3GPP TSG-RAN WG2 Meeting #122 R2-2306541

Incheon, South Korea, May 22th-26th, 2023

**Agenda item: 8.1**

**Source: Vice Chairman (ZTE Corporation)**

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

**Document for: Approval**

General

Recording of voice or video at meetings is not used in 3GPP. This applies also to this e-Meeting. At this e-Meeting, no specific actions are taken to prevent the recording of web conferences. Companies that have concerns related to recordings, if any, may express those by email in the main meeting organizational thread [AT122][000]

Organizational

1. All organization emails and notes will be shared over the following email discussion throughout the meeting:

* [AT122][100] Organizational – NR-NTN and IoT-NTN session (RAN2 VC)

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** |
| **Monday May 22** | | | |
| 09:00 – 10:30 | Opening:  [1], [2], [3] 20-25 min  NR1516 CP (Johan)  - Common [5.1.1] [5.1.3]  NR17 (Johan)  - Common [6.1.1] [6.1.3.0, 6.1.3.1, 6.1.3.3]: In the order: General, 71GHz, feMIMO, TEI, Slicing, ePowSav, MGE, RedCap, QoE, DCCA,  [6.1.3.2] UE cap | Breakout to start after formal opening of meeting and NR CPUP - common items if any in the main room:  NR151617 UP (Diana)  NR18 MT-SDT [0.5] (Diana)  NR18 Network Energy Saving [1] (Diana)  - DTX/DRX,  - SSB-less (if time allows) | Breakout to start after formal opening of meeting in main room:  NR17 Pos (Nathan)  NR17 SL Relay (Nathan) - UP items if time permits |
| 11:00 – 13:00 |
| 14:30 – 16:30 | NR18 UAV [1] (Diana)  - measurement reporting,  - flight path,  - BRID (if time allows) | NRLTE1516 (Kyeongin)  NR17 (Kyeongin) |
| 17:00 – 19:00 | NR17 (Johan)  - Common[6.1.1] [6.1.3] SDT, IAB  NR18 MIMO evo [0.5] (Erlin)  - 7.20.1 (if any)  - 7.20.2 | **NR18 NTN enh [1] (Sergio)**  **- 7.7.1**  **- 7.7.4.1**  **- 7.7.4.2** | NR18 SL evolution [1] (Kyeongin) |
| **Tuesday May 23** | | | |
| 08:30 – 10:30 | NR18 LP WUS [0.5] (Johan)  NR18 fCovEnh [0.5] (Eswar)   * Start with Stage-2 CP issues (7.21.2) after organizational   + CBRA open issues, CFRA support, RSRP thresholds etc * UP issues (7.21.3)   + fallbacks * Stage-3 CP issues if time left (how to signal partitions, priorities and capability etc) | NR17 MBS (Dawid):  - 6.2.0, 6.2.1 (CP), 6.2.2 (UP)  NR18 eQoE [0.5] (Tero)  - 7.14.2: Area scope + other aspects if time allows | NR17 (Nathan)  - SL Relay |
| 11:00 – 13:00 | **NR17 NTN Maint (Sergio)**  **- 4.2**  **- 6.4**  **NTN Self evaluation (Sergio)**  **- 7.25.4** | NR18 eQoE [0.5] (Tero)  - 7.14.2: Area scope, buffer sizes, other RRC details  - 7.14.3: Need for RVQoE events in RRC, LS replies to RAN3/SA4  EUTRA16+ (Tero) – 12:30-13:00- 4.1: HO completion in Stage-2, QoE configuration release | NR18 Pos [2] (Nathan) |
| 14:30 – 16:30 | NR18 Other [2] (Johan) | NR18 XR [2] (Tero)  - 7.5.1: LSs, rapporteur input, running CR(s)  - 7.5.4.1: Delay reporting, BSR tables for XR  - 7.5.4.2: Discard operation for XR | NR18 SL relay [1.5] (Nathan)- |
| 17:00 – 19:00 | NR18 feMob [2] (Johan) | NR18 XR [2] (Tero)  - 7.5.3: Non-integer periodicity for DRX, SFN wrap-around  - 7.5.2: UL jitter signaling, UL EoDB detection at gNB  - 7.5.4.3: Retransmission-less, CG, other CG enhancements | NR17 (Nathan)  NR18 SL relay [1.5] (Nathan) |
| **Wednesday May 24** | | | |
| 08:30 – 10:30 | NR18 feMob [2] (Johan) | NR18 NCR [0.5] (Sasha) | NR18 Pos [2] (Nathan) |
| 11:00 – 13:00 | NR18 Mobile IAB [0.5] (Johan)  NR18 Other [2] (Johan) | NR18 RedCap [1] (Mattias) | NR17 SONMDT (HuNan) |
| 14:30 – 16:30 | NR18 URLLC [0.5] (Diana)  NR18 Network Energy Saving [1] (Diana)  - Mobility,  - Cell reselection | NR17 MBS (Dawid)  - Continuation, if needed  NR 18 MBS [0.75] (Dawid)  - 7.11.1 (Organizational)  - 7.11.3 (Shared processing)  - 7.11.2.1 (CP issues for INACTIVE) | NR18 SONMDT [1] (HuNan) |
| 17:00 – 19:00 | NR18 AIML [1] (Johan) | **R18 IoT-NTN [1] (Sergio)**  **- 7.6.1**  **- 7.6.2.2: Report of [101]**  **- 7.6.3.1: Report of [102]**  **- 7.6.3.2** | NR18 IDC [1] (Yi) |
| **Thursday May 25** | | | |
| 08:30 – 10:30 | CB NR151617 (Johan) | CB Diana  - maintaince CRs,  - NES CBs . | CB Kyeongin |
| 11:00 – 13:00 | NR18 TEI [1] (Nathan, Johan)  No SL Relay proposals. | CB Diana  - NES CBs  - UAV CBs and subscription based AI. | CB Kyeongin |
| 14:30 – 16:30 | CB NR17 (Johan) | **CB Sergio (14:30-15:30)**  **NR18 NTN CB**  **- 7.7.4.1.1 : Report of [103]**  **- 7.7.4.1.2 : Report of [104]**  **- 7.7.4.2: Report of [105], [106],** [**R2-2304899**](file:///C:\Data\3GPP\Extracts\R2-2304899%20Discussion%20on%20unchanged%20PCI%20scenario.docx)  CB Tero (15:30 – 16:30)  - NR18 eQoE leftovers and CBs  - 7.14.4: Remaining RRC details | CB Nathan |
| 17:00 – 19:00 | CB NR17 (Johan)  CB NR18 (Johan) | CB Tero  - 4.1: LTE CBs (if any)  - 7.5.X: XR leftovers and CBs | CB Nathan |
| **Friday May 26** | | | |
| 08:30 – 10:30 | NR18 MIMO evo [0.5] (Erlin)  - CBs from 7.20.2 (if any),  - 7.20.3.  CB Dawid | CB Mattias TBD (8:30 – 9:30)  **CB Sergio (9:30 – 10:30)**  **R17 NTN Maint CB**  **- including reports of [107]~[112]** | CB Nathan, Kyeongin TBD |
| 11:00 – 13:00 | CB Johan, Eswar TBD | **CB Sergio**  **NR18 NTN CB**  **- remaining CBs from 7.7.4.2**  **- 7.7.3**  **R18 IoT-NTN CB**  **- 7.6.3.1: Report of [102],[113]**  **- 7.6.4** | CB Yi |
| 14:30 – 16:00 | CB Johan | CB Sasha, Tero | CB HuNan |
| 16:00 – 17:00 | CB and conclusion (Johan) |  |  |

List and status of offline discussions

NOTE: No offline email discussions will be kicked off before Monday May 22th, 09:00 local time

* [AT122][101][IoT NTN] GNSS operation enhancements (Apple)

Initial scope: Discuss the proposals in the submitted contributions in AI 7.6.2.2

Initial intended outcome: Summary of the offline discussion with e.g.:

* List of proposals for agreement (if any)
* List of proposals that require online discussions
* List of proposals that should not be pursued (if any)

Deadline for companies' feedback: Wednesday 2023-04-24 08:00

Deadline for rapporteur’s summary (in R2-2306641): Wednesday 2023-04-24 14:00

Status: Closed

* [AT122][102][IoT NTN] Mobility Enhancements (Qualcomm)

Updated scope: Discuss the remaining proposals from R2-2306642 with majority support. F2F discussion is invited

Updated intended outcome: Summary of the offline discussion

Deadline for rapporteur’s summary (in R2-2306664): Friday 2023-04-26 11:00

Status: Ongoing

* [AT122][103][NR-NTN Enh] NTN-TN cell reselection (Nokia)

Scope: Continue the discussion on 1) how to indicate frequency information for TN coverage (e.g options 1~3) and 2) whether to provide the NTN neighbor cell info in TN cell. F2F discussion is invited

Intended outcome: Summary of the offline discussion

Deadline for rapporteur's summary (in R2-2306643): Thursday 2023-05-25 13:00

Status: Ongoing

* [AT122][104][NR-NTN Enh] Location-based cell reselection enhancements (CMCC)

Scope: F2F discussion on Location-based cell reselection enhancements, e.g. p3-p4 from [R2-2305598](file:///C:\Data\3GPP\Extracts\R2-2305598%20Discussion%20on%20NTN-NTN%20reselection.docx)

Intended outcome: summary of offline discussion

Deadline for rapporteur's summary (in R2-2306644): Thursday 2023-05-25 13:00

Status: Ongoing

* [AT122][105][NR-NTN Enh] Common signaling in (C)HO (Oppo)

Scope: discuss p2~p4 from [R2-2304753](file:///C:\Data\3GPP\Extracts\R2-2304753%20NTN%20connected%20mode%20mobility.doc). F2F discussion is invited

Intended outcome: summary of offline discussion

Deadline for rapporteur's summary (in R2-2306645): Thursday 2023-05-25 13:00

Status: Ongoing

* [AT122][106][NR-NTN Enh] RACH-less HO (Huawei)

Scope: discuss RACH-less HO proposals from [R2-2306071](file:///C:\Data\3GPP\Extracts\R2-2306071%20Remaining%20issues%20on%20RACH-less%20HO%20in%20NTN.docx) and [R2-2306465](file:///C:\Data\3GPP\Extracts\R2-2306465%20-%20Handover%20enhancements.docx)

Intended outcome: summary of offline discussion

Deadline for rapporteur's summary (in R2-2306646): Thursday 2023-05-25 13:00

Status: Ongoing

* [AT122][107][NR-NTN] CR0668 (vivo)

Scope: discuss the change in [R2-2304837](file:///C:\Data\3GPP\Extracts\38300_CR0668_(Rel-17)_R2-2304837%20Correction%20on%20stage-2%20descriptions%20for%20measurement%20in%20NR%20NTN.docx)

Intended outcome: Summary of offline discussion / agreeable CR

Deadline for rapporteur's summary (in R2-2306657): Friday 2023-05-26 09:00

Status: Ongoing

* [AT122][108][NR-NTN] CR0676 (Oppo)

Scope: discuss the CR in [R2-2305376](file:///C:\Data\3GPP\Extracts\R2-2305376_38.300%20NTN%20CR-v3.docx)

Intended outcome: Agreeable CR

Deadline for final CR (in R2-2306658): Friday 2023-05-26 09:00

Status: Ongoing

* [AT122][109][NR-NTN] CR3979 (QC)

Scope: discuss the CR in [R2-2305193](file:///C:\Data\3GPP\Extracts\38331_CR3979_(Rel-17)_R2-2305193%20EUTRA%20capability.docx)

Intended outcome: Agreeable CR

Deadline for final CR (in R2-2306660): Friday 2023-05-26 09:00

Status: Ongoing

* [AT122][110][NR-NTN] CR4112 (Intel)

Scope: discuss the CR in [R2-2305497](file:///C:\Data\3GPP\Extracts\38331_CR4112_(Rel-17)_R2-2305497.docx) and [R2-2306251](file:///C:\Data\3GPP\Extracts\R2-2306251%20-%20Clarification%20on%20configuration%20upon%20TN%20NTN%20mobility%20in%20RRC-INACTIVE.docx)

Intended outcome: Agreeable merged CR

Deadline for final CR (in R2-2306661): Friday 2023-05-26 09:00

Status: Ongoing

* [AT122][111][NR-NTN] RRC CR for kmac (Oppo)

Scope: Draft a CR to reflect p2 in [R2-2305378](file:///C:\Data\3GPP\Extracts\R2-2305378%20MAC%20and%20RRC%20correction%20for%20R17%20NR%20NTN.doc)

Intended outcome: Agreeable CR

Deadline for final CR (in R2-2306662): Friday 2023-05-26 09:00

Status: Ongoing

* [AT122][112][NR-NTN] CR4040 (ASUSTeK)

Scope: Draft a CR to reflect p2 in [R2-2305378](file:///C:\Data\3GPP\Extracts\R2-2305378%20MAC%20and%20RRC%20correction%20for%20R17%20NR%20NTN.doc)

Intended outcome: Agreeable CR

Deadline for final CR (in R2-2306663): Friday 2023-05-26 09:00

Status: Ongoing

* [AT122][113][IoT NTN] Measurements before RLF (Interdigital)

Scope: Discuss the RLF-related proposals in [R2-2305170](file:///C:\Data\3GPP\Extracts\R2-2305170%20(R18%20IoT-NTN%20WI%20AI%207.6.3.1)%20-%20measurements.docx). F2F discussion is invited

Intended outcome: Summary of the offline discussion

Deadline for final CR (in R2-2306665): Friday 2023-05-26 11:00

Status: Ongoing

## 4.2 NB-IoT and eMTC support for NTN Rel-17

(LTE\_NBIOT\_eMTC\_NTN; leading WG: RAN1; REL-17; WID: [RP-211601](file:///C:\Data\3GPP\archive\RAN\RAN%2392\Tdocs\RP-211601.zip))

Tdoc Limitation: 1 tdocs

This Agenda Item is treated in the Breakout session that includes NTN

### 4.2.0 In-Principle-Agreed CRs

Stage 2

[R2-2306261](file:///C:\Data\3GPP\Extracts\R2-2306261%20-%2036300_CR1383r2_(Rel-17)%20-%20Correction%20for%20R17%20IoT%20NTN.docx) Correction for R17 IoT NTN Ericsson, OPPO, Thales CR Rel-17 36.300 17.4.0 1383 2 F LTE\_NBIOT\_eMTC\_NTN-Core [R2-2304260](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304260.zip)

* Agreed

36.321

[R2-2304762](file:///C:\Data\3GPP\Extracts\R2-2304762%20-%20MAC%20correction%20on%20TDD%20support%20for%20IoT%20NTN.doc) MAC correction on TDD support for IoT NTN OPPO CR Rel-17 36.321 17.4.0 1560 3 F LTE\_NBIOT\_eMTC\_NTN [R2-2302530](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2302530.zip)

* Agreed

[R2-2305409](file:///C:\Data\3GPP\Extracts\R2-2305409%20Clarification%20on%20UL%20operation%20upon%20validity%20timer%20expiry%20for%20IoT%20NTN.docx) Clarification on UL operation upon validity timer expiry for IoT NTN Nokia, Nokia Shanghai Bell, Apple, Ericsson CR Rel-17 36.321 17.4.0 1565 2 F LTE\_NBIOT\_eMTC\_NTN-Core [R2-2304267](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304267.zip)

* Agreed

36.331

[R2-2305821](file:///C:\Data\3GPP\Extracts\R2-2305821-CR-TS36331-Alignment-of-NPRACH-preamble-description-V2.docx) Alignment of NPRACH preamble descriptions with RAN1 specification for IoT-NTN parameters Nokia, Nokia Shanghai Bell CR Rel-17 36.331 17.4.0 4930 2 F LTE\_NBIOT\_eMTC\_NTN-Core [R2-2304270](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304270.zip) Revised

* Revised in R2-2306514

[R2-2306514](file:///C:\Data\3GPP\Extracts\R2-2306514-CR-TS36331-Alignment-of-NPRACH-preamble-description-V2.docx) Alignment of NPRACH preamble descriptions with RAN1 specification for IoT-NTN parameters Nokia, Nokia Shanghai Bell CR Rel-17 36.331 17.4.0 4930 3 F LTE\_NBIOT\_eMTC\_NTN-Core [R2-2305821](file:///C:\Data\3GPP\Extracts\R2-2305821-CR-TS36331-Alignment-of-NPRACH-preamble-description-V2.docx)

* Update the coversheet also adding the inter-operability part
* Revised in R2-2306647

R2-2306647 Alignment of NPRACH preamble descriptions with RAN1 specification for IoT-NTN parameters Nokia, Nokia Shanghai Bell CR Rel-17 36.331 17.4.0 4930 4 F LTE\_NBIOT\_eMTC\_NTN-Core [R2-2305821](file:///C:\Data\3GPP\Extracts\R2-2305821-CR-TS36331-Alignment-of-NPRACH-preamble-description-V2.docx)

[R2-2306064](file:///C:\Data\3GPP\Extracts\R2-2306064%20CR%20to%2036.331%20on%20T317%20and%20T318.docx) CR to 36.331 on T317 and T318 Huawei, HiSilicon CR Rel-17 36.331 17.4.0 4928 3 F LTE\_NBIOT\_eMTC\_NTN-Core [R2-2304262](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304262.zip)

* Fix the font in the change
* Revised in R2-2306648

R2-2306648 CR to 36.331 on T317 and T318 Huawei, HiSilicon CR Rel-17 36.331 17.4.0 4928 4 F LTE\_NBIOT\_eMTC\_NTN-Core [R2-2304262](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304262.zip)

### 4.2.1 Corrections

A single CR per TS with miscelaneous corrections is encouraged. Small editorial corrections should be sent directly to rapporteur. Big open issues can be discussed with contributions with CR in the appendix of the contribution

Stage 2

[R2-2304810](file:///C:\Data\3GPP\Extracts\R2-2304810%20Miscellaneous%20Stage%202%20corrections%20for%20IoT%20NTN.docx) Miscellaneous Stage 2 corrections for IoT NTN Huawei, HiSilicon CR Rel-18 36.300 17.4.0 1384 - F LTE\_NBIOT\_eMTC\_NTN

- ZTE is fine with this CR

- Ericsson thinks the first change is not needed, even if the change is correct.

* Remove “BL UEs and UEs in enhanced coverage in” in the second change
* Revised in R2-2306649

R2-2306649 Miscellaneous Stage 2 corrections for IoT NTN Huawei, HiSilicon CR Rel-18 36.300 17.4.0 1384 1 F LTE\_NBIOT\_eMTC\_NTN

36.321

[R2-2304763](file:///C:\Data\3GPP\Extracts\R2-2304763%20-%20Correction%20on%20UL%20operation%20upon%20validity%20timer%20expiry%20in%20IoT%20NTN.doc) Correction on UL operation upon validity timer expiry in IoT NTN OPPO CR Rel-17 36.321 17.4.0 1566 - F LTE\_NBIOT\_eMTC\_NTN

- LG thinks this is not needed

- Ericsson agrees with the change as this is consistent with the use of a Note

- HW think the existing note is fine

* Not pursued

36.331

[R2-2305760](file:///C:\Data\3GPP\Extracts\R2-2305760%20Reference%20time%20for%20the%20GNSS%20validity%20duration%20IE.docx) Reference time for the GNSS validity duration IE Nokia, Nokia Shanghai Bell CR Rel-17 36.331 17.4.0 4932 - F LTE\_NBIOT\_eMTC\_NTN-Core

- QC and Google think this is not needed. Samsung agrees

* Not pursued

[R2-2305972](file:///C:\Data\3GPP\Extracts\R2-2305972%2036331(R17)_Correction%20on%20definition%20of%20ta-Report.docx) Correction on definition of ta-Report ZTE Corporation, Sanechips CR Rel-17 36.331 17.4.0 4933 - F LTE\_NBIOT\_eMTC\_NTN-Core

- QC thinks this is not needed as the procedural text is clear enough

- Ericsson thinks this is good clarification but suggests to remove “within dedicated signalling”

- Oppo thinks we could revise as “… during Random Access due to RRC connection establishment, RRC connection resume or RRC connection reestablishment”

* Revised to remove “within dedicated signalling” and to change to as “… during Random Access due to RRC connection establishment, RRC connection resume or RRC connection reestablishment”
* Revised in R2-2306650

R2-2306650 Correction on definition of ta-Report ZTE Corporation, Sanechips CR Rel-17 36.331 17.4.0 4933 1 F LTE\_NBIOT\_eMTC\_NTN-Core

[R2-2306041](file:///C:\Data\3GPP\Extracts\R2-2306041%20Clarify%20the%20reference%20point%20for%20UTC%20in%20SIB16.docx) Clarify the reference point for UTC in SIB16 MediaTek Inc. CR Rel-17 36.331 17.4.0 4934 - F LTE\_NBIOT\_eMTC\_NTN-Core

- QC agrees and thinks we should do the same change for NR

* Check offline
* CB Friday

[R2-2306483](file:///C:\Data\3GPP\Extracts\R2-2306483%20RRC%20correction%20on%20PUCCH%20TX%20duration.docx) RRC correction on PUCCH TX duration Samsung Suzhou CR Rel-17 38.331 17.4.0 4153 - F LTE\_NBIOT\_eMTC\_NTN

- Ericsson and ZTE support this. MTK also agrees

* Add the inter-operability part to the coversheet and fic the font size
* Revised in R2-2306651

R2-2306651 RRC correction on PUCCH TX duration Samsung Suzhou CR Rel-17 36.331 17.4.0 XXXX - F LTE\_NBIOT\_eMTC\_NTN

## 6.4 NR Non-Terrestrial Networks (NTN)

(NR\_NTN\_solutions-Core; leading WG: RAN2; REL-17; WID: [RP-211557](file:///C:\Data\3GPP\archive\RAN\RAN%2392\Tdocs\RP-211557.zip))

Tdoc Limitation: 1 tdocs

### 6.4.0 In principle agreed CRs

Stage 2

[R2-2304761](file:///C:\Data\3GPP\Extracts\R2-2304761_38.300%20NTN%20CR.docx) NTN stage-2 correction OPPO, Ericsson, Thales, Samsung CR Rel-17 38.300 17.4.0 0647 3 F NR\_NTN\_solutions-Core [R2-2304268](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304268.zip)

* Add impact analysis
* Revised in R2-2306655

R2-2306655 NTN stage-2 correction OPPO, Ericsson, Thales, Samsung CR Rel-17 38.300 17.4.0 0647 1 F NR\_NTN\_solutions-Core [R2-2304268](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304268.zip)

38.306

[R2-2304869](file:///C:\Data\3GPP\Extracts\R2-2304869%2038306_CR0894_(Rel-17)_Correction%20on%20missing%20referencing%20of%20the%20NTN%20spec%20in%2038.306.docx) Correction on missing referencing of the NTN spec in 38.306 MediaTek CR Rel-17 38.306 17.4.0 0894 3 F NR\_NTN\_solutions-Core [R2-2304265](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304265.zip)

* Update the coversheet (meeting details)
* Revised in R2-2306652

R2-2306652 Correction on missing referencing of the NTN spec in 38.306 MediaTek CR Rel-17 38.306 17.4.0 0894 1 F NR\_NTN\_solutions-Core [R2-2304265](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304265.zip)

[R2-2305503](file:///C:\Data\3GPP\Extracts\38306_CR0888_(Rel-17)_R2-2305503_Correction%20on%20NR%20NTN%20UE%20capabilities.docx) Correction on NR NTN UE capabilities Intel Corporation CR Rel-17 38.306 17.4.0 0888 1 F NR\_NTN\_solutions-Core [R2-2302693](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2302693.zip)

* Agreed

38.321

[R2-2304929](file:///C:\Data\3GPP\Extracts\R2-2304929%20Corrections%20to%20NR%20NTN%20for%2038.321.docx) Corrections to NR NTN for 38.321 CATT, Turkcell, Huawei, HiSilicon, Quectel, CAICT, Ericsson CR Rel-17 38.321 17.4.0 1597 2 F NR\_NTN\_solutions-Core [R2-2304263](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304263.zip)

* Add RAN tickmark. Fix the date format. Add the inter-operability analysis
* Revised in R2-2306654

R2-2306654 Corrections to NR NTN for 38.321 CATT, Turkcell, Huawei, HiSilicon, Quectel, CAICT, Ericsson CR Rel-17 38.321 17.4.0 1597 3 F NR\_NTN\_solutions-Core [R2-2304263](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304263.zip)

[R2-2306152](file:///C:\Data\3GPP\Extracts\R2-2306152_NR%20MAC%20CR_validity%20timer%20expiry_v0.docx) Clarification on UL operation upon validity timer expiry Apple, Nokia, Nokia Shanghai Bell, Huawei, HiSilicon, LG Electronics Inc. CR Rel-17 38.321 17.4.0 1588 2 F NR\_NTN\_solutions-Core [R2-2304266](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304266.zip)

* Agreed

38.331

[R2-2304828](file:///C:\Data\3GPP\Extracts\38331_CR4011_(Rel-17)_R2-2304828%20Correction%20on%20Event%20D1%20for%20Rel-17%20NTN.docx) Correction on Event D1 for Rel-17 NTN vivo CR Rel-17 38.331 17.4.0 4011 1 F NR\_NTN\_solutions-Core [R2-2303461](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303461.zip)

* Agreed

[R2-2304870](file:///C:\Data\3GPP\Extracts\R2-2304870%2038331_CR4021_(Rel-17)_Correction%20on%20missing%20referencing%20of%20the%20NTN%20spec%20in%2038.331_v1.docx) Correction on missing referencing of the NTN spec in 38.331 MediaTek CR Rel-17 38.331 17.4.0 4021 2 F NR\_NTN\_solutions-Core [R2-2303675](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303675.zip)

* Update the coversheet (meeting details)
* Revised in R2-2306653

R2-2306653 Correction on missing referencing of the NTN spec in 38.331 MediaTek CR Rel-17 38.331 17.4.0 4021 3 F NR\_NTN\_solutions-Core [R2-2303675](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303675.zip)

[R2-2306116](file:///C:\Data\3GPP\Extracts\R2-2306116%20Clarification%20on%20T430%20handling%20for%20target%20cell.docx) Clarification on T430 handling for target cell ASUSTeK, Samsung, Huawei, HiSilicon CR Rel-17 38.331 17.4.0 4039 1 F NR\_NTN\_solutions-Core [R2-2303923](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303923.zip)

* Agreed
* RAN2 understands that the UE can use Epoch time only after sync to the target cell

[R2-2306117](file:///C:\Data\3GPP\Extracts\R2-2306117%20Correction%20on%20MIB%20configuration%20for%20NR%20NTN.docx) Correction on MIB configuration for NR NTN ASUSTeK CR Rel-17 38.331 17.4.0 4040 1 F NR\_NTN\_solutions-Core [R2-2303924](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303924.zip)

- Ericsson thinks we could modify/simplify the text to avoid repetitions.

- HW thinks we tried this but the current description seems to be the best now so far

* Check in offline 112
* Revised in R2-2306663

R2-2306663 Correction on MIB configuration for NR NTN ASUSTeK CR Rel-17 38.331 17.4.0 4040 2 F NR\_NTN\_solutions-Core

* [AT122][112][NR-NTN] CR4040 (ASUSTeK)

Scope: Discuss the CR in [R2-2306117](file:///C:\Data\3GPP\Extracts\R2-2306117%20Correction%20on%20MIB%20configuration%20for%20NR%20NTN.docx)

Intended outcome: Agreeable CR

Deadline for final CR (in R2-2306663): Friday 2023-05-26 09:00

[R2-2306356](file:///C:\Data\3GPP\Extracts\R2-2306356.docx) Correction on SMTC for NR NTN Samsung, Huawei, HiSilicon, Google CR Rel-17 38.331 17.4.0 4025 2 F NR\_NTN\_solutions-Core [R2-2304264](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304264.zip)

* Change “gNB-to-UE” to “gNB-UE”
* Move the impact analysis to the right place
* Revised in R2-2306656

R2-2306656 Correction on SMTC for NR NTN Samsung, Huawei, HiSilicon, Google CR Rel-17 38.331 17.4.0 4025 3 F NR\_NTN\_solutions-Core [R2-2304264](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304264.zip)

Withdrawn

R2-2304730 Correction on missing referencing of the NTN spec in 38.306 Mediatek India Technology Pvt. CR Rel-17 38.306 17.4.0 0909 - F NR\_NTN\_solutions-Core Withdrawn

[R2-2304866](file:///C:\Data\3GPP\Extracts\R2-2304866%2038306_CR0894_(Rel-17)_Correction%20on%20missing%20referencing%20of%20the%20NTN%20spec%20in%2038.306.docx) Correction on missing referencing of the NTN spec in 38.306 MediaTek CR Rel-17 38.306 17.4.0 0894 2 F NR\_NTN\_solutions-Core [R2-2304265](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304265.zip) Withdrawn

[R2-2304867](file:///C:\Data\3GPP\Extracts\R2-2304867%2038331_CR4021_(Rel-17)_Correction%20on%20missing%20referencing%20of%20the%20NTN%20spec%20in%2038.331_v1.docx) Correction on missing referencing of the NTN spec in 38.331 MediaTek CR Rel-17 38.331 17.4.0 4021 1 F NR\_NTN\_solutions-Core [R2-2303675](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303675.zip) Withdrawn

### 6.4.1 Corrections

A single CR per TS with miscellaneous corrections is encouraged. Small editorial corrections should be sent directly to rapporteur. Big open issues can be discussed with contributions with CR in the appendix of the contribution

Incoming LSs

[R2-2304639](file:///C:\Data\3GPP\Extracts\R2-2304639_R4-2306389.docx) Reply LS on enhanced cell reselection in NTN (R4-2306389; contact: Nokia) RAN4 LS in Rel-17 NR\_NTN\_solutions To:RAN2

* Noted

Stage 2

[R2-2304837](file:///C:\Data\3GPP\Extracts\38300_CR0668_(Rel-17)_R2-2304837%20Correction%20on%20stage-2%20descriptions%20for%20measurement%20in%20NR%20NTN.docx) Correction on stage-2 descriptions for measurement in NR NTN vivo CR Rel-17 38.300 17.4.0 0668 - F NR\_NTN\_solutions-Core

- MTK thinks the sentence is still needed as not all the info is available. Apple agrees. QC agrees

- Ericsson thinks that there might be UEs which don’t have this info.

- vivo wonders if the UE still has to perform autonomous SMTC adjustment

- HW thinks ephemeris are needed, as also indicated by RAN4

- Oppo shares vivo understanding, if ephemeris is included in otherConfig the UE should perform measurements. Google agrees

- Apple thinks we did not discuss/agree that the UE should use the info in otherConfig for this

* Continue in offline 107
* [AT122][107][NR-NTN] CR0668 (vivo)

Scope: discuss the change in [R2-2304837](file:///C:\Data\3GPP\Extracts\38300_CR0668_(Rel-17)_R2-2304837%20Correction%20on%20stage-2%20descriptions%20for%20measurement%20in%20NR%20NTN.docx)

Intended outcome: Summary of offline discussion / agreeable CR

Deadline for rapporteur's summary (in R2-2306657): Friday 2023-05-26 09:00

[R2-2305376](file:///C:\Data\3GPP\Extracts\R2-2305376_38.300%20NTN%20CR-v3.docx) NTN stage-2 correction OPPO, LG Electronics, Qualcomm, CATT, Huawei, Lenovo, Thales CR Rel-17 38.300 17.4.0 0676 - F NR\_NTN\_solutions-Core

- Apple prefers Oppo version and thinks we should also update the description for HARQ mode (remove the part on DRX retx timer)

- Oppo suggests to just add ”If configured” after DRX retx timer. Samsung is fine

* Update the description of the HARQ modes
* Revise the note to avoid requirements for the NW
* Revised in R2-2306658
* Continue in offline 108

R2-2306658 NTN stage-2 correction OPPO, LG Electronics, Qualcomm, CATT, Huawei, Lenovo, Thales CR Rel-17 38.300 17.4.0 0676 1 F NR\_NTN\_solutions-Core

[R2-2306262](file:///C:\Data\3GPP\Extracts\R2-2306262%20-%2038300_CR0683_(Rel-17)%20-%20Description%20of%20R17%20NR%20NTN%20HARQ%20mode%20A%20and%20B.docx) Description of R17 NR NTN HARQ mode A and B Ericsson CR Rel-17 38.300 17.4.0 0683 - F NR\_NTN\_solutions-Core

* Continue in offline 108
* [AT122][108][NR-NTN] CR0676 (Oppo)

Scope: discuss the CR in [R2-2305376](file:///C:\Data\3GPP\Extracts\R2-2305376_38.300%20NTN%20CR-v3.docx)

Intended outcome: Agreeable CR

Deadline for final CR (in R2-2306658): Friday 2023-05-26 09:00

38.306

[R2-2305878](file:///C:\Data\3GPP\Extracts\R2-2305878%20Missing%20reference%20to%20cell%20reselection%20requirements%20for%20NTN%20UEs%20in%20RRC%20INACTIVE.docx) Missing reference to cell reselection requirements for NTN UEs in RRC INACTIVE Nokia, Nokia Shanghai Bell CR Rel-17 38.306 17.4.0 0921 - F NR\_NTN\_solutions-Core

- ZTE supports this

* Add impact analysis
* Revised in R2-2306659

R2-2306659 Missing reference to cell reselection requirements for NTN UEs in RRC INACTIVE Nokia, Nokia Shanghai Bell CR Rel-17 38.306 17.4.0 0921 1 F NR\_NTN\_solutions-Core

38.331

[R2-2304868](file:///C:\Data\3GPP\Extracts\R2-2304868%2038331_CRxxxx_(Rel-17)_R2-230xxxx%20Correction%20on%20actual%20offset%20of%20SMTC%20for%20multiple%20NTN-Configs_v0.docx) Correction on actual SMTC offset for multiple NTN-Configs MediaTek CR Rel-17 38.331 17.4.0 4082 - F NR\_NTN\_solutions-Core

- Apple is fine with this

- Google thinks the UE can consider multiple SMTC adjustments

- QC thinks the CR is not needed

- Ericsson wonders if this applies also to Connected mode

- CATT thinks the CR is not needed. ZTE agrees this is not needed. Vivo also

* Not pursued

[R2-2304892](file:///C:\Data\3GPP\Extracts\R2-2304892%20Clarification%20on%20the%20SFTD%20applicability%20for%20NTN%20cell.docx) Clarification on the SFTD applicability for NTN cell CATT, Qualcomm Incorporated, THALES, Quectel, Turkcell, IPLOOK CR Rel-17 38.331 17.4.0 4083 - F NR\_NTN\_solutions-Core

- Oppo is fine with the intention but thinks this could also just be captured in the meeting notes

- HW thinks the CR is not changing anything. ZTE agrees and thinks nothing is needed in the chairman notes as well.

- CATT would like to at least capture something in the notes.

- HW thinks this is an optional feature and it’s up to NW implementation to decide to use it so there should be no restriction. Nokia agrees

* Not pursued

[R2-2305193](file:///C:\Data\3GPP\Extracts\38331_CR3979_(Rel-17)_R2-2305193%20EUTRA%20capability.docx) Clarification on TN EUTRA capability reporting Qualcomm Incorporated CR Rel-17 38.331 17.4.0 3979 2 F NR\_NTN\_solutions-Core [R2-2303034](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303034.zip)

- HW thinks the change is clashing with the coversheet and wonders whether we need to fix this.

- Ericsson agrees with HW and thinks we can refer to 36.331

* Continue in offline 109
* [AT122][109][NR-NTN] CR3979 (QC)

Scope: discuss the CR in [R2-2305193](file:///C:\Data\3GPP\Extracts\38331_CR3979_(Rel-17)_R2-2305193%20EUTRA%20capability.docx)

Intended outcome: Agreeable CR

Deadline for final CR (in R2-2306660): Friday 2023-05-26 09:00

[R2-2305497](file:///C:\Data\3GPP\Extracts\38331_CR4112_(Rel-17)_R2-2305497.docx) Different UE capability support between TN and NTN Intel Corporation, Qualcomm Inc., Nokia, MediaTek, OPPO, vivo, Xiaomi, Apple, Thales, Lenovo, Samsung CR Rel-17 38.331 17.4.0 4112 - F NR\_NTN\_solutions-Core

* Continue in offline 110

[R2-2306251](file:///C:\Data\3GPP\Extracts\R2-2306251%20-%20Clarification%20on%20configuration%20upon%20TN%20NTN%20mobility%20in%20RRC-INACTIVE.docx) Clarification on configuration upon TN NTN mobility in RRC\_INACTIVE Ericsson CR Rel-17 38.331 17.4.0 4027 1 F NR\_NTN\_solutions-Core [R2-2303785](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303785.zip)

- QC suggests to remove “optional”

- ZTE suggests to remove “e.g.”

* Continue in offline 110
* [AT122][110][NR-NTN] CR4112 (Intel)

Scope: discuss the CR in [R2-2305497](file:///C:\Data\3GPP\Extracts\38331_CR4112_(Rel-17)_R2-2305497.docx) and [R2-2306251](file:///C:\Data\3GPP\Extracts\R2-2306251%20-%20Clarification%20on%20configuration%20upon%20TN%20NTN%20mobility%20in%20RRC-INACTIVE.docx)

Intended outcome: Agreeable merged CR

Deadline for final CR (in R2-2306661): Friday 2023-05-26 09:00

[R2-2305378](file:///C:\Data\3GPP\Extracts\R2-2305378%20MAC%20and%20RRC%20correction%20for%20R17%20NR%20NTN.doc) MAC and RRC corrections for NR NTN OPPO discussion Rel-17 NR\_NTN\_solutions-Core

- For p2, QC thinks we should rather add the missing description

- Ericsson thinks it’s better to remove some text

* Continue the discussion on p2 in offline 111 to draft a CR to clarify the field description for kmac
* [AT122][111][NR-NTN] RRC CR for kmac (Oppo)

Scope: Draft a CR to reflect p2 in [R2-2305378](file:///C:\Data\3GPP\Extracts\R2-2305378%20MAC%20and%20RRC%20correction%20for%20R17%20NR%20NTN.doc)

Intended outcome: Agreeable CR

Deadline for final CR (in R2-2306662): Friday 2023-05-26 09:00

[R2-2306063](file:///C:\Data\3GPP\Extracts\R2-2306063%20CR%20to%2038.331%20on%20Event%20D1.docx) CR to 38.331 on Event D1 Huawei, HiSilicon CR Rel-17 38.331 17.4.0 4127 - F NR\_NTN\_solutions-Core

- ZTE and MTK support

* Agreed

## 7.6 IoT NTN enhancements

(IoT\_NTN\_enh-Core; leading WG: RAN1; REL-18; WID: RP-223519)

Time budget: 1 TU

Tdoc Limitation: 4 tdocs

### 7.6.1 Organizational

LSs, rapporteur inputs and other organizational documents. Rapporteur inputs and other pre-assigned documents in this AI do not count towards the tdoc limitation.

Incoming LSs

[R2-2304612](file:///C:\Data\3GPP\Extracts\R2-2304612_R1-2304126.doc) LS on GNSS position fix during inactive state of Connected DRX for improved GNSS operations (R1-2304126; contact: MediaTek) RAN1 LS in Rel-18 IoT\_NTN\_enh-Core To:RAN2

Running CRs

[R2-2306265](file:///C:\Data\3GPP\Extracts\R2-2306265%20-%2036300_(Rel-18)%20-%20Running%20CR%20for%20R18%20IoT%20NTN.docx) Running CR for R18 IoT NTN Ericsson discussion Rel-18 36.300 IoT\_NTN\_enh-Core

[R2-2304737](file:///C:\Data\3GPP\Extracts\R2-2304737%20Running%20CR%20MAC_36.321_IoT-NTN.docx) 36.321 (MAC) Running CR for IoT-NTN Mediatek Inc. draftCR Rel-18 36.321 17.4.0 LTE\_NBIOT\_eMTC\_NTN-Core

[R2-2305199](file:///C:\Data\3GPP\Extracts\36306_CRxxxx_(Rel-18)_R2-2305199%20UE%20capability%20running%20CR.docx) Running CR for TS 36.306 for Rel-18 IoT NTN Qualcomm Incorporated draftCR Rel-18 36.306 17.4.0 B IoT\_NTN\_enh-Core

[R2-2306065](file:///C:\Data\3GPP\Extracts\R2-2306065%2036331%20running%20CR%20for%20IOT%20NTN.docx) 36331 running CR for IOT NTN Huawei, HiSilicon draftCR Rel-18 36.331 17.4.0 B IoT\_NTN\_enh-Core

### 7.6.2 Performance Enhancements

#### 7.6.2.1 HARQ enhancements

[R2-2304731](file:///C:\Data\3GPP\Extracts\R2-2304731%20On%20Disabling%20HARQ%20Feedback%20in%20IoT-NTN.docx) On Disabling HARQ Feedback in IoT-NTN Mediatek Inc. discussion

[R2-2304740](file:///C:\Data\3GPP\Extracts\R2-2304740%20-%20Discussion%20on%20HARQ%20enhancement%20for%20IoT%20NTN.doc) Discussion on HARQ enhancement for IoT NTN OPPO discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2304813](file:///C:\Data\3GPP\Extracts\R2-2304813%20Discussion%20on%20HARQ%20mode%20for%20PUR.docx) Discussion on HARQ mode for PUR Huawei, Turkcell, HiSilicon discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2304893](file:///C:\Data\3GPP\Extracts\R2-2304893-Discussion%20on%20the%20HARQ%20enhancements%20in%20IoT%20NTN.docx) Discussion on the HARQ enhancements in IoT NTN CATT discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305168](file:///C:\Data\3GPP\Extracts\R2-2305168%20(R18%20IoT-NTN%20WI%20AI%207.6.2.1)%20-%20disabling%20HARQ%20feedback.docx) Remaining Issues on Disabling HARQ feedback for IoT-NTN Interdigital, Inc. discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305200](file:///C:\Data\3GPP\Extracts\R2-2305200%20IoT%20HARQ%20process.doc) UL HARQ process enhancement Qualcomm Incorporated discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305609](file:///C:\Data\3GPP\Extracts\R2-2305609%20Discussion%20on%20the%20HARQ%20enhancement%20for%20IoT-NTN.docx) Discussion on the HARQ enhancement for IoT-NTN CMCC discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305727](file:///C:\Data\3GPP\Extracts\R2-2305727%20Discussion%20on%20HARQ%20enhancement.doc) Discussion on HARQ enhancement Xiaomi discussion Rel-18

[R2-2305758](file:///C:\Data\3GPP\Extracts\R2-2305758%20On%20HARQ%20enhancements%20for%20IoT%20NTN.docx) On HARQ enhancements for IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305956](file:///C:\Data\3GPP\Extracts\R2-2305956%20Further%20discussion%20on%20HARQ%20enhancements.doc) Further discussion on HARQ enhancements ZTE Corporation, Sanechips discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2306264](file:///C:\Data\3GPP\Extracts\R2-2306264%20-%20R18%20IoT%20NTN%20HARQ%20enhancements.docx) R18 IoT NTN HARQ enhancements Ericsson discussion Rel-18 IoT\_NTN\_enh-Core

#### 7.6.2.2 GNSS operation enhancements

[R2-2304732](file:///C:\Data\3GPP\Extracts\R2-2304732%20Enhancements%20on%20GNSS%20operation.docx) GNSS Operation Enhancements in IoT-NTN MediaTek Inc. discussion

[R2-2304751](file:///C:\Data\3GPP\Extracts\R2-2304751%20GNSS%20operation.doc) Discussion on GNSS operation for IoT NTN OPPO discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2304814](file:///C:\Data\3GPP\Extracts\R2-2304814%20Discussion%20on%20GNSS%20operation%20enhancements.doc) Discussion on GNSS operation enhancements Huawei, Turkcell, HiSilicon discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2304894](file:///C:\Data\3GPP\Extracts\R2-2304894%20Discussion%20on%20GNSS%20operation%20in%20connected%20mode.docx) Discussion on GNSS operation in connected mode CATT discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305151](file:///C:\Data\3GPP\Extracts\R2-2305151.docx) GNSS fix in connected mode NEC discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305169](file:///C:\Data\3GPP\Extracts\R2-2305169%20(R18%20IoT-NTN%20WI%20AI%207.6.2.2)%20GNSS%20enhancements.docx) GNSS acquisition and reporting for IoT NTN Interdigital, Inc. discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305203](file:///C:\Data\3GPP\Extracts\R2-2305203%20GNSS%20operation.doc) GNSS fix in RRC\_CONNECTED Qualcomm Incorporated discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305610](file:///C:\Data\3GPP\Extracts\R2-2305610%20Discussion%20on%20GNSS%20enhancement%20for%20IoT-NTN.docx) Discussion on GNSS enhancement for IoT-NTN CMCC discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305711](file:///C:\Data\3GPP\Extracts\R2-2305711%20Further%20considerations%20on%20GNSS%20operations%20in%20RRC_CONNECTED%20for%20IoT%20NTN.docx) Further considerations on GNSS operations in RRC\_CONNECTED for IoT NTN Lenovo discussion Rel-18

[R2-2305726](file:///C:\Data\3GPP\Extracts\R2-2305726%20Discussion%20on%20GNSS%20operation%20enhancement.doc) Discussion on GNSS operation enhancement Xiaomi discussion Rel-18

[R2-2305759](file:///C:\Data\3GPP\Extracts\R2-2305759%20GNSS%20operation%20enhancements%20for%20IoT%20NTN.docx) GNSS operation enhancements for IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305894](file:///C:\Data\3GPP\Extracts\R2-2305894%20Issues%20for%20the%20GNSS%20Validity%20Reporting.docx) Issues for the GNSS Validity Reporting Google Inc. discussion

[R2-2305957](file:///C:\Data\3GPP\RAN2\Docs\R2-2305957.zip) Further discussion on GNSS reacquisition ZTE Corporation, Sanechips discussion Rel-18 IoT\_NTN\_enh-Core [R2-2302820](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2302820.zip)

[R2-2305992](file:///C:\Data\3GPP\Extracts\R2-2305992.docx) GNSS operation enhancements SHARP Corporation discussion

[R2-2306166](file:///C:\Data\3GPP\Extracts\R2-2306166_Improved%20GNSS%20Operation.doc) Improved GNSS Operation Apple discussion Rel-18 IoT\_NTN\_enh

[R2-2306263](file:///C:\Data\3GPP\Extracts\R2-2306263%20-%20R18%20IoT%20NTN%20GNSS%20operation%20enhancements.docx) R18 IoT NTN GNSS operation enhancements Ericsson discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2306485](file:///C:\Data\3GPP\Extracts\R2-2306485%20On%20improved%20GNSS%20operation%20and%20HARQ%20enhancements%20for%20IoT%20NTN.docx) On improved GNSS operation for IoT NTN Samsung Suzhou discussion Rel-18 IoT\_NTN\_enh

* [AT122][101][IoT NTN] GNSS operation enhancements (Apple)

Initial scope: Discuss the proposals in the submitted contributions in AI 7.6.2.2

Initial intended outcome: Summary of the offline discussion with e.g.:

* List of proposals for agreement (if any)
* List of proposals that require online discussions
* List of proposals that should not be pursued (if any)

Deadline for companies' feedback: Wednesday 2023-04-24 08:00

Deadline for rapporteur’s summary (in R2-2306641): Wednesday 2023-04-24 14:00

[R2-2306641](file:///C:\Data\3GPP\RAN2\Inbox\R2-2306641.zip) [offline-101] GNSS operation enhancements Apple discussion Rel-18 IoT\_NTN\_enh-Core

Easy agreements:

Proposal 2: (16/16) Confirm the working assumption that GNSS validity duration UE reports is the remaining validity duration.

* Agreed

Proposal 4: (13/16 preferred, 0 unacceptable) Agree that UE triggers GNSS measurement reporting every time upon completing the GNSS fix operation.

* Agreed

Proposal 7: (14/16) When network triggers GNSS measurement initiation is up to network implementation.

* Agreed

Proposal 8: (15/16) Agree that UE re-starts the validity duration timer upon successful GNSS measurement.

- Oppo thinks this could be start or restart

- Nokia this would result in different timer lengths at the UE and the NW side so the UE should start the timer at the time the message is generated to be sent to the NW

- IDC wonders about the difference due to the minimum granularity of 10s. MTK thinks that if we want to change we also need to change the granularity

- Nokia agrees the granularity would have to be changed

- Samsung thinks this is not a real timer so there is no need to be more precise. MTK agrees and thinks there is no need to change the granularity. QC agrees and thinks that even if we change we cannot guarantee exact timings at the UE and the NW

- Ericsson thinks we can avoid the term timer

- ZTE thinks the situation in R18 is different than in R17 and think we should keep the UE and NW aligned.

- HW thinks we could go for “the UE regains the valid GNSS position upon successful GNSS measurement”

- Apple could be fine but at the end we need to think how to reflect this in spec

- IDC thinks that if we have a definition for the validity duration in Rel-17 we can simply reuse it

Proposal 9: (14/16) Note RAN1 LS R2-2304612/ R1-2304126 and no reply LS is needed.

* Agreed

Proposal 12: Add a note to state some AS operations are suspended when UE is performing GNSS measurement during GNSS measurement gap.

* Agreed

Discuss online: P3 and P6 can be discussed together.

Proposal 3: (15/16) Agree with a working assumption that MAC CE for GNSS validity duration reporting is used for NB-IoT user plane solution and eMTC UE as well, in addition to previously agreed NB-IoT control plane solution.

- Ericsson thinks the GNSS validity duration is only an estimate

Proposal 6: (14/16 Yes, 1/16 No, 1/16 no strong view) Agree with a working assumption that a new DL MAC CE is introduced to trigger connected UE to perform GNSS measurement.

- Ericsson really thinks the trigger should be done by RRC to avoid the security issues

- ZTE thinks the DL trigger is not so useful so are ready to consider other solutions, like sending a trigger only in msg4 and then have an UE autonomous trigger. Google tends to agree on the use of RRC for DL

- IDC thinks the trigger should be done in the same layer as the report. Also not convinced about the security impact.

- Xiaomi thinks there are other DL MAC CEs with similar possible security impacts

- Oppo thinks that we are going to use MAC CE for LTM to switch a UE to a different cell so they not sure about the security concern. MTK agrees

- CMCC prefers MAC CE also to have a unified solution with NB-IoT CP solution.

- Ericsson thinks we could add new RRC messages for NB-IoT CP solution

* Working Assumption:

1. An UL MAC CE for GNSS validity duration reporting is used for NB-IoT user plane solution and eMTC UE as well, in addition to previously agreed NB-IoT control plane solution

2. A new DL MAC CE is introduced to trigger connected UE to perform GNSS measurement.

Proposal 1: Discuss online whether GNSS operation fix duration should be reported in 1) and 2).

1) (10/16) RRCConnectionReestablishmentComplete and RRCConnectionReestablishmentComplete-NB

2) (8/16) RRCConnectionReconfigurationComplete for HO case

- Ericsson supports this. Nokia agrees. Google agrees

- Oppo wonders if this is needed in all the HO cases

- Samsung thinks we can specify that this is done when connecting to NTN

* GNSS fix time duration should be reported in 1) and 2).

1) RRCConnectionReestablishmentComplete and RRCConnectionReestablishmentComplete-NB

2) RRCConnectionReconfigurationComplete for HO case

(FFS whether there are some scenarios where this is not needed or whether there has to be some explicit NW indication to do so)

Proposal 10: (12/16) If time allows, discuss online whether to agree when to start GNSS measurement is up to UE implementation in DRX inactive duration. Otherwise, postpone the DRX related discussion to next RAN2 meeting.

Proposal 13: If time allows, discuss online about the following:

1) (12/16) Acquisition of SIB31 may be also postponed until GNSS measurement is completed if T317 expires

2) (14/16) T318 starting is delayed if T317 expires during GNSS measurement gap

3) (11/16) T318 (if running) is stopped or suspended at the start of GNSS measurement

4) (12/16) The acquisition of all SIB(s) is postponed until GNSS measurement is completed

Postpone to next meeting:

Proposal 5: (5/16 Yes, 3/16 Maybe, 8/16 No) FFS whether to introduce specific SR to GNSS validity duration MAC CE.

Proposal 11: (7 vs 6) Postpone the discussion on how and when UE initiates GNSS validity duration reporting during DRX inactive duration.

Agreements:

1. Confirm the working assumption that GNSS validity duration UE reports is the remaining validity duration.
2. The UE triggers GNSS measurement reporting every time upon completing the GNSS fix operation.
3. When network triggers GNSS measurement initiation is up to network implementation.
4. Add a note to state some AS operations are suspended when UE is performing GNSS measurement during GNSS measurement gap.
5. GNSS fix time duration should be reported in 1) and 2):

1) RRCConnectionReestablishmentComplete and RRCConnectionReestablishmentComplete-NB

2) RRCConnectionReconfigurationComplete for HO case

(FFS whether there are some scenarios where this is not needed or whether there has to be some explicit NW indication to do so)

Working Assumptions:

1. An UL MAC CE for GNSS validity duration reporting is used for NB-IoT user plane solution and eMTC UE as well, in addition to previously agreed NB-IoT control plane solution

2. A new DL MAC CE is introduced to trigger connected UE to perform GNSS measurement.

### 7.6.3 Mobility Enhancements

#### 7.6.3.1 Enhancements for neighbour cell measurements

[R2-2304733](file:///C:\Data\3GPP\Extracts\R2-2304733%20Enhancements%20on%20neighbour%20cell%20measurement.docx) On Enhancing Neighbor Cell Measurements in IoT-NTN MediaTek Inc. discussion

[R2-2304741](file:///C:\Data\3GPP\Extracts\R2-2304741%20-%20Discussion%20on%20measurement%20triggering%20enhancement%20for%20IoT%20NTN.doc) Discussion on measurement triggering enhancement for IoT NTN OPPO discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2304742](file:///C:\Data\3GPP\Extracts\R2-2304742%20-%20Discussion%20on%20neighbour%20cell%20assistance%20information%20for%20IoT%20NTN.doc) Discussion on neighbour cell assistance information for IoT NTN OPPO discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2304895](file:///C:\Data\3GPP\Extracts\R2-2304895%20Discussion%20on%20the%20mobility%20enhancements%20for%20IoT%20NTN%20UE.docx) Discussion on the mobility enhancements for IoT NTN UE CATT discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305202](file:///C:\Data\3GPP\Extracts\R2-2305202%20neighbor%20cell%20info.doc) Satellite and coverage information signalling Qualcomm Incorporated discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305611](file:///C:\Data\3GPP\Extracts\R2-2305611%20Discussion%20on%20mobility%20enhancements%20for%20IoT-NTN.docx) Discussion on mobility enhancements for IoT-NTN CMCC discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305671](file:///C:\Data\3GPP\Extracts\R2-2305671%20Discussion%20on%20the%20neighbour%20cell%20measurement%20for%20RRC%20Connected%20UE.doc) Discussion on the neighbour cell measurement for RRC Connected UE Xiaomi discussion

[R2-2305712](file:///C:\Data\3GPP\Extracts\R2-2305712%20On%20location-based%20neighbour%20cell%20measurement%20in%20RRC_CONNECTED%20in%20IoT%20NTN.docx) On location-based neighbour cell measurement in RRC\_CONNECTED in IoT NTN Lenovo discussion Rel-18

Moved here from 7.6.3.2

[R2-2305713](file:///C:\Data\3GPP\Extracts\R2-2305713%20On%20new%20SIB%20for%20neighbour%20cell%20information%20in%20IoT%20NTN.docx) On new SIB for neighbour cell information in IoT NTN Lenovo discussion Rel-18

[R2-2305958](file:///C:\Data\3GPP\Extracts\R2-2305958%20Further%20discussion%20on%20neighbor%20satellite%20assistance%20information%20and%20new%20triggers%20for%20neighbor%20cell%20measurement.docx) Further discussion on neighbor satellite assistance information and new triggers for neighbor cell measurement ZTE Corporation, Sanechips discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2306066](file:///C:\Data\3GPP\Extracts\R2-2306066%20Enhancements%20for%20neighbour%20cell%20measurements.doc) Enhancements for neighbour cell measurements Huawei, HiSilicon, Turkcell discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2306484](file:///C:\Data\3GPP\Extracts\R2-2306484%20On%20enhancements%20for%20neighbour%20cell%20measurements.docx) On enhancements for neighbour cell measurements Samsung Suzhou discussion Rel-18 IoT\_NTN\_enh

* [AT122][102][IoT NTN] Mobility Enhancements (Qualcomm)

Initial scope: Discuss the proposals in contributions in 7.6.3 related to SIBxx and SIB3 (i.e. for neighbor cell/satellite information and for triggers for neighbor cell measurements), leaving out the parts on CHO and RLF enhancements.

Initial intended outcome: Summary of the offline discussion with e.g.:

* List of proposals for agreement (if any)
* List of proposals that require online discussions
* List of proposals that should not be pursued (if any)

Deadline for companies' feedback: Wednesday 2023-04-24 08:00

Deadline for rapporteur’s summary (in R2-2306642): Wednesday 2023-04-24 14:00

Updated scope: Discuss the remaining proposals from R2-2306642 with majority support. F2F discussion is invited

Updated intended outcome: Summary of the offline discussion

Deadline for rapporteur’s summary (in R2-2306664): Friday 2023-04-26 11:00

R2-2306642 [offline-102] Mobility enhancements Qualcomm discussion Rel-18 IoT\_NTN\_enh-Core

Proposals for agreement

Proposal 2 (15/15) extend the neighbour cell information in existing SIB (i.e., SIB3/4/5) to include satellite ID.

- Ericsson wonders about SIB3

- Huawei thinks SIB3 should be included.

* Agreed as: “extend the neighbour cell information in existing SIBs (not SIB31) to include satellite ID.”

Proposal 4 (16/16) The system Information modification procedure is not triggered for an update of new SIB on neighbor-cell assistance information.

* Agreed

Proposal 5 (16/16) SIBxx is not an essential SIB. UE does not need to consider the cell barred if it is unable to acquire the SIB when scheduled.

- Ericsson thinks this is ok for NB-IoT but not sure for eMTC

* For NB-IoT, SIBxx is not an essential SIB. UE does not need to consider the cell barred if it is unable to acquire the SIB when scheduled. FFS for eMTC

Proposal 6 (16/16) In RRC IDLE, how to (re-)acquire neighbour cell assistance information is up to UE’s implementation.

* Agreed

Proposal 17 (14/14) The satellite ID in the new SIB is an integer of X bits wherein X depends on the maximum number of satellites to be considered for mobility.

* Agreed

Proposal 19 (14/14) the satellite ID is defined as Radio resource control information element to be used in other configurations.

* Agreed

Proposals with majority support for online discussion

Proposal 1 (12/16) Revert the previous agreement “SIB3 is extended to include the reference location and distanceThresh”. SIB31 is extended to include the reference location and distanceThresh.

* Continue in follow-up offline 112

Proposal 3 Decide which option to adopt (1) No validity duration for SIBxx (i.e., implicit based on SIB31) (2) optional explicit validity duration for SIBxx.

Proposal 7 (12/16) RAN2 will not consider option (a) Cell stop time of neighbor cell in SIBxx.

Proposal 10 (13/16) For NB-IoT NTN, location-based measurement initiation can also be used in RRC\_IDLE for cell re-selection purposes (like in NR-NTN), with the assumption that it is up to the UE to update GNSS location.

Proposal 11 Decide one option (7/15) When the distance between UE and reference location is above a threshold, the UE triggers neighbour cell measurements or (6/15) The same triggered mechanism (connected mode) for neighbor cell measurement can also be reused in RRC\_IDLE state.

Proposal 12 Do not consider the option: (2/15) UE starts measurements on a neighbouring cell if the distance between the UE and a first reference location (e.g. within the serving cell) is above a threshold, and the distance between the UE and a second reference location (e.g. within a neighbour cell) is below a threshold.

Proposal 13 (14/16) If ephemeris is absent in a list in SIBxx, serving satellite ephemeris applies. FFS signalling details of other parameters such as validity duration.

Proposal 14 (14/16) If a parameter in the common TA parameters is absent, then the value of the parameter is assumed zero.

* Agreed

Proposal 15 (14/16) If Kmac is absent, then the value of Kmac for the neighbor satellite in the list is assumed zero. FFS on further optimization on signaling, e.g., signalling explicit value 0 of Kmac.

* Agreed

Proposals requiring further discussion

Proposal 8 (11/16) Cell start time of quasi-earth fixed neighbor cell is broadcast in SIBxx.

- Apple thinks we need an exact definition for this.

Proposal 9 (8/16) Reference location + distance threshold of moving neighbor cell is not broadcast in SIBxx.

Proposal 16 (6/16) FFS if the epoch time is absent for a satellite in the list, the implicit epoch time is the end of SI window where the SIB message is received.

Proposal 18 (6/14) FFS whether the satellite ID for the satellite in a list is unique within the context of the identified PLMN.

Agreements:

1. Extend the neighbour cell information in existing SIBs (not SIB31) to include satellite ID
2. The system Information modification procedure is not triggered for an update of new SIB on neighbor-cell assistance information.
3. For NB-IoT, SIBxx is not an essential SIB. UE does not need to consider the cell barred if it is unable to acquire the SIB when scheduled. FFS for eMTC
4. In RRC IDLE, how to (re-)acquire neighbour cell assistance information is up to UE’s implementation.
5. The satellite ID in the new SIB is an integer of X bits wherein X depends on the maximum number of satellites to be considered for mobility.
6. The satellite ID is defined as Radio resource control information element to be used in other configurations.
7. If a parameter in the common TA parameters is absent, then the value of the parameter is assumed zero.
8. If Kmac is absent, then the value of Kmac for the neighbor satellite in the list is assumed zero. FFS on further optimization on signaling, e.g., signalling explicit value 0 of Kmac.

R2-2306664 [offline-102] Mobility enhancements – second round Qualcomm discussion Rel-18 IoT\_NTN\_enh-Core

Neighbour cell measurements before RLF

[R2-2305170](file:///C:\Data\3GPP\Extracts\R2-2305170%20(R18%20IoT-NTN%20WI%20AI%207.6.3.1)%20-%20measurements.docx) Neighbour cell measurements before RLF and CHO enhancements Interdigital, Inc. discussion Rel-18 IoT\_NTN\_enh-Core

For quasi-earth fixed cells:

Proposal 1a: The agreement in RAN2#120 (UE shall start intra/inter frequency measurement in connected mode before the t-Service if present) only applies to the case of overlapping coverage.

Proposal 1b: Measurements of a neighbouring NTN cell are triggered before t-service only if the incoming neighbour cell t-serviceStart is before t-service, or if no t-serviceStart is provided for the neighbour cell.

- Oppo thinks the only reason to provide t-service in the serving cell is when there will be overlapping coverage, so there is no need to introduce t-service start

- Telit supports p1b

- Samsung is not sure this is needed

- MTK thinks this is a further optimization

- CATT could support p1b

- Inmarsat thinks t-service is needed anyway, also in case of non-overlapping cells

* Continue in offline 113

Proposal 2a: Measurements on TN carriers (if configured by the NW) can start before t-service independently of neighbouring NTN cell coverage.

Proposal 2b: For the hard switch coverage scenario, discuss whether UE should wait until t-Service before starting TN measurements, or whether UE should start TN measurements before t-Service.

Proposal 3: If the serving cell t-service expires, stop T310 and start T311 (i.e. perform cell search and re-establishment without attempting to recover on the current cell for the duration of T310).

For earth-moving cells:

Proposal 4: Introduce a distance-based trigger for starting neighbour cell measurements before RLF.

Proposal 5: UE starts measurements on a neighbouring cell if the distance between the UE and a first reference location (e.g. within the serving cell) is above a threshold, and the distance between the UE and a second reference location (e.g. within a neighbour cell) is below a threshold.

Proposal 6: If the distance between the UE and the first reference location (e.g. within the serving cell) is above a threshold (different threshold than is used for measurements), stop T310 and start T311 (i.e. perform cell search and re-establishment without attempting to recover on the current cell for the duration of T310).

* [AT122][113][IoT NTN] Measurements before RLF (Interdigital)

Scope: Discuss the RLF-related proposals in [R2-2305170](file:///C:\Data\3GPP\Extracts\R2-2305170%20(R18%20IoT-NTN%20WI%20AI%207.6.3.1)%20-%20measurements.docx). F2F discussion is invited

Intended outcome: Summary of the offline discussion

Deadline for final CR (in R2-2306665): Friday 2023-05-26 11:00

R2-2306665 [offline-113] Measurements before RLF Interdigital discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2306168](file:///C:\Data\3GPP\Extracts\R2-2306168_RLF%20in%20IoT%20NTN.doc) Neighbour cell measurements before RLF for NB-IoT Apple discussion Rel-18 IoT\_NTN\_enh [R2-2303406](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303406.zip)

Proposal 1: The Rel-18 scheme for neighbor cell measurement triggering before RLF over NTN only applies to NB-IoT.

Proposal 2: t-Service/location based trigger for measurements in connected mode can work independently from legacy signal quality conditions.

[R2-2306254](file:///C:\Data\3GPP\Extracts\R2-2306254%20-%20Neighbor%20cell%20measurements%20before%20RLF.docx) Neighbour cell measurements before RLF Ericsson discussion Rel-18 IoT\_NTN\_enh-Core [R2-2304065](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304065.zip)

Observation 1 A UE may not perform measurements for an NTN neighbour cell if satellite assistance information for the cell is not provided in SIB19.

Observation 2 For IoT NTN, satellite assistance information of neighbour cells is not provided in system information in Rel-17.

Observation 3 Even though satellite assistance information of neighbour cells is to be supported for IoT NTN in Rel-18, the information can be provided only for a limited number of cells, i.e., at most 3, due to TB size limitation.

Observation 4 In NTN, difference in signal strength is small between the cell edge and the cell centre.

Proposal 1 Introduce a mechanism to trigger neighbour cell measurements in connected mode for LTE-M in NTN.

Proposal 2 Introduce time-based criteria, based on T-service, to trigger neighbour cell measurements in connected mode for LTE-M in NTN.

Proposal 3 For LTE-M in NTN, for quasi-earth fixed cells, UE shall start intra/inter frequency measurement in connected mode before T-service, if present. The exact time to start measurements in connected mode before T-service is left to UE implementation. FFS for earth-moving cells.

[R2-2305862](file:///C:\Data\3GPP\Extracts\R2-2305862-IoT-NTN-Mobility-Enhancements.docx) Further analysis on mobility enhancements for IoT-NTN Nokia, Nokia Shanghai Bell discussion

Proposal 9: Fast RLF declaration based on measurement availability is considered for LEO scenario for NB-IoT NTN.

Proposal 10: RLF declaration and the start of re-establishment is linked to service time in EFC for NB-IoT-NTN.

#### 7.6.3.2 Other

CHO enhancements

[R2-2306486](file:///C:\Data\3GPP\Extracts\R2-2306486%20On%20IoT%20NTN%20CHO%20and%20other%20mobility%20enhancements.docx) On IoT NTN CHO and other mobility enhancements Samsung Suzhou discussion Rel-18 IoT\_NTN\_enh

Proposal 1: RAN2 to discuss whether to allow NTN CHO events to trigger independently.

- IDC thinks we could make the measurement optional and then allow independent triggers

- Oppo thinks we should align to R17 and RSRP is a must. Apple agrees. QC also agrees

- ZTE thinks we could allow independent trigger (no RSRP-measurement based). Ericsson agrees.

- Inmarsat agrees there are a number of cases where measurement are not needed/possible

- HW thinks measurements are needed and the NW can set a low value. CATT agrees

- CMCC thinks we could continue to rely on R17 (i.e. always request an RSRP measurement)

* CB Friday

Proposal 2: RAN2 to work on reducing the size of the CHO handover command by sending ephemeris per satellite/per eNB.

Proposal 3: RAN2 to discuss signaling to enable target eNB to reduce the amount of ephemeris elements in the CHO configuration to the UE.

Proposal 4: For eMTC RACH-less the agreements in NR NTN can directly apply to IoT NTN:

- In Rel-18 we don’t aim at RACH-less HO for NTN-TN mobility

- NTN RACH-less HO is supported for Intra-satellite handover with the same feeder link. i.e with same gateway/eNB.

- NTN RACH-less HO can be supported for intra-satellite handover with different feeder links, i.e., with gateway/eNB switch, inter-satellite handover with gateway/eNB switch, and inter-satellite handover with same gateway/eNB.

Proposal 5: For further agreements on RACH-less, wait for NR NTN developments.

Proposal 6: CHO can be combined with RACH less.

Proposal 7: RAN2 to consider enabling NB-IoT mobility using RRC release in an earth-fixed scenario.

From:

[R2-2305862](file:///C:\Data\3GPP\Extracts\R2-2305862-IoT-NTN-Mobility-Enhancements.docx) Further analysis on mobility enhancements for IoT-NTN Nokia, Nokia Shanghai Bell discussion

Proposal 12: RAN2 should further investigate the joint use of distance-based and time-based triggering events for moving UEs in EFC.

Proposal 13: RAN2 to consider a mechanism where the CHO condition is evaluated only against the time/distance-based event skipping radio condition evaluation dynamically based on the history of measurements and CHO execution results.

[R2-2306169](file:///C:\Data\3GPP\Extracts\R2-2306169_Mobility%20enhancement%20in%20IoT%20NTN.doc) Mobility enhancement in IoT NTN Apple discussion Rel-18 IoT\_NTN\_enh [R2-2303405](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303405.zip)

Proposal 1: Support joint configuration of condEventA4 and time/location-based trigger condition for CHO.

From:

[R2-2305170](file:///C:\Data\3GPP\Extracts\R2-2305170%20(R18%20IoT-NTN%20WI%20AI%207.6.3.1)%20-%20measurements.docx) Neighbour cell measurements before RLF and CHO enhancements Interdigital, Inc. discussion Rel-18 IoT\_NTN\_enh-Core

For conditional reconfiguration:

Proposal 7: For eMTC NTN, clarify that the agreed time-based conditional reconfiguration trigger is based on condEventT1 in NR, where the event will be satisfied if conditional handover execution occurs between T1 and T2, where T2 = T1 + a duration (similar to condEventT1 in NR)

Proposal 8: Time and location-based trigger conditions may be configured independently (i.e., without a jointly configured measurement condition) for eMTC NTN.

From:

[R2-2305611](file:///C:\Data\3GPP\Extracts\R2-2305611%20Discussion%20on%20mobility%20enhancements%20for%20IoT-NTN.docx) Discussion on mobility enhancements for IoT-NTN CMCC discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 5: Same as NR NTN, time/location-based trigger condition is always configured together with one of the measurement-based trigger conditions (CHO events A3/A4/A5).

Proposal 6: Same as NR NTN, joint time-based and location-based CHO execution triggering for the same candidate cell is not supported for eMTC NTN.

### 7.6.4 Enhancements to discontinuous coverage

[R2-2305959](file:///C:\Data\3GPP\Extracts\R2-2305959%20RAN2%20enhancements%20for%20discontinuous%20coverage.docx) RAN2 enhancements for discontinuous coverage ZTE Corporation, Sanechips discussion Rel-18 IoT\_NTN\_enh-Core [R2-2302822](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2302822.zip)

[R2-2304812](file:///C:\Data\3GPP\Extracts\R2-2304812%20Discussion%20on%20discontinuous%20coverage.doc) Discussion on discontinuous coverage Huawei, HiSilicon discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305171](file:///C:\Data\3GPP\Extracts\R2-2305171%20(R18%20IoT-NTN%20WI%20AI%207.6.4)%20-%20discontinuous%20coverage.docx) IoT-NTN discontinuous coverage enhancements Interdigital, Inc. discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305172](file:///C:\Data\3GPP\Extracts\R2-2305172%20(R18%20IoT-NTN%20WI%20AI%207.6.4)%20draft%20LS%20to%20SA2%20on%20discontinuous%20coverage.docx) <draft> LS on PTW modification due to UE unreachability Interdigital, Inc. LS out Rel-18 IoT\_NTN\_enh-Core To:SA2 Cc:CT1

\*\*\* Paging enhancements \*\*\*

From [R2-2305959](file:///C:\Data\3GPP\Extracts\R2-2305959%20RAN2%20enhancements%20for%20discontinuous%20coverage.docx):

Observation 1: The PSM, eDRX or MICO schemes would be reused to support the discontinuous coverage.

Observation 2: For determining the PSM or eDRX related parameters as accurately as possible, the out-of-coverage period or unreachability period need to be taken into account. Either UE or core network nodes can determine the out-of-coverage period or unreachability period based on the information they can obtain. After determination, such unreachability period information also needs to be notified to the peer node (e.g., via NAS signaling).

Proposal 1a: If legacy eDRX is used for keeping alignment between UE and NW during discontinuous coverage, in order to align the starting time of PTW with the out-of-coverage period or unreachability period, it’s suggested to introduce a configurable offset to shift the starting time of PTW.

Proposal 1b: The out-of-coverage period or unreachability period should be informed to RAN, e.g., from core network node, to assist RAN to provide a more appropriate paging schedule for UE in idle mode.

From [R2-2305171](file:///C:\Data\3GPP\Extracts\R2-2305171%20(R18%20IoT-NTN%20WI%20AI%207.6.4)%20-%20discontinuous%20coverage.docx):

Observation: All of the proposed solutions for updating the PTW to receive paging outside of a coverage gap determine or configure an offset. Each solution may use a different approach to determine/configure the offset.

Proposal 5: Update the PTW if it falls in a coverage gap by applying an offset. FFS how to determine/configure the offset.

Proposal 6: Send an LS to SA2 indicating that RAN2 <have agreed/are considering> shifting the PTW if it falls in a coverage gap, asking what the content/granularity of “UE unreachability period is, whether it can be provided to the gNB, and whether adjusting the PTW is feasible from SA2 point of view.

\*\*\* RRC connection release enhancements \*\*\*

From [R2-2305959](file:///C:\Data\3GPP\Extracts\R2-2305959%20RAN2%20enhancements%20for%20discontinuous%20coverage.docx):

Proposal 2a: A new release reason, e.g., ‘Release due to discontinuous coverage’ as that introduced in RAN3, can be introduced in RRC release message for indicating UE to stop the subsequent AS layer processes after it is released to idle mode.

Proposal 2b: An AS-NAS interaction (e.g., an indication from AS to NAS) also needs to be introduced for indicating UE to stop the subsequent NAS layer processes after it is released to idle mode due to discontinuous coverage.

Proposal 2c: The legacy IE extendedWaitTime can be reused to stop the subsequent NAS layer processes after UE is released to idle mode due to discontinuous coverage. The extension to the value range of extendedWaitTime needs to be discussed.

Proposal 2d: The UE in connected mode could provide out-of-coverage period or unreachability period information as an assistance to the network (eNB).

From [R2-2304812](file:///C:\Data\3GPP\Extracts\R2-2304812%20Discussion%20on%20discontinuous%20coverage.doc):

Proposal 1: UE can indicate “RRC\_IDLE” to the Network as the preferred RRC state when it is going to enter a coverage gap and start a timer, similar as the mechanism designed by R17 MUSIM.

\*\*\* UE behaviour when in discontinuous coverage / possible RLF enhancements \*\*\*

From [R2-2305171](file:///C:\Data\3GPP\Extracts\R2-2305171%20(R18%20IoT-NTN%20WI%20AI%207.6.4)%20-%20discontinuous%20coverage.docx):

Proposal 3: It is beneficial in terms of UE power saving if the UE can enter RRC\_IDLE upon detecting a coverage gap without executing the RLF procedure.

From [R2-2304812](file:///C:\Data\3GPP\Extracts\R2-2304812%20Discussion%20on%20discontinuous%20coverage.doc):

Proposal 3：After RLF is triggered, UE enters RRC\_IDLE if the remaining serving time is less than a threshold in discontinuous coverage scenario.

Proposal 4：UE stops the AS idle mode tasks related to TN only when there is no TN cells in the discontinuous coverage.

\*\*\* Additional satellite information \*\*\*

From [R2-2305171](file:///C:\Data\3GPP\Extracts\R2-2305171%20(R18%20IoT-NTN%20WI%20AI%207.6.4)%20-%20discontinuous%20coverage.docx):

Proposal 4: RAN2 to discuss how to support signalling of additional satellite information using one of the following options:

Option1: Dedicated signalling

Option 2: Additional information in SIBs e.g. using an additional new SIB or SIB segmentation

\*\*\* Proposals postponed from RAN2#121bis-e \*\*\*

Proposal 4a: (For discussion) For earth-moving cells, some assistance information (similar to NR-NTN) will be broadcast in SIB31 to assist the UE to verify if the remaining time of current cell’s coverage is sufficient to accommodate a new connection establishment.

Proposal 4b: (For discussion) The decision if UE will initiate the connection (re)establishment if the remaining time in the current cell is not sufficient for a new connection establishment is left up to UE implementation.

[R2-2304896](file:///C:\Data\3GPP\Extracts\R2-2304896%20Discussion%20on%20enhancements%20to%20discontinuous%20coverage.docx) Discussion on enhancements to discontinuous coverage CATT discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305201](file:///C:\Data\3GPP\Extracts\R2-2305201%20DC%20enhancement.doc) RRC release procedure in discontinuous coverage Qualcomm Incorporated discussion Rel-18 IoT\_NTN\_enh-Core [R2-2303042](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303042.zip)

[R2-2305307](file:///C:\Data\3GPP\Extracts\R2-2305307%20Considerations%20on%20Supporting%20Discontinuous%20Coverage.docx) Considerations on Supporting Discontinuous Coverage NEC Europe Ltd discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305372](file:///C:\Data\3GPP\Extracts\R2-2305372.docx) Discussion on enhancement to discontinuous coverage for IoT NTN Transsion Holdings discussion Rel-18

[R2-2305560](file:///C:\Data\3GPP\Extracts\R2-2305560.doc) Discussion on power saving enhancements for supporting discontinuous coverage Spreadtrum Communications discussion Rel-18

[R2-2305612](file:///C:\Data\3GPP\Extracts\R2-2305612%20Discussion%20on%20the%20discontinuous%20coverage%20for%20IoT-NTN.docx) Discussion on the discontinuous coverage for IoT-NTN CMCC discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305672](file:///C:\Data\3GPP\Extracts\R2-2305672%20Enhancements%20to%20discontinuous%20coverage.doc) Enhancements to discontinuous coverage Xiaomi discussion

[R2-2305714](file:///C:\Data\3GPP\Extracts\R2-2305714%20Further%20considerations%20on%20discontinuous%20coverage%20(Revision%20of%20R2-2303253).docx) Further considerations on discontinuous coverage Lenovo discussion Rel-18

[R2-2305785](file:///C:\Data\3GPP\Extracts\R2-2305785.docx) Enhancements to discontinuous coverage Samsung Shenzhen discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2305863](file:///C:\Data\3GPP\Extracts\R2-2305863-Discontinuous%20coverage%20for%20IoT%20NTN.docx) On RAN impacts for Discontineous coverage enhancements Nokia, Nokia Shanghai Bell discussion

[R2-2306167](file:///C:\Data\3GPP\Extracts\R2-2306167_Discontinuous%20coverage%20in%20IoT%20NTN.doc) Support on discontinuous coverage in IoT NTN Apple discussion Rel-18 IoT\_NTN\_enh

[R2-2306466](file:///C:\Data\3GPP\Extracts\R2-2306466%20-%20Enhancements%20to%20discontinuous%20coverage.docx) Enhancements to discontinuous coverage Ericsson discussion Rel-18 IoT\_NTN\_enh-Core

## .7 NR NTN enhancements

(NR\_NTN\_enh -Core; leading WG: RAN1; REL-18; WID: RP-223534)

Time budget: 1 TU

Tdoc Limitation: 4 tdocs

### 7.7.1 Organizational

LSs, rapporteur inputs and other organizational documents. Rapporteur inputs and other pre-assigned documents in this AI do not count towards the tdoc limitation.

Workplan

[R2-2305391](file:///C:\Data\3GPP\Extracts\R2-2305391.docx) R18 WI NR-NTN-enh work plan at RAN1, 2 and 3 THALES Work Plan Rel-18

* Noted

Incoming LSs

[R2-2304634](file:///C:\Data\3GPP\Extracts\R2-2304634_R4-2305926.docx) LS on the system parameters for NTN above 10 GHz (R4-2305926; contact: CATT) RAN4 LS in Rel-18 NR\_NTN\_enh-Core To:RAN1, RAN2

* Noted

Running CRs

[R2-2305407](file:///C:\Data\3GPP\Extracts\R2-2305407.docx) Stage 2 running CR for TS 38.300 for Rel-18 NTN THALES draftCR Rel-18 38.300 17.4.0 B NR\_NTN\_enh-Core

* Noted

[R2-2305933](file:///C:\Data\3GPP\RAN2\Docs\R2-2305933.zip) Stage 3 NTN running CR for 38.321 - RAN2#121bise InterDigital draftCR Rel-18 38.321 17.4.0 B NR\_NTN\_enh-Core Late

* Endorsed

[R2-2306294](file:///C:\Data\3GPP\Extracts\R2-2306294_Stage%203%20running%2038.304%20CR%20for%20NTN-v1.docx) Stage 3 running 38.304 CR for NTN ZTE corporation, Sanechips draftCR Rel-18 38.304 17.4.0 NR\_NTN\_enh-Core

* Endorsed (naming of IEs can still be changed)

[R2-2306468](file:///C:\Data\3GPP\Extracts\R2-2306468%20-%2038331_CR4152_(Rel-18)%20-%20Stage%203%20Running%20RRC%20CR%20for%20NR%20NTN%20Rel-18.docx) Stage 3 Running RRC CR for NR NTN Rel-18 Ericsson CR Rel-18 38.331 17.4.0 4152 - B NR\_NTN\_enh-Core

- CATT thinks we still need to decide the format of the location info IE

=> Noted

[R2-2305506](file:///C:\Data\3GPP\Extracts\R2-2305506_Discussion%20on%20NR%20NTN%20UE%20capabilities.docx) Discussion on NR NTN UE capabilities Intel Corporation discussion Rel-18 NR\_NTN\_enh-Core [R2-2302694](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2302694.zip)

* CB Thursday

[R2-2305507](file:///C:\Data\3GPP\Extracts\R2-2305507_Draft%20306%20CR%20for%20NR%20NTN%20UE%20capabilities.docx) Draft 306 CR for NR NTN UE capabilities Intel Corporation draftCR Rel-18 38.306 17.4.0 NR\_NTN\_enh-Core [R2-2302696](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2302696.zip)

[R2-2305508](file:///C:\Data\3GPP\Extracts\R2-2305508_Draft%20331%20CR%20for%20NR%20NTN%20UE%20capabilities.docx) Draft 331 CR for NR NTN UE capabilities Intel Corporation draftCR Rel-18 38.331 17.4.0 NR\_NTN\_enh-Core [R2-2302695](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2302695.zip)

### 7.7.2 Coverage Enhancements

This AI will be treated only after corresponding progress in RAN1

[R2-2304743](file:///C:\Data\3GPP\Extracts\R2-2304743%20-%20Discussion%20on%20PUCCH%20enhancement%20for%20Msg4%20HARQ-ACK%20in%20NR%20NTN.doc) Discussion on PUCCH enhancement for Msg4 HARQ-ACK in NR NTN OPPO discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305744](file:///C:\Data\3GPP\Extracts\R2-2305744%20Discussion%20on%20coverage%20enhancement.doc) Discussion on coverage enhancement Xiaomi discussion Rel-18

### 7.7.3 Network verified UE location

[R2-2304811](file:///C:\Data\3GPP\Extracts\R2-2304811%20Discussion%20on%20the%20network%20verified%20UE%20location.doc) Discussion on the network verfied UE location Huawei, Turkcell, HiSilicon discussion Rel-18 NR\_NTN\_enh-Core

< Mirror point issue >

Proposal 1: The gNB can configure different reference signals towards the real UE location and the mirror point and then, based on UE’s beam measurement report, tell which one is the correct UE location.

< UE capability >

Proposal 2: RAN2 to discuss how to handle the UEs that do not support the new feature of location verification.

< Overall procedure of verification >

Observation 1: The AMF may only verify whether the selected PLMN is correct based on the location information provided by LMF according to the reply LS from SA2.

Observation 2: There is some misalignment between SA2 and RAN on the requirements and use cases of Network verified UE location in R18.

Proposal 3: RAN2 to discuss whether the UE location verification procedure in SA2’s LS is sufficient to fulfil the requirements and use cases identified by RAN.

[R2-2305033](file:///C:\Data\3GPP\Extracts\R2-2305033%20-%20discussion%20on%20network%20verified%20UE%20location.docx) Discussion on network verified UE location Ericsson discussion Rel-18 NR\_NTN\_enh-Core

< Mirror point issue >

Proposal 1 In order to resolve the mirror point ambiguity issue, the network relies on the legacy signaling and procedure to configure NTN UE to measure and report neighbor cells (e.g., neighbour cells in the opposite side of a satellite beam). No spec changes are needed.

< UE capability >

Proposal 2 Network verified UE location is a NW-feature which does not require any additional UE behaviour (beyond RAT-dependent positioning), e.g., no additional UE capability is needed for indicating whether UE supports the feature of network verified UE location.

[R2-2305940](file:///C:\Data\3GPP\Extracts\R2-2305940%20Network%20verified%20UE%20location.docx) On Network verified UE location Nokia, Nokia Shanghai Bell discussion NR\_NTN\_enh-Core [R2-2302794](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2302794.zip)

Observation 1: One factor of importance is the configured periodicity of the RTT measurements reports from the UE, since this will be a factor contributing to the accuracy.

Proposal 1: The work on network verified UE location should consider cell changes.

[R2-2305673](file:///C:\Data\3GPP\Extracts\R2-2305673%20Discussion%20on%20network%20verified%20UE%20location.doc) Discussion on network verified UE location Xiaomi discussion

Proposal 1: The periodic SRS is considered with high priority for network verified UE location in Rel-18.

Proposal 2: The above signalling procedures is considered as baseline for multi-RTT positioning with a single satellite in view when periodic SRS is configured.

Proposal 3: gNB should provide multiple gNB Rx-Tx time difference measurements and UE should provide multiple UE Rx-Tx time difference measurements with multiple measurement times to LMF respectively.

Proposal 4: LMF could configure UE and gNB to report the positioning measurement periodically or configure the UE and gNB to report multiple positioning measurements in one shot report.

Proposal 5: gNB and UE determine the satellite location when UE and gNB performs the positioning measurement, and provide the satellite location which is associated with the positioning measurement to LMF.

[R2-2304735](file:///C:\Data\3GPP\Extracts\R2-2304735-Network%20verification%20of%20UE%20location.docx) On Network Verified UE Location in NR NTN MediaTek Inc. discussion

[R2-2305194](file:///C:\Data\3GPP\Extracts\R2-2305194%20Multi%20RTT.doc) Single satellite Multi-RTT based positioning Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305249](file:///C:\Data\3GPP\Extracts\R2-2305249%20Discussion%20on%20multiple-RTT%20based%20positioning%20in%20NTN.docx) Discussion on multiple-RTT based positioning in NTN Quectel discussion

[R2-2305393](file:///C:\Data\3GPP\Extracts\R2-2305393%20Discussion%20on%20NTN%20NW%20verified%20UE%20location.docx) Discussion on NTN NW verified UE location Lenovo discussion Rel-18

[R2-2305408](file:///C:\Data\3GPP\Extracts\R2-2305408.docx) Discussion on network verified UE location in NR NTN THALES discussion Rel-18 NR\_NTN\_enh-Core [R2-2303261](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303261.zip)

[R2-2305596](file:///C:\Data\3GPP\Extracts\R2-2305596%20Network%20verified%20UE%20location.doc) Network verified UE location CMCC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305790](file:///C:\Data\3GPP\Extracts\R2-2305790.docx) Remaining issues on Network Verified UE Location Samsung Shenzhen discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305940](file:///C:\Data\3GPP\Extracts\R2-2305940%20Network%20verified%20UE%20location.docx) On Network verified UE location Nokia, Nokia Shanghai Bell discussion NR\_NTN\_enh-Core [R2-2302794](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2302794.zip)

[R2-2306244](file:///C:\Data\3GPP\Extracts\R2-2306244%20Consideration%20on%20NW%20verified%20UE%20location%20and%20CE.doc) Consideration on NW verified UE location and CE ZTE Corporation, Sanechips discussion Rel-18

[R2-2306377](file:///C:\Data\3GPP\Extracts\R2-2306377.docx) Discussion on Network Verified UE Location TCL Communication Ltd. discussion Rel-18

### 7.7.4 NTN-TN and NTN-NTN mobility and service continuity enhancements

#### 7.7.4.1 Cell reselection enhancements

##### 7.7.4.1.1 NTN-TN enhancements

[R2-2304834](file:///C:\Data\3GPP\Extracts\R2-2304834%20Further%20discussion%20on%20power%20saving%20for%20NTN-TN%20mobility.docx) Further discussion on power saving for NTN-TN mobility vivo discussion Rel-18

Proposal 1: An RRC\_IDLE/RRC\_INACTIVE UE is not required to perform neighbour cell measurements for a TN frequency in the area where there is no coverage of that frequency.

- Samsung this should be true regardless of the frequency priority

- MTK wonders how the UE knows about the priorities. Vivo thinks this is derived from SIB4/5

- HW thinks in practical deployment TN frequencies will have higher priorities so there is not even need to clarify this

* Agreed as: “An RRC\_IDLE/RRC\_INACTIVE UE is not required to perform neighbour cell measurements for cell reselection for a TN frequency in the area, if configured, where there is no coverage of that frequency, regardless of the frequency priority”

Proposal 2: Frequency information (i.e. a list of TN frequencies) for each TN coverage area is indicated directly under each TN coverage area configuration.

- vivo is also fine to adopt the bitmap approach if that is the majority view

Proposal 3: Rel-17 referenceLocation and distanceThresh can be reused, with the field description of existing referenceLocation and distanceThresh modified to configure the TN coverage area inforamation and the legacy location-based cell reselection, respectively.

Proposal 4: The information on the TN coverage area can be included in SIB19.

[R2-2305882](file:///C:\Data\3GPP\Extracts\R2-2305882%20Resolving%20Open%20Issues%20on%20TN%20Coverage%20Definition.docx) Resolving Open Issues on TN Coverage Definition Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_NTN\_enh-Core

< Definition of TN coverage area >

Observation 1: Reusing the Rel-17 referenceLocation and distanceThresh will allow to signal a TN coverage area having a diameter of approximately 6500 of kilometres.

Proposal 1: Reuse Rel-17 referenceLocation and distanceThresh for signaling the TN coverage area centre and radius.

- NEC is ok to use the referenceLocation but not sure about the distanceThresh. Nokia would agree but for sake of progress is ok to go for p1

- QC is ok to use the same format but not reuse the same IE

* Reuse the same format of Rel-17 referenceLocation and distanceThresh for signaling the TN coverage area centre and radius

< How to indicate frequency information for TN coverage >

Observation 2: If the frequency is signalled directly within the TN coverage area list, it may occur the same frequency information is repeated multiple times, under different TN coverage areas.

Observation 3: Signaling up to 8 ARFCNs per TN coverage area and up to 8 TN coverage areas per system information requires up to 1400 bits.

Observation 4: The frequency information related to TN coverage is already broadcast somewhere else (e.g. SIB4 or SIB5).

Observation 5: If the approach with TN coverage ID in SIB4-5 is used, then the UE needs to read multiple SIBs in order to obtain the complete information on TN coverage areas.

Proposal 2: The frequency information for TN coverage area is indicated using TN coverage area identity in SIB4 and SIB5.

< Signaling other than broadcast >

Observation 6: TN coverage area is a static type of information; it does not change, and it is the same for all UEs within certain area.

Observation 7: Dedicated RRC signalling is not available to RRC\_IDLE UEs. RRC Release is the only RRC-based dedicated way to configure TN coverage information to UEs going to RRC\_IDLE.

Proposal 3: TN coverage area information is provided only using broadcast-type of signalling.

Proposal 4: There is no TN coverage information differentiation such as coarse information and accurate information.

< Which system information block to use >

Proposal 5: TN coverage area list is sent in other SIB than SIB19.

< Trigger for reacquiring the TN coverage information >

Proposal 6: RAN2 confirms new triggers making the UE reacquire the TN coverage information from SI are not introduced.

[R2-2304744](file:///C:\Data\3GPP\Extracts\R2-2304744%20Discussion%20on%20NTN-TN%20cell%20reselection%20enhancement.doc) Discussion on NTN-TN cell reselection enhancement OPPO discussion Rel-18 NR\_NTN\_enh-Core [R2-2302539](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2302539.zip)

< Signalling detail on area center location and radius >

Proposal 1 Rel-17 IEs DistanceThresh-r17 and ReferenceLocation-r17 are reused directly to describe the radius and area center location of a TN coverage area in TN coverage information list.

< Which SIB to use and signalling detail on the frequency information >

Observation 1 The decision on which SIB to use depends on the detailed design of TN coverage information and its associated frequency information.

Observation 2 For an NTN serving cell, using TN coverage information to indicate intra-frequency TN cells is not needed for the reduction of UE’s measurements.

Observation 3 For an NTN serving cell, using TN coverage area information to indicate inter-frequency TN cells could avoid unnecessary inter-frequency neighbor TN cell measurements.

Proposal 2 An NTN cell only needs to broadcast TN coverage information for inter-frequency carrier frequencies.

Observation 4 Regarding which SIB to use for TN coverage information and its associated frequency information, two options may be considered:

a. Option 1: New SIB + frequency information under each TN coverage information

b. Option 2: SIB4 + frequency index bitmap under each TN coverage information

Proposal 3 TN coverage information list is broadcasted in SIB4.

Proposal 4 Frequency index bitmap is indicated under each TN coverage area, where the frequency index refers to the

frequency’s position in the frequency list of the current SIB4.

< (Re-)acquisition of TN coverage information from SI >

Proposal 5 RAN2 to confirm the working assumption: We do not introduce new triggers making the UE reacquire the TN coverage information from SI.

< Need of dedicated signalling >

Observation 5 TN coverage information is relatively static and common for all UEs in an NTN cell.

Proposal 6 UE-specific TN coverage area provided/updated via dedicated signalling is not considered.

< NTN-config-r17 in TN cell SIB3/4 >

Proposal 7 In TN cell, NTN-config-r17 is provided in SIB3/SIB4 for NTN neighbour cells.

Proposal 8 The change of NTN-config-r17 provided in SIB3/4 should neither result in system information change notifications nor in a modification of valueTag in SIB1.

\*\*\* How to indicate frequency information for TN coverage \*\*\*\*

Option 1: Frequency information (i.e. a list of TN frequencies) for each TN coverage area is indicated directly under each TN coverage area configuration.

Option 2: : A TN coverage area configuration is associated with a TN coverage Area ID. The frequency information for TN coverage area is indicated by adding TN coverage area IDs in SIB4 and SIB5.

Option 3: Frequency index bitmap is indicated under each TN coverage area, where the frequency index refers to the

frequency’s position in the frequency list of the current SIB4.

- CATT prefers option 1

- QC prefers option 2, thinks this would also support RAN sharing cases and other future enhancements

- Nokia thinks the preference depends on how many ARFCNs and how many coverage areas we want to signal

- Google thinks that for option 1 and option 3 we might gave to deal with frequency mismatch issues

- Samsung prefers options 2 as it reuses existing signalling

- HW prefers option 1

- ZTE thinks a combination of option 1 and 3 would be appropriate. LG agrees

- Apple prefers option 1

- QC thinks that the issue of updating SIB is not an issue for selecting which option to adopt

* Continue in offline 103

\*\*\* Which SIB for TN coverage information \*\*\*\*

Option 1: SIB19

Option 2: SIB4

Option 3: Other SIB

- LG thinks we should not go for option 1, as there is no room in SIB19

* TN coverage info is NOT included in SIB19. FFS if we use an existing SIB or a new one

[R2-2306153](file:///C:\Data\3GPP\Extracts\R2-2306153_%20NTN-TN%20cell%20reselection%20enhancement_v0.doc) NTN-TN Cell Reselection Enhancement Apple discussion Rel-18 DUMMY

<Provision of TN coverage information>

Observation 1: If broadcast signaling is used to carry the TN coverage area data, the data size shall not exceed the max size of SIB.

Observation 2: The max number of TN coverage area that can be provided via broadcast signaling is 46.

Observation 3: The broadcast signaling cannot provide accurate and complete TN coverage data within one NTN cell.

Observation 4: Accurate and complete TN coverage data is more helpful for the optimization of NTN-TN cell reselection.

Observation 5: To provide the accurate and complete TN coverage data, UE dedicate signaling does not require more signaling overhead than broadcast.

Proposal 1: Consider using UE dedicated signaling to provide the accurate TN coverage data as the supplementary method.

- Telit thinks we need a clear justification for adding dedicated signalling for this.

- MTK thinks this is for idle mode. If we use dedicated signalling the UE has to store it so not sure this is needed/beneficial. Nokia agrees

- Oppo does not see the need for additional accuracy.

- QC supports p1. Thinks this could be used to differentiate the area for different PLMNs

- HW thinks that dedicated signalling cannot provide a more granular information that broadcast signalling

* We don’t introduce RRC dedicated signalling to provide more accurate TN coverage information

<Measurement on overlapped TN frequency>

Observation 6: Only if TN frequency is set with high priority, UE can start the measurement on TN neighbor cell when NTN serving cell’s quality is good.

Observation 7: The priority of TN frequency for measurement which is configured by network via RRC signaling cannot be dynamically changed to IDLE/INACTIVE UE based on UE location.

Proposal 2: UE triggers the measurement on overlapped TN frequency with high priority when UE is in TN coverage.

Proposal 3: For UE power saving purpose, UE may relax the measurement on TN frequency if UE doesnot detect RS on that TN frequency for some time.

<Provision of NTN neighbor cell info in TN cell>

Observation 8: If NTN neighbor cell information is not provided in TN cell, IDLE/INACTIVE UE will take long time to find the suitable cell to camp on and have poor mobility performance in the direction of movement from TN to NTN network.

Proposal 4: Support to provide the NTN neighbor cell info in TN cell.

- LG thinks we should de-prioritize this

- Ericsson this is a low hanging fruit and we should go for this

- Nokia wonders what NTN neighbor cell info is

- HW thinks this is not so easy.

* Continue in offline 103

Proposal 5: RAN2 to select one of the following two options to provide the NTN neighbor cell info in TN cell:

- Option 1: SIB19 can be broadcasted in TN cell in order to provide the NTN neighbor cell info;

- Option 2: NTN neigbhor cell info can be provided in SIB 3 and/or SIB4 in TN cell.

Agreements:

1. An RRC\_IDLE/RRC\_INACTIVE UE is not required to perform neighbour cell measurements for cell reselection for a TN frequency in the area, if configured, where there is no coverage of that frequency, regardless of the frequency priority
2. Reuse the same format of Rel-17 referenceLocation and distanceThresh for signaling the TN coverage area centre and radius
3. TN coverage info is NOT included in SIB19. FFS if we use an existing SIB or a new one
4. We don’t introduce RRC dedicated signalling to provide more accurate TN coverage information

* [AT122][103][NR-NTN Enh] NTN-TN cell reselection (Nokia)

Scope: Continue the discussion on 1) how to indicate frequency information for TN coverage (e.g options 1~3) and 2) whether to provide the NTN neighbor cell info in TN cell. F2F discussion is invited

Intended outcome: Summary of the offline discussion

Deadline for rapporteur's summary (in R2-2306643): Thursday 2023-05-25 13:00

R2-2306643 [offline-103] NTN-TN cell reselection Nokia discussion Rel-18 NR\_NTN\_enh-Core

[R2-2304783](file:///C:\Data\3GPP\RAN2\Inbox\R2-2304783.zip) Considerations on the NTN-TN cell re-selection enhancements Telit Communications S.p.A. discussion Late

[R2-2304897](file:///C:\Data\3GPP\Extracts\R2-2304897%20Discussion%20on%20the%20mechanism%20for%20providing%20TN%20coverage%20information.docx) Discussion on the mechanism for providing TN coverage information CATT discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305048](file:///C:\Data\3GPP\Extracts\R2-2305048%20-%20Discussion%20on%20NTN-TN%20cell%20reselection%20enhancements.docx) Discussion on NTN-TN cell reselection enhancements Continental Automotive discussion

[R2-2305195](file:///C:\Data\3GPP\Extracts\R2-2305195%20TN%20coverage.doc) TN cell coverage info and measurement relaxation Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305373](file:///C:\Data\3GPP\Extracts\R2-2305373%20Discussion%20on%20remaining%20issues%20of%20NTN-TN%20cell%20reselection%20enhancements.doc) Discussion on remaining issues of NTN-TN cell reselection enhancements Transsion Holdings discussion Rel-18

[R2-2305597](file:///C:\Data\3GPP\Extracts\R2-2305597%20Discussion%20on%20NTN-TN%20cell%20reselection%20enhancements.docx) Discussion on NTN-TN cell reselection enhancements CMCC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305674](file:///C:\Data\3GPP\Extracts\R2-2305674%20Cell%20reselection%20enhancements%20for%20NTN-TN%20mobility.doc) Cell reselection enhancements for NTN-TN mobility Xiaomi discussion

[R2-2305715](file:///C:\Data\3GPP\Extracts\R2-2305715%20Further%20discussions%20on%20indication%20of%20TN%20coverage%20information.docx) Further discussions on indication of TN coverage information Lenovo discussion Rel-18

[R2-2305866](file:///C:\Data\3GPP\Extracts\R2-2305866_Details%20of%20the%20TN%20coverage%20data%20signalling.docx) Details of the TN coverage data signalling NEC Telecom MODUS Ltd. discussion

[R2-2305893](file:///C:\Data\3GPP\Extracts\R2-2305893%20Discussion%20on%20the%20TN%20Coverage%20Information.docx) Discussion on the TN Coverage Information Google Inc. discussion

[R2-2305934](file:///C:\Data\3GPP\Extracts\R2-2305934%20(R18%20NR%20NTN%20WI%20AI%207.7.4.1.1)%20NTN-TN%20mobility.docx) NTN-TN mobility and service continuity InterDigital discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305994](file:///C:\Data\3GPP\Extracts\R2-2305994.docx) NTN-TN Mobility Cell Reselection and PCI Values SHARP Corporation discussion [R2-2303724](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303724.zip)

[R2-2306031](file:///C:\Data\3GPP\Extracts\R2-2306031%20%5bNTN%5d%20Discussion%20on%20providing%20TN%20coverage%20area%20information.docx) Discussion on providing TN coverage area information LG Electronics France discussion Rel-18 NR\_NTN\_enh-Core [R2-2303975](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303975.zip)

[R2-2306070](file:///C:\Data\3GPP\Extracts\R2-2306070%20Discussion%20on%20the%20NTN-TN%20cell%20reselection%20enhancements.doc) Discussion on the NTN-TN cell reselection enhancements Huawei, HiSilicon, Turkcell discussion Rel-18 NR\_NTN\_enh-Core

[R2-2306324](file:///C:\Data\3GPP\Extracts\R2-2306324.docx) Remaining issues on NTN-TN Cell Reselection Enhancements Samsung Research America discussion Rel-18 NR\_NTN\_enh-Core

[R2-2306352](file:///C:\Data\3GPP\Extracts\R2-2306352%20-%20Discussion%20on%20TN%20area%20information.docx) Discussion on TN area information for the NTN-TN cell re-selection enhancements ETRI discussion Rel-18 NR\_NTN\_enh-Core

[R2-2306389](file:///C:\Data\3GPP\Extracts\R2-2306389.docx) Discussion on NTN-TN Cell re-selection ITL discussion Rel-18

[R2-2306467](file:///C:\Data\3GPP\Extracts\R2-2306467%20-%20TN%20NTN%20mobility%20enhancements.docx) TN NTN mobility enhancements Ericsson discussion Rel-18 NR\_NTN\_enh-Core

Withdrawn

R2-2304696 Discussion on TN-NTN cell reselection enhancements CAICT discussion Rel-18 NR\_NTN\_enh-Core Withdrawn

##### 7.7.4.1.2 NTN-NTN enhancements

Location/time-based measurement triggers

[R2-2306470](file:///C:\Data\3GPP\Extracts\R2-2306470%20-%20NTN%20NTN%20mobility%20enhancements.docx) NTN NTN mobility enhancements Ericsson discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1 Re-use epochTime-r17 in ntn-Config IE to provide the time reference for an Earth moving cell reference location.

- QC is fine. MTK agrees

* Agreed

Proposal 2 Re-use t-Service-r17 to trigger UE neighbour cell measurements prior to cell replacement due to feeder link soft switch.

- QC wonders if this works for moving cells. Vivo agrees a new IE is needed for the moving cells case

- Ericsson wonders what the problem is to reuse this also for EMC.

* Re-use t-Service-r17 format for the IE used to trigger UE neighbour cell measurements prior to cell replacement due to feeder link switch. FFS whether we reuse exactly the same IE name as in R17 (updating the field description) or a new one.

1. Re-use epochTime-r17 in ntn-Config IE to provide the time reference for an Earth moving cell reference location.
2. Re-use t-Service-r17 format for the IE used to trigger UE neighbour cell measurements prior to cell replacement due to feeder link switch. FFS whether we reuse exactly the same IE name as in R17 (updating the field description) or a new one

[R2-2305675](file:///C:\Data\3GPP\Extracts\R2-2305675%20Cell%20reselection%20enhancements%20for%20NTN-NTN%20mobility.doc) Cell reselection enhancements for NTN-NTN mobility Xiaomi discussion

Proposal 1: We suggest introduce a new epochTime IE for the reference location, which is clearer and more flexible from the spec perspective.

Proposal 2: Introduce a new parameter for the timing on feeder link switch for UE performing neighbour cell measurement for earth moving cell.

< Location-based cell reselection enhancements >

Proposal 3: The location based cell reselection criteria is not supported in Rel-18.

[R2-2305935](file:///C:\Data\3GPP\Extracts\R2-2305935%20(R18%20NR%20NTN%20WI%20AI%207.7.4.1.2)%20Earth%20moving%20cell.docx) Cell reselection enhancements for Earth moving cell InterDigital discussion Rel-18 NR\_NTN\_enh-Core

< Reference location for Earth-moving cell reselection >

Proposal 1: For Earth-moving cells, the reference location reuses the existing epochTime IE.

Proposal 2: For Earth-moving cells, a change in reference location will not trigger system information change notification nor a modification of valueTag in SIB1.

Observiation 1: Broadcasting multiple future reference point coordinates and associated timestamp can reduce frequency of SIB update and improve trajectory calculation.

Proposal 3: For Earth-moving cells, multiple future reference location coordinates and associated timestamp information can be broadcast simultaneously.

Proposal 4: If multiple future reference location coordinates are supported, timestamp information for each future reference point is provided by broadcasting an offset to epochTime.

< Time-based trigger for feeder-link switch >

Observation 2: During a hard switch, the service interruption extends to all cells originating from the satellite. Prior to the switch, UE should only measure cells originating from a different satellite with a stable feeder-link.

Proposal 5: RAN2 to discuss whether the UE can relax (e.g., not perform) measurements on neighbouring cell(s) originating from the same satellite about to perform the switch.

< Location-based cell reselection enhancements >

Proposal 6: Location-based cell reselection criteria are not supported in Rel-18

Location based cell reselection

[R2-2305598](file:///C:\Data\3GPP\Extracts\R2-2305598%20Discussion%20on%20NTN-NTN%20reselection.docx) Discussion on NTN-NTN reselection CMCC discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: Additional information is not needed for reference location derivation in earth moving cell.

Proposal 2: It is proposed to cover the epochTime corresponding to the reference location in the same new IE agreed to introduce in RAN2 #121bis if needed.

< Location-based cell reselection enhancements >

Proposal 3: It is proposed to support location-based cell reselection criteria.

* Continue in offline 104

Option 1: Introduce a distance threshold.

* Cell ranked on R-criterion first and then the distance threshold applies to down scope the candidate cells for reselection.

(For cells not provided with reference location:

Alt.1: Not considered as candidate cell for reselection

Alt.2: Considered as candidate cell for reselection)

Option 2: Introduce a distance threshold.

* Distance threshold applies to decide the candidate cells and then rank the candidate cells based on R-criterion to decide the target cell for reselection.

(For cells not provided with reference location:

Alt.1: Not considered as candidate cell for reselection

Alt.2: Considered as candidate cell for reselection)

Option 3: Introduce a distance threshold.

* Cell ranked on R-criterion first and then the distance criteria apply to decide the target cell for reselection.

Proposal 4: It is proposed to support option 2 with alt.1 to enhance the cell reselection procedure for NTN-NTN scenario considering power consumption reduction.

* Continue in offline 104
* [AT122][104][NR-NTN Enh] Location-based cell reselection enhancements (CMCC)

Scope: F2F discussion on Location-based cell reselection enhancements, e.g. p3-p4 from [R2-2305598](file:///C:\Data\3GPP\Extracts\R2-2305598%20Discussion%20on%20NTN-NTN%20reselection.docx)

Intended outcome: summary of offline discussion

Deadline for rapporteur's summary (in R2-2306644): Thursday 2023-05-25 13:00

R2-2306644 [offline-104] Location-based cell reselection enhancements CMCC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2304698](file:///C:\Data\3GPP\Extracts\R2-2304698%20Discussion%20on%20NTN-NTN%20cell%20reselection%20enhancements.docx) Discussion on NTN-NTN cell reselection enhancements CAICT discussion Rel-18 NR\_NTN\_enh-Core

[R2-2304745](file:///C:\Data\3GPP\Extracts\R2-2304745%20Discussion%20on%20NTN-NTN%20cell%20reselection%20enhancement.doc) Discussion on NTN-NTN cell reselection enhancement OPPO discussion Rel-18 NR\_NTN\_enh-Core [R2-2302538](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2302538.zip)

[R2-2304835](file:///C:\Data\3GPP\Extracts\R2-2304835%20Further%20discussion%20on%20cell%20reselection%20enhancements%20for%20earth-moving%20cell.docx) Further discussion on cell reselection enhancments for earth-moving cell vivo discussion Rel-18

[R2-2304898](file:///C:\Data\3GPP\Extracts\R2-2304898%20Discussion%20on%20the%20cell%20reselection%20enhancement%20for%20earth-moving%20cell.docx) Discussion on the cell reselection enhancement for earth-moving cell CATT, IPLOOK discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305374](file:///C:\Data\3GPP\Extracts\R2-2305374%20Discussion%20on%20remaining%20issues%20of%20NTN-NTN%20reselection%20enhancements.doc) Discussion on remaining issues of NTN-NTN reselection enhancements Transsion Holdings discussion Rel-18

[R2-2305561](file:///C:\Data\3GPP\Extracts\R2-2305561.doc) Discussion on NTN-NTN mobility enhancements Spreadtrum Communications discussion Rel-18

[R2-2305666](file:///C:\Data\3GPP\Extracts\R2-2305666%20NTN%20NTN%20Mobility%20Enhancements.docx) Proposals for completing the decisions from last RAN2 meeting #121bis-e PANASONIC discussion

[R2-2305716](file:///C:\Data\3GPP\Extracts\R2-2305716%20Neighbour%20cell%20measurement%20triggering%20in%20NTN%20moving%20cells%20(Revision%20of%20R2-2303254).docx) Neighbour cell measurement triggering in NTN moving cells Lenovo discussion Rel-18

[R2-2306032](file:///C:\Data\3GPP\Extracts\R2-2306032%20%5bNTN%5d%20Discussion%20on%20NTN-NTN%20cell%20reselection%20enhancements.docx) Discussion on NTN-NTN cell reselection enhancements LG Electronics France discussion Rel-18 NR\_NTN\_enh-Core [R2-2303976](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2303976.zip)

[R2-2306154](file:///C:\Data\3GPP\Extracts\R2-2306154_%20NTN-NTN%20cell%20reselection%20enhancement_v0.doc) NTN-NTN Cell Reselection Enhancement Apple discussion Rel-18 DUMMY

[R2-2306295](file:///C:\Data\3GPP\Extracts\R2-2306295_Consideration%20on%20cell%20reselection%20enhancements%20for%20NTN-NTN.docx) Consideration on cell reselection enhancements for NTN-NTN ZTE corporation, Sanechips,Intel Corporation discussion Rel-18 NR\_NTN\_enh-Core

[R2-2306325](file:///C:\Data\3GPP\Extracts\R2-2306325.docx) Discussion on NTN-NTN Cell Reselection Enhancements Samsung Research America discussion Rel-18 NR\_NTN\_enh-Core

#### 7.7.4.2 Handover enhancements

Broadcast/groupcast common signaling in HO

[R2-2304753](file:///C:\Data\3GPP\Extracts\R2-2304753%20NTN%20connected%20mode%20mobility.doc) Discussion on NTN handover enhancements OPPO discussion Rel-18 NR\_NTN\_enh-Core

< signalling overhead reduction >

Observation 1 In both cases of LEO’s high mobility and traffic offloading for overloaded cells, a large number of UEs need to be handed over to another cell within short period, which would creat a lot of signalling overhead with existing handover command.

Proposal 1 Network can trigger handover by simply indicating target cell’s ID/index. The target cell’s configuration can be pre-configured to the UE, e.g. via CHO configuration. FFS on the triggering signaling, e.g. MAC CE or RRC message. FFS whether it can be sent in a groupcast manner and needs RAN1’s involvement.

Proposal 2 A new SIB is used to broadcast the target cell’s servingCellConfigCommon.

- QC thinks we agreed to see some analysis of the benefits but for now we mainly see the additional complexity this will bring.

- Ericsson still wonders if there are any practical cases whether there would be a real benefit of this.

- vivo supports p2~p4 and thinks the mechanism does not really introduces additional complexity.

- HW thinks we need to discuss what happens if the UE fails to receive the SIB

- Apple also supports p2~p4. Also thinks we can consider group HO in the next release.

- ZTE also supports p2~p4 and that the complexity is manageable. Samsung also supports.

- Nokia agrees with HW and Ericsson.

* Continue in offline 105

Proposal 3 When to broadcast the new SIB is up to network’s implementation, e.g. before satellite switching for the quasi-earth fixed cell scenario.

Proposal 4 UE acquires the “complete” handover command by combining the target cell’s servingCellConfigCommon broadcasted by the serving cell and the target cell’s configuration within the received handover command.

< RACH-less HO >

Proposal 5 In NTN RACH-less handover, network indicates explicitly whether NTA in the target cell is identical to the source cell or equal to zero (same as LTE RACH-less handover).

Proposal 6 Upon RACH-less HO failure, fallback to RACH-based HO is supported. Details can be FFS.

Proposal 7 RAN2 does not pursue combining RACH-less HO with time-based CHO for NTN.

* [AT122][105][NR-NTN Enh] Common signaling in (C)HO (Oppo)

Scope: discuss p2~p4 from [R2-2304753](file:///C:\Data\3GPP\Extracts\R2-2304753%20NTN%20connected%20mode%20mobility.doc). F2F discussion is invited

Intended outcome: summary of offline discussion

Deadline for rapporteur's summary (in R2-2306645): Thursday 2023-05-25 13:00

R2-2306645 [offline-105] Common signalling in (C)HO Oppo discussion Rel-18 NR\_NTN\_enh-Core

[R2-2304736](file:///C:\Data\3GPP\Extracts\R2-2304736%20Group%20HO.doc) Enabling Group Handover in NR-NTN MediaTek Inc. discussion

Proposal 1: Support group-based Handover. FFS whether to support it as group Handover command or UE specific preconfigured Handover command plus group HO indication.

- IDC thinks that one benefit to support group HO is to resolve RACH congestion.

- Nokia wonders how the Group HO would work.

- Sequans thinks that CHO already solves the situation for this. LG agrees and has some concerns on the use of groupcast indication for this.

* Proponents of group HO can raise this in offline 105

Proposal 2: It is up to network how to group UEs, i.e., based on UE location, active BWP, UE’s DRX pattern etc.

Proposal 3: Send LS to RAN1 to check whether existing CSS can be used to monitor PDCCH addressed to G-RNTI in NTN.

Proposal 4: Broadcast/groupcast of target cell common configuration is also supported. FFS if either broadcast or groupcast or both of them are considered.

[R2-2306465](file:///C:\Data\3GPP\Extracts\R2-2306465%20-%20Handover%20enhancements.docx) Handover enhancements Ericsson discussion Rel-18 NR\_NTN\_enh-Core

< Reduction of signalling overhead during handover >

Observation 1 Quasi-earth fixed cell scenarios and feeder link switch in Earth-moving cell scenarios may involve a considerable signalling load during the RA procedure and during the handover preparation phase.

Observation 2 In a quasi-earth fixed cell and at a feeder link switch, most of UEs in the source cell will perform handover to the same target cell. Only UEs moving closer to the cell border may need to perform handover to a different target cell.

Observation 3 CHO mitigates the signalling load in the source cell since handover preparation information can be sent well in advance before the short overlap time between old (source) cell and new (target) cell, or before a feeder link switch.

Observation 4 Unlike CHO, group-based handover requires additional signalling between network and a group of UEs to trigger handover to the target cell. In addition to increased signalling, it may also raise security concerns.

Proposal 1 Group-based handover for NTN is down-prioritized in Release 18.

Observation 5 Most information provided to each UE in the (C)HO command describing target cell configuration is identical for all UEs accessing the same target cell.

Observation 6 Certain target cell configurations such as C-RNTI or security keys need to be sent in a dedicated manner to each UE.

Observation 7 From a deployment perspective, during service link switch in a quasi-Earth fixed cell or a feeder link switch in an Earth-moving cell, it can be assumed that the source cell and the target cell will be configured almost identically.

Observation 8 Common (C)HO signalling broadcast or group-cast requires RAN3 involvement.

Observation 9 Delta configuration implies reduced signalling, with substantially less impact to the specification and to the inter-node signalling, compared to a solution where common target cell configuration is broadcast or groupcast in the source cell.

Proposal 2 RAN2 will not specify mechanisms to reduce signalling overhead in NTN based on common target cell configuration, neither via broadcast nor groupcast.

Proposal 3 RAN2 to rely on and possibly optimize the delta configuration concept for the concerned NTN handover scenarios.

< CHO enhancements >

Observation 10 The validity of ephemeris and Common TA parameters obtained in the RRCReconfiguration message may expire before CHO execution.

Observation 11 Expiration of the uplink validity of the target cell ephemeris and common TA parameters before CHO execution might lead to increased handover failures.

Proposal 4 Multiple sets of ephemeris and Common TA parameters, each with its own epoch (increasingly further into the future) and validity time can be transmitted in the CHO configuration message (RRCReconfiguration).

< RACH-less HO >

Observation 12 In NTN RACH-less handover, for both intra- and inter-satellite cases, a UE can autonomously calculate and pre-compensate Timing Advance from its own location information, and satellite ephemeris and Common TA parameters broadcast by the network

Proposal 5 In NTN RACH-less intra-satellite handover, network indicates explicitly when the Timing Advance (NTA) of the target cell is identical to the source cell.

Proposal 6 In NTN RACH-less inter-satellite handover, network indicates a value of zero for the Timing Advance (NTA) of the target cell.

- LG thinks we should not exclude cases where the NTA is different than 0

Observation 13 A valid SIB19 is sufficient for the UE in NTN to estimate and pre-compensate TA.

Proposal 7 Similar to regular NTN HO, during NTN RACH-less handover, the UE shall acquire SIB19 from the target cell if T430 for the target cell expires. It is up to UE implementation when to re-acquire SIB19 before the expiry of the T430.

Observation 14 In LTE the pre-allocated UL grant is released after successful RACH-less handover.

Proposal 8 Reuse the LTE solution, i.e., release the pre-allocated UL grant after successful RACH-less handover, unless significant problems are identified.

Observation 15 During RACH-less handover, there is no real benefit of a fallback to RACH-based handover in NTN.

Proposal 9 RAN2 does not specify a fallback mechanism NTN RACH-less handover in Rel-18.

Proposal 10 In NTN RACH-less handover, network shall configure a long enough TimeAlignmentTimer for the target cell.

Proposal 11 In NTN RACH-less conditional handover, network ensures the pre-allocated grant, and the provision of dynamic grant happens within the CHO time window [T1, T2].

Proposal 12 It is up to gNB implementation how to assign an optimal allocation and minimize reserved resources waste.

Proposal 13 RAN2 to discuss when to start TAT for a candidate target cell during RACH-less Conditional handover.

< Reusing PCI after service link switch >

Proposal 14 Postpone work on hard satellite switch until RAN2 receives LS response from RAN1 which confirms the technical feasibility.

RACH-less HO

[R2-2306071](file:///C:\Data\3GPP\Extracts\R2-2306071%20Remaining%20issues%20on%20RACH-less%20HO%20in%20NTN.docx) Remaining issues on RACH-less HO in NTN Huawei, HiSilicon, Turkcell discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: Asynchronous RACH-less solution is not considered in NR NTN.

Proposal 2: Release pre-allocated UL grant after RACH-less HO completion.

Proposal 3: LTE approach (of confirming the HO completion) is reused for both pre-allocated grant and dynamic grant: UE Contention Resolution Identity MAC CE is used but UE ignores the content of this field.

Proposal 4: In NTN RACH-less handover, NW either indicates NTA in the target cell is identical to the source cell (i.e. intra-satellite handover), or the NTA explicitly provided by the NW is 0. RAN2 will not discuss the case where NTA does not equal to 0.

- Apple wonders if referring to NTA is sufficient here or whether we need to consider the other TA components.

* Agreed as “In NTN RACH-less handover, NW either indicates NTA in the target cell is identical to the source cell, or the NTA explicitly provided by the NW is 0. RAN2 will not discuss the case where NTA does not equal to 0.”

Proposal 5: The benefit of falling back to RACH-based HO after RACH-less failure needs to be further justified, compared with initiating reestablishment when T304 expires. Otherwise, RAN2 de-prioritizes the RACH-less failure discussion in Rel-18.

Proposal 6: RACH-less combination with time-based CHO can work but it PUSCH resources are wasted.

Agreements:

1. In NTN RACH-less handover, NW either indicates NTA in the target cell is identical to the source cell, or the NTA explicitly provided by the NW is 0. RAN2 will not discuss the case where NTA does not equal to 0

* [AT122][106][NR-NTN Enh] RACH-less HO (Huawei)

Scope: discuss RACH-less HO proposals from [R2-2306071](file:///C:\Data\3GPP\Extracts\R2-2306071%20Remaining%20issues%20on%20RACH-less%20HO%20in%20NTN.docx) and [R2-2306465](file:///C:\Data\3GPP\Extracts\R2-2306465%20-%20Handover%20enhancements.docx)

Intended outcome: summary of offline discussion

Deadline for rapporteur's summary (in R2-2306646): Thursday 2023-05-25 13:00

R2-2306646 [offline-106] RACH-less HO Huawei discussion Rel-18 NR\_NTN\_enh-Core

“Unchanged PCI”

[R2-2304899](file:///C:\Data\3GPP\Extracts\R2-2304899%20Discussion%20on%20unchanged%20PCI%20scenario.docx) Discussion on unchanged PCI scenario CATT discussion Rel-18 NR\_NTN\_enh-Core

< Indication of performing DL and UL sync >

Observation 1: UE should get information of whether the cell supporting unchanged PCI without handover and when to perform DL and UL sync.

Proposal 1: In unchanged PCI scenario, the t-Service in SIB19 can be reused to indicate the time when the current satellite stops provide coverage for the serving cell.

Proposal 2a: In unchanged PCI scenario, t-Start is introduced to indicate the time of the target satellite starts providing coverage for the serving cell and indicate the cell supporting unchanged PCI without handover.

Proposal 2b: Upon receiving the t-Start, the UE supporting unchanged PCI without handover should perform DL/UL sync at t-Start.

Proposal 3: RAN2 further discuss how to provide the t-start

- via system information, e.g., SIB19

- via dedicated signalling e.g. RRCReconfiguration.

< Perform sync to the serving cell after satellite switch >

Proposal 4: CBRA/CFRA procedure can be used for UE to re-acquire UL synchronization to the target satellite in PCI unchanged scenario without handover.

Proposal 5: UE getting UL sync without RACH in unchanged PCI without handover scenario is supported. Details wait for the progress on RACH-less topic.

< Stage 2 procedure >

Proposal 6: For hard satellite switching, take the stage 2 procedure in R2-2304899 as baseline.

[R2-2304734](file:///C:\Data\3GPP\RAN2\Docs\R2-2304734.zip) Handover Enhancements in Earth Moving Cells MediaTek Inc. discussion

[R2-2304833](file:///C:\Data\3GPP\Extracts\R2-2304833%20Discussion%20on%20handover%20enhancement%20with%20common%20HO%20configuration%20in%20NR%20NTN.docx) Discussion on handover enhancement with common HO configuration in NR NTN vivo discussion Rel-18

[R2-2304836](file:///C:\Data\3GPP\Extracts\R2-2304836%20Further%20discusison%20on%20service%20link%20switching%20with%20unchanged%20PCI.docx) Further discusison on service link switching with unchanged PCI vivo discussion Rel-18

[R2-2304900](file:///C:\Data\3GPP\Extracts\R2-2304900%20Discussion%20on%20common%20(C)HO%20configuration%20and%20RACH-less.docx) Discussion on common (C)HO configuration and RACH-less CATT discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305049](file:///C:\Data\3GPP\Extracts\R2-2305049%20-%20Discussion%20on%20NTN%20handover%20enhancements.docx) Discussion on NTN-NTN handover enhancements Continental Automotive discussion

[R2-2305152](file:///C:\Data\3GPP\Extracts\R2-2305152.docx) Satellite switch\_PCI change without L3 handover NEC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305153](file:///C:\Data\3GPP\Extracts\R2-2305153.docx) Support RACH-less CHO NEC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305196](file:///C:\Data\3GPP\Extracts\R2-2305196%20RACH-less%20HO.doc) RACH-less handover for NTN Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305197](file:///C:\Data\3GPP\Extracts\R2-2305197%20Mobility%20enhancements.doc) Satellite switch enhancements for NTN Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305238](file:///C:\Data\3GPP\Extracts\R2-2305238_Support%20of%20broadcasting%20HO%20signaling%20in%20NTN.doc) Support of broadcasting HO signaling in NTN China Telecom discussion Rel-18 NR\_NTN\_enh

[R2-2305375](file:///C:\Data\3GPP\Extracts\R2-2305375%20Discussion%20on%20NTN-NTN%20handover%20enhancements.doc) Discussion on NTN-NTN handover enhancements Transsion Holdings discussion Rel-18

[R2-2305380](file:///C:\Data\3GPP\Extracts\R2-2305380.docx) Discussion on NTN handover enhancements TCL Communication Ltd. discussion

[R2-2305518](file:///C:\Data\3GPP\Extracts\R2-2305518.docx) Signaling overhead reduction and group handover during NTN-NTN HOs Sony discussion Rel-18 NR\_NTN\_enh

[R2-2305599](file:///C:\Data\3GPP\Extracts\R2-2305599%20Discussion%20on%20handover%20enhancements%20for%20NTN.docx) Discussion on handover enhancements for NTN CMCC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305676](file:///C:\Data\3GPP\Extracts\R2-2305676%20Discussion%20on%20handover%20enhancements%20for%20NTN-NTN%20mobility.doc) Discussion on handover enhancements for NTN-NTN mobility Xiaomi discussion

[R2-2305717](file:///C:\Data\3GPP\Extracts\R2-2305717%20Potential%20issues%20for%20RACH-less%20HO%20in%20NTN.docx) Potential issues for RACH-less HO in NTN Lenovo discussion Rel-18

[R2-2305883](file:///C:\Data\3GPP\Extracts\R2-2305883%20Open%20Aspects%20on%20RACH-less%20HO%20in%20Rel-18%20NTN.docx) Open Aspects on RACH-less HO in Rel-18 NTN Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305884](file:///C:\Data\3GPP\Extracts\R2-2305884%20On%20Common%20and%20Conditional%20Handover%20Signalling%20in%20Rel-18%20NTN%20R2-2305885%20Uncrewed%20Aerial%20Vehicles%20in%20Rel-18%20-%20Updated%20Workplan.docx) On Common and Conditional Handover Signalling in Rel-18 NTN Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305936](file:///C:\Data\3GPP\Extracts\R2-2305936%20(R18%20NR%20NTN%20WI%20AI%207.7.4.2)%20CONN%20mobility%20enh.docx) NTN mobility enhancements for RRC\_CONNECTED InterDigital discussion Rel-18 NR\_NTN\_enh-Core

[R2-2305937](file:///C:\Data\3GPP\Extracts\R2-2305937%20(R18%20NR%20NTN%20WI%20AI%207.7.4.2)%20same%20PCI.docx) Satellite switching without PCI change InterDigital discussion Rel-18 NR\_NTN\_enh-Core

[R2-2306033](file:///C:\Data\3GPP\Extracts\R2-2306033%20%5bNTN%5d%20Discussion%20on%20handover%20enhancements.docx) Discussion on handover enhancements LG Electronics France discussion Rel-18 NR\_NTN\_enh-Core

[R2-2306072](file:///C:\Data\3GPP\Extracts\R2-2306072%20Discussion%20on%20Common%20(C)HO%20configuration.docx) Discussion on the Common (C)HO configuration Huawei, HiSilicon, Turkcell discussion Rel-18 NR\_NTN\_enh-Core

[R2-2306122](file:///C:\Data\3GPP\Extracts\R2-2306122%20Discussion%20on%20handover%20enhancement%20with%20common%20signalling.docx) Discussion on handover enhancement with common signalling ASUSTeK discussion Rel-18 38.331 NR\_NTN\_enh-Core

[R2-2306123](file:///C:\Data\3GPP\Extracts\R2-2306123%20Discussion%20on%20RACH-less%20handover%20for%20NTN.docx) Discussion on RACH-less handover for NTN ASUSTeK discussion Rel-18 NR\_NTN\_enh-Core

[R2-2306155](file:///C:\Data\3GPP\Extracts\R2-2306155_Signaling%20optimization%20on%20common%20HO%20configuration_v0.doc) Signaling optimization on common HO configuration Apple discussion Rel-18 DUMMY

[R2-2306156](file:///C:\Data\3GPP\Extracts\R2-2306156_NTN%20specific%20handover%20enhancement_v0.doc) NTN specific handover enhancement Apple discussion Rel-18 DUMMY

[R2-2306296](file:///C:\Data\3GPP\Extracts\R2-2306296_Consideration%20on%20HO%20enhancements%20in%20NTN-v1.docx) Consideration on HO enhancements in NTN ZTE corporation, Sanechips discussion Rel-18 NR\_NTN\_enh-Core

[R2-2306326](file:///C:\Data\3GPP\Extracts\R2-2306326.docx) Discussion on NTN Handover Enhancements Samsung Research America discussion Rel-18 NR\_NTN\_enh-Core

[R2-2306351](file:///C:\Data\3GPP\Extracts\R2-2306351%20Discussion%20on%20the%20SMTC%20and%20Measurement%20Gap%20Enhancements.docx) Discussion on the SMTC and Measurement Gap Enhancements Google Inc. discussion Rel-18 [R2-2300514](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121\Tdocs\R2-2300514.zip)

[R2-2306370](file:///C:\Data\3GPP\Extracts\R2-2306370_NTN_Discussion_on_handover_enhancements.doc) Discussion on handover enhancements Sharp discussion Rel-18 NR\_NTN\_enh-Core

[R2-2306453](file:///C:\Data\3GPP\Extracts\R2-2306453_NTN-NTN%20handover%20enhancements.docx) NTN-NTN handover enhancements Sequans Communications discussion Rel-18 NR\_NTN\_enh-Core [R2-2304134](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304134.zip)

[R2-2306517](file:///C:\Data\3GPP\Extracts\R2-2306517_) “Unchanged PCI” solution vs “PCI change only” solution Sequans Communications discussion Rel-18 NR\_NTN\_enh-Core [R2-2304147](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121bis\Tdocs\R2-2304147.zip)

### 7.25.4 Self-Evaluation NTN

(FS\_IMT-2020\_Sat\_eval; leading Group: TSG RAN; REL-18; WID: RP-230754)

This will be treated in NTN breakout session (Sergio).

Study on Self-Evaluation towards the 3GPP submission of a IMT-2020 Satellite Radio Interface Technology, including both NR NTN and IoT-NTN. Note that the time allocated will be very limited, and this is expected to be mostly an offline activity.

[R2-2306469](file:///C:\Data\3GPP\Extracts\R2-2306469%20-%20Satellite%20IMT-2020%20RAN2%20aspects.docx) Satellite IMT-2020 RAN2 aspects Ericsson discussion Rel-18

Observation 1 3GPP is preparing to submit 5G NTN (NR NTN + IoT NTN) to be recognized as the satellite component of IMT-2020.

Observation 2 User plane latency, control plane latency and mobility interruption time requirements are within RAN2 scope.

Observation 3 The methodology for these evaluations can re-use the terrestrial submission as described in TR 37.910.

Proposal 1 Discuss the basic assumptions needed to perform the evaluations of user plane latency, control plane latency, and mobility interruption time.

* RAN2 will perform the evaluations of user plane latency, control plane latency, and mobility interruption time.

[R2-2305965](file:///C:\Data\3GPP\Extracts\R2-2305965.DOC) Self Evaluation for NR NTN Huawei, HiSilicon discussion Rel-18 FS\_IMT2020\_SAT\_eval

Observation 1: RAN2 focus on the evaluation of NR NTN on control plane latency, user plane latency and mobility interruption time

Proposal 1: Discuss the assumption of the max RTD before the self-evaluation.

- QC wonders whether this should be minimum RTT

- Inmarsat wonders what the intention is to discuss minimum RTT

Proposal 2: Evaluate the control plane latency from RRC\_INACTIVE to RRC\_CONNECTED.

* Agreed

Proposal 3: Evaluate the control plane latency based on the 2-step RACH.

- Ericsson wonders if we can do this as this is an optional feature. Oppo thinks the same applies to RRC Inactive

* Agreed

Proposal 4: For user plane latency evaluation, HARQ disabling should be assumed.

* Agreed

Proposal 5: Evaluate the mobility interruption in beam mobility

- Nokia wonders if we can have this assumption if we are considering intra-cell mobility

- QC thinks that from RAN2 perspective we can consider beam mobility

- Inmarsat thinks both beam mobility for intra-cell and HO for inter-cell should be considered

* CB Friday

Proposal 6: Confirm 0ms mobility interruption time is achieved by NR in beam mobility

- Nokia thinks this should be discussed together with p5.

- Oppo thinks that if we consider R18 then we have RACH-less HO and 0ms interruption can be assumed

* CB Friday

Proposal 7: Discuss whether the evaluation of mobility interruption time in cell handover is needed.

- HW wonders if we also need to consider inter-satellite HO

* CB Friday

Proposal 8: If RAN2 agrees to evaluate the interruption time in cell handover, RAN2 firstly need to agree the assumption of the SMTC periodicity.

Agreements:

1. RAN2 will perform the evaluations of user plane latency, control plane latency, and mobility interruption time.
2. Evaluate the control plane latency from RRC\_INACTIVE to RRC\_CONNECTED.
3. Evaluate the control plane latency based on the 2-step RACH.
4. For user plane latency evaluation, HARQ disabling should be assumed.

[R2-2305410](file:///C:\Data\3GPP\Extracts\R2-2305410.docx) Discussion on IMT-2020 Satellite self-evaluation for Latency and Mobility THALES discussion Rel-18 NR\_NTN\_enh-Perf

Observation 1: Feeder and service links propagation delays are not included in the time budget to satisfy the 40 ms control plane latency requirement.

Observation 2: Feeder and service links propagation delay are not included in the time budget to satisfy the 10 ms user plane latency requirement.

Proposal 1: The Table 2 is used for NR NTN Control plane latency analysis

Proposal 2: Send LS to RAN1 to provide input on:

- The required duration for preamble detection and processing in gNB

- UE Processing Delay

Proposal 3: The components in Table 3 are considered for DL user plane procedure latency analysis for NR NTN with HARQ enabled.

FFS: DL UP latency with disabled HARQ and radio retransmission handled by RLC ARQ.

Proposal 4: The components in Table 4 are considered for UL user plane procedure latency analysis for NR NTN.

FFS: UL UP latency with disabled HARQ and radio retransmission handled by RLC ARQ.

Proposal 5: Beam level mobility in same cell with no RRC involvement should be considered for mobility interruption time evaluation.

[R2-2305198](file:///C:\Data\3GPP\Extracts\R2-2305198%20IMT-2020%20Satellite.docx) RAN2 aspects on evaluation methodology for IMT-2020 Satellite Qualcomm Incorporated discussion Rel-18 FS\_IMT2020\_SAT\_eval

Observation 1. RAN2 can start working on evaluation of some items identified as in RAN2 scope such as UP/CP latency and analytical analysis of mobility interruption.

Observation 2. As done in TR 37.910 for IMT 2020 evaluation, RAN2 should focus on NR NTN for bullet (b) e.g., latency, energy efficiency and mobility interruption evaluation.

Proposal 1 The evaluation provided in Table 5.7.2.1-1 in TR 37.910 for control plane latency with additional latency of 2xUE-gNB RTT is used as baseline for CP latency evaluation for NR NTN.

Proposal 2 The evaluation provided in Table 5.7.1.1.1-1 in TR 37.910 for DL user plane procedure with addition of UE-gNB RTT is used as baseline for UP latency evaluation in DL.

Proposal 3 The uplink procedure using a grant free transmission evaluated in Table 5.7.1.1.2-1 in TR 37.910 for UL user plane procedure with addition of UE-gNB RTT is used as baseline for UP latency evaluation in UL.

Proposal 4 Beam-based mobility can be used as a scenario for mobility interruption time evaluation in NR NTN.

# Summary

TBD

Agreed CRs

NR-NTN

IoT-NTN

Approved LSs out

[Post122] Email discussions

Short

Long