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  - 8.8.5 (if time allows) | **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)** |  |
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| 17:00 – 19:00 | **AI/ML PHY [2] (Diana)** | **R19 Mob [2] (Kyeongin)** | TBD  CB Nathan |  |
|  |
| Thursday | | | | |
| 08:30 – 10:30 | **CB Diana TBD**  **[CB R19 AI/ML PHY]** | **R18 NR/IoT NTN CB (Sergio)**  - TBD  **[R19 IoT CB]**  - TBD | CB Nathan  SL relay CB |  |
|  |
| 11:00 – 13:00 | **Rel-19 Ambient IoT [2] (Diana)** | **Rel-19 NTN NR [1] (Sergio)**  - 8.8.5 (if needed)  - 8.8.2  - TBD | CB Dawid:  R19 XR CB  R18 MBS/QoE CB |  |
| 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 TBD  CB Diana  R19 AI/ML PHY | CB Mattias  CB Sergio | CB Nathan  TBD |  |
| 11:00 – 13:00 | CB Diana  @11-12 R19 Ambient IoT  NR Others CBs  Reports from breakout sessions  EoM | **R18 NR/IoT NTN CB (Sergio)**  - TBD  **[R19 NR/IoT NTN CB]**  - TBD | TBD? |
| 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

## 7.6 IoT NTN enhancements

(IoT\_NTN\_enh-Core; leading WG: RAN1; REL-18; WID: [RP-223519](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_98e/Docs/RP-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](C:\\Data\\3GPP\\Extracts\\R2-2406211_R1-2405569.docx" \o "C:\Data\3GPP\Extracts\R2-2406211_R1-2405569.docx) 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

Rapporteur inputs

[R2-2406938](file:///C:\Data\3GPP\Extracts\R2-2406938%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

[R2-2407303](file:///C:\Data\3GPP\Extracts\R2-2407303%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

### 7.6.2 Corrections

Corrections for all specifications.

[R2-2406951](C:\\Data\\3GPP\\Extracts\\R2-2406951 Discussion on RRC Corrtions to IoT NTN.docx" \o "C:\Data\3GPP\Extracts\R2-2406951 Discussion on RRC Corrtions to IoT NTN.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.

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.

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

[R2-2406329](file:///C:\Data\3GPP\Extracts\R2-2406329%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

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

[R2-2406450](file:///C:\Data\3GPP\Extracts\R2-2406450_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.

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

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

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.

[R2-2407166](file:///C:\Data\3GPP\Extracts\R2-2407166%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.

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.

[R2-2407254](file:///C:\Data\3GPP\Extracts\R2-2407254%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.

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.

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.

Proposal 5: Introduce a signalled UE capability for a UE to measure an NTN cell using NTN assistance information 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:\Data\3GPP\Extracts\R2-2407553%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.

Proposal 2 Consider the text proposal below.

[R2-2406642](file:///C:\Data\3GPP\Extracts\36321_CR1587_(Rel-18)_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

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:\Data\3GPP\Extracts\R2-2407302%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.

[R2-2407538](file:///C:\Data\3GPP\Extracts\R2-2407538%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.

## 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](C:\\Data\\3GPP\\Extracts\\R2-2406215_R1-2405719.docx" \o "C:\Data\3GPP\Extracts\R2-2406215_R1-2405719.docx) 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

[R2-2406229](file:///C:\Data\3GPP\Extracts\R2-2406229_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

Rapporteur inputs

[R2-2407239](file:///C:\Data\3GPP\Extracts\R2-2407239%20-%2038331_CR4935_(Rel-18)%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

### 7.7.2 Corrections

Corrections for all specifications.

Reference Point for SSB-TimeOffset

[R2-2406727](file:///C:\Data\3GPP\Extracts\R2-2406727_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:\Data\3GPP\Extracts\R2-2407482%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.

[R2-2406641](file:///C:\Data\3GPP\Extracts\R2-2406641%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.

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”.

Misc changes

[R2-2406328](file:///C:\Data\3GPP\Extracts\R2-2406328%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.

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.

[R2-2406846](file:///C:\Data\3GPP\Extracts\R2-2406846%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.

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

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

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:\Data\3GPP\Extracts\R2-2407238%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.

[R2-2407255](file:///C:\Data\3GPP\Extracts\R2-2407255%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…

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.

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.

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.

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.

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.

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.

[R2-2406992](file:///C:\Data\3GPP\Extracts\R2-2406992%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

UE capabilities corrections

[R2-2406451](file:///C:\Data\3GPP\Extracts\R2-2406451%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.

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

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.

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:\Data\3GPP\Extracts\R2-2406280%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

## 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:\Data\3GPP\Extracts\R2-2406220_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

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

(moved here from 8.8.6)

[R2-2407259](file:///C:\Data\3GPP\Extracts\R2-2407259%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

[R2-2406318](file:///C:\Data\3GPP\Extracts\R2-2406318%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".

[R2-2406319](file:///C:\Data\3GPP\Extracts\R2-2406319%20Introduction%20of%20LTE%20TN%20to%20NR%20NTN%20IDLE%20mode%20mobility%20(Option%201).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:\Data\3GPP\Extracts\R2-2406320%20Introduction%20of%20LTE%20TN%20to%20NR%20NTN%20IDLE%20mode%20mobility%20(Option%202).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

[R2-2406321](file:///C:\Data\3GPP\Extracts\R2-2406321%20Introduction%20of%20LTE%20TN%20to%20NR%20NTN%20IDLE%20mode%20mobility%20(Option%203).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:\Data\3GPP\Extracts\R2-2406250_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

### 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:\Data\3GPP\Extracts\R2-2406591%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.

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.

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:\Data\3GPP\Extracts\R2-2407306%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:\Data\3GPP\Extracts\R2-2407129%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:\Data\3GPP\Extracts\R2-2407532_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

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:\Data\3GPP\Extracts\R2-2406490.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.

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:\Data\3GPP\Extracts\R2-2406952%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:\Data\3GPP\Extracts\R2-2406993%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.

[R2-2406246](file:///C:\Data\3GPP\Extracts\R2-2406246%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:\Data\3GPP\Extracts\R2-2406324%20Discussion%20on%20Downlink%20Coverage%20Enhancements.docx) Discussion on Downlink Coverage Enhancements CATT discussion NR\_NTN\_Ph3-Core

[R2-2406550](file:///C:\Data\3GPP\Extracts\R2-2406550.doc) Discussions on cell DTX during satellite dynamic power sharing Fujitsu discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406571](file:///C:\Data\3GPP\Extracts\R2-2406571%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:\Data\3GPP\Extracts\R2-2406638%20Cell%20DTX.docx) Discussion on cell DTX Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406685](file:///C:\Data\3GPP\Extracts\R2-2406685.doc) DL coverage enhancement in NTN Apple discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406765](file:///C:\Data\3GPP\Extracts\R2-2406765%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:\Data\3GPP\Extracts\R2-2406870%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:\Data\3GPP\Extracts\R2-2406894%20Consideration%20on%20downlink%20coverage%20enhancement.docx) Consideration on downlink coverage enhancement NEC Corporation discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406902](file:///C:\Data\3GPP\Extracts\R2-2406902_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:\Data\3GPP\Extracts\R2-2407187%20(R19%20NR%20NTN%20WI%20AI%208.8.2)%20DL%20coverage.docx) Downlink coverage enhancement for NTN InterDigital discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407345](file:///C:\Data\3GPP\Extracts\R2-2407345%20Discussion%20on%20downlink%20coverage%20enhancement.docx) Discussion on downlink coverage enhancement HONOR discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407382](file:///C:\Data\3GPP\Extracts\R2-2407382%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:\Data\3GPP\Extracts\R2-2407401%20Discussion%20on%20NTN%20downlink%20coverage%20enhancements.docx) Discussion on NTN downlink coverage enhancements NERCDTV discussion

[R2-2407462](file:///C:\Data\3GPP\RAN2\Docs\R2-2407462.zip) Discussion on downlink coverage enhancement LG Electronics Inc. discussion Rel-19

[R2-2407551](file:///C:\Data\3GPP\Extracts\R2-2407551%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.

[R2-2406687](file:///C:\Data\3GPP\Extracts\R2-2406687.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.

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:\Data\3GPP\Extracts\R2-2406635%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:\Data\3GPP\Extracts\R2-2407236%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.

[R2-2406491](file:///C:\Data\3GPP\Extracts\R2-2406491.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.

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.

[R2-2406719](file:///C:\Data\3GPP\Extracts\R2-2406719%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.

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.

[R2-2406247](file:///C:\Data\3GPP\Extracts\R2-2406247%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:\Data\3GPP\Extracts\R2-2406267.docx) Discussion on MBS service in NTN system CAICT discussion

[R2-2406323](file:///C:\Data\3GPP\Extracts\R2-2406323%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:\Data\3GPP\Extracts\R2-2406352_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:\Data\3GPP\Extracts\R2-2406551.doc) Discussions on supporting broadcast intending to serve partial cell Fujitsu discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406583](file:///C:\Data\3GPP\Extracts\R2-2406583_MBService_Area_Indication_&_Geoblocking.docx) MBService area indication & geoblocking PANASONIC discussion

[R2-2406606](file:///C:\Data\3GPP\Extracts\R2-2406606%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:\Data\3GPP\Extracts\R2-2406628.docx) Broadcast service area signaling Sony discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406849](file:///C:\Data\3GPP\Extracts\R2-2406849%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:\Data\3GPP\Extracts\R2-2406865_NTN_MBS.docx) Discussions on handling MRB(s) associated with intended service areas ITRI discussion NR\_NTN\_Ph3-Core

[R2-2406871](file:///C:\Data\3GPP\Extracts\R2-2406871%20On%20broadcast%20service%20area%20indication%20in%20NTN%20(Revision%20of%20R2-2404798).docx) On broadcast service area indication in NTN Lenovo discussion Rel-19

[R2-2406903](file:///C:\Data\3GPP\Extracts\R2-2406903_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:\Data\3GPP\Extracts\R2-2406958.docx) Discussions on MBS in Rel-19 NTN TOYOTA Info Technology Center discussion

[R2-2406971](file:///C:\Data\3GPP\Extracts\R2-2406971%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:\Data\3GPP\Extracts\R2-2406994%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:\Data\3GPP\Extracts\R2-2407049_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:\Data\3GPP\Extracts\R2-2407053.doc) Discussion on the support of broadcast service Xiaomi discussion

[R2-2407188](file:///C:\Data\3GPP\Extracts\R2-2407188%20(R19%20NR%20NTN%20WI%20AI%208.8.4)%20Broadcast.docx) Support for broadcast service in NTN InterDigital discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407263](file:///C:\Data\3GPP\Extracts\R2-2407263.docx) Considerations on MBS in NTN Continental Automotive discussion Rel-19

[R2-2407307](file:///C:\Data\3GPP\Extracts\R2-2407307%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:\Data\3GPP\Extracts\R2-2407346%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:\Data\3GPP\Extracts\R2-2407415-NTN_MBS_UE_procedure.docx) UE behaviour for MBS related procedures Sharp discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407416](file:///C:\Data\3GPP\Extracts\R2-2407416_NTN_MBS.docx) Discussion on MBS service support for NR NTN Sharp discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407418](file:///C:\Data\3GPP\Extracts\R2-2407418%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:\Data\3GPP\Extracts\R2-2407453%20Support%20of%20broadcast%20service%20in%20NTN.docx) Support of broadcast service in NTN NERCDTV discussion

[R2-2407473](file:///C:\Data\3GPP\Extracts\R2-2407473.docx) Discussion on support of broadcast service ITL discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407497](file:///C:\Data\3GPP\Extracts\R2-2407497.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:\Data\3GPP\Extracts\R2-2406972%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.

* RACH-less HO

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

[R2-2406686](file:///C:\Data\3GPP\Extracts\R2-2406686.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.

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.

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:\Data\3GPP\Extracts\R2-2406850%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:\Data\3GPP\Extracts\R2-2407054.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.

[R2-2406248](file:///C:\Data\3GPP\Extracts\R2-2406248%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:\Data\3GPP\Extracts\R2-2406268.docx) Discussion on NTN regenerative payload CAICT discussion

[R2-2406322](file:///C:\Data\3GPP\Extracts\R2-2406322%20Further%20discussion%20on%20regenerative%20payload.docx) Further discussion on regenerative payload CATT discussion NR\_NTN\_Ph3-Core

[R2-2406629](file:///C:\Data\3GPP\Extracts\R2-2406629.docx) Satellite switch with re-sync in regenerative payload Sony discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406636](file:///C:\Data\3GPP\Extracts\R2-2406636%20Regenerative%20payload.docx) Discussion on regenerative payload Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406744](file:///C:\Data\3GPP\Extracts\R2-2406744.doc) Discussion on regenerative payload KT Corp. discussion

[R2-2406773](file:///C:\Data\3GPP\Extracts\R2-2406773%20regenerative%20payload.doc) Discussion on satellite switch with resynch for regenerative payload OPPO discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2406872](file:///C:\Data\3GPP\Extracts\R2-2406872%20UE%20location%20verification%20in%20NTN%20regenerative%20architecture.docx) UE location verification in NTN regenerative architecture Lenovo discussion Rel-19

[R2-2406904](file:///C:\Data\3GPP\Extracts\R2-2406904_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:\Data\3GPP\Extracts\R2-2406995%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:\Data\3GPP\Extracts\R2-2407016.docx) mobility with regenerative payload NEC discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407026](file:///C:\Data\3GPP\Extracts\R2-2407026.doc) Discussion on RACH-less handover for regenerative payload Transsion Holdings discussion Rel-19

[R2-2407260](file:///C:\Data\3GPP\Extracts\R2-2407260%20Regenerative%20payload%20for%20NR%20NTN.docx) Regenerative payload for NR NTN Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407264](file:///C:\Data\3GPP\Extracts\R2-2407264.docx) Considerations on RACH-less handover for regenerative payload Continental Automotive discussion Rel-19 Revised

[R2-2407308](file:///C:\Data\3GPP\Extracts\R2-2407308%20Discussion%20on%20regenerative%20payload.docx) Discussion on regenerative payload Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407347](file:///C:\Data\3GPP\Extracts\R2-2407347%20Discussion%20on%20regenerative%20payload.docx) Discussion on regenerative payload HONOR discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407452](file:///C:\Data\3GPP\Extracts\R2-2407452%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:\Data\3GPP\Extracts\R2-2407498.docx) Discussion on support of NTN regenerative payload architecture TCL discussion Rel-19

[R2-2407548](file:///C:\Data\3GPP\Extracts\R2-2407548.docx) Considerations on RACH-less handover for regenerative payload Continental Automotive discussion Rel-19 [R2-2407264](file:///C:\Data\3GPP\Extracts\R2-2407264.docx)

[R2-2407550](file:///C:\Data\3GPP\Extracts\R2-2407550%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:\Data\3GPP\Extracts\R2-2406325%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].

Proposal 2: The ntn-PolarizationalDL is optional.

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.

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

Proposal 5: RAN2 confirms the working assumption "We don’t 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.

[R2-2407258](file:///C:\Data\3GPP\Extracts\R2-2407258%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.

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.

[R2-2406637](file:///C:\Data\3GPP\Extracts\R2-2406637%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:\Data\3GPP\Extracts\R2-2406905_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:\Data\3GPP\Extracts\R2-2406249%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.

[R2-2406745](file:///C:\Data\3GPP\Extracts\R2-2406745%20(R19%20NR%20NTN%20WI%20A8.8.6)%20LTE%20to%20NR%20NTN%20mobility.doc) Discussion on LTE to NR NTN mobility InterDigital, Inc. discussion Rel-19

[R2-2406774](file:///C:\Data\3GPP\Extracts\R2-2406774%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:\Data\3GPP\Extracts\R2-2406848%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:\Data\3GPP\Extracts\R2-2406873%20NR%20satellite%20assistance%20information%20provisioning%20for%20LTE.docx) NR satellite assistance information provisioning for LTE Lenovo discussion Rel-19

[R2-2406973](file:///C:\Data\3GPP\Extracts\R2-2406973%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:\Data\3GPP\Extracts\R2-2406996%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:\Data\3GPP\Extracts\R2-2407017.docx) LTE TN to NR NTN Idle Mode Mobility NEC discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2407036](file:///C:\Data\3GPP\Extracts\R2-2407036%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:\Data\3GPP\Extracts\R2-2407055.doc) Discussion on the cell reselection from EUTRA TN to NR NTN Xiaomi discussion

[R2-2407235](file:///C:\Data\3GPP\Extracts\R2-2407235%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:\Data\3GPP\Extracts\R2-2407309%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:\Data\3GPP\Extracts\R2-2406240_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

[R2-2406245](file:///C:\Data\3GPP\Extracts\R2-2406245_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

### 8.9.2 Support of Store & Forward

Contributions should focus on possible impacts to the radio interface.

[R2-2407237](file:///C:\Data\3GPP\Extracts\R2-2407237%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.

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.

Proposal 4 Include 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.

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

* 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:\Data\3GPP\Extracts\R2-2407075-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:\Data\3GPP\Extracts\R2-2406689.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.

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:\Data\3GPP\Extracts\R2-2407256%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:\Data\3GPP\Extracts\R2-2406536.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

[R2-2407487](file:///C:\Data\3GPP\Extracts\R2-2407487.docx) Considerations on S&F operation from device perspective Telit Communications S.p.A., Novamint, Sateliot, Thales discussion Rel-19 [R2-2406536](file:///C:\Data\3GPP\Extracts\R2-2406536.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.

[R2-2406251](file:///C:\Data\3GPP\Extracts\R2-2406251%20RAN2%20Aspect%20for%20S&F%20Operation.docx) RAN2 Aspect for S&F Operation vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406283](file:///C:\Data\3GPP\Extracts\R2-2406283%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:\Data\3GPP\Extracts\R2-2406326%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:\Data\3GPP\Extracts\R2-2406526%20Discussion%20on%20information%20for%20Store%20&%20Forward.docx) Discussion on information for Store & Forward ASUSTeK discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406570](file:///C:\Data\3GPP\Extracts\R2-2406570%20Discussion%20on%20the%20S&F%20indication.docx) Discussion on the S&F indication Google discussion Rel-19 IoT\_NTN\_Ph3-Core

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

[R2-2406771](file:///C:\Data\3GPP\Extracts\R2-2406771%20S&F%20operation.doc) Discussion on Store & Forward satellite operation OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406821](file:///C:\Data\3GPP\Extracts\R2-2406821%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:\Data\3GPP\Extracts\R2-2406874%20Store%20and%20Forward%20support%20in%20IoT%20NTN%20(Revision%20of%20R2-2404801).docx) Store and Forward support in IoT NTN Lenovo discussion Rel-19

[R2-2406906](file:///C:\Data\3GPP\Extracts\R2-2406906_The%20design%20of%20radio%20interface%20for%20IoT%20NTN%20Store%20&%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:\Data\3GPP\Extracts\R2-2406967%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:\Data\3GPP\Extracts\R2-2407018.docx) Support of Store and Forward NEC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2407056](file:///C:\Data\3GPP\Extracts\R2-2407056.doc) Discussion on the support of store and forward Xiaomi discussion

[R2-2407152](file:///C:\Data\3GPP\Extracts\R2-2407152%20Further%20consideration%20on%20S&F%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:\Data\3GPP\Extracts\R2-2407233.doc) AS Security for Store & Forward Satellite Operation SHARP Corporation discussion

[R2-2407353](file:///C:\Data\3GPP\Extracts\R2-2407353%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:\Data\3GPP\Extracts\R2-2407491_IoT-NTN_S&F.docx) Consideration on S&F operation DENSO CORPORATION discussion IoT\_NTN\_Ph3-Core

[R2-2407537](file:///C:\Data\3GPP\Extracts\R2-2407537_Support%20of%20Store%20&%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:\Data\3GPP\Extracts\R2-2407502.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.

[R2-2406640](file:///C:\Data\3GPP\Extracts\R2-2406640%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:\Data\3GPP\Extracts\R2-2407552%20-%20UL%20capacity%20enhancements%20objectives%20for%20IoT%20NTN.docx) UL capacity enhancements objectives for IoT NTN Ericsson discussion Rel-19

* Revised in R2-2407555

[R2-2407555](file:///C:\Data\3GPP\Extracts\R2-2407555%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.

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.

[R2-2406327](file:///C:\Data\3GPP\Extracts\R2-2406327%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:\Data\3GPP\Extracts\R2-2407153%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:\Data\3GPP\Extracts\R2-2407140%20(R19%20IoT-NTN%20AI%208.9.3)%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:\Data\3GPP\Extracts\R2-2406252%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:\Data\3GPP\Extracts\R2-2406284%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:\Data\3GPP\Extracts\R2-2406592%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:\Data\3GPP\Extracts\R2-2406593.docx) Performance of Advanced Random Access Protocols DLR discussion Rel-19

[R2-2406688](file:///C:\Data\3GPP\Extracts\R2-2406688.doc) Uplink capacity enhancement in IoT NTN Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2406763](file:///C:\Data\3GPP\Extracts\R2-2406763.doc) Uplink Capacity Enhancement for EDT transaction Spreadtrum Communications discussion Rel-19

[R2-2406766](file:///C:\Data\3GPP\Extracts\R2-2406766%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:\Data\3GPP\Extracts\R2-2406868%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:\Data\3GPP\Extracts\R2-2406869%20Discussion%20on%20enhanced%20EDT.docx) Discussion on enhanced EDT MediaTek Inc. discussion IoT\_NTN\_Ph3-Core R2-2405133

[R2-2406875](file:///C:\Data\3GPP\Extracts\R2-2406875%20EDT%20for%20uplink%20capacity%20enhancement%20in%20NTN%20(Revision%20of%20R2-2404802).docx) EDT for uplink capacity enhancement in NTN Lenovo discussion Rel-19

[R2-2406907](file:///C:\Data\3GPP\Extracts\R2-2406907_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:\Data\3GPP\Extracts\R2-2406974%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:\Data\3GPP\Extracts\R2-2407028%20%20Uplink%20Capacity%20enhancement%20for%20IoT-NTN.docx) Discussion on uplink capacity enhancement Transsion Holdings discussion Rel-19

[R2-2407121](file:///C:\Data\3GPP\Extracts\R2-2407121.docx) Discussion on Contention Resolution Diversity Slotted ALOHA TOYOTA Info Technology Center other Rel-19 IoT\_NTN\_Ph3-Core

[R2-2407139](file:///C:\Data\3GPP\Extracts\R2-2407139%20(R19%20IoT-NTN%20AI%208.9.3)%20-%20PUR%20resource%20enhancement.docx) Msg3 transmission without msg1/RAR Interdigital, Inc. discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2407167](file:///C:\Data\3GPP\Extracts\R2-2407167%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:\Data\3GPP\Extracts\R2-2407257%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

[Post127] Email discussions

Short

Long