3GPP TSG-RAN WG2 Meeting #125bis R2-2403733

Changsha, China, Apr 15th – 19th, 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:

* [AT125bis][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 April 15th** | | | | |
| 09:00 – 10:30 | [**1], [2], [3],**  **[7.0] R18 common (Diana)**  **[7.0.1][7.0.2]**  **[7.0.3] ASN.1 Review common**  **[7.0.5]**  **-----**  **Break out of ASN.1 Review**  **[7.0.4]**  **@NR151617 UP (Diana)** | Breakout to start after common session including ASN.1 review  ---  **MUSIM (Erlin) (if ASN.1 common session ends early)**  7.17.1  7.17.2 | Breakout to start after common session ASN.1 Review:  ---  **NR18 Positioning (Nathan)**  [7.2.1] RIL and open issue lists  [7.2.4] LPP corrections (as time permits) |  |
| 11:00 – 13:00 |
| 14:30 – 16:30 | **NR18 URLLC (Diana)**  **NR18 Network Energy Saving (Diana)** | **@14:30-15:30 Rel-18 MUSIM (Erlin)**  7.17.2 (cont.)  **@15:30 NR18 MIMO evo**  7.20.1  7.20.2  7.20.3  IDC (Yi) (email discussion only)  NCR(Sasha) (email discussion only) | **NRLTE1516 V2X/SL (Kyeongin)**  **NR17 SL (Kyeongin)**  **NR18 SL (if time allows)** |
| 17:00 – 19:00 | **Rel-18 UAV (1hr)**  **NR18 TEI (Diana)**  **SDT, including MT-SDT and related TEI18** | **NR18 fCovEnh (Eswar)**  **7.21.1 Organizational**  **7.21.2 CP**  - Aim to treat all CP tdocs and RILs  **7.21.3 UP**  - RO mask issue  - Open as many UP docs as possible and determine if any offline(s) are needed until the CB session  **NR18 Mobile IAB (Johan)** | **NR18 SL (Kyeongin)** |  |
|  |  |
| **Tuesday April 16th** | | | | |
| 08:30 – 10:30 | **NR18 feMob (Johan)** | **NR18 eQoE (Dawid)**  7.14.1: LSin, RIL resolutions and rapp CR endorsement  7.14.2: RIL issues  7.14.3: Other corrections  **@09:00 NR18 MBS (Dawid):**  7.11.1: RIL resolutions and rapp CR endorsement  7.11.2: High priority ToDo RILs  7.11.3: Other corrections  **TEI18 MBS:**  7.24.2.2: MBS with eDRX/MICO, MBS and (e)RedCap  **If time allows:**  **NR18 MBS:**  7.11.2: Low priority ToDo RILs and non-RIL issues | **NR18 SL Relay (Nathan)**  As much as possible of:  [7.9.3] RRC (from open issues list/email report)  [7.9.4] SRAP  [7.9.6] RLC/PDCP  [7.9.7] UE capabilities  [7.9.8] Idle mode  [7.9.2] Stage 2 (if time) |  |
| 11:00 – 13:00 | **NR18 feMob con’t (Johan)**  **@12:00 NR18 XR (Diana)** | **NR18 eRedCap (Mattias)**  [7.19.1]  [7.19.2]  [7.19.3] | **NRLTE1516 Pos (Nathan)**  [5.3]  **NR17 Positioning and SL Relay (Nathan)**  [6.4] [6.2]  **NR18 Pos (Nathan)**  [7.2.1] LSs  [7.2.4] (continued from Monday if not sent offline)  [7.2.3] SLPP corrections (as time permits) |
| 14:30 -16:30 | **NR18 XR (Diana)** | **R18 NTN IoT (Sergio)**  [7.6.1]  [7.6.2]  [7.6.3] | **NR18 Pos (Nathan)**  [7.2.3] SLPP corrections (continued from morning)  [7.2.5] RRC corrections  [7.2.6] MAC corrections  [7.2.7] UE capabilities (as time permits)  [7.2.2] Stage 2 (as time permits) |  |
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| 17:00– 19:00 | **Rel-19 Ambient IoT [2] (Diana)** | **NR18 NR NTN enh (Sergio)**  [7.7.1]  [7.7.2]  [7.7.3]  [7.7.4]  [7.7.5] | **EUTRA&NR151617 (Mattias)**  As far as possible with:  [6.1.3.2] <- Note starting with this AI to treat intraband EN-DC early.  [4.1]  [4.1.1]  [5.1.1]  [5.1.1.1]  [5.1.3.1]  [5.1.3.2]  [6.1]  [6.1.1]  [6.1.3.1] |  |
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| **Wednesday April 17th** | | | | |
| 08:30 – 10:30 | **NR19 Network Energy Saving [1] (Kyeongin)** | **R18 NTN IoT CB (Sergio)**  [7.6.4]  [7.6.5]  **R19 IoT-NTN [0.5] (Sergio)**  [8.9.1]  [8.9.2]  [8.9.3] | **NR18 SONMDT (Mattias)**  [7.13.1]  [7.13.2]  [7.13.3]  **NR19 SONMDT [0.5] (Mattias)**  [8.10.1]  [8.10.2]  [8.10.4] |  |
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| 11:00 – 13:00 | **NR18 Other Diana** | **NR19 XR [1] (Dawid)** | **EUTRA&NR151617 (Mattias)**  Continue from Tuesday maintenance session. |  |
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| 14:30 – 16:30 | **AI/ML Mobility [1.5] (Diana)** | **@14:30-15:15 Rel-18 MUSIM /MIMO CBs**  Details TBD after Monday sessions  **@15:15-16:30 Rel-19 LP-WUS (Erlin)**  8.4.1  8.4.2  8.4.3 | **NR18 Pos (Nathan)**  Remaining agenda items after Tuesday sessions**TEI/POS (Nathan)**  Positioning and relay documents from:  [7.24.2.2] TEI RAN2  [7.24.1] TEI other groups  [7.25.3] Other |  |
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| 17:00 – 19:00 | **AI/ML PHY [1] (Diana)** | **NR19 feMob [1] (Kyeongin)** | **Positioning or SL offlines for Rel-18** |  |
| **Thursday April 18th** | | | | |
| 08:30 – 10:30 | **CB Eswar [8:30 – 9:30]**  **CB Diana Pani XR/NES** | **R18 NTN IoT CB (Sergio)**  - report of [303]  - other issues marked CB Thursday  **NR18 NR NTN CB (Sergio)**  - report of [305]  - other issues marked CB Thursday  - 7.7.4  - 7.7.5 | CB Kyeongin  Comebacks SL |  |
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| 11:00 – 13:00 | **Rel-19 Ambient IoT [2] (Diana)** | **Rel-19 NTN NR [1] (Sergio)**  [8.8.1]  [8.8.2]  [8.8.4]  [8.8.5]  [8.8.6] | CB Dawid:  - QoE  - MBS  - MBS TEI18 |  |
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| 14:30 – 16:30 | **NR18 Other (Diana)**  **TEI18** | CB Johan  - mIAB  - feMob | CB Nathan |  |
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| 17:00 – 19:00 | **CB Diana**  **[R18 NES]**  **[R18 UAV]**  **18:00-19:00 AI/ML Mobilitly (Diana)** | TBD Kyeongin/Johan/Erlin? | CB Nathan |  |
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| **Friday April 19th** | | | | |
| 08:30 – 10:30 | CB Diana ASN.1 Review common session  TEI 18 CBs  NR Others CBs | CB Erlin/Kyeongin TDB | CB Mattias |  |
| 11:00 – 13:00 | CB Diana | **NR18 NR NTN CB (Sergio) (11:00-12:00)**  - report of [306]  - other issues marked CB Friday | CB Nathan |
| 14:30 – 16:00 |  |  |  |
| 16:00 – 17:00 |  |  |  |  |

List and details of [AT125bis] offline discussions

NOTE: No offline email discussions will be kicked off before Monday Apr 15th, 09:00 local time

* [AT125bis][301][IoT NTN Enh] Preliminary RILs checking (Huawei)

Scope: Allow checking the PropAgree and PropReject RILs in [R2-2403221](file:///C:\Data\3GPP\Extracts\R2-2403221%20CR%2036.321%20R18%20IoT%20NTN.docx), if needed, before the online discussion. No technical discussion is expected to happen via email: disagreeing companies are invited to discuss F2F with the WI RRC rapporteur before the online session.

Intended outcome: Updated RILs list (if needed)

Deadline for rapporteur's summary in R2-2403761: Tuesday 2024-04-16 13:00

* [AT125bis][302][NR NTN Enh] Preliminary RILs checking (Ericsson)

Scope: Allow checking the PropAgree and PropReject RILs in [R2-2403633](file:///C:\Data\3GPP\Extracts\R2-2403633%20-%20Rapporteur%20input%20R18%20NR%20NTN%20RRC%20RIL.docx), if needed, before the online discussion. No technical discussion is expected to happen via email: disagreeing companies are invited to discuss F2F with the WI RRC rapporteur before the online session.

Intended outcome: Updated RILs list (if needed)

Deadline for rapporteur's summary in R2-2403762: Tuesday 2024-04-16 13:00

* [AT125bis][303][IoT NTN Enh] Open issues on GNSS enhancements (Nokia)

Scope: Discuss the proposals in [R2-2403480](file:///C:\Data\3GPP\Extracts\R2-2403480%20Further%20discussion%20on%20stage-2%20open%20issues%20for%20IoT%20NTN.docx) (and possible counter-proposals from other companies on the same issues)

Intended outcome: Report of the offline discussion

Deadline for rapporteur's summary (in [R2-2403764](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403764.zip)): Wednesday 2024-04-17 22:00

* [AT125bis][304][NR NTN Enh] LS to RAN4 on reference point (Apple)

Scope: Draft an LS to RAN4 on on reference point for SSB-TimeOffset

Intended outcome: Agreeable LS

Deadline for draft LS (in R2-2403765): Friday 2024-04-19 08:00

* [AT125bis][305][NR NTN Enh] PDCCH order during satellite switch (Samsung)

Scope: Discuss the proposals p3 and p4 in [R2-2402800](file:///C:\Data\3GPP\Extracts\R2-2402800%20RIL%20S486,%20V500,%20V501,%20H063.docx)

Intended outcome: Report of the offline discussion

Deadline for rapporteur's summary (in [R2-2403766](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403766.zip)): Wednesday 2024-04-17 22:00 (if F2F offline is possible on Wednesday, otherwise Friday 2024-04-19 08:00)

* [AT125bis][306][NR NTN Enh] Corrections on (cond)EventD2 (Ericsson)

Scope: Discuss the proposal in [R2-2402882](file:///C:\Data\3GPP\Extracts\R2-2402882_NR%20NTN%20ReportConfig.doc) (and corresponding ones from other companies on the same issue)

Intended outcome: Report of the offline discussion

Deadline for rapporteur's summary (in R2-2403767): Wednesday 2024-04-17 22:00 (if F2F offline is possible on Wednesday, otherwise Friday 2024-04-19 08:00)

## 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: 3 tdocs

### 7.6.1 Organizational

LSs, rapporteur inputs and other organizational documents.

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 and other pre-assigned documents in this AI do not count towards the tdoc limitation.

Incoming LSs

[R2-2402120](file:///C:\Data\3GPP\Extracts\R2-2402120_R1-2401824.docx) LS on Rel-18 RAN1 UE features list for LTE after RAN1#116 (R1-2401824; contact: NTT DOCOMO, AT&T) RAN1 LS in Rel-18 IoT\_NTN\_enh To:RAN2 Cc:RAN4

* Ericsson indicates that RAN1 is discussing whether they are ok with the implementation of two capabilities (for HARQ and GNSS) that we implemented differently
* Noted

[R2-2402143](file:///C:\Data\3GPP\Extracts\R2-2402143_S2-2403851.docx) Reply LS on UE Location Information for NB-IoT NTN (S2-2403851; contact: Qualcomm) SA2 LS in Rel-18 IoT\_NTN\_enh To:RAN2, CT1, RAN3 Cc:SA1, SA3-LI

* Noted

[R2-2402187](file:///C:\Data\3GPP\Extracts\R2-2402187%20UE%20Location%20Information%20for%20NB-IoT%20NTN.doc) Discussion on SA2 and CT1 reply LS on UE Location Information for NB-IoT NTN OPPO discussion Rel-18 IoT\_NTN\_enh-Core

RAN2 agree that it is useful for MME to further signal the coarse location information received from the UE in NAS back to eNB. RAN2 can reply to SA2 with this.

[R2-2402771](file:///C:\Data\3GPP\Extracts\R2-2402771%20Discussion%20on%20the%20need%20for%20eNB%20to%20get%20UE%20location%20information%20from%20MME.docx) Discussion on the need for eNB to get UE location information from MME Huawei, HiSilicon discussion Rel-18 IoT\_NTN\_enh-Core

There is no need for the MME to signal back the UE’s coarse location to eNB, and for the eNB to report any updated ULI to the MME.

[R2-2402888](file:///C:\Data\3GPP\Extracts\R2-2402888_Discussion%20on%20LS.doc) Discussion on LS about UE Location Information for NB-IoT NTN Apple discussion Rel-18 IoT\_NTN\_enh-Core

Proposal: Send a response LS to SA2 that MME does not need to signal the coarse location information to eNB.

[R2-2402813](file:///C:\Data\3GPP\Extracts\R2-2402813%20NB-IoT%20UE%20location.doc) Discussion on reply LS on UE Location Information for NB-IoT NTN Qualcomm Incorporated discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1 Send LS reply that it is useful for MME to further signal the coarse location information received from the UE in NAS back to eNB. Draft LS reply is provided in [2].

* Nokia agrees it would be useful to have the coarse UE location information at the RAN side.
* Ericsson thinks this would be an optimization
* Vivo thinks we could say it’s useful
* Send a reply LS saying that, for RAN2 perspective, even if not essential it may be useful for the eNB if the MME furthers signal the coarse location information received from the UE in NAS back to eNB. RAN2 thinks that whether further information can be fed back to the MME based on the received coarse location information from the MME is up to RAN3 to decide.

[R2-2402814](file:///C:\Data\3GPP\Extracts\R2-2402814%20Draft%20LS%20reply%20UE%20location.docx) [Draft] Reply LS on UE Location Information for NB-IoT NTN Qualcomm Incorporated LS out Rel-18 IoT\_NTN\_enh-Core To:SA2, RAN3

* Revised in R2-2403763

[R2-2403763](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403763.zip) [Draft] Reply LS on UE Location Information for NB-IoT NTN Qualcomm Incorporated LS out Rel-18 IoT\_NTN\_enh-Core To:SA2, RAN3

* Remove the last sentence “RAN2 thinks that whether further information can be fed back to the MME based on the received coarse location information from the MME is up to RAN3 to decide.”
* Revised in R2-2403770

[R2-2403770](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403770.zip) Reply LS on UE Location Information for NB-IoT NTN Qualcomm Incorporated LS out Rel-18 IoT\_NTN\_enh-Core To:SA2, RAN3

* Approved (unseen)

Rapporteur inputs

[R2-2403210](file:///C:\Data\3GPP\Extracts\R2-2403210%20Corrections%20to%20IoT%20NTN.docx) Corrections to IOT NTN Huawei, HiSilicon CR Rel-18 36.331 18.1.0 5011 - F IoT\_NTN\_enh-Core Late

[R2-2403211](file:///C:\Data\3GPP\RAN2\Docs\R2-2403211.zip) IOT NTN ASN1 RIL List Huawei, HiSilicon report Rel-18 IoT\_NTN\_enh-Core Late

* [AT125bis][301][IoT NTN Enh] Preliminary RILs checking (Huawei)

Scope: Allow checking the PropAgree and PropReject RILs in [R2-2403221](file:///C:\Data\3GPP\Extracts\R2-2403221%20CR%2036.321%20R18%20IoT%20NTN.docx), if needed, before the online discussion. No technical discussion is expected to happen via email: disagreeing companies are invited to discuss F2F with the WI RRC rapporteur before the online session.

Intended outcome: Updated RILs list (if needed)

Deadline for rapporteur's summary in [R2-2403761](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403761.zip): Tuesday 2024-04-16 13:00

[R2-2403761](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403761.zip) Updated IOT NTN ASN1 RIL List Huawei, HiSilicon report Rel-18 IoT\_NTN\_enh-Core

Proposal: Except for C654/E803/E804/K001, the PropAgree/PropReject/ToDo states in R2-2403211 are confirmed.

* For E803/E804 Huawei, QC and Samsung think we should stick to previous agreements.
* E803 and E804 are rejected
* Except for C654/K001, the PropAgree/PropReject/ToDo states in R2-2403211 are confirmed.

[R2-2403630](file:///C:\Data\3GPP\Extracts\R2-2403630%20-%20R18%20IoT%20NTN%20stage%202%20remaining%20issues.docx) R18 IoT NTN stage 2 remaining issues Ericsson discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1 The behaviour at failed GNSS acquisition is not further discussed.

Proposal 2 The behaviour for autonomous GNSS acquisition in C-DRX inactive time is not further discussed.

Proposal 3 Triggering of GNSS remaining validity duration report after autonomous GNSS acquisition in C-DRX inactive time is not further discussed.

Proposal 4 There is no need to update Feeder link and Service link definitions.

Proposal 5 First time Kmac is introduced, it is explained to be the RRC parameter k-Mac, and only Kmac is used in stage 2.

* In Stage 2 we use the term Kmac saying it refers to the RRC parameter k-Mac
* Vivo thinks we shouls aling this for both 36.300 and 38.300

Proposal 6 Figure 23.21.2.1-1 is updated as above.

* Agreed

Proposal 7 In 36.300 23.21.4.3 Measurements, consider adding this (same as in NR NTN): “The time-based measurement initiation may be applicable for the feeder link switchover case for cell (re)selection.”

* Agreed

### 7.6.2 Stage 2 corrections

[R2-2402772](C:\\Data\\3GPP\\Extracts\\R2-2402772 Correction to Stage 2 on IoT NTN.docx" \o "C:\Data\3GPP\Extracts\R2-2402772 Correction to Stage 2 on IoT NTN.docx) Correction to Stage 2 on IoT NTN Huawei, HiSilicon CR Rel-18 36.300 18.1.0 1400 - F IoT\_NTN\_enh-Core

* Regarding the first change, Samsung wonders if we should refer to hard satellite switch for IoT-NTN. HW thinks this couls also be the case for IoT-NTN. Oppo thinks this could be too detailed for Stage 2. HW indicates the same wording is used for NR NTN
* Second change is endorsed
* Can come back in future meetings regarding the first change

[R2-2403480](file:///C:\Data\3GPP\Extracts\R2-2403480%20Further%20discussion%20on%20stage-2%20open%20issues%20for%20IoT%20NTN.docx) Further discussion on stage-2 open issues for IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: The GNSS Measurement Command MAC Control Element can indicate whether the UE shall move to RRC Idle or can stay RRC Connected if the GNSS measurement fails during the triggered GNSS measurement gap.

Proposal 1a: For GNSS measurement triggered by the network, the UE shall move directly to RRC idle mode after the end of the GNSS measurement gap if the UE failed to re-acquire the GNSS position, independently of the GNSS position status.

* MTK and Ericsson supports 1a. Nokia thinks that 1a would be enough.
* Google thinks this puts extra constraints on the UE and then it would be very hard to test.
* Oppo thinks this would lead to worse performance than in Rel-17
* Google thinks that the NW could release the UE in case it sees issues.
* Continue in offline 303 (Nokia)

Alternative proposals from R2-2402773):

Proposal 2a: For the network triggered GNSS measurement, upon the measurement failure, the UE doesn’t enter RRC\_IDLE in case the GNSS position is valid or the uplink transmission extension is active. (No spec change)

* Google and Oppo support this proposal
* Samsung thinks the UE should at least report the failure case

Proposal 2b: RAN2 to confirm once GNSS measurement fails, regardless of which kind of GNSS measurement it is, UE will go to RRC IDLE if the GNSS position is outdated and uplink transmission extension is not active. (No spec change)

Proposal 2: For autonomous GNSS acquisition, if the GNSS measurement fails the UE always moves to RRC Idle upon the end of autonomous GNSS measurement timer, except the measurement is triggered autonomously by the UE during C-DRX inactive time.

Proposal 3: For autonomous GNSS acquisition in C-DRX inactive time, the UE shall move to RRC idle mode if either of below conditions is met:

1) the GNSS position is outdated and uplink transmission extension is not active, or

2) the UL transmission extension period is expired.

* Continue in offline 303 (Nokia)

Proposal 4: UE implementation can determine whether to report the remaining GNSS validity duration based on the presence of ‘gnss-PositionFixDurationReporting-r18’ in SIB2.

* Continue in offline 303 (Nokia)

Proposal 5: RAN2 can discuss whether the condition based on ‘gnss-PositionFixDurationReporting-r18’ to report the remaining GNSS validity duration shall be captured in specification.

* Continue in offline 303 (Nokia)
* [AT125bis][303][IoT NTN Enh] Open issues on GNSS enhancements (Nokia)

Scope: Discuss the proposals in [R2-2403480](file:///C:\Data\3GPP\Extracts\R2-2403480%20Further%20discussion%20on%20stage-2%20open%20issues%20for%20IoT%20NTN.docx) (and possible counter-proposals from other companies on the same issues)

Intended outcome: Report of the offline discussion

Deadline for rapporteur's summary (in [R2-2403764](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403764.zip)): Wednesday 2024-04-17 22:00

[R2-2403764](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403764.zip) Summary of [AT125bis][303][IoT NTN Enh] Open issues on GNSS enhancements Nokia discussion Rel-18 IoT\_NTN\_enh-Core

Easy agreements:

Proposal 2: (12/12) For autonomous GNSS acquisition, if the GNSS measurement fails the UE always moves to RRC Idle upon the end of autonomous GNSS measurement gap, except the measurement is triggered autonomously by the UE during C-DRX inactive time.

* Agreed

Proposal 4: (10:1) Following current specification to decide whether UE can remain in RRC\_CONNECTED when the GNSS position becomes outdated in a c-DRX inactive state. (no spec impact)

* Agreed

Proposal 5: (10/11) UE shall not report the GNSS validity duration report MAC CE to a release 17 serving cell.

* Oppo thinks this has no spec impact
* UE shall not report the GNSS validity duration report MAC CE to a serving cell not supporting this feature. The UE identifies when a serving cell does not support this feature (and then the UE shall not send the MAC CE) based on configuration (no spec impact)

Discuss online:

Observation 1: (9:1) RAN2 understands Option1 listed below is aligned with RAN1 agreement on how to handle NW-triggered GNSS measurement failure.

Option1: For GNSS measurement triggered by the network, the UE shall move directly to RRC idle mode after the end of the GNSS measurement gap if the UE failed to re-acquire the GNSS position, independently of the GNSS position status.

Proposal 1: RAN2 discuss UE behaviour when network-triggered GNSS measurement fails, with below three options on table:

Option1 (7): For GNSS measurement triggered by the network, the UE shall move directly to RRC idle mode after the end of the GNSS measurement gap if the UE failed to re-acquire the GNSS position, independently of the GNSS position status.

Option2(5): if UE fails to conduct the GNSS position fix in an aperiodic GNSS measurement gap, the UE can still remain in RRC\_CONNECTED until [X + GNSS validity duration] expires.

* We go for option 2

Option3 (2): The network indicates whether the UE shall move to RRC Idle or can stay RRC Connected if the GNSS measurement fails during the network-triggered GNSS measurement gap.

Proposal 3: RAN2 discuss whether UE can try autonomous GNSS measurement again if the autonomous GNSS acquisition in C-DRX inactive time fails.

Option 1 (8): Upon failure of autonomous GNSS acquisition in C-DRX inactive time, after GNSS position is outdated and uplink transmission extension is not active, the UE can still try autonomous GNSS measurement (if configured by the network).

* We go for option 1 (no spec change)

Option 2 (3): Upon failure of autonomous GNSS acquisition in C-DRX inactive time, after GNSS position is outdated and uplink transmission extension is not active, there is no need for the UE to try autonomous GNSS measurement again.

[R2-2402213](file:///C:\Data\3GPP\Extracts\R2-2402213%20Discussion%20on%20Autonomous%20GNSS%20Fix%20in%20C-DRX%20Inactive%20Time.docx) Discussion on Autonomous GNSS Fix in C-DRX Inactive Time vivo discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: RAN2 confirms UE will trigger GNSS remaining validity duration report after autonomous GNSS acquisition in C-DRX inactive time when the UE is communicating in a network not supporting releases later than Release 17. No spec change is needed.

Proposal 2: It is up to network implementation to release a UE before the time point that the network assumes UE’s GNSS remaining validity duration expiry.

[R2-2402373](file:///C:\Data\3GPP\Extracts\R2-2402373_Open_Issues_wrt_GNSS_Operation.docx) Open issues with regards to GNSS operation PANASONIC R&D Center Germany discussion

Proposal 1: It shall be up to the UE how it defines GNSS validity duration and up to the network how many attempts towards GNSS acquisition it triggers prior to the expiration of the GNSS validity duration. So the answer to the question asked is NO. Text of clause 23.21.2.2 in TS 36.300 V18.1.0 needs to be adjusted correspondingly.

Proposal 2: Adjust existing definition in TS 36.300 V18.1.0, clause 23.21.2.2, in a way that applying GNSS acquisition trials do not function as GNSS validity duration extensions.

Proposal 3: Amend the existing specification TS 36.300 V18.1.0, clause 23.21.2.2, in a way that the rule making up the boxed question above is integrated.

Agreements:

1. For autonomous GNSS acquisition, if the GNSS measurement fails the UE always moves to RRC Idle upon the end of autonomous GNSS measurement gap, except the measurement is triggered autonomously by the UE during C-DRX inactive time.
2. Following current specification to decide whether UE can remain in RRC\_CONNECTED when the GNSS position becomes outdated in a c-DRX inactive state. (no spec impact)
3. UE shall not report the GNSS validity duration report MAC CE to a serving cell not supporting this feature. The UE identifies when a serving cell does not support this feature (and then the UE shall not send the MAC CE) based on configuration (no spec impact)
4. if UE fails to conduct the GNSS position fix in an aperiodic GNSS measurement gap, the UE can still remain in RRC\_CONNECTED until [X + GNSS validity duration] expires.
5. Upon failure of autonomous GNSS acquisition in C-DRX inactive time, after GNSS position is outdated and uplink transmission extension is not active, the UE can still try autonomous GNSS measurement (if configured by the network).

### 7.6.3 RRC Corrections

[V510] (Marked PropAgree)

[R2-2402214](file:///C:\Data\3GPP\Extracts\R2-2402214_CR5002_36331%20%5bV510%5d%20Correction%20on%20GNSS%20Measurement%20Failure.docx) [V510] Correction on GNSS Measurement Failure vivo CR Rel-18 36.331 18.1.0 5002 - F IoT\_NTN\_enh-Core

* HW indicates this is already captured in the rapporteur CR
* Not Pursued

[K001] (Marked PropAgree)

[R2-2402584](file:///C:\Data\3GPP\Extracts\R2-2402584%20%5bK001%5d%20Discussion%20on%20T317%20expiry%20during%20GNSS%20measurement.docx) [K001] Discussion on T317 expiry during GNSS measurement ASUSTeK discussion Rel-18 36.331 IoT\_NTN\_enh-Core

Proposal 1: [K001] Consider T317 expiry upon receiving indication that GNSS becomes valid if timer T317 expires during GNSS measurement. Adopt the TP as above..

* HW indicates this is already captured in the rapporteur CR. ASUSTeK agrees with that.
* QC thinks the current text is fine but is ok to further check offline.
* Not Pursued
* Remove the changes on informing lower layers of UL sync loss upon T317 expiry from the latest rapporteur CR

[C651] (Marked ToDo)

[C652] (Marked PropReject)

[C653] (Marked PropAgree)

[C654] (Marked PropAgree)

[R2-2402913](file:///C:\Data\3GPP\Extracts\R2-2402913%20%5bC651%5d%5bC652%5d%5bC653%5d%5bC654%5d%20Corrections%20on%20Event%20D1,%20Event%20D2%20and%20condEvent%20D2.docx) [C651][C652][C653][C654] Corrections on Event D1, Event D2 and condEvent D2 CATT discussion

Proposal 1 [C651]: Support the configuration of reportOnLeave for Event D1 and Event D2 in ReportConfigEUTRA and specify the corresponding procedure.

* HW supports this
* Agreed

Proposal 2 [C652]: Clarify in the Spec that when hysteresisLocation is configured UE shall ignore hysteresis.

Proposal 3 [C653]: E-UTRAN does not configure useAllowedCellList for Event D1 and Event D2. Clarify this in the field description.

Proposal 4 [C654]: Remove the field cellForWhichToTriggerD2 in condEvent D2 and related descriptions.

* Discuss in the NR NTN session and attempt to align between IoT NTN and NR NTN

Proposal 5: Adopt the TP in Annex A.

[H004] (Marked ToDo)

[R2-2403491](file:///C:\Data\3GPP\Extracts\R2-2403491%20%5bH004%5d%20Addition%20of%20polarization%20parameters.docx) [H004] Addition of polarization parameters Huawei, HiSilicon discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: Add polarization information to measObjectEUTRA and SIB33.

* Ericsson thinks this is not needed for IoT NTN and a 3dB budget loss was already considered to take this into account. MTK agrees
* QC thinks could be useful and suggests to send a LS to RAN4
* MTK thinks this is not a correction but an optimization and we don’t need this. Nokia agrees
* We don’t add polarization information to measObjectEUTRA and SIB31/SIB33 unless explicitly requested (no LS is sent). We also don’t introduce this change for R17

Proposal 2: Adopt the TP in the Annex.

[S066] (Marked PropAgree)

[S067] (Marked ToDo)

[S068] (Marked ToDo)

[R2-2403335](file:///C:\Data\3GPP\Extracts\R2-2403335%20Various%20RRC%20corrections%20for%20IoT%20NTN%20including%20%5bS066%5d%5bS067%5d%5bS068%5d.docx) Various RRC connection for IoT NTN including [S066][S067][S068] Samsung discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: Agree [S066] – remove extension field “...” from NeighSatelliteInfo.

* Agreed

Proposal 2: [067] is agreed – T390 is stopped upon RRC re-establishment initiation.

* Apple agrees for the re-establishment case, not sure about the HO case. ZTE agrees
* Update the specification to ensure that T390 is stopped upon RRC re-establishment initiation

Proposal 3: [068] is agreed – T390 is stopped upon starting handover.

* Google thinks is related to whether the UE performs GNSS measurements during HO.
* Nokia agrees that stopping the timer is the clean solution, especially in the re-establishment case
* Further check this offline
* We come back to this in the next meeting, also considering the CHO case

[X041] (Marked ToDo)

[X042] (Marked ToDo)

[R2-2403717](file:///C:\Data\3GPP\Extracts\R2-2403717%20%5bX041%5d%5bX042%5d%20Correction%20on%20GNSS%20operation%20enhancement.doc) [X041][X042] Correction on GNSS operation enhancement Beijing Xiaomi Mobile Software discussion Rel-18

[X041] revise the wording “GNSS becomes valid” to “GNSS position is fixed” or “GNSS position is updated”.

* QC supports this change
* revise the wording “GNSS becomes valid” to “…. new GNSS position becomes valid” (actual wording can be further checked offline).

[X042] Clarify in field description of gnss-AutonomousEnabled that it is only applicable to autonomous GNSS measurement during autonomous gap. And introduce capability signalling to indicate the support of autonomous GNSS measurement during inactive period of C-DRX.

* ZTE disagrees. Vivo agrees.
* Oppo is fine with the first part, not with the second
* Samsung agrees with the proposal. CATT also agrees
* Apple thinks that in any case this would remain a best effort task for the UE. Oppo thinks that in any case a simple capability reporting would not be sufficient. QC agrees. HW also agrees
* We don’t introduce capability signalling to indicate the support of autonomous GNSS measurement during inactive period of C-DRX.
* We clarify in field description of gnss-AutonomousEnabled that it is only applicable to autonomous GNSS measurement during autonomous gap

[E801] (Marked ToDo)

[R2-2403723](file:///C:\Data\3GPP\Extracts\R2-2403723%20-%20%5bE801%5d%20Satellite%20assistance%20information%20for%20event%20D2.docx) [E801] Satellite assistance information for event D2 Ericsson discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1 RAN2 to discuss whether event D2 is cell or satellite specific.

Proposal 2 For eventD2/condEventD2 satellite assistance information is included in ReportConfig, outside the event type. This solution applies to both NR and IoT NTN.

Proposal 3 Adopt the Text Proposal in Section 3 as a baseline.

[N021] (Marked ToDo)

[R2-2403481](file:///C:\Data\3GPP\Extracts\R2-2403481%20Remaining%20issue%20on%20gap%20length%20for%20autonomous%20GNSS%20measurement.docx) Remaining issue on gap length for autonomous GNSS measurement Nokia, Nokia Shanghai Bell discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: eNB can indicate the supported GNSS measurement gap length(s) for autonomous GNSS measurement.

* HW thinks this would add extra flexibility which is not needed. Ericsson agrees with HW

Proposal 2: The supported GNSS measurement gap length(s) can be indicated by NW in UE-specific RRC message (e.g., RRCConnectionSetup).

Proposal 3: UE shall report the GNSS position fix duration among the gap length values supported by network.

[R2-2402185](file:///C:\Data\3GPP\Extracts\R2-2402185%20extending%20scenarios%20for%20t-service.doc) Extending scenarios for t-service OPPO discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1 T-service is also broadcasted for earth moving cells.

Proposal 2 Adopt the following TP for t-service’s field description.

* IDC agrees
* T-service can also be broadcasted for earth moving cells.

[R2-2402203](file:///C:\Data\3GPP\Extracts\R2-2402203%20-%20Correction%20to%2036.331%20for%20IoT%20NTN.doc) Correction to 36.331 for IoT NTN OPPO CR Rel-18 36.331 18.1.0 4999 - F IoT\_NTN\_enh-Core

* Endorsed (to be merged in the rapporteur CR)

[R2-2402383](file:///C:\Data\3GPP\Extracts\R2-2402383%20RRC%20corrections%20on%20T390%20and%20MO%20for%20IoT%20NTN.docx) RRC corrections on T390 and MO for IoT NTN ZTE Corporation, Sanechips CR Rel-18 36.331 18.1.0 5001 - F IoT\_NTN\_enh-Core

* Samsung and Oppo think we deliberately decided to add this to dedicated signalling for moving cells. Nokia agrees
* ZTE thinks there is a difference between IoT NTN and NR NTN due to the presence of Satellite IDs
* HW thinks we can remove at least the Satellite ID. Samsung disagrees but thinks we can revisit and only leave the Epoch time in dedicated signalling but remove ephemeris. Oppo thinks this does not work as Epoch time comes with ephemeris
* Ericsson thinks that the overhead is big but still negligible with respect to the reconfiguration message
* Not pursued (can come back to the second issue in the next meeting)

GNSS operation enhancements

[R2-2402773](file:///C:\Data\3GPP\Extracts\R2-2402773%20Remaining%20issues%20on%20GNSS%20operation%20enhancements.docx) Remaining issues on GNSS operation enhancements Huawei, HiSilicon discussion Rel-18 IoT\_NTN\_enh-Core

* Value reset of T390

Proposal 1: RAN2 to agree Alt-1a and send a reply LS to RAN1.

- ZTE thinks we should go for a fized value but it could be the Y value

- MTK supports 1a and don’t think we should introduce a new option. Nokia agrees

- Oppo prefers option 1. Google agrees. Vivo agres

- Ericsson thinks that Alt1 adds extra complexity to the UE and could be avoided. HW agrees. ZTE also agrees and can compromise to 1a.

* We go for Alt 1a. Send a LS back to RAN1 accordingly in R2-2403765
* Clarification of UE behaviours related to GNSS acquisition

Proposal 2a: For the network triggered GNSS measurement, upon the measurement failure, the UE doesn’t enter RRC\_IDLE in case the GNSS position is valid or the uplink transmission extension is active. (No spec change)

Proposal 2b: RAN2 to confirm once GNSS measurement fails, regardless of which kind of GNSS measurement it is, UE will go to RRC IDLE if the GNSS position is outdated and uplink transmission extension is not active. (No spec change)

Proposal 2c: RAN2 to confirm that upon outdated GNSS position the UE doesn’t enter RRC\_IDLE if GNSS acquisition is being performed, regardless of which kind of GNSS acquisition is ongoing.

* GNSS remaining validity duration report to legacy eNB

Proposal 3: No special handling is needed regarding GNSS remaining validity duration report to the legacy eNB.

* Impact on TA report

Proposal 4: Before sending the TA report triggered during the GNSS measurement gap, the triggering condition should be re-evaluated after the GNSS measurement gap.

[R2-2403765](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403765.zip) Reply LS on improved GNSS operations in Rel-18 IoT NTN Huawei LS out Rel-18 IoT\_NTN\_enh-Core To:RAN1

* Approved

[R2-2402186](file:///C:\Data\3GPP\Extracts\R2-2402186%20GNSS%20operation.doc) Discussion on GNSS operation for IoT NTN OPPO discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2402705](file:///C:\Data\3GPP\Extracts\R2-2402705%20Discussion%20on%20IOT%20NTN%20GNSS%20operation%20enhancement%20related%20open%20issues.doc) Discussion on IOT NTN GNSS operation enhancement related open issues Xiaomi discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2403081](file:///C:\Data\3GPP\Extracts\R2-2403081%20Remaining%20issues%20on%20the%20GNSS%20Opeartion%20Enhancements.docx) Remaining Issues on the GNSS Operation Enhancements Google Inc. discussion Rel-18

On satellite assistance information

[R2-2402908](file:///C:\Data\3GPP\Extracts\R2-2402908%20On%20the%20necessity%20of%20satellite%20assistance%20information%20for%20measurement%20in%20IoT%20NTN.docx) On the necessity of satellite assistance information for measurement in IoT NTN CATT discussion

### 7.6.4 MAC corrections

[R2-2403220](C:\\Data\\3GPP\\Extracts\\R2-2403220 R18 IoT NTN MAC Issue.docx" \o "C:\Data\3GPP\Extracts\R2-2403220 R18 IoT NTN MAC Issue.docx) Discussion on remaining MAC issues for Rel-18 IoT NTN MediaTek Inc. discussion IoT\_NTN\_enh-Core

Proposal 1: When timeAlignmentTimer is not infinity, T390 is reset with length equal to configured timeAlignmentTimer value when receiving the UL Transmission Extension Update MAC CE.

Proposal 2: For single TB scheduled by DCI, for a HARQ process configured as HARQ feedback disabled by RRC and further reversed to HARQ feedback enabled by DCI, NB-IoT UE behaviour on DRX follows the case when HARQ feedback is disabled.

* Agreed (clarification of a previous agreement for single TB)

Proposal 3: For multiple TBs scheduled by DCI, for a HARQ process configured as HARQ feedback disabled by RRC and further reversed to HARQ feedback enabled by DCI, NB-IoT UE behaviour on DRX follows the case when HARQ feedback is enabled.

* Agreed

Proposal 4: For NB-IoT, when multiple TBs are scheduled by PDCCH for the non-interleaved case or for the interleaved case when HARQ-ACK bundling is not configured, RAN2 does not change the HARQ RTT timer.

* Agreed (no spec change)

Agreements:

1. For single TB scheduled by DCI, for a HARQ process configured as HARQ feedback disabled by RRC and further reversed to HARQ feedback enabled by DCI, NB-IoT UE behaviour on DRX follows the case when HARQ feedback is disabled (clarification of a previous agreement)
2. For multiple TBs scheduled by DCI, for a HARQ process configured as HARQ feedback disabled by RRC and further reversed to HARQ feedback enabled by DCI, NB-IoT UE behaviour on DRX follows the case when HARQ feedback is enabled.
3. For NB-IoT, when multiple TBs are scheduled by PDCCH for the non-interleaved case or for the interleaved case when HARQ-ACK bundling is not configured, RAN2 does not change the HARQ RTT timer (no spec change)

[R2-2403482](file:///C:\Data\3GPP\Extracts\R2-2403482%20On%20MAC%20open%20issues%20for%20IoT%20NTN.docx) On MAC open issues for IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: When UL Transmission Extension Update MAC CE is received, the T390 restarts with a timer value equal to the configured TAT time length.

Proposal 2: If UL Transmission Extension is enabled, upon original GNSS validity duration expires the T390 starts with a timer value equal to the configured TAT time length.

Proposal 3: For single TB scheduling case in NB-IoT: for a HARQ process configured as HARQ feedback disabled by RRC and further reversed to HARQ feedback enabled by DCI, UE behavior on DRX follows the case when HARQ feedback is disabled.

Proposal 4: For multiple TB scheduling case in NB-IoT: for HARQ process(es) configured as HARQ feedback disabled by RRC and further reversed to HARQ feedback enabled by DCI, UE behavior on DRX follows the case when HARQ feedback is enabled.

[R2-2402204](file:///C:\Data\3GPP\Extracts\R2-2402204%20-%20Discussion%20on%20remaining%20issue%20on%20GNSS%20validity%20duration%20reporting.doc) Discussion on remaining issue on GNSS validity duration reporting OPPO discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1 If a GNSS Validity Duration Report MAC MAC CE is included in a MAC PDU for Msg3 transmission, all triggered GNSS validity duration reports shall be cancelled when the Random Access procedure is successfully completed.

- after further discussion Ericsson does not support the proposal

- Nokia thinks this is not needed

- QC thinks we don’t need to have specific clarification for Random Access procedure. Vivo agrees that in case this should apply to other similar cases, like for BSR

- MTK thinks this would be an over-specification

[R2-2402215](file:///C:\Data\3GPP\Extracts\R2-2402215%20Discussion%20on%20MAC%20Remaining%20Issues.docx) Discussion on MAC Remaining Issues vivo discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2402704](file:///C:\Data\3GPP\Extracts\R2-2402704%20Discussion%20on%20issue%20related%20to%20UL%20Transmission%20Extension%20Update%20MAC%20Control%20Element.doc) Discussion on issue related to UL Transmission Extension Update MAC Control Element Xiaomi discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2403631](file:///C:\Data\3GPP\Extracts\R2-2403631%20-%20R18%20IoT%20NTN%20GNSS%20extension.docx) R18 IoT NTN GNSS extension Ericsson discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2403221](file:///C:\Data\3GPP\Extracts\R2-2403221%20CR%2036.321%20R18%20IoT%20NTN.docx) Corrections on UE behaviour on DRX for IoT NTN MediaTek CR Rel-18 36.321 18.1.0 1585 - F IoT\_NTN\_enh-Core

- MTK indicated this reflects the proposals in R2-2402204

- QC would like to further check the details

* Continue the discussion in the Post125bis email discussion

Withdrawn

R2-2402384 MAC corrections to IoT NTN ZTE Corporation, Sanechips CR Rel-18 36.321 18.1.0 1584 - F IoT\_NTN\_enh-Core Withdrawn

### 7.6.5 Corrections to other specs

Corrections to other affected specs, including corrections on UE capabilities

Corrections on issues affecting multiple Stage 3 specs (e.g. RRC and MAC) can also be submitted here

[R2-2403152](C:\\Data\\3GPP\\Extracts\\R2-2403152.docx" \o "C:\Data\3GPP\Extracts\R2-2403152.docx) Miscellaneous correction for IoT-NTN Nokia CR Rel-18 36.304 18.1.0 0873 - F IoT\_NTN\_enh-Core

* Change is endorsed
* Revised in R2-2403768 to include agreements from R2-2402385 and R2-2402915

[R2-2403768](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403768.zip) Miscellaneous correction for IoT-NTN Nokia CR Rel-18 36.304 18.1.0 0873 1 F IoT\_NTN\_enh-Core

* In-principle agreed (unseen)

[R2-2402385](file:///C:\Data\3GPP\Extracts\R2-2402385%2036.304_Corrections%20to%20idle%20mode%20measurement%20for%20IoT%20NTN.docx) Corrections to idle mode measurement for IoT NTN ZTE Corporation, Sanechips CR Rel-18 36.304 18.1.0 0874 - F IoT\_NTN\_enh-Core

- QC and Samsung would like to skip the first change (keep the existing text), which is also there since R17

* First change is not pursued
* Changes in the second part are endorsed

[R2-2402915](file:///C:\Data\3GPP\Extracts\R2-2402915%20Corrections%20on%20Location-based%20Measurement%20Initiation%20in%20TS36.304.docx) Corrections on Location-based Measurement Initiation in TS 36.304 CATT discussion

Proposal 1: For the location-based measurement initiation procedure, change the conditions “If the distance between the UE and the serving cell reference location is shorter than distanceThresh, the UE may choose not to perform intra-frequency measurements” and “Else, the UE shall perform intra-frequency measurements” into a lower-level condition under the loop “If referenceLocation is set to fixedReferenceLocation and if the UE supports location-based measurement initiation for fixed cell, referenceLocation is used as serving cell reference location.”.

- Nokia thinks there is no real issue with the existing text but is fine with the change if considered as clearer

- Ericsson support p1 and all other proposals

* Agreed

Proposal 2: Change “fixed cell” and “moving cell” to “quasi-Earth fixed cell” and “Earth moving cell” respectively in 36.304 to align with TS36.331 and TS36.306.

* Agreed

Proposal 3: Support location-based measurement initiation for earth fixed cell in TS 36.304 (in addition to quasi-earth fixed cell).

- Nokia wonders if the capabilities also need to be updated to reflect this change

* Agreed (changes are also needed for 36.306)

Proposal 4: Add definitions for quasi-Earth fixed cell, Earth fixed cell and Earth moving cell in TS 36.304.

* Agreed

Proposal 5: Adopt the TP in Annex for Proposal 1-4.

* Agreed

[R2-2403336](file:///C:\Data\3GPP\Extracts\R2-2403336%20On%20procedures%20and%20capabilities%20for%20GNSS%20position%20fix%20during%20C-DRX.docx) On procedures and capabilities related to GNSS fix during C-DRX Samsung discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: Clarify that UE reports GNSS Validity Duration Report MAC CE after successful GNSS position fix during C-DRX.

- Xiaomi thinks this is already covered by previous agreements

- HW and Oppo support this proposal

- ZTE also supports but thinks this is common understanding based on previous agreements

- Apple wonders if in C-DRX the UE has the freedom to decide whether to trigger RACH for this. Ericsson thinks this might have to be fixed in MAC, to clarify the UE needs to trigger CBRA. QC thinks we need to wait for RAN1 to progress on this

* Agreed (confirmation of previous agreements). Continue the discussion on how the UE reports this

Proposal 2: “GNSS measurement during inactive” time is changed to a signalled capability.

Proposal 3: Agree text proposal to 36.306 in Appendix A.

- QC thinks we don’t need changes to 36.306 but are fine to have clarifications to Stage2

- ZTE also don’t think this is needed, not even in Stage 2

- vivo is open to clarifications in stage 2, if needed

[R2-2403614](file:///C:\Data\3GPP\Extracts\R2-2403614%20Corrections%20on%20uplink%20transmission%20extension.docx) Corrections on uplink transmission extension Samsung discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: Feature should be named “GNSS invalidity duration”.

- HW and vivo think the current name is clearer

- QC thinks the new suggestion is also not so clear and changing the name would imply a number of changes to other parts which is probably not needed at this stage.

Proposal 2: UE supports both procedures for timeAlignmentTimer infinity and non-infinity if ntn-UplinkTxExtension is supported.

Proposal 3: Clarify that UE shall support receiving Uplink Transmission Extension Update MAC CE if ntn-UplinkTxExtension is supported.

Proposal 4: Agree text 36.306 proposal.

[R2-2402812](file:///C:\Data\3GPP\Extracts\R2-2402812%20GNSS%20extension.doc) Remaining issues on out-of-date GNSS fix Qualcomm Incorporated discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1 When a new UL transmission extension update MAC CE to extend UL TX is received, the timer T390 is started with the length equal to the remaining time of the current TAT timer.

Proposal 2 If the network includes the new UL transmission extension update MAC CE and the TA command MAC CE in the same MAC PDU, clarify whether the intention is to whether extend UL TX by current remaining TAT length or by full length of TAT timer.

Proposal 3 RAN2 confirm whether the UE should start the timer T390, when the ul-TransmissionExtensionEnabled is configured, only if the new UL transmission extension update MAC CE has been received from network.

Proposal 4 UE resets the value of N\_TA before resuming UL operation after GNSS is fixed. Text proposal is provided above.

* Can come back in the next meeting

Proposal 5 If the UE receives GNSS measurement trigger too early (i.e., remaining GNSS validity is still long), the UE is allowed not to trigger the GNSS measurement but trigger the GNSS Validity Duration Report. Text proposal is provided above.

- Samsung, HW, Nokia disagree: how to define too early?

## 7.7 NR NTN enhancements

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

Time budget: 0 TU

Tdoc Limitation: 3 tdocs

### 7.7.1 Organizational

LSs, rapporteur inputs and other organizational documents.

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 and other pre-assigned documents in this AI do not count towards the tdoc limitation.

Incoming LSs

[R2-2402114](C:\\Data\\3GPP\\Extracts\\R2-2402114_R1-2401748.docx" \o "C:\Data\3GPP\Extracts\R2-2402114_R1-2401748.docx) Reply LS on Satellite Switch with Resync (R1-2401748; contact: Apple) RAN1 LS in Rel-18 NR\_NTN\_enh-Core To:RAN2 Cc:RAN4

* Noted

[R2-2402129](file:///C:\Data\3GPP\Extracts\R2-2402129_R4-2403493.docx) Reply LS on RAN2 agreements for satellite switch with resync (R4-2403493; contact: Apple) RAN4 LS in Rel-18 NR\_NTN\_enh-Core To:RAN2 Cc:RAN1

* Noted

[R2-2402542](file:///C:\Data\3GPP\Extracts\R2-2402542%20Discussion%20on%20reply%20LS%20from%20RAN1%20and%20RAN4%20for%20unchanged%20PCI.docx) Discussion on reply LS from RAN1 and RAN4 for unchanged PCI CMCC discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: No additional specification work for RAN2 is needed to support UE to perform the downlink synchronization with the target satellite and keep the communication with the source satellite of the same serving cell simultaneously in soft satellite switch based on the reply LS from RAN1 and RAN4.

- CATT thinks we could still discuss a few aspects related to soft switch

Rapporteur inputs

[R2-2403632](file:///C:\Data\3GPP\Extracts\R2-2403632%20-%2038331_CR4761_(Rel-18)%20-%20Rapporteur%20input%20R18%20NR%20NTN%20RRC.docx) Rapporteur input R18 NR NTN RRC Ericsson CR Rel-18 38.331 18.1.0 4761 - F NR\_NTN\_enh-Core Late

[R2-2403633](file:///C:\Data\3GPP\Extracts\R2-2403633%20-%20Rapporteur%20input%20R18%20NR%20NTN%20RRC%20RIL.docx) Rapporteur’s input R18 NR NTN RRC RILs Ericsson discussion Rel-18 NR\_NTN\_enh-Core Late

* [AT125bis][302][NR NTN Enh] Preliminary RILs checking (Ericsson)

Scope: Allow checking the PropAgree and PropReject RILs in [R2-2403633](file:///C:\Data\3GPP\Extracts\R2-2403633%20-%20Rapporteur%20input%20R18%20NR%20NTN%20RRC%20RIL.docx), if needed, before the online discussion. No technical discussion is expected to happen via email: disagreeing companies are invited to discuss F2F with the WI RRC rapporteur before the online session.

Intended outcome: Updated RILs list (if needed)

Deadline for rapporteur's summary in [R2-2403762](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403762.zip): Tuesday 2024-04-16 13:00

[R2-2403762](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403762.zip) Updated Rapporteur’s input R18 NR NTN RRC RILs Ericsson discussion Rel-18 NR\_NTN\_enh-Core

For the following RILs, the conclusion proposed by the rapporteur can be considered for agreement:

C604, C650, C651, E145, E301, H063, H116, H117, H500, K005, K006, K007, N131, N132, S486, and V501.

* The proposed conclusion is agreed for C604, C650, C651, E145, E301, H063, H116, H117, H500, K005, K006, K007, N131, N132, S486, and V501.

The following RILs need further discussion:

E252, H010, O600, V500, E251, E300, E302, and H115.

### 7.7.2 Stage 2 corrections

[R2-2402798](C:\\Data\\3GPP\\Extracts\\R2-2402798 7.7.2 stage-2 correction.docx" \o "C:\Data\3GPP\Extracts\R2-2402798 7.7.2 stage-2 correction.docx) Stage-2 corrections Samsung discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: If satellite switch with resync is a new trigger for NW to send PDCCH order CFRA, add stage-2 description of PDCCH order CFAR triggered by satellite switch with resync.

* To be discussed in Post125bis email discussion

### 7.7.3 RRC corrections

Satellite switching with re-sync

* [K005][V500][V501] epochTime/ ntn-UlSyncValidityDuration clarification

[K005] (Marked ToDo)

[R2-2402585](file:///C:\Data\3GPP\Extracts\R2-2402585%20%5bK005%5d%20Discussion%20on%20epoch%20time%20for%20satellite%20switch.docx) [K005] Discussion on epoch time for satellite switch ASUSTeK discussion Rel-18 38.331 NR\_NTN\_enh-Core

Proposal 1: [K005] Add “For satellite switch with resynchronization, it indicates the SFN nearest to the frame where the message indicating the epochTime is received” to the EpochTime field descriptions.

- Ericsson and QC think the change is not needed.

[R2-2402188](file:///C:\Data\3GPP\Extracts\R2-2402188%20satellite%20switch%20with%20resync.doc) Discussion on soft switch unchanged PCI OPPO discussion Rel-18 NR\_NTN\_enh-Core

* Revised in R2-2403951 (to suggest changes based on the latest version of 38.331)

[R2-2403951](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403951.zip) Discussion on soft switch unchanged PCI OPPO discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1 To cover soft switch unchanged PCI, adopt the above TP.

- ZTE supports the clarification suggested by Oppo

* Introduce a clarification to the EpochTime field description to cover satellite switch with resync, e.g. along the lines of what suggested in R2-2403951

[V500/V501] (Marked ToDo)

[R2-2402216](file:///C:\Data\3GPP\Extracts\R2-2402216%20%5bV500%5d%5bV501%5d%20Correction%20on%20NTN-Config%20in%20case%20of%20Satellite%20Switch.docx) [V500][V501] Correction on NTN-Config in case of Satellite Switch vivo discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: RAN2 clarifies that UE uses the epochTime or ntn-UlSyncValidityDuration of the serving satellite if epochTime or ntn-UlSyncValidityDuration for the neighbor cell is not provided in SIB19.

* V500/V501 are rejected
* RAN2 understands that epochTime or ntn-UlSyncValidityDuration in the configuration for satellite switch with resync are only used for this procedure

Proposal 2: RAN2 adopts the TP in the Annex if proposal 1 is agreed.

* SSB-TimeOffset

Opt1: reference point in UL RP

[R2-2402189](file:///C:\Data\3GPP\Extracts\R2-2402189%20ssb-TimeOffset.doc) Discussion on ssb-TimeOffset OPPO discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1 Keep the current spec wording that ssb-TimeOffset is the time offset between the SSB from source and target satellite at RP. Add the following TP in the field description of ssb-TimeOffset.

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. It is used by the UE to derive the SSB timing of the target satellite together with the UE-RP propagation delay difference between source and target satellite.

- Oppo thinks no matter which option we decide to go, we need to have some clarification in the specs

- vivo agrees and thinks option 2 (reference point in the gNB) is the best approach. LG agrees

- CMCC and ZTE think that both option work but option 2 is simpler. Nokia agrees. CATT agrees

- Google thinks that option 2 is more aligned to idle mode behaviour.

- Apple is fine with both but thinks that RAN4 is defining requirements based on option 1 so in case we need to inform them

- HW thinks the granularity of 1ms would be ok in this case.

* Send an LS to RAN4 saying that RAN2 is considering to adopt the gNB as the reference point and asking whether this would be a problem from RAN4 perspective

Opt2: reference point in gNB

[R2-2402218](file:///C:\Data\3GPP\Extracts\R2-2402218%20Further%20Discussion%20on%20ssb-TimerOffset.docx) Further Discussion on ssb-TimeOffset vivo discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: The ssb-TimeOffset within the SatSwitchWithReSync IE indicates the time offset between the SSB from source and target satellite at the gNB.

Proposal 2: Capture in the field description of the ssb-TimeOffset that UE shall adjust the actual ssb-TimeOffset based on the actual service link and feeder link propagation delay difference between source satellite and target satellite.

Proposal 3: If Proposal 1 and Proposal 2 are agreed, RAN2 adopts the Text proposal in Annex.

[R2-2402844](file:///C:\Data\3GPP\Extracts\R2-2402844%20Discussion%20on%20Remaining%20Open%20Issues%20for%20Unchanged%20PCI%20Mechanism.docx) Discussion on Remaining Open Issues for Unchanged PCI Mechanism CATT discussion

Observation 1: Per current procedures in 5.7.19, the agreement "UE shall apply the acquired DL timing and start accessing the target satellite with related operations (e.g. restart T430, reset N\_TA, resume UL operations) not before t-Service" is missing in the specification for a UE that has already acquired Target DL timing before t-Service.

Proposal 1: Add a Note in 5.7.19 clarifying that the UE which has already acquired the timing of the target satellite may omit acquiring the DL timing when the UE starts synchronising to the DL of the target satellite.

* Can come back to this after checking the latest version of the CR
* CB Friday

Proposal 1a: Adopt the TP for Option 2 in Annex A.

Proposal 2: Clarify that reference point of ssb-TimeOffset is the gNB, and specify this in the field description of ssb-TimeOffset as "Indicates the time offset between the SSB from source and target satellite at the gNB".

Observation 2: The ssb-PositionsInBurst and ssb-periodicityServingCell do not need to be changed, as they are for the same serving cell after satellite switch with unchanged PCI.

Proposal 3: Clarify that the ssb-TimeOffset refers to the time offset between the start subframe of the SSB burst from source and target satellite.

- HW agrees with the issue and thinks we could refer to the specific SSB index

- CATT thinks this proposal is to avoid referring to SSB index.

- ZTE is not sure anything else needs to be clarified: the ssb-TimeOffset is the same between different SSB indices

* We don’t introduce additional clarifications

Proposal 4: Adopt the TP in Annex B.

[R2-2403068](file:///C:\Data\3GPP\Extracts\R2-2403068%20Consideration%20on%20remaining%20issues%20on%20PCI%20unchanged.doc) Remaining issues on unchanged PCI ZTE Corporation, Sanechips discussion Rel-18 NR\_NTN\_enh-Core

* ssb-Timeoffset clarification

Proposal 1: The RP for provided ssb-TimeOffset is at gNB, and UE shall calculate offset with consideration actual propagation delay. Update the field description ssb-TimeOffset as provided in TP1.

Proposal 2: If P1 is not agreed, then the field description ssb-TimeOffset is updated clarify the SSB offset is provided per UL RPs from both source and target, and UE shall calculate offset with consideration actual propagation delay. Update the field description ssb-TimeOffset as provided in TP2.

* RACH-based satellite switch with resync

Proposal 3: For satellite switch with resync, existing mechanism (e.g., PDCCH order) can be used to trigger RACH, there is no need to introduce new RACH trigger.

[R2-2402831](file:///C:\Data\3GPP\Extracts\R2-2402831%20Discussion%20on%20the%20remaining%20issues%20for%20NR%20NTN.doc) Discussion on the remaining issues for NR NTN Xiaomi discussion

Opt3: Use an equation for the calculation

[R2-2402335](file:///C:\Data\3GPP\Extracts\R2-2402335.docx) SMTC configuration of target satellite for satellite switch with re-sync NTU discussion Rel-18

Proposal 1: For hard switch, SMTC configuration is applied by UE based on functions (1) and (2).

Proposal 2: For soft switch, SMTC configuration is applied by UE based on functions (3) and (4).

* [AT125bis][304][NR NTN Enh] LS to RAN4 on reference point (Apple)

Scope: Draft an LS to RAN4 on on reference point for SSB-TimeOffset

Intended outcome: Agreeable LS

Deadline for draft LS (in R2-2403769): Friday 2024-04-19 08:00

R2-2403769 [Draft] LS on reference point for SSB-TimeOffset Apple LS out Rel-18 NR\_NTN\_enh-Core To:RAN4

* CB Friday
* RACH-based

[H063] (Marked as PropReject)

[R2-2403192](file:///C:\Data\3GPP\Extracts\R2-2403192%20%5bH063%5d%20RACH-based%20satellite%20switching%20with%20re-sync.docx) [H063] RACH-based satellite switching with re-sync Huawei, HiSilicon, Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: For satellite switching with re-sync, both RACH-less and RACH-based procedure are supported.

- MTK thinks there should be no UE related issue (all UEs should be able to support RACH-less procedure) but maybe in some scenarios it would be useful to rely on a RACH-based approach

- QC agrees with MTK and thinks that in case we can rely on PDCCH order

- HW thinks that if we go for PDCCH order we need to rely on CFRA, which is an issue for the NW.

- Samsung thinks that for PDCCH order both CFRA and CBRA with TAT expired are supported in current specs.

Proposal 2: Downselect from the options on RACH-based satellite switching with re-sync:

- Option 1: Network uses dedicated RRC signalling to configure whether RACH is performed during satellite switching with re-sync;

- Option 2: Network uses 1-bit in the broadcast signalling to configure whether RACH is performed during satellite switching with re-sync;

- Option 2b: On top of the 1-bit indication, network also indicates a maximum delay/time window for RACH attempts;

- Option 3: It is up to UE implementation to decide whether RACH is performed, and the RACH resources are configured by the network in SIB1 (as in legacy).

* We only rely on a PDCCH order based solution to trigger RACH during satellite switch with resync in Rel-18 (no other option is considered in Rel-18)
* Continue in offline 305 to check what we need to add to make a PDCCH-order based solution work in the satellite switch with resync case

[R2-2402543](file:///C:\Data\3GPP\Extracts\R2-2402543%20%5bH063%5d%20Discussion%20on%20RACH-based%20solution%20for%20unchanged%20PCI.docx) [H063] Discussion on RACH-based solution for unchanged PCI CMCC discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: [H063] Support legacy CB RACH solution for unchanged PCI.

Proposal 2: Reuse the rachlessHandoverNTN-r18 and add some description to indicate whether UE supports RACH-less operation in unchanged PCI case.

Proposal 3: It is proposed to provide RA resource configuration (i.e. RACH-ConfigCommon, MsgA-ConfigCommon) of the incoming target satellite in the SatSwitchWithReSync optionally.

Proposal 4: Alliteratively, if the RA resource configuration of target satellite is absent, the RA resource configured in SIB1 for current satellite can be applied to the target satellite.

Proposal 5: If P1 is agreed, UE should apply the TA command of RAR/MsgB whether TAT is running or not to keep TA alignment between UE and network.

Proposal 6: Kindly suggest RAN2 to adopt the TP in the annex.

[R2-2402800](file:///C:\Data\3GPP\Extracts\R2-2402800%20RIL%20S486,%20V500,%20V501,%20H063.docx) RIL S486, V500, V501, H063 Samsung discussion Rel-18 NR\_NTN\_enh-Core

Proposal 3: RAN2 confirms for satellite switch with resync NW can send PDCCH order CFAR/CBRA as legacy trigger (i.e., DL/UL date arrives but TAT is expired).

* Continue in offline 305

Proposal 4: RAN2 discuss if NW can send PDCCH order CFRA for the purpose of resynchronization in satellite switch even there is no DL/UL data or TAT is still running (i.e., satellite switch with resync become a new trigger for PDCCH order CFRA).

* Continue in offline 305

[R2-2403635](file:///C:\Data\3GPP\Extracts\R2-2403635%20-%20Remaining%20issues%20for%20soft%20switch%20with%20unchanged%20PCI.docx) Remaining issues for soft switch with unchanged PCI Ericsson discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1 A RACH-based solution to access the target cell during satellite switch with re-synchronization is down prioritized in Release 18.

Proposal 2 If RACH-based access is agreed, revert the previous agreement which mandates all UEs to switch cell upon t-Service since it will cause RACH congestion.

Proposal 3 If RACH-based access is agreed, UE derives the UE-specific switch time based on a (pre)configured rule without dedicated signalling.

[R2-2403301](file:///C:\Data\3GPP\Extracts\R2-2403301%20On%20RACH-based%20Satellite%20Switching%20with%20Resynchronization%20and%20Confirming%20Successful%20Switching.docx) On RACH-based Satellite Switching with Resynchronization and Confirming Successful Switching Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: RAN2 to discuss means for reducing the NW uncertainty in case of satellite switching with resynchronization.

Proposal 2: RAN2 to agree on a NW-controlled timer that starts at t-Service, stops upon UE’s UL confirmation and allows the NW to release UE-specific resources upon timer’s expiration.

Proposal 3: In case a UE successfully completed the satellite switching but NW did not receive any UL confirmation, upon timer expiration a UE can send an SR or trigger RACH procedure.

Proposal 4: Timer controlling how long the NW keeps the UE-specific resources in satellite switching with resynchronization can be signalled in SIB19.

Proposal 5: Timer controlling how long the NW keeps the UE-specific resources in satellite switching with resynchronization can be UE-specific and depend on UE’s capabilities or UE’s UL buffer.

Proposal 6: RAN2 to support RACH-less and RACH-based access for satellite switching with re-sync.

Proposal 7: NW indicates RACH as the procedure access and the maximum delay time to perform RACH attempt.

Moved here from 7.7.5

[R2-2402586](file:///C:\Data\3GPP\Extracts\R2-2402586%20Discussion%20on%20RACH-based%20satellite%20switch.docx) Discussion on RACH-based satellite switch ASUSTeK discussion Rel-18 38.321 NR\_NTN\_enh-Core

* [AT125bis][305][NR NTN Enh] PDCCH order during satellite switch (Samsung)

Scope: Discuss the proposals p3 and p4 in [R2-2402800](file:///C:\Data\3GPP\Extracts\R2-2402800%20RIL%20S486,%20V500,%20V501,%20H063.docx)

Intended outcome: Report of the offline discussion

Deadline for rapporteur's summary (in [R2-2403766](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403766.zip)): Wednesday 2024-04-17 22:00 (if F2F offline is possible on Wednesday, otherwise Friday 2024-04-19 08:00)

[R2-2403766](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403766.zip) Summary of [AT125bis][305][NR NTN Enh] PDCCH order during satellite switch Samsung discussion Rel-18 NR\_NTN\_enh-Core

P1: For satellite switch with resync, as legacy, PDCCH order CFRA and CBRA can be used for UL sync with the target satellite when TAT is expired.

* Agreed

P2: For satellite switch with resync, PDCCH order CFRA can be used for UL sync with the target satellite regardless of TAT status.

* Agreed

P3: Add the sentence “For the resynchronization to the target satellite, random access can be triggered by a PDCCH order.” in stage-2 section of Satellite switch with re-synchronization.

* Agreed

Agreements:

1. For satellite switch with resync, as legacy, PDCCH order CFRA and CBRA can be used for UL sync with the target satellite when TAT is expired.
2. For satellite switch with resync, PDCCH order CFRA can be used for UL sync with the target satellite regardless of TAT status.
3. Add the sentence “For the resynchronization to the target satellite, random access can be triggered by a PDCCH order.” in stage-2 section of Satellite switch with re-synchronization.

* Idle mode support

[N131] (Marked PropAgree)

[N132] (Marked PropReject)

[R2-2403302](file:///C:\Data\3GPP\Extracts\R2-2403302%20RRC%20Corrections%20and%20Proposed%20RIL%20%5bN131%5d%20and%20%5bN132%5d%20Resolutions%20for%20Rel-18%20NTN.docx) RRC Corrections and Proposed RIL [N131] and [N132] Resolutions for Rel-18 NTN Nokia discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: RAN2 is asked to adopt the Text Proposal (TP) from Annex A.

Proposal 2: if t-ServiceStart is configured, IDLE UEs shall continue in the same (logical) cell without performing cell reselection.

Proposal 3: RAN2 to discuss the UE behaviour in case S-Quality condition triggers right before t-ServiceStart. A corresponding LS to RAN4 can be considered.

Proposal 4: RAN2 to agree that UEs in RRC\_IDLE can use SSB time-offset in SIB19.

* Measurement relaxation

[R2-2402217](file:///C:\Data\3GPP\Extracts\R2-2402217%20Remaining%20Issue%20on%20Measurement%20during%20Hard%20Satellite%20Switch.docx) Remaining Issue on Measurement during Hard Satellite Switch vivo discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: RAN2 to capture the agreement that the UE is allowed to skip measurements on other cells and satellites than the target satellite from T-service until the satellite switch completion.

- Nokia thinks we already agreed that the UE will reset filters and that in case this will be reflected in RAN4 specs.

- Apple thinks we need to capture the agreement somewhere

* Can come back to this if nothing will be captured for this in RAN4 specs

Proposal 2: RAN2 to adopt the text proposal in the Annex.

SIB19 in TN

[O600] (Marked ToDo)

[R2-2402190](file:///C:\Data\3GPP\Extracts\R2-2402190%20TN%20broadcasting%20NTN%20info.doc) [O600] Discussion on TN cell broadcasting NTN info OPPO discussion Rel-18 NR\_NTN\_enh-Core

* Revised in R2-2403952 (to suggest changes based on the latest version of 38.331)

[R2-2403952](file:///C:\Data\3GPP\RAN2\Inbox\R2-2403952.zip) [O600] Discussion on TN cell broadcasting NTN info OPPO discussion Rel-18

Proposal 1 The field description of epochTime is corrected as:

- QC supports this, apart fronm the reference to or SatSwitchWithReSync

* Text in proposal 1 is agreed, removing the reference to SatSwitchWithReSync

[R2-2403636](file:///C:\Data\3GPP\Extracts\R2-2403636%20-%20UE%20behaviour%20upon%20absence%20of%20EpochTime%20in%20TN%20cells.docx) UE behaviour upon absence of EpochTime in TN cells Ericsson discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1 RAN2 to decide whether epochTime is a mandatory or optional parameter when SIB19 is broadcast in TN cells.

Proposal 2 If epochTime is an optional parameter when SIB19 is broadcast in TN cells, clarify UE behaviour upon its absence taking the TP presented in section 3 as a baseline.

(Cond)EventD2

[C650] (Marked Duplicate)

[C651] (Marked PropReject)

[R2-2402850](C:\\Data\\3GPP\\Extracts\\R2-2402850 [C650][C651] Corrections on eventD2 and condEventD2.docx" \o "C:\Data\3GPP\Extracts\R2-2402850 [C650][C651] Corrections on eventD2 and condEventD2.docx) [C650] [C651] Corrections on EventD2 and condEventD2 CATT discussion

Proposal 1 [C650]: Clarify in the description of Ml2 in 5.5.4.15a that the epoch time and satellite ephemeris for the candidate cell refer to the configuration in measObjectNR.

Proposal 2 [C651]: Modify the field description of distanceThreshFromReference1/ distanceThreshFromReference2 in EventTriggerConfig as follows: "Distance from a fixed reference location configured with referenceLocation1 or referenceLocation2 or a moving reference location determined by the UE based on the serving cell movingReferenceLocation broadcast in SIB19 or referenceLocation2 and their corresponding satellite ephemeris and epoch time. Each step represents 50m."

Proposal 3: Adopt the TPs in Annex A and B.

[R2-2402882](file:///C:\Data\3GPP\Extracts\R2-2402882_NR%20NTN%20ReportConfig.doc) Correction on referenceLocation2 Apple discussion Rel-18 NR\_NTN\_enh-Core

Proposal: RAN2 to select one from the two options to fix the problem.

- Option 1: Move referenceLocation2 to MeasObjectNR

- Option 2: Introduce cellForWhichToTriggerD2-r18 into eventD2-r18 and condEventD2-r18 in TS38.331.

* Continue in offline 306

[H115] (Marked PropReject)

[H116] (Marked Duplicate)

[R2-2403490](file:///C:\Data\3GPP\Extracts\R2-2403490%20RRC%20corrections%20on%20RILs%20%5bH115%5d%5bH116%5d.docx) RRC corrections on RILs [H115][H116] Huawei, HiSilicon discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: Clarify in clause 5.2.2.2.1 that only SIB19 is re-acquired after satellite switching with re-sync. Add the UE behaviour of obtaining SIB19 in clause 5.2.2.4.21.

Proposal 2: Adopt the TP for [H115] in the Annex.

Proposal 3: For association with the ephemeris in MeasObjectNR, a PCI is added to the neighbour cell reference location in ReportConfigEUTRA.

Proposal 4: Adopt the TP for [H116] in the Annex.

* [AT125bis][306][NR NTN Enh] Corrections on (cond)EventD2 (Ericsson)

Scope: Discuss the proposal in [R2-2402882](file:///C:\Data\3GPP\Extracts\R2-2402882_NR%20NTN%20ReportConfig.doc) (and corresponding ones from other companies on the same issue)

Intended outcome: Report of the offline discussion

Deadline for rapporteur's summary (in R2-2403767): Wednesday 2024-04-17 22:00 (if F2F offline is possible on Wednesday, otherwise Friday 2024-04-19 08:00)

R2-2403767 Summary of [AT125bis][306][NR NTN Enh] Corrections on (cond)EventD2 Ericsson discussion Rel-18 NR\_NTN\_enh-Core

* CB Friday

VSAT UEs

[R2-2403634](file:///C:\Data\3GPP\Extracts\R2-2403634%20-%20Remaining%20issue%20on%20VSAT%20UEs.docx) Remaining issue on VSAT UEs Ericsson discussion Rel-18 NR\_NTN\_enh-Core

Observation 1 Mechanically steered VSATs are limited to blind handover for service link switch.

Observation 2 RAN4 has extended the maximum interruption time and handover delay for mechanically steered VSATs.

Observation 3 Worst-case, the new delay component could accumulate up to 7.3 seconds and consume a significant portion of T304.

Observation 4 Mechanically VSAT UEs may require the network to configure larger values of T304.

Proposal 1 Upon handover, a VSAT UE starts T304 when it has aligned its beam towards the target satellite.

- HW thinks the value range is sufficient to cover the scenari, even without changing the starting time

- Nokia thinks this does not really solve the problem of how much the HO will take so the proposal is not needed. Oppo agrees

- IDC thinks the if the delay happens all the time there is no real issue to always configure T304 to a long value that can cover the reconfiguration time.

Other

[R2-2402867](file:///C:\Data\3GPP\Extracts\R2-2402867_Open%20issues%20on%20NR%20NTN%20enhancements_v0.doc) Open issues on NR NTN measurement enhancement Apple discussion Rel-18 NR\_NTN\_enh-Core

[R2-2403082](file:///C:\Data\3GPP\Extracts\R2-2403082%20Provision%20of%20the%20TN%20PLMN%20ID%20in%20an%20NTN%20Cell.docx) Provision of the TN PLMN ID in an NTN Cell Google Inc., Continental Automotive discussion Rel-18 R2-2400501

On support of Satellite Switch with Resync

[R2-2402799](file:///C:\Data\3GPP\Extracts\R2-2402799%207.7.3.docx) Discussion on LS replies for Satellite Switch with Resync Samsung discussion Rel-18 NR\_NTN\_enh-Core

[R2-2403193](file:///C:\Data\3GPP\Extracts\R2-2403193%20Discussion%20on%20satellite%20switch%20with%20re-sync.docx) Discussion on satellite switch with re-sync Huawei, HiSilicon discussion Rel-18 NR\_NTN\_enh-Core

Withdrawn

R2-2402263 SMTC configuration on satellite switch with re-sync NTU discussion Withdrawn

[R2-2402264](file:///C:\Data\3GPP\RAN2\Docs\R2-2402264.zip) SMTC configuration on satellite switch with re-sync NTU discussion Withdrawn

### 7.7.4 MAC corrections

[R2-2402774](C:\\Data\\3GPP\\Extracts\\R2-2402774 Discussion on HARQ buffer flush during satellite switch with re-synchronization.DOCX" \o "C:\Data\3GPP\Extracts\R2-2402774 Discussion on HARQ buffer flush during satellite switch with re-synchronization.DOCX) Discussion on HARQ buffer flush during satellite switch with re-synchronization Huawei, HiSilicon discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: During satellite switch with re-synchronization, UE doesn’t flush the HARQ buffers.

* CB Friday

[R2-2403637](file:///C:\Data\3GPP\Extracts\R2-2403637%20-%20TAT%20handling%20in%20RACH-less%20CHO.docx) TAT handling in RACH-less CHO Ericsson discussion Rel-18 NR\_NTN\_enh-Core

Observation 1 During a RACH-less handover, the MAC entity starts TAT for the target cell when the UE applies the RRC reconfiguration message.

Observation 2 In a conditional handover, the exact time when the triggering conditions are fulfilled, and the UE applies the conditional reconfiguration may be unknown to the network.

Observation 3 In RACH-less conditional handover, the network may not know the exact time when TAT for the selected target cell is started.

Proposal 1 Start TAT for the (selected) target cell upon successful completion of the RACH-less (C)HO.

Proposal 2 If P1 is agreed, RAN2 to discuss the TPs presented in section 3.

* CB Friday

### 7.7.5 Corrections to other specs

Corrections to other affected specs, including corrections on UE capabilities

Corrections on issues affecting multiple Stage 3 specs (e.g. RRC and MAC) can also be submitted here

[R2-2403300](file:///C:\Data\3GPP\Extracts\R2-2403300%20On%20Scheduling%20Restrictions%20in%20Satellite%20Soft%20Switching%20with%20Resynchronization%20–%20RAN1%20and%20RAN4%20feedback.docx) On Scheduling Restrictions in Satellite Soft Switching with Resynchronization – RAN1 and RAN4 feedback Nokia discussion Rel-18 NR\_NTN\_enh-Core

Observation 1: The SSBs received from two satellites during soft-switching with resynchronization need to be spaced in time by at least 1 OFDM symbol at the UE’s receiver.

Observation 2: The UEs performing satellite soft-switching with resynchronization may be subject to scheduling restrictions.

Observation 3: The NW might have an issue to effectively schedule the UE during soft-switching period if the UE does not support parallelMeasurementWithoutRestriction and simultaneousRxDataSSB-DiffNumerology.

Observation 4: simultaneousRxDataSSB-DiffNumerology may not be fully relevant to soft-satellite switching with resynchronization, as serving cell is the same as the neighbour, so the same configuration (including the numerology) is used, for both SSB and PDSCH/PDCCH from any of these satellites.

Proposal 1: In case the UE supports softSatelliteSwitchResyncNTN-r18, the UE shall also support parallelMeasurementWithoutRestriction.

Observation 5: Service link propagation delay difference (PDD) can be used to measure the service link between the inbound and outbound satellite in satellite soft-switching with resynchronization.

Proposal 2: In case the UE supports softSatelliteSwitchResyncNTN-r18, the UE shall also support serviceLinkPropDelayDiffReporting-r17.

Proposal 3: Confirm with RAN4 that service link propagation delay difference helps in reducing the scheduling restriction duration during satellite soft-switching with resynchronization. RAN2 asks how early such measurements, calculations and reporting should be done.

Proposal 4: Adopt the 38.306 and 38.331 Text Proposals in the Annex A and B.

Moved here from 7.7.3

[R2-2402866](file:///C:\Data\3GPP\Extracts\R2-2402866_Clarification%20on%20UE%20operation%20during%20soft%20satellite%20switch%20with%20resync_v0.doc) Clarification on UE operation during soft satellite switch with resync Apple discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: If NW configures soft satellite switch with resync, network implementation should ensure the SSB reception time in UE side is not be overlapped and with at least 1 symbol difference.

Proposal 2: If UE supports soft satellite switch with resync, UE should support the simultaneous transmission/reception in source satellite and DL sync in target satellite during the switch period.

- CMCC thinks we don’t need this restriction. CATT agrees

- Nokia supports p2

* Agreed

Proposal 3: Clarify that UE supporting soft satellite switch with resync also supports parallelMeasurementWithoutRestriction-r17; in the different SCS case, UE also supports multaneousRxDataSSB-DiffNumerology.

- Nokia thinks we need to support p3, otherwise scheduling restrictions will have to be considered and this would kill the feature

- Apple thinks that if we don’t go for p3 then we need to make the softSatelliteSwitchResync capability per band

- QC is ok with the first part of p3

* Can come back Thursday to check if we need to make the softSatelliteSwitchResync capability per band

- HW thinks that the problem of a NW having to deal with a UE not supporting parallelMeasurementWithoutRestriction-r17 is already a Rel-17 issue

* RAN2 understands that a UE supporting softSatelliteSwitchResync but not supporting e.g. parallelMeasurementWithoutRestriction-r17 in a band can still perform soft satellite switch with scheduling restriction at the source satellite at the switch

- CMCC thinks that if RAN4 has more considerations on the scheduling restrictions they will inform us

[R2-2403069](file:///C:\Data\3GPP\Extracts\R2-2403069%20Discussion%20on%20NTN%20FR2%20UE%20capability.doc) Discussion on NTN FR2 UE capability ZTE Corporation, Sanechips discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: Add the reference of FR2 band (i.e., Table 5.2.3-1 of TS38.101-5) for UE capability: uplink-TA-Reporting, uplinkPreCompensation,ue-specific-K-Offset and k1-RangeExtension.

Proposal 2: Update TS 38306 to allow indicate below UE capabilities for NTN FR2:

* SDT related: cg-SDT-r17, mt-CG-SDT-r18
* MBS related: maxDynamicSlotRepetitionForSPS-Multicast-r17, maxNumberG-CS-RNTI-r17, maxNumberG-RNTI-r17, multiPUCCH-HARQ-ACK-ForMulticastUnicast-r17, priorityIndicatorInDCI-Multicast-r17, priorityIndicatorInDCI-SPS-Multicast-r17, releaseSPS-MulticastWithCS-RNTI-r17, sps-MulticastMultiConfig-r17, re-LevelRateMatchingForMulticast-r17, twoHARQ-ACK-CodebookForUnicastAndMulticast-r17

Proposal 3: RAN2 discuss P1/P2 and agree on the corresponding CR in R2-2403070.

* CB Friday

[R2-2403070](file:///C:\Data\3GPP\Extracts\R2-2403070%20Corrections%20to%2038306%20on%20NTN%20FR2%20UE%20capability.docx) CR to 38306 on NTN FR2 UE capability ZTE Corporation, Sanechips CR Rel-18 38.306 18.1.0 1074 - F NR\_NTN\_enh-Core

[R2-2402852](file:///C:\Data\3GPP\Extracts\R2-2402852%20Correction%20on%20Location-based%20Measurement%20Initiation%20for%20Earth%20Fix%20Cell%20in%20TS38.304.docx) Correction on Location-based Measurement Initiation for Earth Fixed Cell in TS 38.304 CATT discussion

Proposal 1: Add the support of location-based measurement initiation for Earth-fixed system in section 5.2.4.2, and add the definition of Earth-fixed system in section 3.1 in TS 38.304.

Proposal 2: Change “Quasi-Earth-fixed cell” and “Earth-moving cell” to “Quasi-Earth-fixed system” and “Earth-moving system” in section 3.1 in TS 38.304 for alignment between the definition and procedure.

Proposal 3: Adopt the TP in Annex.

## 8.8 NTN for NR Ph3

(NR\_NTN\_Ph3-Core; leading WG: RAN2; REL-19; WID: RP-240775

LTE\_TN\_NR\_NTN\_mob, leading WG: RAN2, Rel-19 WID: RP-240846)

Time budget: 1 TU

Tdoc Limitation: 3 tdocs

### 8.8.1 Organizational

LS, Rapporteur input, including workplan, etc.

[R2-2402357](file:///C:\Data\3GPP\Extracts\R2-2402357%20Work%20plan%20for%20NR_NTN_Ph3.docx) Work plan for Rel-19 NR\_NTN\_Ph3 CATT, Thales Work Plan Rel-19

- Session chair thinks the work on mobility from LTE to NR NTN could take far less time than the whole R19 timespan and could be closed sooner

* Noted

[R2-2403638](file:///C:\Data\3GPP\Extracts\R2-2403638%20-%20NR%20NTN%20phase%203%20scope.docx) NR NTN phase 3 scope Ericsson discussion Rel-19 NR\_NTN\_Ph3-Core

### 8.8.2 Downlink coverage enhancements

Contributions should take into account corresponding progress in RAN1.

[R2-2402702](file:///C:\Data\3GPP\Extracts\R2-2402702%20Discussion%20on%20downlink%20coverage%20enhancements%20for%20NR%20NTN.doc) Discussion on downlink coverage enhancements for NTN Xiaomi discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1 With regard to link level enhancement, RAN2 waits for RAN1 agreement on the DL channels to enhance before starting any RAN2 work.

* Agreed

Proposal 2 RAN2 starts to work on beam level on/off mechanism to solve the EIRP reduction issue.

- ZTE wonders what beam refers to in this case. Lenovo wonders the same and think we can start discussing cell level DTX first

- Thales thinks this discussion should happen in RAN1 first. Ericsson agrees, for instance regarding the relationship between beams and cells. Also R18 NES needs to be considered as a baseline. Samsung agrees

- vivo agrees with the principle of this proposal and think that RAN2 can consider the signalling support for this. Nokia agrees

- HW agrees with the principle and think we can leave the beam issue open

- QC is ok to start working on this in RAN2

- IDC suggests to consider sending an LS to RAN1 at the next meeting asking questions that could have an impact on our work

* We will continue the discussion on RAN2 aspects of DL coverage enhancements (e.g. cell level / beam level DTX/DRX mechanism, etc.) in the next meetings, trying to identify questions to RAN1 for aspects where we need their input

Proposal 3 For beam level on/off, beam DTX is supported.

Proposal 4 For beam level on/off, RAN2 to discuss whether beam DRX is supported or not.

Agreements:

1. With regard to link level enhancement, RAN2 waits for RAN1 agreement on the DL channels to enhance before starting any RAN2 work.
2. We will continue the discussion on RAN2 aspects of DL coverage enhancements (e.g. cell level / beam level DTX/DRX mechanism, etc.) in the next meetings, trying to identify questions to RAN1 for aspects where we need their input

[R2-2402883](file:///C:\Data\3GPP\Extracts\R2-2402883_DL%20coverage%20enhancement.doc) DL coverage enhancement in NTN Apple discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: RAN2 to support beam based DTX/DRX operation.

Observation 1: During beam based DTX non-active time duration, satellite would not be able to transmit any DL signals (e.g., DL re-transmission, MSG2/MSG4, etc).

Proposal 2: UE behavior during beam based DTX/DRX non-active duration should be discussed.

Proposal 3: RAN2 to discuss about providing the non-serving beams’ DTX/DRX configuration to UE.

Proposal 4: RAN2 to discuss about whether the beam specific DTX/DRX should apply to RRC idle UE.

[R2-2402219](file:///C:\Data\3GPP\Extracts\R2-2402219%20RAN2%20Aspects%20For%20Downlink%20Coverage%20Enhancements.docx) RAN2 Aspects For Downlink Coverage Enhancements vivo discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2402547](file:///C:\Data\3GPP\Extracts\R2-2402547%20Downlink%20coverage%20enhancement%20for%20NR%20NTN.docx) Downlink coverage enhancement for NR NTN CMCC,CSPG discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2402712](file:///C:\Data\3GPP\Extracts\R2-2402712%20Network%20energy%20saving%20for%20downlink%20coverage%20enhancement%20in%20NTN.docx) Network energy saving for downlink coverage enhancement in NTN Lenovo discussion Rel-19

[R2-2402805](file:///C:\Data\3GPP\Extracts\R2-2402805%208.8.2%20DL%20coverage%20v1.docx) Downlink Coverage Enhancement Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2402825](file:///C:\Data\3GPP\Extracts\R2-2402825%20Discussion%20on%20downlink%20coverage%20enhancements.docx) Discussion on downlink coverage enhancements Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2403034](file:///C:\Data\3GPP\Extracts\R2-2403034%20On%20DL%20Coverage%20Enhancements.docx) DL coverage enhancements Nokia, Nokia Shanghai Bell discussion NR\_NTN\_Ph3-Core

[R2-2403071](file:///C:\Data\3GPP\Extracts\R2-2403071%20Consideration%20on%20downlink%20coverage%20enhancements.doc) Consideration on downlink coverage enhancements ZTE Corporation, Sanechips discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2403276](file:///C:\Data\3GPP\Extracts\R2-2403276%20NR%20NTN%20DL%20Coverage%20enhancements%20discussion.docx) Discussion on RAN2 Aspects for Downlink Coverage Enhancements in NR NTN evolution THALES discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2403319](file:///C:\Data\3GPP\Extracts\R2-2403319%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

[R2-2403649](file:///C:\Data\3GPP\Extracts\R2-2403649-Discussion_for_DL_coverage_enhancement.docx) Discussion for DL coverage enhancement Sharp discussion Rel-19 NR\_NTN\_Ph3-Core

### 8.8.3 Uplink Capacity Throughput Enhancement

No contributions are expected for this AI at this meeting.

### 8.8.4 Support of Broadcast service

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

* Use cases

[R2-2403275](file:///C:\Data\3GPP\Extracts\R2-2403275%20NR%20NTN%20MBS%20discussion.docx) Discussion on MBS broadcast additional features for NR NTN Evolution THALES discussion Rel-19 NR\_NTN\_Ph3-Core

Observation 1 An important use case for MBS service in NR NTN is the GSO for media content broadcast

Proposal 1 Focus on the MBS broadcast service in GSO use case for the definition of the intended broadcast service area and how to handle it

- vivo sees no need to limit to GSO and at least EFC should be considered. Lenovo agrees

* For MBS broadcast service we don’t restrict the work to any satellite constellation type

Observation 2 NTN shall be able to broadcast emergency message in geographical area when TN may be unavailable

Proposal 2 Discuss to support emergency messaging broadcast in an identified area in both GSO and NGSO

- HW thinks that in R19 we can limit to MBS broadcast

- QC think we could clarify this only refers to ETWS

- CATT wonders if we can prioritize MBS first. LG agrees but also agrees that ETWS needs to be covered

- IDC thinks the priority is MBS broadcast

* We prioritize working on a solution for MBS broadcast but we don’t preclude other broadcast services, namely ETWS

[R2-2402355](file:///C:\Data\3GPP\Extracts\R2-2402355%20Discussion%20on%20support%20of%20broadcast%20service%20via%20NR%20NTN.docx) Discussion on support of broadcast service via NR NTN CATT, China Broadnet discussion Rel-19

Proposal 1: RAN2 discusses and confirms the intended scenarios to be supported for MBS broadcast service via NR NTN in Rel-19:

S1: The service area is a portion of an NTN cell, and the Content of the service can only be received within the service area (e.g. broadcast via a dedicated beam(s) ).

S2: The service area is a portion of an NTN cell, but the content of the service can be received within the whole cell.

S3: The intended service area consists of a list of NTN cell(s)/tracking area(s).

- LG thinks we need to clarify the meaning of intended service area

- Nokia thinks that S3 is easy and could be covered, while S1 is complex and we should rather consider S2

- CATT thinks that S1 is the case where there is no broadcst transmission outside of the intended portion of the NTN cell. Apple thinks this is very difficult.

- Ericsson thinks the area described could be larger than the NTN cell

- CATT thinks S3 was meant to check if there is any impact on RAN3

* We will cover at least the case where the indicated intended service area covers a portion of a NTN cell
* The intended service area can cover the area of more than one NTN cells (or portions thereof)
* Can discuss next time whether the broadcast transmission can be limited to the intended service area only (i.e. no transmission happens outside of the intended serive area)

- QC thinks that S1 is not possible

Proposal 2: Support both GSO and NGSO deployment for MBS broadcast service via NR NTN.

[R2-2402220](file:///C:\Data\3GPP\Extracts\R2-2402220%20Discussion%20on%20MBS%20Broadcast%20Provision%20in%20NTN.docx) Discussion on MBS Broadcast Provision in NTN vivo discussion Rel-19 NR\_NTN\_Ph3-Core

Observation 1: In NR, broadcast service can be interpreted as various broadcast signals, such as system information, paging message, and MBS broadcast.

Proposal 1: RAN2 to clarify that broadcast service is referred to as MBS broadcast service.

Observation 2: Thanks to local MBS broadcast service mechanism, NW can deliver the MBS broadcast service only in the intended service area, whose coverage contains one or more than one cell area or tracking area.

Proposal 2: In Rel-19, RAN2 shall focus on the intended service area that is a partition of the cell area.

Proposal 3: RAN2 to further clarify whether Earth-fixed, Quasi-Earth-fixed, or Earth-moving cell are considered in Rel-19.

* Service area details

[R2-2402152](file:///C:\Data\3GPP\Extracts\R2-2402152_Signalling%20of%20indicating%20service%20area%20in%20NR%20NTN.doc) Signaling of indicating service area in NR NTN China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 2: RAN2 discusses the following formats to model service area:

* Circle which is like TN coverage
* Multiple cells or TAIs to align with NG interference
* Geographical area information to indicate the exact shape of service area

- IDC thinks we can chance the third option to refer to polygons

- ZTE wonders if the second option provides additional information and thinks we could signal the country information

* At least the following geographical area formats to model service area can be further considered (the signalling of other information than the geographical information can be considered):

- Circles (like for TN coverage)

- Geographical area information, e.g. via polygons, to better approximate the intended shape of service area

[R2-2403072](file:///C:\Data\3GPP\Extracts\R2-2403072%20Consieration%20on%20broadcast%20service%20ehancements.doc) Consideration on broadcast service enhancements ZTE Corporation, Sanechips discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 3: MBS broadcast service area information includes country information and/or geographical coverage for MBS broadcast service, details ffs.

Proposal 4: When broadcast service area information is provided, it needs to be associated with MBS service.

[R2-2402544](file:///C:\Data\3GPP\Extracts\R2-2402544%20Discussion%20on%20MBS%20broadcast%20enhancements%20for%20NTN.docx) Discussion on MBS broadcast enhancements for NTN CMCC discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: To further limit the intended service area in NTN system, the following 3 options could be discussed:

Option 1: Network provides intended service area ID, service area reference location and distance radius information in SI.

Option 2: Directly update the granularity of FSAI(Frequency Selection Area Identities) in SIB21 from frequency level to service area level

Option 3: Network broadcast mapped cell ID and the corresponding area information, and provide association between mapped cell ID and service area.

Agreements:

1. For MBS broadcast service we don’t restrict the work to any satellite constellation type
2. We prioritize working on a solution for MBS broadcast but we don’t preclude other broadcast services, namely ETWS
3. We will cover at least the case where the indicated intended service area covers a portion of a NTN cell
4. The intended service area can cover the area of more than one NTN cells (or portions thereof)
5. Can discuss next time whether the broadcast transmission can be limited to the intended service area only (i.e. no transmission happens outside of the intended serive area)
6. At least the following geographical area formats to model service area can be further considered (the signalling of other information than the geographical information can be considered):

- Circles (like for TN coverage)

- Geographical area information, e.g. via polygons, to better approximate the intended shape of service area

* Association between service area and MBS service

[R2-2402199](file:///C:\Data\3GPP\Extracts\R2-2402199%20Discussion%20on%20providing%20MBS%20service%20area%20in%20NTN%20network.docx) Discussion on providing MBS service area in NTN network OPPO discussion Rel-19 NR\_NTN\_Ph3-Core

Observation 2: if the satellite footprint consists of one cell or multiple cells with large coverage area, different MBS sessions may be available in different areas in one particular cell.

Proposal 1: RAN2 to agree that different MBS sessions should be associated with different geographical areas, and such information should be embedded in the SIB, if the satellite footprint consists of one cell or multiple cells with large coverage area.

Observation 3: for the NTN network where the 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 particular MBS session could be distributed in each cell.

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

[R2-2402806](file:///C:\Data\3GPP\Extracts\R2-2402806%208.8.4%20Broadcast%20service%20area%20v2.docx) MBS Broadcast Service Area in NTN Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 4: Discuss how to map between MBS broadcast service and the intended service area, considering MBS broadcast service can be identified from different aspects (e.g., service ID, TMGI, session ID, G-RNTI, MRB, SSB, etc).

* UE behaviour

[R2-2402284](file:///C:\Data\3GPP\Extracts\R2-2402284_discussion%20on%20support%20of%20broadcast%20service%20in%20NTN.docx) Discussion on the support of broadcast service in NTN ETRI discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 2: Under reception of the new system information, UE should be restricted from accessing the respective services if they are outside the designated service area, regardless of whether they possess a valid identifier for receiving those services.

[R2-2402833](file:///C:\Data\3GPP\Extracts\R2-2402833%20Discussion%20on%20the%20service%20area%20of%20a%20broadcast%20service.doc) Discussion on the service area of a broadcast service Xiaomi discussion

Proposal 1: Introduction of service area of broadcast services is not intended to prevent UE from receiving system messages related to broadcast services.

[R2-2403320](file:///C:\Data\3GPP\Extracts\R2-2403320%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

Proposal 2: Clarify whether existing procedures are sufficient to prevent a UE outside of a service area, but within cell coverage, from accessing service content.

* Which SIB

[R2-2402807](file:///C:\Data\3GPP\Extracts\R2-2402807%20MBS%20broadcast%20in%20NTN.docx) MBS broadcast service area information Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 2 Discuss whether to extend existing SIBs such as SIB21 and SIB25 or introduce new SIB for broadcasting MBS broadcast service area.

[R2-2402826](file:///C:\Data\3GPP\Extracts\R2-2402826%20Discussion%20on%20MBS%20over%20NTN.docx) Discussion on MBS over NTN Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 2: RAN2 consider the following possibilities for including the service area information: SIB20/ SIB21/ MBSBroadcastConfiguration, and discuss the corresponding UE behaviour.

[R2-2402280](file:///C:\Data\3GPP\Extracts\R2-2402280%20Discussions%20on%20signaling%20of%20the%20intended%20service%20area%20of%20a%20broadcast%20service.doc) Discussions on signaling of the intended service area of a broadcast service Fujitsu discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2402695](file:///C:\Data\3GPP\Extracts\R2-2402695%20Discussion%20on%20the%20support%20of%20broadcast%20service.docx) Discussion on the support of Broadcast service HONOR discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2402708](file:///C:\Data\3GPP\Extracts\R2-2402708.docx) Discussion on MBS service in NTN system CAICT discussion

[R2-2402713](file:///C:\Data\3GPP\Extracts\R2-2402713%20On%20support%20of%20MBS%20broadcast%20in%20NTN.docx) On support of MBS broadcast in NTN Lenovo discussion Rel-19

[R2-2402884](file:///C:\Data\3GPP\Extracts\R2-2402884_MBS%20over%20NTN.doc) Broadcast service support over NTN Apple discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2403093](file:///C:\Data\3GPP\Extracts\R2-2403093.docx) Discussion on MBS Broadcasting Control over NTN access TCL discussion Rel-19

[R2-2403121](file:///C:\Data\3GPP\Extracts\R2-2403121%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 NR\_NTN\_Ph3

[R2-2403306](file:///C:\Data\3GPP\Extracts\R2-2403306%20On%20MBS%20Service%20Area%20Signalling%20in%20Rel-19%20NTN.docx) On MBS Service Area Signalling in Rel-19 NTN Nokia discussion Rel-19 NR\_NTN\_Ph3

[R2-2403587](file:///C:\Data\3GPP\Extracts\R2-2403587.docx) Discussion on support of broadcast service ITL discussion Rel-19

[R2-2403648](file:///C:\Data\3GPP\Extracts\R2-2403648%20Discussion%20on%20Intended%20Service%20Area%20for%20NTN-MBS.docx) Discussion on Intended Service Area for NTN-MBS NTT DOCOMO INC. discussion Rel-19

[R2-2403650](file:///C:\Data\3GPP\Extracts\R2-2403650-Discussion_on_MBS_service_support_for_NR_NTN.docx) Discussion on MBS service support for NR NTN Sharp discussion Rel-19 NR\_NTN\_Ph3-Core

### 8.8.5 Support of regenerative payload

Contributions should focus on the needed updates for Stage 2 description.

[R2-2403606](file:///C:\Data\3GPP\Extracts\R2-2403606%20NR%20NTN%20Regenerative%20TP_v4.docx) Regenerative NTN payload support in NR NTN Evolution THALES, CATT, Huawei, ZTE, Inmarsat, Viasat discussion Rel-19 NR\_NTN\_Ph3-Core

Observation 1 Impacts of regenerative payload architecture on NG and Xn interface, if any, are not in the RAN2 scope.

Proposal 1 Wait for RAN3 inputs to update section 16.14.4 and 16.14.6 related to switchover and NG interface

* Agreed

Proposal 2 Consider the text proposal for TS 38.300 below as a possible baseline for RAN2 discussion to support the gNB on-board regenerative payload architecture

* Come back in future meetings to check if we can consider the text proposal for TS 38.300 in R2-2403606 as a possible baseline for RAN2 discussion to support the gNB on-board regenerative payload architecture

[R2-2402808](file:///C:\Data\3GPP\Extracts\R2-2402808%20Regenerative%20payload.docx) Discussion on regenerative payload Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

Observation 1. Similar to delay to start contention resolution timer, the PDCCH monitoring for further RRC message can be delayed after sending HARQ feedback of the contention resolution MAC CE.

Observation 2. The satellite switch with resync feature may be supported in regenerative payload architecture.

- Ericsson thinks this would not work

- QC thinks we could at least consider hard satellite switch

- Thales supports this even if thinks we need to address the security problem and possibly revise the feature

- Apple thinks that we would need to modify the procedure

- CMCC think the same PCI could be maintained across satellite and not require security key changes

* We can continue the discussion on this in the next meeting

Observation 3. In regenerative payload with full gNB on board, the delay to network verified UE location can be worse.

Proposal 1 RAN2 discuss whether any existing features need any potential optimization or enhancements to be supported efficiently in regenerative payload architecture and update the WID, if needed.

[R2-2402818](file:///C:\Data\3GPP\Extracts\Draft_R2-2402818%20Support%20of%20Regenerative%20mode%20v2.docx) Support of regenerative payload NEC discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: update NTN overview section to explain regenerative mode with full gNB on board in addition to exiting transparent mode

Proposal 2: common TA is zero in case of regenerative mode with full gNB on board

Proposal 3a: RAN2 discuss if we support RP is not at gNB with regenerative mode, , i.e., Kmac can be configured as a non-zero value.

Proposal 3b: RAN2 send LS to RAN1 ask for any necessary RAN1 spec update in order to support RP not at gNB with regenerative mode

[R2-2402153](file:///C:\Data\3GPP\Extracts\R2-2402153_Stage-2%20impact%20of%20regenerative%20payload%20in%20NR%20NTN.doc) Stage-2 impact of regenerative payload in NR NTN China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2402196](file:///C:\Data\3GPP\Extracts\R2-2402196%20stage2%20regenerative%20payload.doc) Discussion on stage-2 update on the support of regenerative payload OPPO discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2402356](file:///C:\Data\3GPP\Extracts\R2-2402356%20Discussion%20on%20support%20of%20regenerative%20payload%20in%20Rel-19%20NR%20NTN.docx) Discussion on support of regenerative payload in Rel-19 NR NTN CATT, China Broadnet discussion Rel-19

[R2-2402714](file:///C:\Data\3GPP\Extracts\R2-2402714%20On%20support%20of%20regenerative%20payload%20in%20NTN.docx) On support of regenerative payload in NTN Lenovo discussion Rel-19

[R2-2403092](file:///C:\Data\3GPP\Extracts\R2-2403092.docx) Discussion on Regenerative NTN Architecture TCL discussion Rel-19

[R2-2403409](file:///C:\Data\3GPP\Extracts\R2-2403409.docx) Discussion on Regenerative NTN Payload Architecture TCL discussion Rel-19

[R2-2403639](file:///C:\Data\3GPP\Extracts\R2-2403639%20-%20Stage%202%20updates%20for%20regenerative%20payload.docx) Stage 2 updates for regenerative payload Ericsson discussion Rel-19 NR\_NTN\_Ph3-Core

### 8.8.6 LTE to NR NTN mobility

Support for idle mode mobility between LTE and NR NTN

[R2-2402809](file:///C:\Data\3GPP\Extracts\R2-2402809%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 Confirm normal LTE UE, non-Cat M UE, eMTC UE and NB-IoT UE are in scope.

- Samsung thinks at least NB-IoT UE to NR NTN should not be considered. Nokia agrees

- HW thinks the intention is to limit to normal LTE UEs

* At least normal LTE UE are in scope
* Can come back in the next meeting to check if also eMTC UE and NB-IoT UEs could also be considered in scope

Proposal 2 Confirm that LTE to ATG NR cell mobility, i.e., broadcasting information of SIB22 is not in scope.

- CMCC thinks it’s too early to preclude this

[R2-2403035](file:///C:\Data\3GPP\Extracts\R2-2403035%20Support%20of%20Idle%20Mode%20Mobility%20from%20EUTRA%20TN%20to%20NR%20NTN.docx) Support of Idle Mode Mobility from EUTRA TN to NR NTN CATT discussion

Observation 1: The cell reselection from NR TN to NR NTN is already supported in NR Spec, and consists of the following key parts:

- Step 0: SI reception (cell reselection related information from SIB2/3/4 and satellite assistance information in SIB19;

- Step 1: Neighbor cell measurement initiation (based on RRM measurement results i.e. same as cell reselection to TN cells in legacy);

- Step 2: NTN neighbor cell measurement (with UE autonomous SMTC adjustment based on SMTC configuration in SIB2/4 and satellite assistance information in SIB19);

- Step 3: Cell reselection evaluation (as in legacy based on RRM measurement results).

Observation 2: Current satellite assistance information defined in SIB33 in TS36.331 does not include the ntn-PolarizationDL, which is needed for NR satellite.

Observation 3: Current satellite assistance information defined in SIB33 for IoT NTN has the same value range as that defined in TS38.331 for NR NTN, except for the TA common related configurations.

Proposal 1: SIB24 is reused to provide the NR NTN cell reselection related information (e.g. frequency information, SMTC config, etc.).

Proposal 2: To support the idle mode mobility from EUTRA TN to NR NTN, the satellite assistance information for NR NTN neighbor cells is needed and should include the following parameters:

- Satellite ephemeris information

- TA common information

- k-Mac

- epoch time

- validity duration

- ntn-PolarizationDL.

Proposal 3: The Ephemeris information/epoch time/k-mac/ validity duration defined in SIB33 specified in TS36.331 should be reused for NR satellite assistance information.

Proposal 4: The ntn-PolarizationDL and TA common related configurations within NTN-Config specified in TS38.331 should be introduced in TS36.331 for NR satellite assistance information.

Proposal 5: The EUTRA cell provides the satellite assistance information for NR neighbor cell per satellite, as identified by the satellite ID. Introduce a satellite ID list in the SIB24 per frequency.

Proposal 6: RAN2 further down-selects the following options on how to provide the NR 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.

Proposal 7: NR NTN neighbor cell measurement initiation is performed as in legacy, i.e. based on RRM measurement as in cell reselection from EUTRA TN to NR TN. No spec impact is needed on cell reselection procedure in TS 36.304.

Proposal 8: Introduce the clarification in the field description of measTimingConfig (configured via SIB24 in TS 36.331) that it is configured based on the assumption that the gNB-UE propagation delay equals to 0 ms, and UE can adjust the offset based on the actual propagation delay, when the corresponding frequency is associated with a satellite ID.

Proposal 9: Besides the field description clarification in Proposal 8, no other enhancement to the measTimingConfig is needed for the UE to perform NTN neighbor cell measurement.

Proposal 10: NR NTN cell reselection evaluation is based on RRM measurements as legacy; no spec impact foreseen for EUTRA TN to NR NTN cell.

[R2-2402885](file:///C:\Data\3GPP\Extracts\R2-2402885_LTE%20TN%20to%20NTN%20mobility.doc) Mobility from LTE TN to NR NTN Apple discussion Rel-19

Proposal 2: RAN2 to discuss if smtc4List should be extended to LTE SIB24.

- HW thinks we don’t need to consider multiple SMTC

* WA: we don’t introduce multiple SMTCs in LTE

[R2-2402834](file:///C:\Data\3GPP\Extracts\R2-2402834%20Discussion%20on%20the%20cell%20reselection%20from%20LTE%20to%20NR%20NTN.doc) Discussion on the cell reselection from LTE to NR NTN Xiaomi discussion

Proposal 2: In order to reduce UE power consumption, the issue of the unnecessary measurement on the NR NTN neighbour cells should be addressed.

Proposal 3: The time information on when NR NTN neighbour cells provide the service and the reference location and threshold of the NR NTN neighbour cells can be considered to determine whether performs the NR NTN neighbour cell measurement.

Proposal 4: Introduce a separate reselection timer (TreselectionNR-NTN) specifically for NR NTN.

Agreement:

1. For idle mode mobility from LTE to NR NTN, at least normal LTE UE are in scope. Can come back in the next meeting to check if also eMTC UE and NB-IoT UEs could also be considered in scope

Working Assumption:

1. We don’t introduce multiple SMTCs in LTE

[R2-2402154](file:///C:\Data\3GPP\Extracts\R2-2402154_Support%20of%20LTE%20TN%20to%20NR%20NTN%20mobility.doc) Support of LTE TN to NR NTN mobility China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2402195](file:///C:\Data\3GPP\Extracts\R2-2402195%20LTE%20to%20NR%20NTN%20mobility.doc) Discussion on LTE to NR NTN idle mode mobility OPPO discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2402221](file:///C:\Data\3GPP\Extracts\R2-2402221%20Discussion%20on%20LTE%20TN%20to%20NR%20NTN%20Mobility.docx) Discussion on LTE TN to NR NTN Mobility vivo discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2402545](file:///C:\Data\3GPP\Extracts\R2-2402545%20Discussion%20on%20idle%20mode%20mobility%20enhancements%20for%20E-UTRAN%20TN%20to%20NR-NTN.docx) Discussion on idle mode mobility enhancements for E-UTRAN TN to NR-NTN CMCC discussion Rel-19

[R2-2402827](file:///C:\Data\3GPP\Extracts\R2-2402827%20Discussion%20on%20LTE%20TN%20to%20NR%20NTN%20mobility.docx) Discussion on LTE TN to NR NTN mobility Huawei, HiSilicon, Turkcell discussion Rel-19 LTE\_TN\_NR\_NTN\_mob-Core

[R2-2403066](file:///C:\Data\3GPP\Extracts\R2-2403066.docx) Support for LTE to NR-NTN idle mode mobility Telit Communications S.p.A. ; Thales discussion

[R2-2403073](file:///C:\Data\3GPP\Extracts\R2-2403073%20Consideration%20on%20idle%20mode%20mobility%20between%20LTE%20TN%20and%20NR%20NTN.doc) Consideration on idle mode mobility between LTE TN and NR NTN ZTE Corporation, Sanechips discussion Rel-19

[R2-2403123](file:///C:\Data\3GPP\Extracts\R2-2403123%20%5bNTN%5d%20Discussion%20on%20support%20of%20LTE%20to%20NR%20NTN%20cell%20reselection_final.docx) Discussion on support of LTE to NR NTN cell reselection LG Electronics France discussion Rel-19 LTE\_TN\_NR\_NTN\_mob

[R2-2403205](file:///C:\Data\3GPP\Extracts\R2-2403205%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 LTE\_TN\_NR\_NTN\_mob

[R2-2403226](file:///C:\Data\3GPP\Extracts\R2-2403226%20E-UTRA%20TN%20to%20NR%20NTN%20Idle%20mobility.docx) Discussion on cell reselection from E-UTRA TN to NR NTN MediaTek Inc. discussion NR\_NTN\_Ph3-Core

[R2-2403307](file:///C:\Data\3GPP\Extracts\R2-2403307%20On%20E-UTRA%20TN%20to%20NR%20NTN%20Mobility%20in%20IDLE%20mode.docx) On E-UTRA TN to NR NTN Mobility in IDLE mode Nokia discussion Rel-19 NR\_NTN\_Ph3

[R2-2403339](file:///C:\Data\3GPP\Extracts\R2-2403339%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

[R2-2403640](file:///C:\Data\3GPP\Extracts\R2-2403640%20-%20E-UTRAN%20TN%20to%20NR-NTN%20mobility.docx) E-UTRAN TN to NR-NTN mobility Ericsson discussion Rel-19 NR\_NTN\_Ph3-Core

## 8.9 IoT NTN Ph3

(IoT\_NTN\_Ph3-Core; leading WG: RAN2; REL-19; WID: RP-240776)

Time budget: 0.5 TU

Tdoc Limitation: 2 tdocs

### 8.9.1 Organizational

LS, Rapporteur input, including workplan, etc.

[R2-2402941](file:///C:\Data\3GPP\Extracts\R2-2402941%20R19%20IOT%20NTN%20WorkPlan.docx) Work Plan for Rel-19 IoT NTN MediaTek Inc. Work Plan IoT\_NTN\_Ph3-Core

- Ericsson supports the Workplan including not discussing S&F before the work progresses in other group

- HW wonders if there are some parts regarding S&F that we can discuss independently from other groups

- QC thinks we should focus on the S&F aspects for RAN2

* We will continue to have high level discussion on RAN2 related aspects for S&F also in Q2

[R2-2403641](file:///C:\Data\3GPP\Extracts\R2-2403641%20-%20IoT%20NTN%20phase%203%20scope.docx) IoT NTN phase 3 scope Ericsson discussion Rel-19 IoT\_NTN\_Ph3-Core

### 8.9.2 Support of Store & Forward

Contributions should focus on possible impacts to the radio interface.

[R2-2403274](file:///C:\Data\3GPP\Extracts\R2-2403274%20IoT%20NTN%20Store%20and%20Forward%20discussion.docx) Discussion on Store and Forward support for IoT NTN Phase 3 THALES discussion Rel-19 NR\_IoT\_NTN\_req\_test\_enh-Core

Proposal 1 Align regenerative payload architecture definition for IoT NTN with the NR NTN

- CT thinks that S&F is not in the scope of NR NTN and there is no need to put CN parts on the satellite

* RAN2 assumes that S&F implies that at least the full eNB will be onboard

Proposal 2 The following requirements should be considered for the RAN2 Store and Forward work

- Store data on the satellite when the feeder link is unavailable; and forward the data once the feeder link between the satellite and the ground segment becomes available as illustrated on the figure above.

- A 5G system with satellite access shall be able to inform a UE whether S&F Satellite operation is applied

- Ericsson thinks this might also be coming from NAS

* RAN2 assumes that an IoT NTN network shall be able to inform UE(s) whether S&F Satellite operation is applied, either via NAS or AS (wait for SA2 progress on this)

- Subject to operator’s policies, a 5G system with satellite access supporting S&F Satellite operation shall be able to support forwarding of the stored data from one satellite to another satellite (e.g., which has an available feeder link to the ground network), through ISLs.

[R2-2403689](file:///C:\Data\3GPP\Extracts\R2-2403689%20-%20RAN%20aspects%20for%20S&F%20satellite%20operation.docx) RAN aspects of S&F operation for IoT NTN Sateliot discussion

Observation#1. Assuming an architecture with full eNB on board the satellite, it’s our view that support for S&F can be introduced with a minimum impact on the RAN functions excepting the broadcasting of system information (SI) intended to advertise UEs whether the network is operating in S&F mode or normal (default) mode.

Proposal#1. The information indicating whether/when a satellite cell is operating in S&F mode or normal/default mode should be broadcasted via system information.

- Novamint supports this and thinks that eventually we will have to agree on a solution via broadcast signalling

[R2-2402155](file:///C:\Data\3GPP\Extracts\R2-2402155_The%20consideration%20of%20supporting%20Store%20&%20Forward%20in%20IoT%20NTN.doc) The consideration of supporting Store & Forward in IoT NTN China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1: Add satellite work mode into SIB to indicate whether S&F function is supported.

Proposal 2: RAN2 could focus on single satellite solution for S&F at first. For multi-satellite solution, RAN2 could wait for RAN3 conclusion on the UE context transmission.

- Novamint disagrees, as there is no deployment relying on a single satellite. The solution will have to support multi-satellite from day1. Oppo agrees with Novamint and don’t think that focussing on single satellite will make things easier. CATT also agrees. Sateliot also agrees

Proposal 3: RAN2 needs to define the RRC connection suspend and resume mechanism for S&F function.

- Oppo thinks we need to say that the UP solution will be supported

[R2-2402541](file:///C:\Data\3GPP\Extracts\R2-2402541%20Discussion%20on%20IoT%20NTN%20Store%20and%20Forward.docx) Discussion on IoT NTN Store and Forward CMCC discussion Rel-19 IoT\_NTN\_Ph3-Core

Architecture

* Architecture

Proposal 1: It is proposed to specify single satellite architecture in S&F mode first. Waiting for SA2 conclusion on multiple satellite architecture in S&F mode (as well as ISL).

* Access control

Proposal 2: It is proposed that eNB broadcasts supporting S&F mode and carrying S&F information in SIB message (e.g. SIB31 or SIB32).

Proposal 3: It is proposed to add new IE in SIB1 (e.g. cellBarredSF-r18) and use one bit to indicate whether UE(s) are allowed to camp on the S&F cell.

Proposal 4: It is proposed to add new UE capability to support S&F operation.

Proposal 5: It is proposed to configure UE with S&F information in advance. FFS how UE is configured (e.g. through pre-configuration, broadcast message or dedicated signaling).

Proposal 6: RAN2 to discuss RA procedure enhancement. e.g. eNB may reject the first UE attach request with the cause value of S&F when the feeder link is unavailable.

Proposal 7: If the eNB rejects UE RA request, it can send a new waiting timer within the rejection message. UE does not need to send RA request until the timer expired.

Proposal 8: Before the waiting timer expires, UE can attach to a normal IoT-NTN cell if there is an available IoT-NTN satellite.

Proposal 9: Normal IoT-NTN cell has a higher priority than the S&F cell. Only when there is no available normal IoT NTN cell, UE supporting S&F mode will try to camp on the available S&F cell.

* Suspension

Proposal 10: Before the service link is unavailable, an indication needs to be gave from eNB to UE to indicate the interruption time. Then UE can know the estimated suspension time for next data transmission occasion.

Proposal 11: RAN2 to discuss UE behaviour during the suspension period e.g. expand the discard timer/retransmission timer due to S&F huge latency.

[R2-2402942](file:///C:\Data\3GPP\Extracts\R2-2402942%20RAN2%20impact%20on%20S&F%20mode.docx) RAN2 impact on S&F mode MediaTek Inc. discussion IoT\_NTN\_Ph3-Core

Proposal 1: Wait for SA2/CT1 discussion progress to see if the legacy UE can access the Rel-19 store and forward enabled network.

Proposal 2: The information indicating enabled Store and Forward mode can be broadcasted via system information.

Proposal 3: The information indicating feeder link status can be broadcasted via system information.

Proposal 4: The information indicating the time with feeder link can be broadcasted via system information.

Proposal 5: With the store and forward assistant information, UE can by implementation skip a cell during the cell selection/reselection or initiate RRC connection establishment at the right time.

[R2-2402475](file:///C:\Data\3GPP\Extracts\R2-2402475%20Overview%20of%20the%20Store%20and%20Forward%20satellite%20operation.docx) Overview of the Store and Forward satellite operation Huawei, HiSilicon, Turkcell discussion Rel-19 IoT\_NTN\_Ph3-Core

* Architecture and principle for S&F

Proposal 1: RAN2 should start with the regenerative payload architecture with at least eNB on board for the discussion of S&F satellite operation. Whether and which CN components are on board is up to SA2.

Proposal 2: RAN2 assumes:

- The S&F satellite operation is common for NB-IoT and eMTC.

- The S&F satellite operation is applied to both CP solution and UP solution.

- CATT thinks that at least CP solution would be supported. Sateliot and Novamint agree

* RAN2 assumes:

- The S&F satellite operation is common for NB-IoT and eMTC.

- The S&F satellite operation is applied to both CP solution and UP solution (for the UP solution pending on SA2 conclusions on the architecture)

- Basic procedure for S&F satellite operation

Proposal 3: RAN2 to start from Modelling 1, i.e., UE is served by the same satellite/eNB after sending the RRC connection request and before being released to IDLE, and can discuss Modelling 2 after sufficient progress is made in RAN3/SA2.

Proposal 4: For the uplink/downlink messages transmission, the following steps/principles are taken as baseline for S&F operation:

1) The UE sends uplink data/signalling to eNB when service link is available and the eNB stores it.

2) When feeder link is available, the eNB sends the uplink data/signalling to the CN.

3) The eNB receives the downlink data/signalling from the CN and stores it when feeder link is available.

4) The eNB sends the downlink data/signalling to the UE when service link is available again.

- Access control for S&F satellite operation

Proposal 5: Legacy UEs should be barred by cellBarred and cellBarredNTN in a cell performing S&F satellite operation.

Proposal 6: UEs not supporting S&F should consider a cell performing S&F satellite operation as barred.

Proposal 7: A new S&F barring indication is broadcasted in the SIB.

- UE’s RRC state when service link is not available

Proposal 8: RAN2 to discuss UE’s RRC state and the related behaviours when service link is becomes unavailable for S&F operation.

[R2-2403148](file:///C:\Data\3GPP\Extracts\R2-2403148-Store-Forward-RAN-Aspects.docx) Radio Interface Imapcts for Store-Forward mode operation of IoT-NTN Nokia, Nokia Shanghai Bell discussion

Proposal 1: RAN2 to discuss the radio interface aspects for Store-and-Forward for eNB-only at Satellite and eNB+MME at Satellite until SA2 concludes on the supported components in NTN node for Store and Forward (S&F) operation.

Proposal 2: RAN2 to identify the application scenarios that requires specific changes for the radio interface operation in S&F mode.

Proposal 3: RAN2 to investigate access control and scheduling related changes for S&F operation.

Proposal 4: RAN2 to analyze additional security requirements for handling control plane CIOT in Store-Forward mode of operation.

Proposal 5: For User Plane solution for IoT-NTN in S&F mode, security handling of same UE context across two successive NTN nodes without direct connectivity needs to be investigated further.

RAN2 assumptions:

1. S&F implies that at least the full eNB will be onboard
2. An IoT NTN network shall be able to inform UE(s) whether S&F Satellite operation is applied, either via NAS or AS (wait for SA2 progress on this)

3. The S&F satellite operation is common for NB-IoT and eMTC.

4. The S&F satellite operation is applied to both CP solution and UP solution (for the UP solution pending on SA2 conclusions on the architecture)

[R2-2402193](file:///C:\Data\3GPP\Extracts\R2-2402193%20S&F%20operation.doc) Discussion on Store & Forward satellite operation OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2402222](file:///C:\Data\3GPP\Extracts\R2-2402222%20Initial%20Discussion%20on%20S&F%20operation.docx) RAN2 Aspects For Store & Forward vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2402380](file:///C:\Data\3GPP\Extracts\R2-2402380%20RAN2%20impacts%20of%20supporting%20Store&Forward%20operation%20in%20IoT%20NTN.docx) RAN2 impacts of supporting Store&Forward operation in IoT NTN ZTE Corporation, Sanechips discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2402454](file:///C:\Data\3GPP\Extracts\R2-2402454.docx) Discussion on support of Store&Forward Transsion Holdings discussion Rel-19

[R2-2402693](file:///C:\Data\3GPP\Extracts\R2-2402693%20Discussion%20on%20Store%20and%20Forward%20operations%20in%20IoT-NTN.docx) Discussion on Store and Forward operations in IoT-NTN HONOR discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2402710](file:///C:\Data\3GPP\Extracts\R2-2402710.docx) Discussion on Store & Forward satellite operation IoT NTN CAICT discussion

[R2-2402715](file:///C:\Data\3GPP\Extracts\R2-2402715%20On%20support%20of%20Store%20and%20Forward%20operations%20in%20NTN.docx) On support of Store and Forward operations in NTN Lenovo discussion Rel-19

[R2-2402810](file:///C:\Data\3GPP\Extracts\R2-2402810%20store%20and%20forward.docx) S&F satellite operation with full eNB as regenerative payload Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

R2-2402819 Support of Store and Forward NEC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2402821](file:///C:\Data\3GPP\Extracts\R2-2402821.doc) Considerations on Store & Forward Satellite Operation SHARP Corporation discussion Rel-19

[R2-2402835](file:///C:\Data\3GPP\Extracts\R2-2402835%20Initial%20views%20on%20the%20support%20of%20store%20and%20forward%20satellite%20operation.doc) Initial views on the support of store and forward satellite operation Xiaomi discussion

[R2-2402886](file:///C:\Data\3GPP\Extracts\R2-2402886_Store%20and%20Forward.doc) Support of S&F operation in IoT NTN Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2403044](file:///C:\Data\3GPP\Extracts\R2-2403044%20Discussion%20on%20support%20of%20store%20and%20forward%20operation.docx) Discussion on support of store and forward operation CATT discussion

[R2-2403321](file:///C:\Data\3GPP\Extracts\R2-2403321%20(R19%20NR%20NTN%20WI%20AI%208.9.2)%20Store%20and%20forward.docx) Support for Store and Forward operation in NTN InterDigital discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2403337](file:///C:\Data\3GPP\Extracts\R2-2403337%20On%20RAN2%20aspects%20on%20Store%20and%20Forward.docx) On RAN2 aspects of Store and Forward Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

### 8.9.3 Uplink Capacity Enhancement

At this meeting contributions should only 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).

[R2-2403206](file:///C:\Data\3GPP\Extracts\R2-2403206%20(R19%20IoT-NTN%20AI%208.9.3)%20-%20EDT.docx) Clarifications on the Scope of EDT enhancement for IoT-NTN Interdigital, Inc. discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1: Clarify whether the scope of uplink capacity enhancements is limited to NB-IoT, or whether eMTC is also within scope.

- MTK and vivo think both are supported

* Both NB-IoT and eMTC are within scope of uplink capacity enhancements

Proposal 2: Clarify whether the scope of uplink capacity enhancements is only for C-plane optimization, or whether U-plane optimization is also within scope.

- Oppo thinks both should be supported

* Both C-plane and U-plane solutions are within scope of uplink capacity enhancements.

Proposal 3: Clarify whether the scope of uplink capacity enhancements is only for CIoT EPS optimizations, or whether CIoT 5GS optimizations are also within scope.

- vivo and MTK thikns we should focus on EPS

* Only CIoT EPS is within scope of uplink capacity enhancements

Proposal 4: Clarify that MO-EDT and MT-EDT can utilize uplink capacity enhancements, however no MT-EDT specific enhancement is in scope.

- Nokia thinks it’s early to exclude MT-EDT enhancements

- ZTE thinks we should remove the reference to EDT and just refer to MO case

Proposal 5: Clarify whether the scope of uplink capacity enhancements is only for NTN, or whether enhancements may apply to TN.

Proposal 6: Clarify the scope of uplink capacity enhancements study is to

- Identify shortcomings with the existing EDT/PUR feature for NTN.

- Identify potential enhancements to the existing EDT/PUR feature.

- Show the gain of potential enhancements compared to the existing EDT/PUR

Agreements:

1. Both NB-IoT and eMTC are within scope of uplink capacity enhancements
2. Both C-plane and U-plane solutions are within scope of uplink capacity enhancements.
3. Only CIoT EPS is within scope of uplink capacity enhancements

[R2-2402381](file:///C:\Data\3GPP\Extracts\R2-2402381%20Consideration%20on%20enhanced%20early%20data%20transmission%20in%20IoT%20NTN.docx) Consideration on enhanced early data transmission in IoT NTN ZTE Corporation, Sanechips discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1: RAN2 clarify that the main task of the objective “to reduce the necessary uplink and downlink signaling to complete an Early Data Transmission (EDT) transaction” is to support contention-based Msg3 transmission or contention-based Shared PUR.

Proposal 2a: It’s suggested that, if an IoT NTN UE in IDLE state is activated to use R19 contention-based Shared PUR, the UE needs to verify/update the TA just before triggering PUR.

Proposal 2b: If the proposal 2a can be agreed, RAN2 further discuss whether the pur-TimeAlignmentTimer is no longer needed.

Proposal 3: It’s suggested that, if contention-based Shared PUR is supported, when the UE changes the camping cell, the UE doesn’t need to stop using this enhanced PUR function.

Proposal 4a: With reference to legacy PUR configuration, RAN2 can take the following resources types as start point for the discussion on shared PUR resources configuration:

• Time domain resources, e.g., Periodicity, Offset, start time (H-SFN, frame, SFN etc.) of PUR occasion

• Frequency domain resources, e.g., Carrier, SubCarrier

• TBS

• PUR MPDCCH/NPDCCH search space window

• RSRP change threshold

• OCC resource

Proposal 4b: RAN2 is suggested to open discuss the following alternatives for configuring shared PUR resources:

• Alt1: To provide a common PUR resource configuration via SIB.

• Alt2: To provide shared PUR 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 PUR resources via the SIB and NW can indicate index of the resource set for a specific UE via the dedicated signaling.

Proposal 5: RAN2 is suggested to open discuss the following alternatives for RNTI design and the scheduling of Msg3:

• Alt1: Common PUR-RNTI configured in the common PUR 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.

Proposal 6: 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 shared PUR scheme. The very simple Physical layer L1 ACK can be used in suitable cases to achieve the expected more efficient Msg4 transmission.

Proposal 7: RAN is suggested to consider the following alternatives for the scheduling of Msg4:

• Alt1: Common PUR-RNTI configured in the common PUR 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.

Proposal 8: The contention resolution scheme in legacy random access procedure can be reused for shared PUR, 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 9: RAN2 is suggested to discuss the following other issues:

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

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

[R2-2402703](file:///C:\Data\3GPP\Extracts\R2-2402703%20Discussion%20on%20uplink%20capacity%20enhancements%20for%20IOT%20NTN.doc) Discussion on uplink capacity enhancements for IOT NTN Xiaomi discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1 For Msg3-based EDT, RAN2 to take OCC based CFS-PUR and OCC based CBS-PUR as a start point.

Proposal 2 CBS-PUR resource can be configured through system information, which doesn’t require TAT configuration.

Proposal 3 For CBS-PUR, resource request is not supported.

Proposal 4 RAN2 to consider the design of RNTI for OCC based CBS-PUR.

Proposal 5 RAN2 to consider reuse the legacy mechanism of including first 48 bits of CCCH SDU in msg4 for contention resolution.

Proposal 6 For EDT enhancement, assume that at most one downlink packet and one uplink packet are supported.

Proposal 7 RAN2 to discuss whether UE can fallback to legacy EDT/PUR procedure when OCC based CBS-PUR procedure fails multiple times.

[R2-2402202](file:///C:\Data\3GPP\Extracts\R2-2402202%20-%20Discussion%20on%20enhanced%20EDT%20for%20IoT%20NTN.doc) Discussion on enhanced EDT for IoT NTN OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2402223](file:///C:\Data\3GPP\Extracts\R2-2402223%20Discussion%20on%20EDT%20Enhancement%20for%20IoT-NTN.docx) Discussion on EDT Enhancement for IoT-NTN vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2402336](file:///C:\Data\3GPP\Extracts\R2-2402336.doc) Uplink Capacity Enhancement for EDT transaction Spreadtrum Communications discussion Rel-19

[R2-2402476](file:///C:\Data\3GPP\Extracts\R2-2402476%20Overview%20of%20capacity%20enhancement%20for%20uplink.docx) Overview of capacity enhancement for uplink Huawei, HiSilicon, Turkcell discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2402546](file:///C:\Data\3GPP\Extracts\R2-2402546%20Discussion%20on%20early%20data%20transmission%20enhancements%20for%20IoT-NTN.docx) Discussion on early data transmission enhancements for IoT-NTN CMCC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2402694](file:///C:\Data\3GPP\Extracts\R2-2402694%20Discussion%20on%20EDT%20optimisation%20in%20IoT-NTN.docx) Discussion on EDT optimisation in IoT-NTN HONOR discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2402709](file:///C:\Data\3GPP\Extracts\R2-2402709.docx) Discussion on enhanced EDT of IoT NTN CAICT discussion

[R2-2402716](file:///C:\Data\3GPP\Extracts\R2-2402716%20EDT%20for%20uplink%20capacity%20enhancement%20in%20NTN.docx) EDT for uplink capacity enhancement in NTN Lenovo discussion Rel-19

[R2-2402811](file:///C:\Data\3GPP\Extracts\R2-2402811%20EDT%20enh.docx) Discussion on EDT enhancements Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2402887](file:///C:\Data\3GPP\Extracts\R2-2402887_PUR.doc) Uplink capacity enhancement in IoT NTN Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2402943](file:///C:\Data\3GPP\Extracts\R2-2402943%20Discussion%20on%20enhanced%20EDT.docx) Discussion on enhanced EDT MediaTek Inc. discussion IoT\_NTN\_Ph3-Core

[R2-2403042](file:///C:\Data\3GPP\Extracts\R2-2403042%20On%20signalling%20overhead%20reduction%20for%20EDT.docx) On signalling overhead reduction for EDT in IoT NTN CATT discussion

[R2-2403126](file:///C:\Data\3GPP\Extracts\R2-2403126%20Consideration%20on%20EDT%20enhancement%20for%20IoT-NTN.docx) Consideration on EDT enhancement for IoT-NTN NEC Corporation. discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2403338](file:///C:\Data\3GPP\Extracts\R2-2403338%20Initial%20discussion%20on%20uplink%20capacity%20enhancements.docx) Initial discussions on uplink capacity enhancements Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2403483](file:///C:\Data\3GPP\Extracts\R2-2403483%20On%20uplink%20capacity%20enhancement%20for%20IoT%20NTN.docx) On uplink capacity enhancement for IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-19 IoT\_NTN\_Ph3-Core

# Summary

Agreed CRs

NR-NTN

IoT-NTN

Approved LSs out

[Post125bis] Email discussions

Short

Medium

Long