this. vivo agrees and thinks we should sned an LS to SA2

- Telit thinks we need to consider also the MVNO case and whether roaming agreements are available

- MTK agrees and thinks we need to send a LS to SA2

- ZTE thinks that in a possible LS to SA2 we would need to convey the RAN2 view on what is possible from AS perspective.

- ZTE does not think we need a way to bar legacy UEs (using legacy cellBarred and/or cellBarred-NTN bit) and still allow R19 S&F capable UEs

- ZTE really hope we can avoid introducing unnecessary bits in MIB/SIB for new barring options.

* RAN2 does not further discuss whether legacy UEs will always need to be barred in a S&F network, at least not before further progress in SA2 discussion. If there will be a need for this, mechanisms to bar legacy UEs are already in place and no further impact on RAN2 specs in expected.
* RAN2 agrees there will be a way to bar legacy UEs (using legacy cellBarred and/or cellBarred-NTN bit) and still allow R19 S&F capable UEs. FFS on the exact solution (e.g. new barring bits or whether this is linked to some other indication)

Proposal 2: RAN2 to discuss whether cellBarred-NTN bit in SIB1 should be always set to barred to forbid legacy UE camping on the S&F mode satellite with partial CN.

Proposal 3: If legacy IoT NTN UE can camp on S&F mode satellite, a new Rel-19 barring bit is not justified.

Proposal 4: S&F indication comprises of starting time point and duration of network S&F mode.

Proposal 5: For RRC connected UE, UE does not automatically go to idle state due to network switching into S&F mode. Network configuration can make sure that, only DRB(s) with tolerant latency are maintained when satellite switches to S&F mode.

Proposal 6: RRC idle UE determines when to monitor paging messages based on current and past feeder link status.

- If camping satellite had once recovered feeder link, UE monitors paging message and perform data reception.

- If camping satellite had never recovered feeder link, UE may skip monitoring paging message.

[R2-2407256](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407256%20On%20SA2%20progress%20and%20RAN2%20aspect%20of%20Store%20and%20Forward.docx) On SA2 progress and RAN2 aspects of Store and Forward Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 2: A UE capable of S&F can be assumed to be discontinuous coverage-capable.

Proposal 3: S&F information provided by NAS can be used for discontinuous coverage operation.

[R2-2406536](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406536.docx) Considerations on S&F operation from device perspective Telit Communications S.p.A., Novamint, Sateliot, Thales discussion Rel-19 R2-2404979 Revised

* Revised in [R2-2407487](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407487.docx)

[R2-2407487](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407487.docx) Considerations on S&F operation from device perspective Telit Communications S.p.A., Novamint, Sateliot, Thales discussion Rel-19 [R2-2406536](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406536.docx)

* S&F Indication

Proposal 1: UE should receive an indication whether S&F satellite operation is activated in an NTN cell or not.

Proposal 2: If the S&F satellite operation mode is indicated to be as not activated, or no S&F satellite operation mode indication is provided (e.g. in a pre-Rel-19 NTN cell), the UE should assume that the NTN cell is operating in RT mode (i.e. default/normal mode).

* Legacy UEs

Proposal 3: Given that a pre-Rel-19 UE will not be able to decode the above proposed S&F indicator, it needs to be discussed whether and, in case, how pre-Rel-19 UEs could be barred from accessing to an NTN cell operating in S&F mode upon operator policy.

* Additional indications

Proposal 4: For S&F Satellite operation expected maximum delivery time should be indicated to the UE.

Proposal 5: Satellite should be able to indicate (broadcast) the duration during which S&F or RT operation are respectively available or unavailable.

Agreements:

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

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

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

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

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

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

[R2-2406251](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406251%20RAN2%20Aspect%20for%20S%26F%20Operation.docx) RAN2 Aspect for S&F Operation vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406283](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406283%20RAN2%20aspects%20of%20the%20Store%20and%20Forward%20satellite%20operation.docx) RAN2 aspects of the Store and Forward satellite operation Huawei, HiSilicon, Turkcell discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406326](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406326%20Discussion%20on%20support%20of%20store%20and%20forward%20operation.docx) Discussion on support of store and forward operation CATT discussion IoT\_NTN\_Ph3-Core

[R2-2406526](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406526%20Discussion%20on%20information%20for%20Store%20%26%20Forward.docx) Discussion on information for Store & Forward ASUSTeK discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406570](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406570%20Discussion%20on%20the%20S%26F%20indication.docx) Discussion on the S&F indication Google discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406639](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406639%20store%20and%20forward.docx) Support of S&F mode operation Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406771](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406771%20S%26F%20operation.doc) Discussion on Store & Forward satellite operation OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406821](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406821%20RAN2%20impact%20on%20SF%20mode.docx) RAN2 impact on S&F mode MediaTek Inc. discussion IoT\_NTN\_Ph3-Core R2-2405132

[R2-2406874](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406874%20Store%20and%20Forward%20support%20in%20IoT%20NTN%20%28Revision%20of%20R2-2404801%29.docx) Store and Forward support in IoT NTN Lenovo discussion Rel-19

[R2-2406906](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406906_The%20design%20of%20radio%20interface%20for%20IoT%20NTN%20Store%20%26%20Forward.doc) The design of radio interface for IoT NTN Store & Forward China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406967](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406967%20Discussion%20on%20IoT%20NTN%20Store%20and%20Forward.docx) Discussion on IoT NTN Store and Forward CMCC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2407018](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407018.docx) Support of Store and Forward NEC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2407056](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407056.doc) Discussion on the support of store and forward Xiaomi discussion

[R2-2407152](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407152%20Further%20consideration%20on%20S%26F%20operation%20in%20IoT%20NTN.docx) Further consideration on S&F operation in IoT NTN ZTE Corporation, Sanechips discussion Rel-19 IoT\_NTN\_Ph3-Core R2-2404882

[R2-2407233](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407233.doc) AS Security for Store & Forward Satellite Operation SHARP Corporation discussion

[R2-2407353](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407353%20Discussion%20on%20the%20Store%20and%20Forward%20satellite%20operation.docx) Discussion on the Store and Forward satellite operation HONOR discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2407491](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407491_IoT-NTN_S%26F.docx) Consideration on S&F operation DENSO CORPORATION discussion IoT\_NTN\_Ph3-Core

[R2-2407537](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407537_Support%20of%20Store%20%26%20Forward.docx) Support of Store & Forward Sequans Communications discussion Rel-19 IoT\_NTN\_Ph3-Core

Withdrawn

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

### 8.9.3 Uplink Capacity Enhancement

Contributions should focus on the possible enhancements to reduce the necessary uplink and downlink signaling to complete an EDT transaction (Msg3 transmission without msg1/RAR; efficient delivery of msg4 / RRCEarlyDataComplete).

[R2-2407502](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407502.docx) Discussion on DSA and CRDSA Performance ESA, Eutelsat Group, Viasat, Inmarsat, Novamint, Echostar, Sateliot discussion Rel-19

Observation 1: The DSA solution is improving the Msg3-EDT throughput by about a factor of 4.5 without any impacts on the current receiver implementation at the network, and minimal specification impact overall.

Observation 2: Observation 2: The CRDSA solution is improving the Msg3-EDT throughput by about a factor from 20 to 40, depending on the selected configuration.

Proposal 1: RAN2 to specify the support of Msg#3-EDT replicas.

Proposal 2: RAN2 to specify the indexing strategy of the Msg#3-EDT replicas, when multiple copies are transmitted.

- vivo thinks we could ask RAN1 if OCC could also be used.

WI objective:

* Study and specify, if beneficial the following enhancements to reduce the necessary uplink and downlink signaling to complete an Early Data Transmission (EDT) transaction [RAN2]:
	+ Msg3 transmission without msg1/ Random Access Response (RAR)
	+ Efficient delivery (reduced overhead) of msg4 / RRCEarlyDataComplete
	+ Study and specify RRM requirement, if identified [RAN4]

CB Thursday to check whether we can agree:

1. to specify a CB-msg3 EDT-like mechanism (or we rather look for improvements for 4-step RA)
2. in case we go for a CB-msg3 EDT-like mechanism, whether a DSA mechanisms can be considered (rather than the current SA mechanism)
3. in case we go for a CB-msg3 EDT-like mechanism, whether a CRDSA mechanism can also be considered (with the understanding that this will inevitably require RAN1 involvement, i.e. an LS to RAN1 or discussion in the plenary)

or we postpone the whole discussion to the next meeting…

- session chair thinks a CB-msg3 EDT-like mechanism would fulfil the WI objective even if, at least in terms of usage of UL resources, there may be a load threshold when CB-msg3 EDT-like mechanisms do not bring additional benefit of top of a 4-step RA mechanism

* RAN2 will continue working on a CB-msg3 EDT-like mechanism
* RAN2 assumes that a DSA based scheme would not have RAN1 impacts, while RAN2 thinks that a CRDSA based scheme would necessarily have RAN1 impacts
* In the next meeting continue the comparison (e.g. in terms of packet loss ratio, usage of UL/DL radio resources) between existing CB mechanism (Slotted Aloha) and other mechanisms (DSA, CRDSA, others) and try to decide on which way to go and in case whether/what to ask to RAN1.

- session chair thinks companies not intending to suggest other schemes than SA/DSA/CRDSA are not requested to bring new simulation results

[R2-2406640](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406640%20EDT%20enh.docx) Discussion on EDT enhancements Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1 For the first objective, the enhancement of Msg3 (RRC connection request/UL data) transmission over contention-based common PUSCH resource is considered.

Proposal 2 Similar to PRACH resource pool, a pool of contention-based common PUSCH resources per CE level is considered.

Proposal 3 The RACH-less EDT establishment cause can be mo-Data or mo-Signalling or mo-ExceptionData or delayTolerantAccess or mo-VoiceCall.

Proposal 4 A new RNTI to monitor response is derived from the resource of the contention-based common PUSCH occasion where Msg3 transmission occurs.

Proposal 5 For the first objective, confirm that, for Msg4, existing contention resolution procedure can be used, i.e., contention resolution timer and contention resolution MAC CE.

Proposal 6 For the first objective, Support enhanced random access techniques, such as Contention Resolution Diversity Slotted Aloha (CRDSA), for improved random-access performance of msg3 transmission without NPRACH.

Proposal 7 For the second objective, a PUR-like L1 ACK concept, as a response to the EDT transmission, can be considered.

Proposal 8 For the second objective, multicast Msg4 (multi-user Msg4 multiplexing) or multi-user Msg4 scheduled by a single DCI (as in multi-TB Msg4 scheduling) can be studied as a solution.

[R2-2407552](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407552%20-%20UL%20capacity%20enhancements%20objectives%20for%20IoT%20NTN.docx) UL capacity enhancements objectives for IoT NTN Ericsson discussion Rel-19

* Revised in [R2-2407555](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407555%20-%20UL%20capacity%20enhancements%20objectives%20for%20IoT%20NTN.docx)

[R2-2407555](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407555%20-%20UL%20capacity%20enhancements%20objectives%20for%20IoT%20NTN.docx) UL capacity enhancements objectives for IoT NTN Ericsson discussion Rel-19

Proposal 1 The Rel-19 enhancement of EDT without Msg1 and Msg2 transmission is referred to as preamble-less EDT.

Proposal 2 As there are no capacity benefits for the preamble-less EDT enhancements compared to 4-step RA, there is no reason to introduces preamble-less EDT – therefore RAN2 shall focus on efficient delivery of msg4 for EDT.

- ESA and Inmarsat wonder if the shown results are correct.

Proposal 3 In case preamble-less EDT is agreed beneficial, System Information is used to provide preamble-less EDT cell specific PUSCH resources for Msg3 transmission. FFS on signalling details.

Proposal 4 In case preamble-less EDT is agreed beneficial, Preamble-less EDT cell specific PUSCH resources for Msg3 transmission are provided per CE level.

Proposal 5 In case preamble-less EDT is agreed beneficial, Preamble-less EDT cell specific PUSCH resources are associated with number of repetitions, RSRP selection threshold and largest TBS for Msg3 transmission.

Proposal 6 In case preamble-less EDT is agreed beneficial, Preamble-less EDT does not require a running TAT for Msg3 transmission.

Proposal 7 In case preamble-less EDT is agreed beneficial, After a failure in Msg3 transmission, the UE may attempt another transmission after waiting for a random back-off and increasing the transmission power.

Proposal 8 In case preamble-less EDT is agreed beneficial, After a number of failed Msg 3 transmission attempts, the UE falls back to 4-step random access EDT. FFS on the maximum number of transmission attempts.

Proposal 9 In case preamble-less EDT is agreed beneficial, The RNTI used to schedule Msg4 transmission is derived based on the PUSCH time-frequency resource(s) used for contention based Msg3 EDT transmission.

Proposal 10 Introduce multiplexing of several UE Contention Resolution Identities in Msg4.

Proposal 11 In case preamble-less EDT is agreed beneficial, For DSA and CRDSA, RAN2 shall first discuss whether it is feasible to integrate them with repetition.

* This aspect can be considered in the evaluation in the next meeting

Agreements:

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

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

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

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

[R2-2406327](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406327%20Consideration%20on%20the%20feasibility%20of%20RAN2%20scope%20on%20UL%20capacity%20enhancements.docx) Consideration on the feasibility of RAN2 scope for UL capacity enhancements CATT discussion IoT\_NTN\_Ph3-Core

Observation 0: RAN2 needs to address the issue on how gNB handles collisions of multiple UEs' CB-Msg3 transmissions on the same PUSCH resources, in order for successful decoding of each UE's transmission. Otherwise, the severe collision degrades resource efficiency, resulting in the feasibility of such CB Msg3 transmission skeptical, especially on whether such CB-Msg3 transmission can really improve UL capability.

Observation 1: OCC allows multiple UEs to transmit at the same time to improve the uplink capability for Msg3-EDT transmission without msg1/RAR, but it has rigorous requirement on symbol/slot alignment which involves RAN1 justification. Also, multiplexing more than 4 UEs are not supported for NPUSCH format 1, as determined for this release by RAN1.

Observation 2: 2-step RACH may realize Msg2 overhead saving purpose, and may be able to resolve the contention resolution/TA issues as well. However, it has never been introduced in LTE Specs, and whether it is in/out of WI is questionable.

Observation 3: Using DM-RS may be one way to differentiate transmissions from different UEs on the same PUSCH resource. But this needs to be done together with MU-MIMO which requires effective tracking of different UEs' channel status at the gNB, and is thus difficult to be realized for IDLE UEs.

Observation 4: (CR)DSA relies on the repetition/retransmission with different resource patterns in the time domain to handle collisions among different UEs. However it may involve non-trivial discussions/Spec impacts on RAN1/RAN2 and the benefit to UL capability improvement may need to be justified first.

Proposal 0: RAN2 waits for RAN1/RAN4 response before carrying out any further discussions on TA related issue for CB-Msg3 transmission.

Proposal 1: RAN2 discusses the feasibility of CB-Msg3 transmission and justifies how the gNB handles the transmission collision on the same PUSCH resource by different UEs, by taking into account the following candidates and the UL capability gain they can bring:

* Code-domain collision handling, e.g. via OCC, 2-Step RACH, DMRS.
* Time domain collision handling, e.g. (CR)DSA.

[R2-2407153](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407153%20Further%20consideration%20on%20uplink%20capacity%20enhancements%20in%20IoT%20NTN.docx) Further consideration on uplink capacity enhancements in IoT NTN ZTE Corporation, Sanechips discussion Rel-19 IoT\_NTN\_Ph3-Core R2-2404884

Proposal 1: It’s suggested not to support CRDSA in R19 IoT NTN.

Proposal 2a: If contention-based Msg3 transmission is supported, when the camping cell of the UE changes, the UE doesn’t need to stop using this function.

Proposal 2b: If RAN1 and RAN4 can confirm that RRC Idle UE with a pre-compensated TA can satisfy the required timing accuracy for Msg3 transmission without Msg1/Msg2, the timing alignment validation condition in legacy PUR (including both PUR TA timer-related criteria and RSRP-related criteria) would not be needed for contention-based Msg3 transmission in R19 IoT NTN.

Proposal 3a: With reference to legacy PUR configuration, RAN2 can take the following resources types as start point for the discussion on resources configuration for contention-based Msg3 transmission:

* Time domain resources, e.g., Periodicity, Offset, start time (H-SFN, frame, SFN etc.) of NPUSCH occasions
* Frequency domain resources, e.g., Carrier, SubCarrier
* TBS
* NPDCCH search space window
* OCC resource

Proposal 3b: RAN2 is suggested to discuss/evaluate the following alternatives for configuring resources for contention-based Msg3 transmission:

• Alt1: To provide a totally shared resource via SIB.

• Alt2: To provide (partially) shared or dedicated resources via dedicated signaling. It can be allowed to configure some different resources for different UEs while the other resources may be same for all the UEs.

• Alt3: To provide multiple sets of shared resources via the SIB and NW can indicate index of the resource set for a specific UE via the dedicated signaling.

Proposal 4: The existing types of “Msg4” for normal PUR process, e.g., Physical layer L1 ACK, Timing Advance Command MAC CE, and RRCEarlyDataComplete/RRCConnectionRelease/RRCConnectionSetup/ RRCConnectionResume, need to be supported for contention-based Msg3 transmission scheme. The very simple Physical layer L1 ACK can be used in suitable cases to achieve the most efficient Msg4 transmission.

Proposal 5: RAN is suggested to discuss the following alternatives for scheduling of Msg4:

• Alt1: Common PUR-RNTI configured in the shared resources configuration.

• Alt2: UE-specific PUR-RNTI allocated by NW that is similar as the one for dedicated PUR.

• Alt3: Resource-specific PUR-RNTI which can be respectively calculated by UE and eNB according to the resources used/selected by the UE for Msg3 transmission.

Proposal 6: The contention resolution scheme in legacy random access procedure can be reused for contention-based Msg3 transmission, e.g., a UE Contention Resolution Identity can be included in the DL MAC PDU and UE checks whether the UE Contention Resolution Identity matches the 48 first bits of the CCCH SDU transmitted in Msg3.

Proposal 7: RAN2 is suggested to discuss the following other issues:

• Issue#1: How to handle the coexistence of dedicated PUR and contention-based Msg3 transmission

• Issue#2: Whether a backoff scheme is needed when Msg3 transmission collision occurs

[R2-2407140](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407140%20%28R19%20IoT-NTN%20AI%208.9.3%29%20-%20EDT%20complete.docx) Efficient delivery (reduced overhead) of msg4 / RRCEarlyDataComplete Interdigital, Inc. discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1: Efficient delivery (reduced overhead) of msg4 / RRCEarlyDataComplete only applies to the C-plane solution.

Proposal 2: Confirm that it is already possible with the existing PUR feature to terminate the EDT procedure without using RRCEarlyDataComplete, by using Layer 1 ACK or Timing advance MAC CE, if eNB is aware that there is no pending downlink data or signalling.

Proposal 3: RAN2 to discuss how eNB knows that there is no pending downlink data from the application layer.

Proposal 4: Confirm that it is already possible with the existing PUR feature for UE to indicate in PURConfigurationRequest whether it expects a downlink response by RRCEarlyDataComplete.

Proposal 5: Confirm that the existing PUR feature may not be optimal in an NTN deployment as there is currently no mechanism for the eNB to determine whether UE expects a downlink application layer response unless the UE moves to RRC\_CONNECTED in every cell to perform dedicated PUR configuration.

Proposal 6: RAN2 to consider whether the following enhancements are beneficial:

1) Introducing network signalling so that PUR configuration request information to be transferred across cells.

2) Indication by the UE in RRCEarlyDataRequest an “rrc-ACK” parameter (whether UE expects a downlink application layer response)

3) Enabling EDT termination without any downlink ACK, or using a common ACK for multiple transmissions or UEs

[R2-2406252](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406252%20Further%20Discussion%20on%20EDT%20Enhancement%20for%20IoT-NTN.docx) Further Discussion on EDT Enhancement for IoT-NTN vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406284](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406284%20Way%20forward%20for%20RAN2%20discussion%20on%20UL%20capacity%20enhancement.docx) Way forward for RAN2 discussion on UL capacity enhancement Huawei, HiSilicon, Turkcell discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406592](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406592%20Discussion%20on%20uplink%20capacity%20enhancements%20for%20IOT%20NTN.doc) Discussion on uplink capacity enhancements for IOT NTN Beijing Xiaomi Mobile Software discussion Rel-19

[R2-2406593](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406593.docx) Performance of Advanced Random Access Protocols DLR discussion Rel-19

[R2-2406688](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406688.doc) Uplink capacity enhancement in IoT NTN Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406763](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406763.doc) Uplink Capacity Enhancement for EDT transaction Spreadtrum Communications discussion Rel-19

[R2-2406766](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406766%20-%20Discussion%20on%20enhanced%20EDT%20for%20IoT%20NTN.doc) Discussion on enhanced EDT for IoT NTN OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406868](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406868%20Consideration%20on%20UL%20capacity%20enhancement%20for%20IoT-NTN.docx) Consideration on UL capacity enhancement for IoT-NTN NEC Corporation. discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406869](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406869%20Discussion%20on%20enhanced%20EDT.docx) Discussion on enhanced EDT MediaTek Inc. discussion IoT\_NTN\_Ph3-Core R2-2405133

[R2-2406875](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406875%20EDT%20for%20uplink%20capacity%20enhancement%20in%20NTN%20%28Revision%20of%20R2-2404802%29.docx) EDT for uplink capacity enhancement in NTN Lenovo discussion Rel-19

[R2-2406907](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406907_Capacity%20enhancement%20for%20IoT%20NTN.doc) Contention-based Msg3-EDT for IoT NTN capacity enhancement China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406974](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2406974%20Considerations%20on%20uplink%20capacity%20enhancement%20for%20IoT-NTN.docx) Considerations on uplink capacity enhancement for IoT-NTN CMCC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2407028](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407028%20%20Uplink%20Capacity%20enhancement%20for%20IoT-NTN.docx) Discussion on uplink capacity enhancement Transsion Holdings discussion Rel-19

[R2-2407121](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407121.docx) Discussion on Contention Resolution Diversity Slotted ALOHA TOYOTA Info Technology Center other Rel-19 IoT\_NTN\_Ph3-Core

[R2-2407139](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407139%20%28R19%20IoT-NTN%20AI%208.9.3%29%20-%20PUR%20resource%20enhancement.docx) Msg3 transmission without msg1/RAR Interdigital, Inc. discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2407167](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407167%20Consideration%20on%20UL%20capacity%20enhancement%20for%20IoT%20NTN.docx) Consideration on UL capacity enhancement for IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2407257](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407257%20Procedures%20for%20uplink%20capacity%20enhancements.docx) Procedures for uplink capacity enhancements for IoT NTN Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

Withdrawn?

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

# Summary

Agreed CRs

NR-NTN

IoT-NTN

Approved LSs out

[R2-2407623](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2407623.zip) LS on common TA in a regenerative payload scenario CMCC LSout Rel-19 NR\_NTN\_Ph3-Core To:RAN1, RAN4

* Approved

R2-2407823 LS on requirements for ETWS primary notification Ericsson LS Rel-19 NR\_NTN\_Ph3-Core To:SA1

* Approved

[Post127] Email discussions

Short

* [Post127][301][R18 NR NTN] 38.300 CR (Thales)

 Scope: Draft a 38.300 based on meeting agreements

 Intended outcome: Agreed CR

 Deadline for agreed CR (in R2-2407621): short

* [Post127][302][R18 NR NTN] 38.331 CR (Ericsson)

 Scope: update the RRC CR with meeting agreements

 Intended outcome: Agreed CR

 Deadline for agreed CR (in R2-2407611): short

* [Post127][303][R18 NR NTN] 38.321 CR (Interdigital)

 Scope: update the MAC CR with meeting agreements

 Intended outcome: Agreed CR

 Deadline for agreed CR (in R2-2407628): short

* [Post127][304][R18 NR NTN] UE Caps CRs (Intel)

 Scope: Draft CRs based on meeting agreements

 Intended outcome: Endorsed CRs

 Deadline for CRs (in R2-2407624 and R2-2407625): very short

* [Post127][305][R18 IoT NTN] 36.300 CR (Ericsson)

 Scope: Draft a 36.300 CR with meeting agreements

 Intended outcome: Agreed CR

 Deadline for agreed CR (in R2-2407626): short

* [Post127][306][R18 IoT NTN] 36.331 CR (Huawei)

 Scope: update the RRC CR with meeting agreements

 Intended outcome: Agreed CR

 Deadline for agreed CR (in R2-2407615): short

* [Post127][307][R18 IoT NTN] 36.321 CR (Mediatek)

 Scope: update the MAC CR with meeting agreements

 Intended outcome: Agreed CR

 Deadline for agreed CR (in R2-2407620): short

* [Post127][308][R18 IoT NTN] 36.306 CR (Qualcomm)

 Scope: Draft a 36.306 CR based on meeting agreements

 Intended outcome: Agreed CR

 Deadline for agreed CR (in R2-2407627): short

* [Post127][309][R18 NR NTN] LS to RAN1 (CATT)

 Scope: Draft a LS to RAN1 on correction on network verification of UE location

 Intended outcome: Approved LS

 Deadline for approved LS (in R2-2407630): short

Long