3GPP TSG-RAN WG2 Meeting #124 R2-2313563

Chicago, USA, Nov 13-17, 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**

Organizational

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

* [AT124][300] Organizational – NR-NTN and IoT-NTN session

Scope:

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

Schedule/Plan

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Main room** | **Brk 2 room** | **Brk 1 room** | **Brk 3 room** |
| **Monday November 13th** | | | | |
| 09:00 – 10:30 | [**1], [2], [3],**  **[7.0] R18 common (Diana)**  **NR18 Network Energy Saving [1] (Diana)**  - 7.3.1 Organizations (including reports from Running CRs email discussions)  - 7.3.2 DTX/DRX  - 7.3.5 Mobility | Breakout to start after common session  **MUSIM [1] (Erlin)**  - 7.17.1 (running CRs, LSin, etc.)  - 7.17.2 (report for email [205], other issues)  - 7.17.3  - 7.17.4  **NR18 MIMO evo [0.75]**  - 7.20.1 (reports for email [203], running CRs, LSin, etc)  MAC aspects  - 7.20.2  - 7.20.3 (if time allows) | Breakout to start after formal opening of meeting in main room:  **NR18 Pos early items (Nathan)**  - LSs and rapporteur inputs, email reports [404] and [405], kickoff of early offline discussions  **NR18 SL Relay early items (Nathan)**  - LSs and rapporteur inputs, email report [420], kickoff of early offline discussions  **NR17 SL Relay if time (Nathan)** |  |
| 11:00 – 13:00 |
| 14:30 – 16:30 | **EUTRA&NR151617 (Mattias)**  4.1.1  5.1.1.1  5.1.3.0  5.1.3.1  5.1.3.2  5.1.3.3  6.1.1.0  6.1.1.1  May continue with the following if time allows  6.1.3.0  6.1.3.1  6.1.3.2  6.1.3.3 | **NR MIMO con’t**  RRC aspects (including report for email [204], other issues in 7.20.1/2/3 if time allows)  **@15:00** **NR151617 UP (Diana)**  **NR18 MT-SDT(Diana)**  IDC (Yi) (email discussion only)  NCR(Sasha) (email discussion only) | **NRLTE1516 V2X/SL (Kyeongin)**  **NR17 SL (Kyeongin)**  **NR18 SL (if time allows)**  5.2.0, 5.2.1  6.6.0, 6.6.1  7.15.1, 7.15.2 (if time allows) |
| 17:00 – 19:00 | **NR18 fCovEnh [0.5] (Eswar)**  - 7.21.1 Organizational:  - LSin  - Endorse the running CRs  - open issues and rapporteur proposals from running CR discussions  CP and UP AIs  - 7.21.2:  - 7.21.3: | **NR18 SL evolution [1] (Kyeongin)**  7.15.2  7.15.3 (if time allows) |  |
| **Tuesday November 14th** | | | | |
| 08:30 – 10:30 | **NR18 feMob [2] (Johan)**  [7.4.1/7.4.2] Kick-off LTM CR limited offline (brief).  [7.4.3] Subsequent CPAC  [7.4.4] CHO with Cand SCG | **NR 18 MBS [0.5] (Dawid):**  - 7.11.1: Organizational  - 7.11.2.1: CP issues  - 7.11.2.2: UP issues  - 7.11.3: Shared processing and UE capabilities  **If time allows, MBS TEI 18:**  - RedCap CFR  - PTM retransmissions | **NR18 SL Relay [1.5] (Nathan)**  - 7.9.1 Organizational if anything left  - 7.9.2 UE-to-UE  - 7.9.3 Service continuity if time |  |
| 11:00 – 13:00 | **NR18 Mobile IAB [0.5] (Johan)**  **NR18 LP WUS [0.5] (Johan)** | **NR18 UAV [1] (Diana)**  (all AIs in order) | **NRLTE1516 Pos (Nathan)**  **NR17 Pos (Nathan)**  **NR17 SL Relay if needed (Nathan)** |
| 14:30 -16:30 | **NR18 XR [2] (Diana)**  - 7.5.1 Organizational (including reports from running CRs email discussions)  - 7.5.4.1 BSR  - 7.5.4.2 discard operation  - 7.5.4.3 configured grant | **NR17 NTN Maint (Sergio)**  - 4.2  - 6.3  **NR18 NTN enh [1] (Sergio)**  - 7.7.1  - 7.7.2  - 7.7.3 | **NR18 Pos [2] (Nathan)**  - 7.2.1 Organizational if anything left  - 7.2.3 RAT-dependent integrity  - 7.2.4 LPHAP  - 7.2.5 RAN1-led objectives if time |  |
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| 17:00– 19:00 | **NR18 Other [2] Diana** | **NR18 NTN enh [1] (Sergio)**  - 7.7.4.1  - 7.7.4.2.1: report of [301],[302]  - 7.7.4.2.2 | **NR18 Pos [2] (Nathan)**  - 7.2.5 RAN1-led objectives  - 7.2.2 SL positioning |  |
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| **Wednesday November 15th** | | | | |
| 08:30 – 10:30 | **NR18 feMob [2] (Johan)**  [7.4.2] LTM cont  [7.4.1] UE caps  [7.4.5] eEMR, incl Inc LS, initial disc | **NR18 eQoE [0.5] (Dawid):**  - 7.14.1: LSin, running CRs, work plan, open issues  - 7.14.2: QoE in IDLE/INACTIVE  - 7.14.3: QoE in NR-DC  - 7.14.4: UE capabilities and others | **NR18 SL relay [1.5] (Nathan)**  - 7.9.3 Service continuity  - 7.9.4 Multi-path  TEI Relay/POS (Nathan) (30minutes) |  |
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| 11:00 – 13:00 | **NR18 URLLC [0.5] (Diana)**  **NR18 Network Energy Saving [1] (Diana)**  - 7.3.4 Cell selection/reselection  - 7.3.6 Others | **NR17 (Mattias)**  6.1.3.0  6.1.3.1  6.1.3.2  6.1.3.3 | **NR17 SONMDT (HuNan)**  **NR18 SONMDT [1] (HuNan)** |  |
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| 14:30 – 16:30 | **NR18 XR [2] (Diana)**  - 7.5.3 XR specific power saving  - 7.5.2 XR awareness  - 7.5.5 UE capabilities | **R18 IoT-NTN [1] (Sergio)**  - 7.6.1  - 7.6.2.1  - 7.6.2.2: report of [304]  - 7.6.3.1  - 7.6.3.2 | **NR18 SONMDT [1] (HuNan)** |  |
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| 17:00 – 19:00 | **NR18 AIML [1] (Diana)**  All AIs | **NR18 RedCap [1] (Mattias)**  7.19.1  7.19.2  7.19.3 | Offlines (to be scheduled during the week) |  |
| **Thursday November 16th** | | | | |
| 08:30 – 10:30 | CB Eswar Cov. Enhc. | **CB NR18 NTN enh (Sergio)**  - 7.7.4: remaining CBs  - 7.7.4.2.1: CHO enhancements (report of [302])  - 7.7.4.2.2: report of [303] and other unchanged PCI aspects  **NTN Self evaluation (Sergio)**  - 7.25.4 | CB Kyeongin  Comebacks |  |
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| 11:00 – 13:00 | **NR18 TEI [1] (Diana)** | CB Erlin  MU-SIM  MIMO evo | CB Kyeongin  Comebacks |  |
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| 14:30 – 16:30 | **NR18 Other [2] (Diana)** | CB Dawid:  - QoE  - MBS  - MBS TEI18 | CB Nathan  Prioritise positioning CBs (TBR) |  |
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| 17:00 – 19:00 | **CB Diana**  XR  UAV  NES  AI/ML if time allows | CB Johan  - LP-WUS  - mIAB  - feMob | CB Nathan  Prioritise relay CBs (TBR) |  |
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| **Friday November 17th** | | | | |
| 08:30 – 10:30 | **CB Johan FeMob** | CB **EUTRA&NR151617** Mattias  CB eRedCap Mattias | 8:30-9:30 CB Kyeongin  9:30-11:30 CB Nathan |  |
| 11:00 – 13:00 | CB Diana  AI/ML (if not done on Thursday) | **CB IoT-NTN [1] (Sergio)**  - 7.6.2.1  - 7.6.2.2: report of [309]  - 7.6.3.1: report of [310]  - 7.6.4 | 11:00-11:30 Nathan CB  11:30 – 12:00 CB Hunan |
| 14:30 – 16:00 | Reports of breakout sessions |  |  |
| 16:00 – 17:00 |  |  |  |  |

List and details of [AT124] offline discussions

NOTE: No offline email discussions will be kicked off before Monday Nov 13th, 09:00 local time

* [AT124][301][NR-NTN Enh] RACH-less HO (Interdigital)

Scope: Discuss the remaining open issues for RACH-less HO, based primarily on [R2-2313004](file:///C:\Data\3GPP\Extracts\R2-2313004%20(R18%20NR%20NTN%20WI%20AI%207.7.4.2.1)%20RACH-less%20HO.docx) and [R2-2312105](file:///C:\Data\3GPP\Extracts\R2-2312105.docx) (if time allows)

Intended outcome: offline discussion summary

F2F schedule: Monday 2023-11-13 16:30-17:00 Brk3

Deadline for rapporteur's summary (in R2-2313784): Tuesday 2023-11-14 12:00

* [AT124][302][NR-NTN Enh] CHO enhancements (Nokia)

Scope: Discuss the remaining open issues for CHO enhancements, based primarily on section 2.2 of [R2-2313051](file:///C:\Data\3GPP\Extracts\R2-2313051%20Remaining%20issues%20for%20IDLE%20and%20CONNECTED%20mode%20mobility%20in%20Rel-18%20NTN.docx) (and section 2.1 if time allows)

Intended outcome: offline discussion summary

F2F schedule: Tuesday 2023-11-14 16:30-17:00 Brk2

NEW F2F schedule: Wednesday 2023-11-15 16:30-17:00 Brk2

Deadline for rapporteur's summary (in R2-2313874): Wednesday 2023-11-15 20:00

* [AT124][303][NR-NTN Enh] Unchanged PCI (Apple)

Scope: Discuss the RACH-less satellite switching aspects

Intended outcome: offline discussion summary

F2F schedule: Wednesday 2023-11-15 10:30-11:00 Brk3

Deadline for rapporteur's summary (in R2-2313785): Wednesday 2023-11-15 22:00

* [AT124][304][IoT-NTN Enh] GNSS enhancements (ZTE)

Scope: Start discussing the remaining open issues for GNSS operation enhancements, based on the list of open issues identified in [R2-2311892](file:///C:\Data\3GPP\Extracts\R2-2311892%20Report%20of%20%5bPost123bis%5d%5b302%5d%5bIoT-NTN%20Enh%5d%2036.331%20running%20CR%20(Huawei).docx) and [R2-2312116](file:///C:\Data\3GPP\Extracts\R2-2312116%20Stage-3%20running%20CR%20for%20TS%2036.321%20for%20Rel-18%20IoT-NTN%20.docx) and the submitted contributions in AI 7.6.2.2

Intended outcome: offline discussion summary

F2F schedule: Tuesday 2023-11-14 10:30-11:00 Brk3

Deadline for rapporteur's summary (in R2-2313786): Wednesday 2023-11-15 12:00

* [AT124][305][NR-NTN Enh] UE Caps CRs (Intel)

Scope: Update the running drafts CRs with meeting agreements

Intended outcome: Endorsed draft CRs

Deadline for companies' feedback: Thursday 2023-11-16 20:00

Deadline for endorsed CRs (in R2-2313775 and R2-2313776): Friday 2023-11-17 08:00

* [AT124][306][NR-NTN] CR on UTC reference point (Huawei)

Scope: update the CR based on meeting decision and discuss p3 from [R2-2313554](file:///C:\Data\3GPP\Extracts\R2-2313554_RP%20of%20epoch%20time%20for%20neighbor%20and%20target%20cells%20_RP%20of%20t-Service.docx)

Intended outcome: Agreed CR

Deadline for companies' feedback: Thursday 2023-11-16 20:00

Deadline for agreed CR (in R2-2313871): Friday 2023-11-17 08:00

* [AT124][307][NR-NTN] CR on cellBarredNTN (Qualcomm)

Scope: Draft a CR based on meeting agreements

Intended outcome: Agreed CR

Deadline for companies' feedback: Thursday 2023-11-16 20:00

Deadline for agreed CR (in R2-2313872): Friday 2023-11-17 08:00

* [AT124][308][NR-NTN Enh] MAC CR on RACH-less HO (Interdigital)

Scope: Finalize the NTN aspects of the MAC CR for RACH-less HO (common CR for NR NTN and mIAB)

Intended outcome: Endorsed CR

Deadline for companies' feedback: Thursday 2023-11-16 20:00

Deadline for rapporteur's CR (in R2-2313873): Friday 2023-11-17 08:00

* [AT124][309][IOT-NTN Enh] GNSS Enhancements phase 2 (Mediatek)

Scope: discuss the remaining proposals from [R2-2313786](file:///C:\Data\3GPP\RAN2\Inbox\R2-2313786.zip)

Intended outcome: offline discussion summary

F2F schedule: Thursday 2023-11-16 time/location FFS

Deadline for rapporteur's summary (in R2-2313875): Friday 2023-11-17 08:00

* [AT124][310][IOT-NTN Enh] Mobility aspects (Huawei)

Scope: discuss the proposals from [R2-2313586](file:///C:\Data\3GPP\Extracts\R2-2313586%20Discussion%20on%20mobility%20enhancements.doc) and [R2-2313011](file:///C:\Data\3GPP\Extracts\R2-2313011%20Enhancements%20for%20neighbour%20cell%20measurements.docx) marked as “continue in offline 310)

Intended outcome: offline discussion summary

F2F schedule: Thursday 2023-11-16 time/location FFS

Deadline for rapporteur's summary (in R2-2313876): Friday 2023-11-17 08:00

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

(LTE\_NBIOT\_eMTC\_NTN; leading WG: RAN1; REL-17; WID: [RP-211601](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_92e/Docs/RP-211601.zip))

Tdoc Limitation: 1 tdocs

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

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

### 4.2.0 In Principle Agreed CRs

[R2-2313161](file:///C:\Data\3GPP\Extracts\R2-2313161%20Clarification%20on%20ul-SyncValidityDuration%20in%20SIB31.docx) Clarification on ul-SyncValidityDuration in SIB31 ZTE Corporation, Sanechips CR Rel-17 36.331 17.6.0 4975 - F LTE\_NBIOT\_eMTC\_NTN-Core

* Agreed

### 4.2.1 Other

Koffset handling

[R2-2313550](file:///C:\Data\3GPP\Extracts\R2-2313550%20Correction%20to%2036.321%20on%20Koffset%20handling%20during%20MAC%20reset.docx) Correction to 36.321 on Koffset handling during handover Huawei, Ericsson, Samsung, OPPO, Nokia, Qualcomm, HiSilicon CR Rel-17 36.321 17.6.0 1573 1 F LTE\_NBIOT\_eMTC\_NTN R2-2311597

* Google supports this in principle but wonders if there are some cases where the reset is not needed
* LG thinks we should remove “configured”
* Revised in R2-2313787 to remove “configured”

R2-2313787 Correction to 36.321 on Koffset handling during handover Huawei, Ericsson, Samsung, OPPO, Nokia, Qualcomm, HiSilicon CR Rel-17 36.321 17.6.0 1573 2 F LTE\_NBIOT\_eMTC\_NTN R2-2311597

* Agreed

[R2-2313485](file:///C:\Data\3GPP\Extracts\36321_CR1579_(Rel-17)_R2-2313485%20Correction%20on%20the%20Koffset%20handling%20during%20RRC%20connection%20re-establishment.docx) Correction on the Koffset handling during RRC connection re-establishment Google Inc. CR Rel-17 36.321 17.6.0 1579 - F LTE\_NBIOT\_eMTC\_NTN-Core

* Not pursued

[R2-2313357](file:///C:\Data\3GPP\Extracts\R2-2313357%20Correction%20on%20Koffset%20when%20receiving%20dedicated%20SIB31.docx) Correction on Koffset when receiving dedicated SIB31 ZTE Corporation, Sanechips CR Rel-17 36.321 17.6.0 1578 - F LTE\_NBIOT\_eMTC\_NTN-Core

* Oppo thinks we don’t need anything for the intra-cell case and it should be up to NW to handle this. QC agrees. Samsung also agrees
* Not pursued

Corrections to SIB31

[R2-2313395](file:///C:\Data\3GPP\Extracts\R2-2313395%20Corrections%20to%20SystemInformationBlockType31%20for%20IoT%20NTN.docx) Corrections to SystemInformationBlockType31 for IoT NTN Huawei, HiSilicon CR Rel-17 36.331 17.6.0 4978 - F LTE\_NBIOT\_eMTC\_NTN

* ZTE thinks the CR is not essential
* QC support the first change. MTK agrees
* Revised in R2-2313788 to remove the last change

R2-2313788 Corrections to SystemInformationBlockType31 for IoT NTN Huawei, HiSilicon CR Rel-17 36.331 17.6.0 4978 1 F LTE\_NBIOT\_eMTC\_NTN

* Agreed

SIB31 in a non NTN cell

[R2-2313008](file:///C:\Data\3GPP\Extracts\R2-2313008%20Correction%20on%20SIB31%20signalling%20only%20in%20NTN%20cell.docx) Correction on SIB31 signalling only in NTN cell Samsung CR Rel-17 36.331 17.6.0 4972 - F LTE\_NBIOT\_eMTC\_NTN

* Oppo suggests to change “in” into “for”
* ZTE thinks that ambiguity will remain and prefers the original change
* Revised in R2-2313789 to simply change “in” into “for” (without removing the sentence).
* Apply same change in field description of SIB31dedicated

R2-2313789 Correction on SIB31 signalling only in NTN cell Samsung CR Rel-17 36.331 17.6.0 4972 1 F LTE\_NBIOT\_eMTC\_NTN

* Agreed

Withdrawn

[R2-2313370](file:///C:\Data\3GPP\Extracts\R2-2313370%20Correction%20to%2036.321%20on%20Koffset%20handling%20during%20MAC%20reset.docx) Correction to 36.321 on Koffset handling during MAC reset Huawei, Ericsson, Samsung, OPPO, Nokia, Qualcomm, HiSilicon CR Rel-17 38.321 17.6.0 1722 - F LTE\_NBIOT\_eMTC\_NTN R2-2311597 Withdrawn

R2-2313547 Correction to 36.321 on Koffset handling during MAC reset Huawei, Ericsson, Samsung, OPPO, Nokia, Qualcomm, HiSilicon CR Rel-17 38.321 17.6.0 1722 1 F LTE\_NBIOT\_eMTC\_NTN [R2-2313370](file:///C:\Data\3GPP\Extracts\R2-2313370%20Correction%20to%2036.321%20on%20Koffset%20handling%20during%20MAC%20reset.docx) Withdrawn

## 6.3 NR Non-Terrestrial Networks (NTN)

(NR\_NTN\_solutions-Core; leading WG: RAN2; REL-17; WID: [RP-211557](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_92e/Docs/RP-211557.zip))

Tdoc Limitation: 1 tdocs

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

### 6.3.0 In Principle Agreed CRs

[R2-2312626](file:///C:\Data\3GPP\Extracts\38331_CR4351r2_(Rel-17)_R2-2312626_Notes%20in%20the%20RRC%20release%20procedure%20for%20NR-NTN.docx) Notes in the RRC release procedure for NR-NTN Google Inc., Qualcomm Inc., LG Electronics CR Rel-17 38.331 17.6.0 4351 2 F NR\_NTN\_solutions-Core [R2-2311313](file:///C:\Data\3GPP\archive\RAN2\RAN2%23123bis\Tdocs\R2-2311313.zip)

* Agreed

### 6.3.1 Other

Koffset handling

[R2-2313369](file:///C:\Data\3GPP\Extracts\R2-2313369%20Correction%20to%2038.321%20on%20Koffset%20handling%20during%20MAC%20reset.docx) Correction to 38.321 on Koffset handling during MAC reset Huawei, Ericsson, Samsung, OPPO, Nokia, Qualcomm, HiSilicon CR Rel-17 38.321 17.6.0 1692 1 F NR\_NTN\_solutions-Core R2-2311598

* Revised in R2-2313790 to remove “configured”

R2-2313790 Correction to 38.321 on Koffset handling during MAC reset Huawei, Ericsson, Samsung, OPPO, Nokia, Qualcomm, HiSilicon CR Rel-17 38.321 17.6.0 1692 2 F NR\_NTN\_solutions-Core R2-2311598

* Agreed

Misc

[R2-2313081](file:///C:\Data\3GPP\Extracts\R2-2313081%20Miscellaneous%20corrections%20to%2038.331%20for%20NR%20NTN.docx) Miscellaneous corrections to 38.331 for NR NTN Huawei, HiSilicon CR Rel-17 38.331 17.6.0 4463 - F NR\_NTN\_solutions-Core

* LG thinks the first change is not essential but an optimization. Oppo agrees. Huawei think that different interpretation would lead to misalignment between the UE and the NW and it’s better to clarify. Oppo and LG think the same behaviour should apply in idle and connected. Oppo thinks we could have a note in Stage 2
* First change is not agreed (for 38.331). Consider to include the first change in Stage 2 in the next rapporteur CR
* QC would like to remove the last change. Samsung agrees
* Fourth change is not agreed
* Nokia thinks we should discuss the second change as well but can accept to compromise if we add a similar note as we added for IoT NTN
* Second change is agreed with the addition of the same note as for IoT NTN. Also add the corresponding description for TimeReferenceInfo (as in the TP in R2-2313298)
* Third change is agreed
* Also change the title of the CR to refer to the UTC reference point
* Revised in R2-2313871

R2-2313871 Correction to UTC refernce point Huawei, HiSilicon, Ericsson CR Rel-17 38.331 17.6.0 4463 1 F NR\_NTN\_solutions-Core

* [AT124][306][NR-NTN] CR on UTC reference point (Huawei)

Scope: update the CR based on meeting decision and discuss p3 from [R2-2313554](file:///C:\Data\3GPP\Extracts\R2-2313554_RP%20of%20epoch%20time%20for%20neighbor%20and%20target%20cells%20_RP%20of%20t-Service.docx)

Intended outcome: Agreed CR

Deadline for companies' feedback: Thursday 2023-11-16 20:00

Deadline for agreed CR (in R2-2313871): Friday 2023-11-17 08:00

Event D1

[R2-2311964](file:///C:\Data\3GPP\Extracts\R2-2311964-Correction%20on%20Event%20D1.docx) Correction on Event D1 OPPO CR Rel-17 38.331 17.6.0 4402 - F NR\_NTN\_solutions-Core

* QC is not sure this change makes any difference
* Vivo thinks this is not essential
* Ericsson also thinks the change is not needed
* Not pursued

Reference point

[R2-2312211](file:///C:\Data\3GPP\Extracts\R2-2312211_Consideration%20on%20UTC%20reference%20point%20and%20correction%20on%20CondEvent%20T1%20in%20NR%20NTN%20R17.docx) Consideration on UTC reference point and correction on CondEvent T1 in NR NTN R17 ZTE Corporation, Sanechips discussion Rel-17 NR\_NTN\_solutions-Core

Proposal 1: RAN2 understands that, for referenceTimeInfo, in NR NTN R17 it’s anyway not possible to achieve the same level of accuracy as in a TN network.

Proposal 2: In NR NTN, the indicated time in referenceTimeInfo and timeInfoUTC is referenced at gNB, i.e., UE should take into account the propagation delay in service link and feeder link when determining the time at the UE.

Proposal 3: Remove “measured” from the definition of Mt for CondEvent T1:

Mt is the time ~~measured~~ at UE.

* Sequans thinks that if we change this only here it will not be consistent with the title of the subclause
* LG suggest to refer to “current time at the UE”

Proposal 4: Agree the TP as included in the Appendix.

[R2-2313298](file:///C:\Data\3GPP\Extracts\R2-2313298%20-%20UTC%20reference%20point%20in%20NR%20NTN%20R17.docx) UTC reference point in NR NTN R17 Ericsson discussion Rel-17 NR\_NTN\_solutions

Proposal 1 Align the NR NTN UTC reference point to the IoT NTN reference point for UTC.

Proposal 2 Consider the text proposal in the Appendix.

* MTK agrees with Ericsson proposal. QC also agrees.
* Nokia don’t think we need to align to IoT NTN
* Oppo prefers to align and thinks there is no technical reason not to do so. Samsung agrees
* ZTE is ok to compromise and go for the majority view

[R2-2313486](file:///C:\Data\3GPP\Extracts\R2-2313486_RP%20of%20epoch%20time%20for%20neighbor%20and%20target%20cells%20_RP%20of%20t-Service.docx) RP of epoch time for neighbor and target cells / RP of t-Service Sequans Communications discussion Rel-17 NR\_NTN\_solutions-Core

* Revised in R2-2313554

[R2-2313554](file:///C:\Data\3GPP\Extracts\R2-2313554_RP%20of%20epoch%20time%20for%20neighbor%20and%20target%20cells%20_RP%20of%20t-Service.docx) RP of epoch time for neighbor and target cells / RP of t-Service Sequans Communications discussion Rel-17 NR\_NTN\_solutions-Core

Proposal 1: Confirm that the reference point for epoch time of neighbour cell is the serving cell ULTSRP

Proposal 2: Confirm that the reference point for epoch time of target cell is the target cell ULTSRP

Proposal 3: The reference point for t-Service is the ULTSRP of the cell

* MTK is ok with proposal 3, while there is no need to capture p1 and p2. Samsung agrees
* RAN2 confirms that the reference point for epoch time of neighbour cell is the serving cell ULTSRP (no need for spec change)
* RAN2 confirms that the reference point for epoch time of target cell is the target cell ULTSRP (no need for spec change)
* Ericsson is not sure about p3. Apple and HW also do not agree
* Sequans thinks we need to clarify in one direction or the other, but not leave it unspecified
* Continue in offline 306 on p3 (any possible agreement related to p3 can be merged with CR 4463)

Other

[R2-2313194](file:///C:\Data\3GPP\Extracts\R2-2313194%20Correction%20on%20cellBarredNTN.docx) Clarification on cellBarredNTN in RRC\_CONNECTED Qualcomm Technologies Ireland discussion Rel-17 NR\_NTN\_solutions-Core

Proposal 1 Clarify the cellBarredNTN bit applies to only UE in RRC\_IDLE, RRC\_INACTIVE and RRC\_CONNECTED while T311 is running.

* Oppo is fine with this clarification
* HW also thikns this is needed
* Agreed
* Draft a CR accordingly
* [AT124][307][NR-NTN] CR on cellBarredNTN (Qualcomm)

Scope: Draft a CR based on meeting agreements

Intended outcome: Agreed CR

Deadline for companies' feedback: Thursday 2023-11-16 20:00

Deadline for agreed CR (in R2-2313872): Friday 2023-11-17 08:00

## 7.6 IoT NTN enhancements

(IoT\_NTN\_enh-Core; leading WG: RAN1; REL-18; WID: [RP-223519](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_98e/Docs/RP-223519.zip))

Time budget: 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.

Including, for each affected spec:

* Updated running CR
* List of open issues to be addressed by company contributions
* (where applicable) CR rapporteur input with proposals for stage-3 issues (e.g. signaling details, parameter values/ranges) where company contributrions should be avoided

based on the outcome of:

[Post123bis][301][IoT-NTN Enh] 36.300 running CR (Ericsson)

[Post123bis][302][IoT-NTN Enh] 36.331 running CR (Huawei)

[Post123bis][303][IoT-NTN Enh] 36.321 running CR (Mediatek)

[Post123bis][304][IoT-NTN Enh] 36.304 running CR (Nokia)

[Post123bis][305][IoT-NTN Enh] 36.306 running CR (Qualcomm)

Incoming LSs

[R2-2311716](file:///C:\Data\3GPP\Extracts\R2-2311716_R1-2310634.docx) LS on Rel-18 RAN1 UE features list for LTE after RAN1#114bis (R1-2310634; contact: NTT DOCOMO, AT&T) RAN1 LS in Rel-18 IoT\_NTN\_enh To:RAN2 Cc:RAN4

(RAN1 UE feature list in R1-2310632)

* Noted

Stage 2 CR

[R2-2313301](file:///C:\Data\3GPP\Extracts\R2-2313301%20-%2036300_CR1387r1_(Rel-18)%20-%20Introduction%20of%20IoT%20NTN%20enhancements.docx) Introduction of IoT NTN enhancements Ericsson CR Rel-18 36.300 17.5.0 1387 1 B IoT\_NTN\_enh-Core [R2-2311244](file:///C:\Data\3GPP\archive\RAN2\RAN2%23123bis\Tdocs\R2-2311244.zip)

* Endorsed
* Revised in R2-2313779

R2-2313779 Introduction of IoT NTN enhancements Ericsson CR Rel-18 36.300 17.5.0 1387 2 B IoT\_NTN\_enh-Core

* [Post124][307][IoT-NTN Enh] 36.300 CR (Ericsson)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313779): short

[R2-2313304](file:///C:\Data\3GPP\Extracts\R2-2313304%20-%20Stage%202%20open%20issues%20R18%20IoT%20NTN.docx) Stage 2 open issues Ericsson discussion Rel-18 IoT\_NTN\_enh-Core

The following issues need to be addressed:

• Adding a new trigger for random access procedure by GNSS validity duration MAC CE in Section 10.1.5.0

• Upon failed GNSS acquisition, shall the UE be allowed to stay in CONNECTED if it still has a valid GNSS position? This can be captured in 23.21.2.2.

• To discuss whether “Provide carrier frequency for the existing satellite list in SIB32 to facilitate cell selection and reduce service interruption after an NTN coverage gap (FFS if the information can be considered as valid after the validity of SI)” needs to be captured in stage 2.

* Continue the discussion in [Post124][308] based on meeting agreements

36.331 CR

[R2-2311891](file:///C:\Data\3GPP\Extracts\R2-2311891%20Introduction%20of%20IOT%20NTN%20enhancements.docx) Introduction of IoT NTN enhancements Huawei, HiSilicon CR Rel-18 36.331 17.6.0 4964 - B IoT\_NTN\_enh-Core

* Endorsed
* Ericsson thinks we need to add a description for the fields in SIB32
* Revised in R2-2313780

R2-2313780 Introduction of IoT NTN enhancements Huawei, HiSilicon CR Rel-18 36.331 17.6.0 4964 1 B IoT\_NTN\_enh-Core

* [Post124][308][IoT-NTN Enh] 36.331 CR (Huawei)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313780): short

[R2-2311892](file:///C:\Data\3GPP\Extracts\R2-2311892%20Report%20of%20%5bPost123bis%5d%5b302%5d%5bIoT-NTN%20Enh%5d%2036.331%20running%20CR%20(Huawei).docx) Report of [Post123bis][302][IoT-NTN Enh] 36.331 running CR (Huawei) Huawei, HiSilicon discussion Rel-18 IoT\_NTN\_enh-Core

Stage-3 issue proposals:

Proposal 1: Remove the references to 5.5.x in Section 5.3.3.4, 5.3.3.4a, 5.3.5.3, 5.3.5.4 and 5.3.7.5, considering that in the updated running CR 5.5.x is already referenced in clause 5.3.3.21.

* Agreed (when to start GNSS measurements is still FFS)

Proposal 2: maxSat-r18 is 4.

* Agreed

Proposal 3: Value range of SatelliteId-r18 is “INTEGER (0..255)”.

* Agreed

Open issue list:

- GNSS

Issue 1-1: How to determine GNSS invalid (considering duration X and Y), this affects 1) condition for entering RRC\_IDLE, and 2) the start of autonomous gap

- Option 1: It is up to RAN1 whether/how to decide GNSS validity duration considering X and Y.

- Option 2: Even if duration X is provided, the remaining GNSS validity duration keeps unchanged.

- Option 3: UE considers the GNSS position as outdated and goes to RRC\_IDLE, upon the expiry of X on top of the expiry of the GNSS validity duration.

* To be discussed in 7.6.2.2

Issue 1-2: Whether to suspend T317, T318 during measurement gap

* To be discussed in 7.6.2.2

- Mobility

Issue 2-1: Regarding RLF based measurement enhancements for eMTC UEs in RRC\_CONNECTED, which frequencies to measure (frequencies in MeasObjects, or frequencies in SIB, or both), whether measurement report will be triggered

* To be discussed in 7.6.3

Issue 2-2: Whether time/location based CHO can be configured simultaneously for the same target cell

* To be discussed in 7.6.3

Issue 2-3: Whether to allow joint configuration among time/location/RSRP-based measurements in RRC Idle/Connected, and if allowed, the intended UE behaviour

* To be discussed in 7.6.3

Issue 2-4: Regarding reacquisition of SIBxx during T318, clarify the intended behavior:

- Option 1: UE acquires SIBxx during T318 if the stored SIBxx has expired (as in the current CR)

- Option 2: Keep the possibility that UE does not acquire SIBxx even if the stored SIBxx expires

- Option 3: Allow the UE to acquire SIBxx even if the stored SIBxx has not expired (e.g. close to expiry)

* To be discussed in 7.6.3

Issue 2-5: How to solve the case where T318 is stopped before successful acquisition of SIBxx

- Option 1: UE stops T318 when both SIB31 and SIBxx have been acquired

- FFS whether to clarify in the spec that RLF is not triggered if T318 expires and SIB31 has been obtained

- Other solutions

* To be discussed in 7.6.3

Issue 2-6: Whether satellite IDs in SIB31/SIB32/SIBxx are unique

* To be discussed in 7.6.3

- Discontinuous coverage

Issue 3-1: Whether to capture a note in RRC about “UE may directly go to RRC\_IDLE after RLF is triggered, if there is not enough time for the UE to finish the procedure of RRC re-establishment due to the discontinuous coverage”

* To be discussed in 7.6.4

Issue 3-2: Whether and how to apply the “early stop of T310 and early start of T311 due to t-Service expiry” to discontinuous coverage scenario

* To be discussed in 7.6.4

Agreements:

1. Remove the references to 5.5.x in Section 5.3.3.4, 5.3.3.4a, 5.3.5.3, 5.3.5.4 and 5.3.7.5, considering that in the updated running CR 5.5.x is already referenced in clause 5.3.3.21 (when to start GNSS measurements is still FFS)
2. maxSat-r18 is 4.
3. Value range of SatelliteId-r18 is “INTEGER (0..255)”.

36.321 CR

[R2-2312116](file:///C:\Data\3GPP\Extracts\R2-2312116%20Stage-3%20running%20CR%20for%20TS%2036.321%20for%20Rel-18%20IoT-NTN%20.docx) Stage-3 running CR for TS 36.321 for Rel-18 IoT-NTN MediaTek Inc. draftCR Rel-18 36.321 17.6.0 F IoT\_NTN\_enh-Core

* Endorsed
* Draft a formal CR in R3-2313781

List of Open Issues:

- Configuring GNSS timers using X and Y introduced by RAN1

* To be discussed in 7.6.2.2

- MAC action related to UL transmission after GNSS validity duration expires with duration X, Y

* To be discussed in 7.6.2.2

- The use of UL LCID for GNSS Validity Duration

* To be discussed in 7.6.2.2

R2-2313781 Stage-3 running CR for TS 36.321 for Rel-18 IoT-NTN MediaTek Inc. draftCR Rel-18 36.321 17.6.0 F IoT\_NTN\_enh-Core

* [Post124][309][NR-NTN Enh] 36.321 CR (Mediatek)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313781): short

36.304 CR

[R2-2313320](file:///C:\Data\3GPP\Extracts\R2-2313320-TS36.304-CR.docx) Introduction of IoT-NTN Enhancements Nokia Solutions & Networks (I) CR Rel-18 36.304 17.4.0 0869 - B IoT\_NTN\_enh-Core

* Endorsed
* ZTE thinks that there are still some formatting issues in the CR
* Revised in R2-2313782

R2-2313782 Introduction of IoT-NTN Enhancements Nokia Solutions & Networks (I) CR Rel-18 36.304 17.4.0 0869 1 B IoT\_NTN\_enh-Core

* [Post124][310][IoT-NTN Enh] 36.304 CR (Nokia)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313782): short

[R2-2313321](file:///C:\Data\3GPP\Extracts\R2-2313321-Report%20of%20%5bPost123bis%5d%5b304%5d%5bIoT-NTN%20Enh%5d%2036.304%20running%20CR%20(Nokia).docx) Report of [Post123bis][304][IoT-NTN Enh] 36.304 running CR (Nokia) Nokia Solutions & Networks (I) discussion Rel-18

Proposal 1 (4/5) : The following EN can be removed in TS36.304.

Editor Note: FFS whether RSS-based measurement condition check is applicable for IoT-NTN.

* Agreed (already reflected in the running CR)

Proposal 2 (4/5) : No update is needed in 36.304 related to cell reselection aspects in TS36.304 due to the introduction of SIBXX. RAN2 to discuss the need to capture the following UE behavior in TS36.304.

“For a UE in Idle/Inactive mode it's up to UE implementation whether to perform NTN neighbor cell measurements on a cell indicated in SIB4 but not included in SIBXX.”

* Agreed (legacy behaviour, no spec change in 36.304 if satellite ID is not present in SIB4)

Proposal 3: RAN2 to wait for SA2 LS response to conclude on paging-related impacts in RAN2 specification

* Agreed

Proposal 4: RAN2 to discuss how to capture frequency information in SIB32 for cell selection in DC scenario. Whether to capture the changes as part of the SIB32 reception or in TS36.304 to be decided.

* To be discussed in 7.6.4

Proposal 5: Need to specify any NAS-AS layer interactions related to unavailability period to be discussed based on contributions in RAN2-124.

* Continue the discussion as part of the discussion for the RRC CR

36.306 CR

[R2-2312281](file:///C:\Data\3GPP\Extracts\36306_CR1872_(Rel-18)_R2-2312281%20UE%20capability_v06_Rapp_clean.docx) Introduction of Rel-18 IoT NTN UE capabilities Qualcomm Incorporated CR Rel-18 36.306 17.4.0 1872 - B IoT\_NTN\_enh-Core

* Endorsed
* Revised in R2-2313783

R2-2313783 Introduction of Rel-18 IoT NTN UE capabilities Qualcomm Incorporated CR Rel-18 36.306 17.4.0 1872 1 B IoT\_NTN\_enh-Core

* [Post124][311][IoT-NTN Enh] 36.306 CR (Qualcomm)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313783): short

[R2-2312282](file:///C:\Data\3GPP\Extracts\36306_CRdraft_(Rel-18)_R2-2312282%20UE%20capability_OpenIssues.docx) Rapporteur input to open issues on the introduction of Rel-18 IoT NTN UE capabilities Qualcomm Incorporated draftCR Rel-18 36.306 17.4.0 B IoT\_NTN\_enh-Core

* QC indicates that we could have the same name for the NB-IoT and eMTC capabilities
* Nokia wonders if there is any dependency between ntn-Triggered-GNSS-Fix-r18 and ntn-Autonomous-GNSS-Fix-r18
* Used as a basis for further discussion in [Post124][311]

### 7.6.2 Performance Enhancements

#### 7.6.2.1 HARQ enhancements

[R2-2311958](file:///C:\Data\3GPP\Extracts\R2-2311958%20-%20Discussion%20on%20HARQ%20enhancement%20for%20IoT%20NTN.doc) Discussion on HARQ enhancement for IoT NTN OPPO discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1 (Missing from summary of offline#308 @RAN2#123bis with unanimous support) For multiple TB scheduling with mixed HARQ feedback enabled/disabled configuration, if HARQ-ACK bundling is not configured, HARQ RTT Timer for HARQ process with HARQ feedback enabled is calculated based on the number of scheduled TBs with HARQ feedback enabled.

* Agreed

Proposal 2 For DL multiple TB scheduling for a NB-IoT UE, if both HARQ processes are configured with disabled HARQ feedback, UE starts drx-InactivityTimer in the subframe containing the last repetition of the PDSCH corresponding to the last scheduled TB plus 12 subframes plus deltaPDCCH.

* For DL multiple TB scheduling for a NB-IoT UE, if both HARQ processes are with disabled HARQ feedback, UE starts drx-InactivityTimer in the subframe containing the last repetition of the PDSCH corresponding to the last scheduled TB plus 12 subframes plus deltaPDCCH.

Proposal 3 For DL multiple TB scheduling for a NB-IoT UE, if only one of the HARQ processes is configured with disabled HARQ feedback, UE starts drx-InactivityTimer in the subframe containing the last repetition of the PDSCH corresponding to the last scheduled TB plus 12 subframes plus deltaPDCCH.

* ZTE disagrees and thinks this is an unnecessary optimization. Nokia agrees
* Vivo supports the proposal. Ericsson as well
* IDC supports p3 to have a similar behaviour as for p2
* QC thinks there could be some benefit
* CATT also supports this
* CB Friday

Proposal 4 For UL multiple TB scheduling for a NB-IoT UE, if both HARQ processes are configured with HARQ mode B, UE starts drx-InactivityTimer in the subframe containing the last repetition of the PUSCH corresponding to the last scheduled TB plus 1 subframe plus deltaPDCCH.

* Agreed

Proposal 5 For UL multiple TB scheduling for a NB-IoT UE, if only one of the HARQ processes is configured with HARQ mode B, UE starts drx-InactivityTimer in the subframe containing the last repetition of the PUSCH corresponding to the last scheduled TB plus 1 subframe plus deltaPDCCH.

* Nokia and ZTE disagree with p5
* CB Friday

Proposal 6 For multiple TB scheduling, for a HARQ process configured as disabled HARQ feedback by RRC and further reversed to enabled HARQ feedback by DCI, RAN2 waits for RAN1 progress before discussing UE DRX behaviour in this case.

Proposal 7 RAN2 confirms that for both single TB scheduling and multiple TB scheduling. for a HARQ process configured as HARQ feedback enabled by RRC and further reversed to HARQ feedback disabled by DCI, UE behaviour on DRX follows the case when HARQ feedback is disabled.

* Agreed

Agreements:

1. For multiple TB scheduling with mixed HARQ feedback enabled/disabled configuration, if HARQ-ACK bundling is not configured, HARQ RTT Timer for HARQ process with HARQ feedback enabled is calculated based on the number of scheduled TBs with HARQ feedback enabled.
2. For DL multiple TB scheduling for a NB-IoT UE, if both HARQ processes are with disabled HARQ feedback, UE starts drx-InactivityTimer in the subframe containing the last repetition of the PDSCH corresponding to the last scheduled TB plus 12 subframes plus deltaPDCCH.
3. For UL multiple TB scheduling for a NB-IoT UE, if both HARQ processes are configured with HARQ mode B, UE starts drx-InactivityTimer in the subframe containing the last repetition of the PUSCH corresponding to the last scheduled TB plus 1 subframe plus deltaPDCCH.
4. RAN2 confirms that for both single TB scheduling and multiple TB scheduling. for a HARQ process configured as HARQ feedback enabled by RRC and further reversed to HARQ feedback disabled by DCI, UE behaviour on DRX follows the case when HARQ feedback is disabled

[R2-2311838](file:///C:\Data\3GPP\Extracts\R2-2311838%20Remaining%20Issue%20on%20HARQ%20Enhancement%20for%20IoT%20NTN.docx) Remaining Issues on HARQ Enhancement for IoT NTN vivo discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2312114](file:///C:\Data\3GPP\Extracts\R2-2312114%20Remaining%20issues%20On%20HARQ%20enhancements%20%20in%20IoT-NTN.docx) Remaining Issues on HARQ Enhancements in IoT-NTN MediaTek Inc. discussion

[R2-2312244](file:///C:\Data\3GPP\Extracts\R2-2312244%20Remaining%20issues%20of%20HARQ%20enhancements.docx) Remaining issues of HARQ enhancements ZTE Corporation, Sanechips discussion IoT\_NTN\_enh-Core

[R2-2312283](file:///C:\Data\3GPP\Extracts\R2-2312283%20IoT%20HARQ%20process.doc) Open issues on HARQ enhancements Qualcomm Incorporated discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2312700](file:///C:\Data\3GPP\Extracts\R2-2312700%20Remaining%20issues%20on%20HARQ%20enhancements%20for%20IoT%20NTN.docx) Remaining issues on HARQ enhancements for IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2312714](file:///C:\Data\3GPP\Extracts\R2-2312714%20Remaining%20issues%20on%20HARQ%20enhancement.DOCX) Remaining issues on HARQ enhancement Huawei, Turkcell, HiSilicon discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2312722](file:///C:\Data\3GPP\Extracts\R2-2312722%20Discussion%20on%20HARQ%20enhancement%20open%20issues.doc) Discussion on HARQ enhancement open issues Xiaomi discussion Rel-18

[R2-2313300](file:///C:\Data\3GPP\Extracts\R2-2313300%20-%20R18%20IoT%20NTN%20HARQ%20enhancements.docx) R18 IoT NTN HARQ enhancements Ericsson discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2313317](file:///C:\Data\3GPP\Extracts\R2-2313317%20Discussion%20on%20HARQ%20enhancements%20in%20IoT%20NTN.docx) Discussion on HARQ enhancements in IoT NTN CATT discussion

#### 7.6.2.2 GNSS operation enhancements

* [AT124][304][IoT-NTN Enh] GNSS enhancements (ZTE)

Scope: Start discussing the remaining open issues for GNSS operation enhancements, based on the list of open issues identified in [R2-2311892](file:///C:\Data\3GPP\Extracts\R2-2311892%20Report%20of%20%5bPost123bis%5d%5b302%5d%5bIoT-NTN%20Enh%5d%2036.331%20running%20CR%20(Huawei).docx) and [R2-2312116](file:///C:\Data\3GPP\Extracts\R2-2312116%20Stage-3%20running%20CR%20for%20TS%2036.321%20for%20Rel-18%20IoT-NTN%20.docx) and the submitted contributions in AI 7.6.2.2

Intended outcome: offline discussion summary

F2F schedule: Tuesday 2023-11-14 10:30-11:00 Brk3

Deadline for rapporteur's summary (in R2-2313786): Wednesday 2023-11-15 12:00

[R2-2313786](file:///C:\Data\3GPP\RAN2\Inbox\R2-2313786.zip) Summary of [AT124][304][IoT-NTN Enh] GNSS Enhancements ZTE discussion

For easy agreements:

Proposal 1a: Upon start of GNSS measurement, UE keeps T317 running if it is currently running.

* Agreed

Proposal 1b: If T317 expires during GNSS measurement gap, the SIB31 reacquisition and also T318 are not started. The SIB31 reacquisition and also T318 are started after GNSS measurement completion.

* If T317 expires during GNSS measurement gap, the SIB31 reacquisition and also T318 are not started until after GNSS measurement completion.

Proposal 1c: Upon start of GNSS measurement, T318 needs to be stopped if it is currently running. The T318 is restarted after GNSS measurement completion.

* Agreed

Proposal 2: The duration X is not used to extend the original GNSS validity duration but at least to perform uplink transmission

* The duration X is not used to extend the original GNSS validity duration but at least to perform uplink transmission

For further online discussion

Proposal 3: (RAN2 discussion) The duration X starts upon receiving the indication that the GNSS position has become out-of-date.

* Check RAN1 agreement offline and continue in offline 309

Proposal 4: If UL transmission extension is enabled, e.g., ul-TransmissionExtensionEnabled is set to TRUE:

- (Easy agreement) If no indication of network triggered GNSS measurement is received from lower layers and gnss-AutonomousEnabled is not configured, upon duration X expires, UE moves to idle mode.

* Agreed

- (Easy agreement) If no indication of network triggered GNSS measurement is received from lower layers and gnss-AutonomousEnabled is configured, upon duration X expires, UE keeps in RRC\_CONNECTED and triggers autonomous GNSS measurement.

* Agreed

- (RAN2 discussion) If indication of network triggered GNSS measurement is received from lower layers within duration X, UE keeps in RRC\_CONNECTED and triggers GNSS measurement.

* Continue in offline 309

Proposal 5: RAN2 discuss whether GNSS position can be considered as valid during Duration X/Y.

* Continue in offline 309

Proposal 6: (RAN2 discussion) For both NB-IoT and eMTC over NTN, use a reserved eLCID for GNSS validity duration report MAC CE.

* MTK thinks there are no eLCID is NB-IoT
* QC thinks we can re-purpose some of the LCID values.
* For both NB-IoT and eMTC over NTN, either we use the remaining LCID value for GNSS validity duration report MAC CE or we repurpose one of the existing codepoint (Continue in offline 309)

Agreements:

1. Upon start of GNSS measurement, UE keeps T317 running if it is currently running.
2. If T317 expires during GNSS measurement gap, the SIB31 reacquisition and also T318 are not started until after GNSS measurement completion.
3. Upon start of GNSS measurement, T318 needs to be stopped if it is currently running. The T318 is restarted after GNSS measurement completion.
4. The duration X is not used to extend the original GNSS validity duration but at least to perform uplink transmission

5. If UL transmission extension is enabled, e.g., ul-TransmissionExtensionEnabled is set to TRUE:

- If no indication of network triggered GNSS measurement is received from lower layers and gnss-AutonomousEnabled is not configured, upon duration X expires, UE moves to idle mode.

- If no indication of network triggered GNSS measurement is received from lower layers and gnss-AutonomousEnabled is configured, upon duration X expires, UE keeps in RRC\_CONNECTED and triggers autonomous GNSS measurement.

1. For both NB-IoT and eMTC over NTN, either we use the remaining LCID value for GNSS validity duration report MAC CE or we repurpose one of the existing codepoint

* [AT124][309][IOT-NTN Enh] GNSS Enhancements phase 2 (Mediatek)

Scope: discuss the remaining proposals from [R2-2313786](file:///C:\Data\3GPP\RAN2\Inbox\R2-2313786.zip)

Intended outcome: offline discussion summary

F2F schedule: Thursday 2023-11-16 time/location FFS

Deadline for rapporteur's summary (in R2-2313875): Friday 2023-11-17 08:00

R2-2313875 Summary of [AT124][309][IoT-NTN Enh] GNSS Enhancements phase 2 Mediatek discussion

[R2-2311839](file:///C:\Data\3GPP\Extracts\R2-2311839%20Remaining%20Issues%20on%20GNSS%20Operation%20for%20IoT%20NTN.docx) Remaining Issues on GNSS Operation for IoT NTN vivo discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2311962](file:///C:\Data\3GPP\Extracts\R2-2311962%20GNSS%20operation.doc) Discussion on GNSS operation for IoT NTN OPPO discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2311963](file:///C:\Data\3GPP\Extracts\R2-2311963%20GNSS%20LS.docx) DRAFT LS on GNSS validity duration OPPO LS out Rel-18 IoT\_NTN\_enh-Core To:RAN1

[R2-2312046](file:///C:\Data\3GPP\Extracts\R2-2312046%20Leftover%20issues%20on%20the%20GNSS%20opeartion%20enhancements.docx) Leftover issues on the GNSS operation enhancements Google Inc. discussion

[R2-2312054](file:///C:\Data\3GPP\Extracts\R2-2312054%20Discussion%20on%20GNSS%20operation%20enhancements.docx) Discussion on GNSS operation enhancements CATT discussion

[R2-2312115](file:///C:\Data\3GPP\Extracts\R2-2312115%20Remaining%20GNSS%20enhancement%20issues%20in%20IoT-NTN.docx) Remaining GNSS Enhancement Issues in IoT-NTN MediaTek Inc. discussion

[R2-2312246](file:///C:\Data\3GPP\Extracts\R2-2312246%20Remaining%20issues%20of%20GNSS%20enhancements.docx) Remaining issues of GNSS enhancements ZTE Corporation, Sanechips discussion IoT\_NTN\_enh-Core

[R2-2312286](file:///C:\Data\3GPP\Extracts\R2-2312286%20GNSS%20operation.doc) Open issues on GNSS fix in RRC\_CONNECTED Qualcomm Incorporated discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2312353](file:///C:\Data\3GPP\Extracts\R2-2312353.doc) Leftover issues in improved GNSS operation Apple discussion Rel-18 IoT\_NTN\_enh

[R2-2312458](file:///C:\Data\3GPP\Extracts\R2-2312458%20Views%20on%20timer%20handling%20during%20GNSS%20measurement%20gap.docx) Views on timer handling during GNSS measurement gap Lenovo discussion Rel-18

[R2-2312608](file:///C:\Data\3GPP\Extracts\R2-2312608%20GNSS%20operation%20enhancement%20v1.docx) GNSS operation enhancement NEC discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2312673](file:///C:\Data\3GPP\Extracts\R2-2312673%20Discussion%20on%20GNSS%20enhancement%20for%20IoT-NTN.docx) Discussion on GNSS enhancement for IoT-NTN CMCC discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2312701](file:///C:\Data\3GPP\Extracts\R2-2312701%20Remaining%20issues%20on%20GNSS%20operation%20enhancement%20for%20IoT%20NTN.docx) Remaining issues on GNSS operation enhancement for IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2312715](file:///C:\Data\3GPP\Extracts\R2-2312715%20Remaining%20issues%20on%20GNSS%20measurement.doc) Remaining issues on GNSS measurement Huawei, Turkcell, HiSilicon discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2312721](file:///C:\Data\3GPP\Extracts\R2-2312721%20Discussion%20on%20GNSS%20operation%20enhancement%20open%20issues.doc) Discussion on GNSS operation enhancement open issues Xiaomi discussion Rel-18

[R2-2312879](file:///C:\Data\3GPP\Extracts\R2-2312879%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

[R2-2313010](file:///C:\Data\3GPP\Extracts\R2-2313010%20GNSS%20measurement%20procedures%20in%20connected%20mode.docx) GNSS measurement procedures in connected mode Samsung R&D Institute UK discussion Rel-18 IoT\_NTN\_enh

[R2-2313299](file:///C:\Data\3GPP\Extracts\R2-2313299%20-%20R18%20IoT%20NTN%20GNSS%20operation%20enhancements.docx) R18 IoT NTN GNSS operation enhancements Ericsson discussion Rel-18 IoT\_NTN\_enh-Core

### 7.6.3 Mobility Enhancements

#### 7.6.3.1 Enhancements for neighbour cell measurements

[R2-2313078](file:///C:\Data\3GPP\Extracts\R2-2313078%20Discussion%20on%20mobility%20enhancements.doc) Remaining issues on mobility enhancements Huawei, HiSilicon, Turkcell discussion Rel-18 IoT\_NTN\_enh-Core

* Revised in R2-2313586

[R2-2313586](file:///C:\Data\3GPP\Extracts\R2-2313586%20Discussion%20on%20mobility%20enhancements.doc) Remaining issues on mobility enhancements Huawei, HiSilicon, Turkcell discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: For NB-IoT NTN, it is up to UE implementation which frequencies to be measured/prioritized in RRC\_CONNECTED.

* Agreed

Proposal 2: For eMTC NTN, UEs in RRC\_CONNECTED only perform measurement and reporting based on the frequencies in MeasObjects. Frequencies in SIB but not in MeasObjects will not be measured and reported by UEs in RRC\_CONNECTED.

* Ericsson thinks we should align to NB-IoT NTN
* QC disagrees with Ericsson and supports the proposal. Nokia agrees
* Samsung agrees with Ericsson
* Continue in offline 310

Proposal 3: Same as NR NTN, the network does not configure the location-based CHO and time-based CHO simultaneously for the same candidate cell.

* Agreed

Proposal 4: For both RRC\_CONNECTED and RRC\_IDLE, time/location based neighbour cell measurement triggering can be configured together with the existing RSRP based triggering. If configured jointly, the UE starts measure neighbour cell when either of the triggering condition is met.

* Agreed

Proposal 5: UE acquires SIBxx during T318 if the stored SIBxx has expired. Additionally, it is up to UE implementation whether to acquire SIBxx during T318 if the stored SIBxx is close to expiry.

* ZTE wonders whether we specify this in the spec
* Samsung thinks we should capture this as normative text
* UE may acquire SIBxx during T318. (update the RRC CR accordingly).

Proposal 6: UE stops T318 when both SIB31 and SIBxx have been acquired. Clarify in the spec that RLF is not triggered if T318 expires and SIB31 has been obtained.

* Oppo thinks this changes the legacy UE behaviour
* HW thinks this is intended and doesn’t change the R17 behaviour
* Continue in offline 310

Proposal 7: The satellite ID broadcast is unique within the physical cell.

Agreements:

1. For NB-IoT NTN, it is up to UE implementation which frequencies to be measured/prioritized in RRC\_CONNECTED
2. Same as NR NTN, the network does not configure the location-based CHO and time-based CHO simultaneously for the same candidate cell.
3. For both RRC\_CONNECTED and RRC\_IDLE, time/location based neighbour cell measurement triggering can be configured together with the existing RSRP based triggering. If configured jointly, the UE starts measure neighbour cell when either of the triggering condition is met.
4. UE may acquire SIBxx during T318.

[R2-2312860](file:///C:\Data\3GPP\Extracts\R2-2312860-Further-Analysis-Mobility-Enhancements.docx) Further analysis on open issues for IoT-NTN Mobility Enhancements Nokia, Nokia Shanghai Bell discussion

- SIBXX Acquisition in connected mode

Proposal 1: If the UE successfully acquire SIBXX in IDLE mode, UE may start Timer T3XX with value equivalent to T317.

Proposal 2: UE may start SIBXX acquisition in connected mode if Timer T3XXX expires in connected mode. In this case no additional timer is started to monitor the completion of SIBXX acquisition.

Proposal 3: If the UE did not have valid SIBXX when entering connected mode, it is up to UE implementation to acquire SIBXX at the appropriate time prior to starting neighbour cell measurements. In this case it should not rely on or wait for the T317 expiry.

Proposal 4: If the introduction of new validity timer of SIBXX is not agreed in RAN2, we propose to leave the SIBXX acquisition to UE implementation without any link to T317 which is not related to the functionality associated with SIBXX.

- Triggering conditions for measurement

Proposal 5: IoT UEs can be configured simultaneously with time-based and location-based triggers.

Proposal 6: UEs configured with time- and location-based conditions should trigger CHO/measurements when at least one of the conditions is met.

- Open issues for connected mode measurements for RLF enhancements in eMTC

Proposal 7: RLF-based measurement enhancements and connected mode measurements are not expected to be configured simultaneously for the UE.

Proposal 8: If RLF-based measurement enhancements are allowed to be configured along with connected mode measurements, the delay impact to connected mode measurement triggering needs to be analysed in RAN4.

Proposal 9: The Target frequencies /cells to be measured for RLF enhancement is left to UE implementation similar to NB-IoT.

- Measurement Relaxation

Proposal 10: For Earth-moving cells, the UE can relax serving cell measurements and trigger neighbor cell measurements based on the trajectory of the serving cell.

Proposal 11: For EFC, the UE can relax serving cell measurements based on t-ServiceStart.

Proposal 12: RAN2 to consider clarifying the intention of “(up to UE implementation)” in the RAN2#122 agreement related to use of t-ServiceStart of the neighbor cell measurements.

- CHO Enhancements

Proposal 13: standalone CHO is an optional feature that should be network-configured only under certain conditions.

Proposal 14: For EMC, the location-based CHO procedure can skip measurement condition.

Proposal 15: For EFC with hard satellite switch, the time-based CHO procedure can skip measurement condition.

Proposal 16: For EFC with hard satellite switch, RAN2 to discuss means to distribute across time UEs accessing the target cell.

[R2-2313011](file:///C:\Data\3GPP\Extracts\R2-2313011%20Enhancements%20for%20neighbour%20cell%20measurements.docx) Enhancements for neighbour cell measurements Samsung R&D Institute UK discussion Rel-18 IoT\_NTN\_enh

- Explicit signaling whether a frequency is NTN or TN

Observation 1: According to working assumption IoT NTN, if satelliteAssistanceInfoList is not present in SIB3/SIB5 for a frequency band shared by TN and NTN, the UE assumes that the cells are terrestrial cells.

Observation 2: According to other agreements in IoT NTN, if satelliteAssistanceInfoList is not present in SIB3/SIB5 for a frequency band shared by TN and NTN, the UE has to assume that the cells are TN and NTN.

Proposal 1: Do not confirm working assumption: “On a frequency band number shared by TN and NTN (e.g., n1), if NTN-specific assistance information is NOT provided for a neighbour cell configured in SIB3/SIB4, UE assumes this is a TN neighbour cell. This understanding is also applicable for Rel-17 and it does not need any spec update”.

* Continue in offline 310

Proposal 2: Introduce explicit signaling whether a frequency is NTN or TN.

* Continue in offline 310

Proposal 3: Also enable explicit signaling that a frequency can be both NTN and TN, meaning that UE searches for both TN cells and NTN cells using ephemeris.

- RLF based mobility

Proposal 4: eMTC UE configured with RLF-based measurement enhancements measures frequencies in MeasObject as in legacy. Measurement reports are triggered based on legacy measurement events.

Proposal 5: Joint configuration of time/location/RSRP-based measurement initiation is not pursued.

- Acquiring new SIB

Observation 3: Without specified rules on how to acquire T318, there will be restrictions on how network can schedule SIBxx.

Proposal 6: Acquiring SIBxx during T318 is NOT captured as a note.

Proposal 7: If UE is acquiring SIBxx, the T318 is not stopped when SIB31 is successfully acquired. T318 expiry does not trigger RLF if SIBxx is being acquired (as in Appendix A1).

Proposal 8: For emphasizing the optional aspect of acquiring SIBxx during T318, capture that neighValidityDuration can be used to determine whether to acquire SystemInformationBlockTypeXX and that UE acquires SIBxx if determined to be needed in the procedural text.

Proposal 9: Agree Text Proposal A1 in appendix as a baseline.

- Satellite IDs

Proposal 10: Satellite IDs are unique, meaning that the satelliteIDs in SIB31/SIBXX/SIB3/SIB5 match to satellites in SIB32.

- Target cell neighbour cell assistance information

Proposal 11: UE acquires target cell neighbour cell assistance information after having completed the handover to the target cell.

- Broadcasting SIBXX in a TN cell

Observation 4: Broadcasting SIBxx in terrestrial cell does not need special considerations (as compared to NR SIB19) as all information elements in SIBxx are for neighbour cells.

Proposal 12: Support broadcasting of new SIB in Terrestrial Network to allow for TN-NTN idle and connected mode mobility.

* Continue in offline 310
* [AT124][310][IOT-NTN Enh] Mobility aspects (Huawei)

Scope: discuss the proposals from [R2-2313586](file:///C:\Data\3GPP\Extracts\R2-2313586%20Discussion%20on%20mobility%20enhancements.doc) and [R2-2313011](file:///C:\Data\3GPP\Extracts\R2-2313011%20Enhancements%20for%20neighbour%20cell%20measurements.docx) marked as “continue in offline 310)

Intended outcome: offline discussion summary

F2F schedule: Thursday 2023-11-16 time/location FFS

Deadline for rapporteur's summary (in R2-2313876): Friday 2023-11-17 08:00

R2-2313876 Summary of [AT124][310][IoT-NTN Enh] Mobility aspects Huawei discussion

[R2-2312247](file:///C:\Data\3GPP\Extracts\R2-2312247%20Remaining%20issues%20of%20mobility%20enhancements.docx) Remaining issues of mobility enhancements ZTE Corporation, Sanechips discussion IoT\_NTN\_enh-Core

Proposal 2: It’s suggest to change the definition of t1-Threshold as below:

t1-Threshold-r18 ~~INTEGER (0..549755813887),~~ TimeOffsetUTC-r17

[R2-2312764](file:///C:\Data\3GPP\Extracts\R2-2312764%20Discussion%20on%20the%20remaining%20issues%20for%20the%20mobility%20enhancements.doc) Discussion on the remaining issues for the mobility enhancements Xiaomi discussion

[R2-2311959](file:///C:\Data\3GPP\Extracts\R2-2311959%20-%20Discussion%20on%20mobility%20enhancement%20for%20IoT%20NTN.doc) Discussion on mobility enhancement for IoT NTN OPPO discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2312055](file:///C:\Data\3GPP\Extracts\R2-2312055%20Discussion%20on%20leftover%20issues%20of%20mobility%20enhancements.docx) Discussion on leftover issues of mobility enhancements CATT discussion

[R2-2312285](file:///C:\Data\3GPP\Extracts\R2-2312285%20IoT%20mobility.doc) Open issues on measurement and Mobility enhancements Qualcomm Incorporated discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2312355](file:///C:\Data\3GPP\Extracts\R2-2312355.doc) Neighbour cell measurements before RLF for eMTC-NTN Apple discussion Rel-18 IoT\_NTN\_enh

[R2-2312880](file:///C:\Data\3GPP\Extracts\R2-2312880%20(R18%20IoT-NTN%20WI%20AI%207.6.3.1)%20-%20RLF%20enhancement%20discontinuous%20coverage.docx) Fast RLF and re-establishment in the discontinuous coverage scenario Interdigital, Inc. discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2313078](file:///C:\Data\3GPP\Extracts\R2-2313078%20Discussion%20on%20mobility%20enhancements.doc) Remaining issues on mobility enhancements Huawei, HiSilicon, Turkcell discussion Rel-18 IoT\_NTN\_enh-Core

* Revised in R2-2313586

[R2-2313586](file:///C:\Data\3GPP\Extracts\R2-2313586%20Discussion%20on%20mobility%20enhancements.doc) Remaining issues on mobility enhancements Huawei, HiSilicon, Turkcell discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2313228](file:///C:\Data\3GPP\Extracts\R2-2313228%20-%20Neighbour%20cell%20measurements%20in%20IoT%20NTN.docx) Neighbour cell measurements in IoT NTN Ericsson discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2313229](file:///C:\Data\3GPP\Extracts\R2-2313229%20-%20Discussion%20on%20triggering%20RA%20for%20RRC%20connection%20re-establishment%20in%20IoT%20NTN.docx) Discussion on triggering RA for RRC connection re-establishment in IoT NTN Ericsson discussion Rel-18 IoT\_NTN\_enh-Core

#### 7.6.3.2 Other

[R2-2311840](file:///C:\Data\3GPP\Extracts\R2-2311840%20Discussion%20on%20CHO%20Enhancement%20for%20IoT%20NTN.docx) Discussion on CHO Enhancement for IoT NTN vivo discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: During CHO recovery, UE shall not use the CHO configuration of a target cell for which the leaving condition of CondEventT1 has been fulfilled.

Proposal 2: For location-based CHO for earth-moving cells, re-use the procedure from cell reselection as baseline to derive the candidate cell’s reference location as the cell moves.

Proposal 3: Regarding how to signal the needed parameters for deriving the reference location for moving cell, RAN2 waits for progress of NR NTN.

Proposal 4: Same with NR NTN, joint configuration of location and time triggers is not supported.

[R2-2312354](file:///C:\Data\3GPP\Extracts\R2-2312354.doc) Leftover issues for mobility enhancement in IoT NTN Apple discussion Rel-18 IoT\_NTN\_enh

[R2-2312459](file:///C:\Data\3GPP\Extracts\R2-2312459%20Views%20on%20providing%20NB-IoT%20UE%20location%20information.docx) Views on providing NB-IoT UE location information Lenovo discussion Rel-18

[R2-2312878](file:///C:\Data\3GPP\Extracts\R2-2312878%20(R18%20IoT-NTN%20WI%20AI%207.6.3.2)%20-%20CHO%20earth-moving%20cell.docx) CHO enhancement for earth-moving cells Interdigital, Inc. discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2313012](file:///C:\Data\3GPP\Extracts\R2-2313012%20On%20other%20mobility%20enhancements%20for%20IoT%20NTN.docx) On other mobility enhancements for IoT NTN Samsung R&D Institute UK discussion Rel-18 IoT\_NTN\_enh

### 7.6.4 Enhancements to discontinuous coverage

[R2-2312056](file:///C:\Data\3GPP\Extracts\R2-2312056%20Discussion%20on%20open%20issues%20for%20discontinuous%20coverage.docx) Discussion on open issues for discontinuous coverage CATT discussion

Proposal 1: Capture a NOTE in RRC Spec “UE may directly go to RRC\_IDLE after RLF is triggered, if there is not enough time for the UE to finish the procedure of RRC re-establishment due to the discontinuous coverage”, and leave it to UE implementation on how to evaluate whether there is “enough time” or not.

Proposal 2-a: UE should apply early stop of T310 and go to RRC\_IDLE state upon expiry of t-Service for the discontinuous coverage scenario.

Proposal 2-b: UE should apply early stop of T310 and go to RRC\_IDLE, if it becomes out of the current serving cell coverage for the discontinuous coverage scenario.

Proposal 3: UE behavior on how to use the frequency information in SIB32 for cell selection in discontinuous coverage scenario should be captured in TS 36.304.

Observation 1: In the discontinuous coverage scenario, UE may fail to receive RRC release message before the loss of NTN coverage (e.g. due to RLF).

Proposal 4: For discontinuous coverage, RAN2 should support UE autonomous release upon detection of coverage gap, i.e. UE shall go to RRC\_IDLE:

- Upon t-Service for (quasi-)earth-fixed cell; or

- Upon being out of current serving cell coverage for earth-moving cell.

Proposal 5: For discontinuous coverage, explicit RRC Release using a new RRC Release cause is not supported.

Observation 2: During the coverage gap the stored SIB32 may be invalid due to the stored time exceeding the validity time (24h or 3h).

Proposal 6: After SIB32 invalid, UE will consider the frequency information in SIB32 to be invalid.

[R2-2312284](file:///C:\Data\3GPP\Extracts\R2-2312284%20DC%20enhancement.doc) UE Autonomous release in discontinuous coverage Qualcomm Incorporated discussion Rel-18 IoT\_NTN\_enh-Core

Observation 1. The UE sending out-of-coverage indication or release assistance information is helpful information for eNB as the eNB may not have UE location information such as for NB-IoT.

Observation 2. In moving cell, UE can predict the serving cell service duration based on reference location broadcast.

Proposal 1 Introduce an out-of-coverage timer with values configurable by the network.

Proposal 2 If the UE is able to predict when the discontinuous coverage starts, reuse NR MUSIM procedure to leave RRC\_CONNECTED state where the UE indicates the out-of-coverage to network and starts an out-of-coverage timer.

Proposal 3 Reuse NR MUSIM timer T346g behavior, i.e., upon expiry of the out-of-coverage timer, the UE performs the actions upon leaving RRC\_CONNECTED, with release cause 'other'.

Proposal 4 Existing DCQR and AS RAI MAC control element is used to carry out-of-coverage information.

[R2-2312048](file:///C:\Data\3GPP\Extracts\R2-2312048%20Leftover%20issues%20on%20the%20discontinuous%20coverage.docx) Leftover issues on the discontinuous coverage Google Inc. discussion

Proposal 1 Add the following NOTE to the clause 5.3.11.3 (TS 36.331).

NOTE 2: UE may perform the actions upon leaving RRC\_CONNECTED (with release cause 'RRC connection failure') after RLF is detected, if there is not enough time for the UE to finish the procedure of RRC connection re-establishment due to the discontinuous coverage.

Proposal 2 If a UE early stops T310 upon the expiry of t-Service, and if the UE is going to enter an unreachability period after t-Service, the UE shall go to RRC\_IDLE immediately without starting T311.

Proposal 3 At the moment when UE determines it has entered an unreachability period:

1) If T310 is running, UE stops T310 and goes to RRC\_IDLE without starting T311

2) If T311 is running, UE stops T311 and goes to RRC\_IDLE

3) If neither T310 nor T311 is running, UE goes to RRC\_IDLE

Proposal 4 A RRC\_CONNECTED UE can inform the network of the remaining time that the UE will be within the satellite coverage before entering an unreachability period, using a RRC message (e.g., UEAssistanceInformation).

Proposal 5 UE is provided with an indication on whether and how to shift PTWs, in order to align PTWs

[R2-2311841](file:///C:\Data\3GPP\Extracts\R2-2311841%20Discussion%20on%20Discontinuous%20Coverage.docx) Discussion on Discontinuous Coverage vivo discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2312199](file:///C:\Data\3GPP\Extracts\R2-2312199%20Considerations%20on%20Supporting%20Discontinuous%20Coverage.docx) Considerations on Supporting Discontinuous Coverage NEC discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2312248](file:///C:\Data\3GPP\Extracts\R2-2312248%20Paging%20window%20alignment%20in%20discontinuous%20coverage.docx) Paging window alignment in discontinuous coverage ZTE Corporation, Sanechips discussion IoT\_NTN\_enh-Core

[R2-2312460](file:///C:\Data\3GPP\Extracts\R2-2312460%20Views%20on%20some%20remaining%20issues%20for%20discontinuous%20coverage%20(Revision%20of%20R2-2309959).docx) Views on some remaining issues for discontinuous coverage Lenovo discussion Rel-18

[R2-2312631](file:///C:\Data\3GPP\Extracts\R2-2312631.docx) Discussion on enhancement to discontinuous coverage for IoT NTN Transsion Holdings discussion Rel-18

[R2-2312716](file:///C:\Data\3GPP\Extracts\R2-2312716%20Remaining%20issues%20of%20discontinuous%20coverage.doc) Remaining issues on discontinuous coverage Huawei, Turkcell, HiSilicon discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2312723](file:///C:\Data\3GPP\Extracts\R2-2312723%20Discussion%20on%20Discontinuous%20coverage%20open%20issues.doc) Discussion on Discontinuous coverage open issues Xiaomi discussion Rel-18

[R2-2312861](file:///C:\Data\3GPP\Extracts\R2-2312861-Reamining-Issues-DC.docx) Discussion on remaining issues discontinuous coverage Enhancements Nokia, Nokia Shanghai Bell discussion

[R2-2312881](file:///C:\Data\3GPP\Extracts\R2-2312881%20(R18%20IoT-NTN%20WI%20AI%207.6.4)%20-%20discontinuous%20coverage.docx) RRC Release in discontinuous coverage Interdigital, Inc. discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2313296](file:///C:\Data\3GPP\Extracts\R2-2313296.docx) Enhancements to Discontinuous Coverage SHARP Corporation discussion

[R2-2313397](file:///C:\Data\3GPP\Extracts\R2-2313397.docx) Enhancements to discontinuous coverage Samsung discussion Rel-18 IoT\_NTN\_enh-Core

## 7.7 NR NTN enhancements

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

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.

Including, for each affected spec:

* Updated running CR
* List of open issues to be addressed by company contributions
* (where applicable) CR rapporteur input with proposals for stage-3 issues (e.g. signaling details, parameter values/ranges) where company contributrions should be avoided

based on the outcome of:

[Post123bis][306][NR-NTN Enh] 38.300 running CR (Thales)

[Post123bis][307][NR-NTN Enh] 38.331 running CR (Ericsson)

[Post123bis][308][NR-NTN Enh] 38.321 running CR (Interdigital)

[Post123bis][309][NR-NTN Enh] 38.304 running CR (ZTE)

[Post123bis][310][NR-NTN Enh] EU caps running CRs (Intel)

[Post123bis][311][NR-NTN Enh] 37.355 running CR (CATT)

Stage 2 CR

[R2-2312858](file:///C:\Data\3GPP\Extracts\R2-2312858%20Stage%202%20running%2038.300%20CR%20for%20NTN%20was%20R2-2311255.docx) Introduction of NTN enhancements THALES CR Rel-18 38.300 17.6.0 0734 - B NR\_NTN\_enh-Core

* Endorsed
* Ericsson thinks we should use the section drafted by RAN3 for the UE location verification part, removing the corresponding section in this running CR
* We will adopt the TP from RAN3 for the UE location verification part
* Revised in R2-2313771

R2-2313771 Introduction of NTN enhancements THALES CR Rel-18 38.300 17.6.0 0734 1 B NR\_NTN\_enh-Core

* [Post124][301][NR-NTN Enh] 38.300 CR (Thales)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313771): short

[R2-2312857](file:///C:\Data\3GPP\Extracts\R2-2312857%20open%20issues%20on%20NR%20NTN%20enh%20(Thales).docx) Remaining Issues on NR Non-Terrestrial Networks (NTN) THALES discussion Rel-18 NR\_NTN\_enh-Core

* Noted

38.331 CR

[R2-2313531](file:///C:\Data\3GPP\Extracts\R2-2313531%20-%2038331_CR4501_(Rel-18)%20-%20Introduction%20of%20Rel-18%20NR%20NTN%20enhancements.docx) Introduction of Rel-18 NR NTN enhancements Ericsson CR Rel-18 38.331 17.6.0 4501 - B NR\_NTN\_enh-Core

* Endorsed
* Revised in R2-2313772

R2-2313772 Introduction of Rel-18 NR NTN enhancements Ericsson CR Rel-18 38.331 17.6.0 4501 1 B NR\_NTN\_enh-Core

* [Post124][302][NR-NTN Enh] 38.331 CR (Ericsson)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313772): short

[R2-2313533](file:///C:\Data\3GPP\Extracts\R2-2313533%20-%20TS%2038%20331%20Open%20Issue%20List%20for%20NR%20NTN%20Rel-18.docx) TS 38.331 Open Issue List for NR NTN Rel-18 Ericsson discussion Rel-18 NR\_NTN\_enh-Core

Issue 1. Configured grant in RACH-less HO takes CG-SDT as a baseline. There are several RAN1 related parameters in the configured grant settings which may not be applicable or have a different configuration for NTN RACH-less HO. The following have been identified:

- ntn-NrofDMRS-Sequences

- ntn-DMRS-Ports

- antennaPort

- cg-RetransmissionTimer

- harq-ProcID-Offset

- pathlossReferenceIndex

- phy-PriorityIndex

- precodingAndNumberOfLayers

- srs-ResourceIndicator

- uci-OnPUSCH

As a solution, the rapporteur suggests sending an LS to RAN1 to check the applicability of these parameters with the exception of cg-RetransmissionTimer and harq-ProcID-Offset. These are within RAN2’s scope and should not apply to RACH-less handover.

* QC thinks there is no need to send LS to RAN1. Vivo also thinks we don’t need to ask RAN1
* CATT thinks we should ask RAN1
* Samsung thinks there also parameters on power control
* We don’t send a LS to RAN1 on this at this meeting

Issue 2. Regarding the association of the Configured Grant with an SSB (ntn-SSB-Subset-r18), can it be optional? What is the UE’s behaviour if this information is not provided?

- Option 1. The association of Configured Grant and SSB is mandatory for NTN RACH-less HO.

- Option 2. The association is optional. If the field is absent, the UE assumes the SSB set includes all actually transmitted SSBs.

* To be discussed in 7.7.4.2.1

Issue 3. Signalling details to indicate in the handover command a single beam associated with the dynamic grant for initial UL transmission.

- Option 1: TCI state ID. Similar mechanism to LTM.

- Option 2: SSB position in burst. Similar mechanism to dynamic grant.

* To be discussed in 7.7.4.2.1

Issue 4. MAC level is configured with the Configured Grant by RRC. This configuration has a “Need N” code which means one-shot configuration that is not maintained. Given that the UE shall not continue using the grant once the handover is completed, a few companies have raised attention of whether this configuration should be released and which layer should be responsible.

- Option 1. Release the configuration explicitly in RRC. Similar approach to LTE.

- Option 2: Release in MAC, i.e., the configured grant is no longer valid after HO completion. Similar approach to LTM.

* To be discussed in 7.7.4.2.1

38.321 CR

[R2-2313014](file:///C:\Data\3GPP\Extracts\R2-2313014%20Introduction%20of%20RACHless%20to%20MAC.docx) Introduction of RACH-less handover to TS 38.321 InterDigital, Samsung CR Rel-18 38.321 17.6.0 1716 - B NR\_NTN\_enh-Core, NR\_mobile\_IAB-Core R2-2309345 Late

* Endorsed
* Revised in R2-2313773

R2-2313773 Introduction of RACH-less handover to TS 38.321 InterDigital, Samsung CR Rel-18 38.321 17.6.0 1716 1 B NR\_NTN\_enh-Core, NR\_mobile\_IAB-Core

* [AT124][308][NR-NTN Enh] MAC CR on RACH-less HO (Interdigital)

Scope: Finalize the NTN aspects of the MAC CR for RACH-less HO (common CR for NR NTN and mIAB)

Intended outcome: Endorsed CR

Deadline for companies' feedback: Thursday 2023-11-16 20:00

Deadline for rapporteur's CR (in R2-2313873): Friday 2023-11-17 08:00

* [Post124][303][NR-NTN Enh] 38.321 CR (Interdigital)

Scope: update the NTN MAC CR (for other aspects than RACH-less HO) with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313773): short

[R2-2313002](file:///C:\Data\3GPP\Extracts\R2-2313002%20Remaining%20UP%20open%20issues_post%20123bis.docx) MAC open issues in NTN InterDigital discussion Rel-18 NR\_NTN\_enh-Core

Unchanged PCI switch scenario

Open issue 1: timeAlignmentTimer handling during RACH-less unchanged PCI switch

* To be discussed in 7.7.4.2.2

Open issue 2: Impacts of unchanged PCI switch on MAC

* To be discussed in 7.7.4.2.2

RACH-less HO procedure

Open issue 3: Beam indication for dynamic grant

* To be discussed in 7.7.4.2.1

Open issue 4: Whether UE can trigger RACH when SR is triggered and rach-lessHO is configured

* To be discussed in 7.7.4.2.1

Open issue 5: Release of CG after completion of RACH-less HO

* To be discussed in 7.7.4.2.1

38.304 CR

[R2-2312210](file:///C:\Data\3GPP\Extracts\R2-2312210_Introduction%20of%20NR%20NTN%20enhancements%20in%2038.304.docx) Introduction of NR NTN enhancements in 38.304 ZTE Corporation, Sanechips CR Rel-18 38.304 17.6.0 0357 - B NR\_NTN\_enh-Core

* Endorsed
* Revised in R2-2313774

R2-2313774 Introduction of NR NTN enhancements in 38.304 ZTE Corporation, Sanechips CR Rel-18 38.304 17.6.0 0357 1 B NR\_NTN\_enh-Core

* [Post124][304][NR-NTN Enh] 38.304 CR (ZTE)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313774): short

UE capabilities

[R2-2312163](file:///C:\Data\3GPP\Extracts\R2-2312163__draftCR-38.306_UECap_NR-NTN-Enh.docx) UE capabilities for Rel-18 NR NTN Enh. WI Intel Corporation draftCR Rel-18 38.306 17.6.0 NR\_NTN\_enh-Core

* Noted
* Revised in R3-2313775

R2-2313775 UE capabilities for Rel-18 NR NTN Enh. WI Intel Corporation draftCR Rel-18 38.306 17.6.0 NR\_NTN\_enh-Core

[R2-2312164](file:///C:\Data\3GPP\Extracts\R2-2312164__draftCR-38.331_UECap_NR-NTN-Enh.docx) UE capabilities for Rel-18 NR NTN Enh. WI Intel Corporation draftCR Rel-18 38.331 17.6.0 NR\_NTN\_enh-Core

* Noted
* Revised in R3-2313776

R2-2313776 UE capabilities for Rel-18 NR NTN Enh. WI Intel Corporation draftCR Rel-18 38.331 17.6.0 NR\_NTN\_enh-Core

* [AT124][305][NR-NTN Enh] UE Caps CRs (Intel)

Scope: Update the running drafts CRs with meeting agreements

Intended outcome: Endorsed draft CRs

Deadline for companies' feedback: Thursday 2023-11-16 20:00

Deadline for endorsed CRs (in R2-2313775 and R2-2313776): Friday 2023-11-17 08:00

[R2-2312162](file:///C:\Data\3GPP\Extracts\R2-2312162_Disc_UECap_NR-NTN-Enh.docx) Open topics on UE capabilities for Rel-18 NR NTN Enh. WI including summary report of email discussion [Post123bis][310] Intel Corporation discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1. To define a new UE capability, e.g., locationBasedCondHandoverNTN-r18, to indicate whether the UE supports location-based conditional handover for moving cell in NTN bands (which involves the calculation of the present reference location from ephemeris and one reference location at epoch time, as specified in TS 38.331).

* Agreed

Proposal 1.1. This locationBasedCondHandoverNTN-r18 capability is defined per Band, optional with signaling capability, and N/A for FDD/TDD DIFF and FR1/FR2 Diff. This is defined as part of §4.2.7.2 BandNR parameters in TS 38.306.

* Agreed

Proposal 1.2. An editor’s note is added to locationBasedCondHandoverNTN-r18 to capture “FFS whether any change or update is needed considering how locationBasedCondHandover-r17 is defined”, or whether location-based conditional handover for moving cell refers to source cell, target cell or both.

* Agreed

Proposal 2. To define a two new UE capability, e.g., unchangedPCI-NTN-SoftSwitch-r18 and unchangedPCI-NTN-HardSwitch-r18, to indicate whether UE support unchanged PCI with soft or hard switch, as specified in TS 38.331.

* Continue offline after further discussion on unchanged PCI aspects

Proposal 2.1. unchangedPCI-NTN-SoftSwitch-r18 and unchangedPCI-NTN-HardSwitch-r18 capabilities are defined per UE, optional with signaling capability, and No for FDD/TDD DIFF and FR1/FR2 Diff. This is defined as part of §4.2.2 General parameters in TS 38.306.

* Continue offline after further discussion on unchanged PCI aspects

Proposal 2.2. An editor’s note is added to unchangedPCI-NTN-SoftSwitch-r18 and unchangedPCI-NTN-HardSwitch-r18 to capture “FFS whether further changes may be needed after further progressing on the design to support unchanged PCI with soft and hard switch”.

* Continue offline after further discussion on unchanged PCI aspects

Proposal 3. If Proposal 1 and Proposal 2 are agreeable, to endorse the UE Capability draftCRs to TS 38.306 and 38.331 provided in R2-2312163 and in R2-2312164 for Rel-18 NR NTN Enh. WI.

Agreements:

1. To define a new UE capability, e.g., locationBasedCondHandoverNTN-r18, to indicate whether the UE supports location-based conditional handover for moving cell in NTN bands (which involves the calculation of the present reference location from ephemeris and one reference location at epoch time, as specified in TS 38.331).
2. This locationBasedCondHandoverNTN-r18 capability is defined per Band, optional with signaling capability, and N/A for FDD/TDD DIFF and FR1/FR2 Diff. This is defined as part of §4.2.7.2 BandNR parameters in TS 38.306.
3. An editor’s note is added to locationBasedCondHandoverNTN-r18 to capture “FFS whether any change or update is needed considering how locationBasedCondHandover-r17 is defined”, or whether location-based conditional handover for moving cell refers to source cell, target cell or both.

37.355 CR

[R2-2313225](file:///C:\Data\3GPP\Extracts\37355_CR0482_(Rel-18)_R2-2313225%20Introduction%20of%20network%20verification%20of%20UE%20location%20in%20TS%2037.355.docx) Introduction of network verification of UE location in TS 37.355 CATT CR Rel-18 37.355 17.6.0 0482 - B NR\_NTN\_enh-Core

* Endorsed
* Revised in R2-2313777

R2-2313777 Introduction of network verification of UE location in TS 37.355 CATT CR Rel-18 37.355 17.6.0 0482 1 B NR\_NTN\_enh-Core

* [Post124][305][NR-NTN Enh] 37.355 CR (CATT)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313777): short

[R2-2313226](file:///C:\Data\3GPP\Extracts\R2-2313226%20LPP%20Stage-3%20issue%20and%20open%20issue%20status%20for%20Rel-18%20NR%20NTN.docx) LPP stage-3 issue and open issue status for Rel-18 NR NTN CATT (Rapporteur) Work Plan Rel-18 NR\_NTN\_enh-Core

- Stage-3 issues (not requiring functionality discussion)

During the email discussion in [1], the following two LPP stage-3 issues were identified (which are also listed in the LPP running CR):

[Stg.3 Issue 1] FFS on the value range of RRC parameter nr-NTN-DL-TimingDrift-r18 (introduced by RAN1 RRC parameter list).

[Stg.3 Issue 2] FFS whether HAPS operating bands need to be added into the field description of UE capability nr-NTN-MeasAndReport (introduced by RAN1 UE feature list).

Rapp’s proposal: RAN2 waits for RAN1 final conclusion to resolve the remaining LPP Stage-3 issues listed above.

* Agreed

38.305 CR

[R2-2312276](file:///C:\Data\3GPP\Extracts\38305_CRxxxx_(Rel-18)_R2-2312276%20NW%20verified.docx) Multi-RTT positioning in NTN Qualcomm Incorporated draftCR Rel-18 38.305 17.6.0 B NR\_NTN\_enh-Core

* Noted
* Oppo thinks there are details missing about mTRP
* QC thinks we don’t need additional details for this in this Stage 2 spec
* Ericsson thinks RAN3 has drafted a CR for this
* Draft a formal CR in R3-2313778

R2-2313778 Multi-RTT positioning in NTN Qualcomm Incorporated CR Rel-18 38.305 17.6.0 XXXX - B NR\_NTN\_enh-Core

* [Post124][306][NR-NTN Enh] 38.305 CR (Qualcomm)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313778): short

### 7.7.2 Coverage Enhancements

[R2-2312702](file:///C:\Data\3GPP\Extracts\R2-2312702%20Msg3%20indication%20for%20PUCCH%20repetition%20for%20Msg4%20HARQ-ACK.docx) Msg3 indication for PUCCH repetition for Msg4 HARQ-ACK Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: Use the LCID codepoint within the Rel-18 extension space to indicate the request/capability of PUCCH repetition for Msg4 HARQ-ACK.

* Agreed

Proposal 2: Feature combination of NTN, RedCap and eRedCap should be supported for Msg3-based early indication via LCID.

* HW is not comfortable to support all combinations now. Oppo agrees
* LG thinks there is no reason to forbid the combinations
* QC thinks that RedCap for NTN is not excluded, for RAN2 perspective this is supported and we need to support the combination in R18. Apple supports QC. Xiaomi as well. IDC thinks the whole point of the enhancement is to support feature combinations. Sequans also agree
* Nokia thinks there are some restriction no how to support RedCap in NTN (half duplex is not supported in R18)
* Feature combination of NTN, RedCap and eRedCap should be supported for Msg3-based early indication via LCID: 6 LCID codepoints will be specified for this in Rel-18

Proposal 3: Discuss the LCID allocation for feature combinations in common session.

Proposal 4: From NTN WI point of view, there is no need to use explicit NW indication to indicate LCID extension. If NW implicitly indicate the support of PUCCH repetition for Msg4 HARQ-ACK in SIB, UE can deduce the NW support LCID extension.

[R2-2312908](file:///C:\Data\3GPP\Extracts\R2-2312908%20Further%20consideration%20on%20PUCCH%20repetition%20for%20Msg4%20HARQ-ACK.doc) Further consideration on PUCCH repetition for Msg4 HARQ-ACK Huawei, HiSilicon discussion Rel-18 NR\_NTN\_enh-Core

Observation 1: For random access during RRC connected state, there is no case requiring common PUCCH resources thus the current PUCCH repetition mechanism for Msg4 HARQ-ACK is not needed.

Proposal 1: PUCCH repetition for Msg4 HARQ-ACK does not apply to random access procedures during RRC connected state.

Agreements:

1. Use the LCID codepoint within the Rel-18 extension space to indicate the request/capability of PUCCH repetition for Msg4 HARQ-ACK.
2. Feature combination of NTN, RedCap and eRedCap should be supported for Msg3-based early indication via LCID: 6 LCID codepoints will be specified for this in Rel-18

[R2-2311960](file:///C:\Data\3GPP\Extracts\R2-2311960%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

[R2-2312052](file:///C:\Data\3GPP\Extracts\R2-2312052%20Discussion%20on%20remaining%20issue%20for%20NR%20NTN%20coverage%20enhancement.docx) Discussion on remaining issue for NR NTN coverage enhancement CATT discussion

[R2-2312280](file:///C:\Data\3GPP\Extracts\R2-2312280%20UE%20capability%20for%20Msg4%20ACK%20repetition.doc) UE capability indication for Msg4 ACK repetition Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312649](file:///C:\Data\3GPP\Extracts\R2-2312649%20Considerations%20on%20the%20coverage%20enhancements.docx) Considerations on the coverage enhancements CMCC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312789](file:///C:\Data\3GPP\Extracts\R2-2312789%20Consideration%20on%20coverage%20enhancements.doc) Consideration on remaining coverage enhancements issues ZTE Corporation, Sanechips discussion

[R2-2313003](file:///C:\Data\3GPP\Extracts\R2-2313003%20(R18%20NR%20NTN%20WI%20AI%207.7.2)%20Coverage%20enhancement.docx) Coverage enhancement in Non-Terrestrial Networks InterDigital discussion Rel-18 NR\_NTN\_enh-Core

[R2-2313294](file:///C:\Data\3GPP\Extracts\R2-2313294_Indication%20for%20Msg3%20based%20request%20for%20PUCCH%20repetition.DOCX) Indication for Msg3 based request for PUCCH repetition LG Electronics Inc. discussion NR\_NTN\_enh-Core

### 7.7.3 Network verified UE location

[R2-2312517](file:///C:\Data\3GPP\Extracts\R2-2312517%20-%20discussion%20on%20network%20verified%20UE%20location.docx) Discussion on network verified UE location Ericsson discussion Rel-18 NR\_NTN\_enh-Core

Observation 1 it is beneficial to capture in specs that the same satellite at different time instances is modelled as a separate TRP, which can show the difference between NTN positioning with a single satellite in this release and the existing RAT dependent positioning framework.

Proposal 1 Capture in Stage 2 spec that both the UE and the serving gNB/satellite need to provide multiple RX-TX time difference measurements at multiple time instances to the LMF for positioning, where the satellite at each time instance is modelled as a separate TRP.

Proposal 2 Adopt the TP for 38.300 running CR captured in Appendix.

Observation 2 The UE can already provide RX-TX measurement results at different time instances in a one-shot report.

Based on the discussion in the previous sections we propose the following:

Proposal 3 There is no spec change in LPP foreseen for UE to report RX-TX time difference measurements at different time instances in separate or the same report message(s).

[R2-2312713](file:///C:\Data\3GPP\Extracts\R2-2312713%20Remaining%20issues%20on%20UE%20location%20verification.doc) Remaining issues on UE location verification Huawei, Turkcell, HiSilicon discussion Rel-18 NR\_NTN\_enh-Core

Observation 1: For legacy handover, the POSITIONING INFORMATION UPDATE message can be relied on to indicated LMF that handover happens.

Proposal 1: Legacy procedure can be reused to indicate the LMF about the happening of CHO.

* Agreed

Agreements:

1. Legacy procedure can be reused to indicate the LMF about the happening of CHO.

[R2-2312121](file:///C:\Data\3GPP\Extracts\R2-2312121%20Remaining%20Issues%20in%20NW%20Verified%20UE%20Locations.docx) Remaining Issues in Network verified UE Location MediaTek Inc. discussion

[R2-2312461](file:///C:\Data\3GPP\Extracts\R2-2312461%20Views%20on%20cell%20change%20during%20UE%20location%20verification.docx) Views on cell change during UE location verification Lenovo discussion Rel-18

[R2-2312650](file:///C:\Data\3GPP\Extracts\R2-2312650%20Discussion%20on%20network%20verified%20UE%20location.doc) Discussion on network verified UE location CMCC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312948](file:///C:\Data\3GPP\Extracts\R2-2312948_UE%20location%20verification%20by%20Network.docx) UE location verification by Network NEC Telecom MODUS Ltd. discussion [R2-2310985](file:///C:\Data\3GPP\archive\RAN2\RAN2%23123bis\Tdocs\R2-2310985.zip)

[R2-2313007](file:///C:\Data\3GPP\Extracts\R2-2313007.docx) Network Verified UE Location in NTN Samsung Electronics Iberia SA discussion Rel-18 NR\_NTN\_enh-Core

[R2-2313050](file:///C:\Data\3GPP\Extracts\R2-2313050%20Remaining%20Aspects%20on%20Network%20Verified%20UE%20Location.docx) Remaining Aspects on Network Verified UE Location Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_NTN\_enh-Core

Withdrawn?

R2-2313346 Discussion on network verified UE location in NR NTN IPLOOK discussion Rel-18

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

NTN neighbour cell information in TN cells

[R2-2313530](file:///C:\Data\3GPP\Extracts\R2-2313530%20-%20NTN%20neighbour%20cell%20information%20in%20TN%20cells.docx) NTN neighbour cell information in TN cells Ericsson, Thales, Apple, Samsung, Deutsche Telekom, Qualcomm discussion Rel-18 NR\_NTN\_enh-Core

Observation 1 Broadcast NTN satellite assistance information in TN cells to facilitate service continuity is a feature which fits into Release 18 scope.

Observation 2 RAN2 has already discussed and identified a potential solution which would fit within Release 18 timeframe and has limited specification impact.

Observation 3 Supporting the broadcast of SIB19 in TN cells gives network operators the flexibility to selectively provide this information where there is a beneficial impact.

Observation 4 Information exchange between TN and NTN system is not precluded by existing specification. In fact, other Rel-18 enhancements assume a certain level of information exchange.

Observation 5 UE implementation can secure maintaining a valid copy of SIB19 in a TN cell.

Proposal 1 SIB19 can be broadcast in TN cells to provide satellite assistance information for NTN neighbour cells (e.g., ntn-NeighCellConfigList-r17).

* HW thinks this is not needed and could be solved by the NW via SMTC configuration
* Samsung thinks the UE needs ephemeris information
* QC supports the proposal and think we don’t need to specify additional UE behaviour.
* Inmarsat thinks that if this is useful we do it now. Otherwise we don’t come back to this in the next release.
* MTK thinks that from UE side this is useful and should be supported.
* Intelsat supports this
* Panasonic also supports this.
* Xiaomi supports this
* Oppo can accept to support this if we don’t spend time to specify the UE behaviour for this.
* HW would like to check the impact on legacy UE
* Agreed

Proposal 2 Adopt the text proposal to TS 38.331.

* Agreed

Moved here from 7.7.4.1

[R2-2312462](file:///C:\Data\3GPP\Extracts\R2-2312462%20Views%20on%20providing%20NTN%20information%20in%20TN%20cell.docx) Views on providing NTN information in TN cell Lenovo discussion Rel-18

Proposal 1: Providing NTN neighbor cell information in a TN serving cell is supported.

Proposal 2: NTN neighbor cell information is provided in SIB19 in a TN serving cell.

Proposal 3: SIB19 is not an essential SIB when provided in a TN serving cell, i.e. UE does not consider the TN serving cell as barred if it fails to acquire SIB19.

* Agreed (no spec impact)

Proposal 4: UE in RRC\_IDLE/INACTIVE is not required to ensure having a valid version of SIB19 in a TN serving cell.

* Agreed (no spec impact)

Proposal 5: The exact time of reacquiring SIB19 for UE in RRC\_IDLE/INACTIVE in TN serving cell is up to UE implementation.

* Agreed (no spec impact)

Proposal 6: UE in RRC\_CONNECTED does not start T430 when SIB19 is provided in a TN cell.

* Agreed (no spec impact)

Proposal 7: The SFN and subframe numbers of epoch time indicated in SIB19 in TN serving cell are based on the timing of the serving cell.

* Agreed (no spec impact).

Proposal 8: If the epoch time indicated in SIB19 in TN serving cell is absent, UE considers the epoch time as the end of SI window where this SIB19 is scheduled in the TN serving cell.

* CB Thursday

Proposal 9: If the validity duration indicated in SIB19 in TN serving cell is absent, one of the following options is adopted:

A) UE considers the validity duration as infinity or not applicable;

B) UE considers the validity duration as a default value.

* CB Thursday

Moved here from 7.7.4.1

[R2-2313481](file:///C:\Data\3GPP\Extracts\R2-2313481_Support%20of%20NTN%20neighbor%20cell%20info%20in%20TN%20cell.docx) Support of NTN neighbor cell info in TN cell Sequans Communications discussion Rel-18 NR\_NTN\_enh-Core

Observation 1: For a TN cell, the ULTSRP is the gNB, whose location is not known

Proposal 1: Assuming the gNBUE propagation delay can be neglected in propagation calculations, the RPepochTime for NTN-config in TN cell is the gNB

* CB Thursday

Proposal 2: If the gNBUE propagation delay cannot be neglected in propagation calculations, the RPepochTime can be indicated by an additional field (UTC time)

* CB Thursday

Proposal 3: Reuse SIB19 to broadcast NTN neighbor cell info in TN cell

Agreements:

1. SIB19 can be broadcast in TN cells to provide satellite assistance information for NTN neighbour cells (e.g., ntn-NeighCellConfigList-r17).
2. SIB19 is not an essential SIB when provided in a TN serving cell, i.e. UE does not consider the TN serving cell as barred if it fails to acquire SIB19 (no spec impact)
3. UE in RRC\_IDLE/INACTIVE is not required to ensure having a valid version of SIB19 in a TN serving cell (no spec impact)
4. The exact time of reacquiring SIB19 for UE in RRC\_IDLE/INACTIVE in TN serving cell is up to UE implementation (no spec impact)
5. UE in RRC\_CONNECTED does not start T430 when SIB19 is provided in a TN cell (no spec impact)
6. The SFN and subframe numbers of epoch time indicated in SIB19 in TN serving cell are based on the timing of the serving cell (no spec impact)

[R2-2313079](file:///C:\Data\3GPP\Extracts\R2-2313079%20Discussion%20on%20TN%20broadcasting%20NTN%20assistance%20information.docx) Discussion on TN broadcasting NTN assistance information Huawei, HiSilicon, Turkcell discussion Rel-18 NR\_NTN\_enh-Core

Observation 1: For UEs in RRC\_CONNECTED, and UEs in RRC\_IDLE/RRC\_INACTIVE that are still in TN coverage, the provision of NTN neighbour cell information is not useful.

Observation 2: Providing NTN neighbour cell information requires the UE to maintain the time-variant information, leading to excessive power consumption.

Observation 3: The NTN frequency priorities will not be higher than TN frequencies, so UEs need not measure NTN frequencies if TN serving cell fulfils Srxlev > SnonIntraSearchP and Squal > SnonIntraSearchQ.

Observation 4: For the UE to perform measurement towards NTN neighbour cell, the NTN frequencies need to be provided in SIB3/4, thus affecting legacy UEs.

Proposal 1: Provision of NTN neighbour cell assistance information by a TN cell is not considered in this release.

Also the following papers are moved here from 7.7.4.1

[R2-2311888](file:///C:\Data\3GPP\Extracts\R2-2311888_Cell_reselection–discussion_on_broadcasting_SIB19_in_TNs.docx) Cell (re)selection – discussion on broadcasting SIB19 in terrestrial networks PANASONIC discussion

[R2-2311968](file:///C:\Data\3GPP\Extracts\R2-2311968%20NTN-TN.doc) Discussion on support of NTN neighbor cell info in TN cell OPPO discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312547](file:///C:\Data\3GPP\Extracts\R2-2312547_NTN_reselection.docx) Discussions on providing NTN neighbor cell information in TN cell ITRI discussion NR\_NTN\_enh-Core

[R2-2312841](file:///C:\Data\3GPP\Extracts\R2-2312841.docx) Support of NTN neighbour cell info in TN cells Sony discussion Rel-18 NR\_NTN\_enh

#### 7.7.4.1 Cell reselection enhancements

[R2-2312104](file:///C:\Data\3GPP\Extracts\R2-2312104.docx) Remaining issues of cell reselection enhancement Samsung discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: Legacy SI update procedure will be used for earth moving cell when the network updates the TN coverage information.

* Agreed (no spec change)

Proposal 2: The new SIB containing TN coverage area information belongs to Other SI, either periodically broadcast, broadcast on-demand, or sent in a dedicated manner.

* Ericsson is not sure whether we should support on-demand
* ZTE thinks we allow on-demand for this kind of SIB so p2 is ok
* Agreed

Proposal 4: If TN cell broadcasting SIB19 is supported, SIB19 belongs to Other SI in TN, and is provided by either periodically broadcast, broadcast on-demand, or a dedicated manner.

* Agreed

Agreements:

1. Legacy SI update procedure will be used for earth moving cell when the network updates the TN coverage information (no spec change)
2. The new SIB containing TN coverage area information belongs to Other SI, either periodically broadcast, broadcast on-demand, or sent in a dedicated manner.
3. When SIB19 is broadcast in a TN cell, SIB19 belongs to Other SI in TN, and is provided by either periodically broadcast, broadcast on-demand, or a dedicated manner.

[R2-2312644](file:///C:\Data\3GPP\Extracts\R2-2312644_Remaining%20issues%20on%20cell%20reslection%20enhancements.docx) Remaining issues on cell reselection enhancements ZTE Corporation, Sanechips discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: Separate capability description for location-based measurement initiation for quasi-earth-fixed system and earth moving system is used in 38.304 to align with the capability definition in 38.306.

* Agreed

Proposal 2: Choose one term from the following for skipping or relaxing measurements on TN cells where there is no coverage and such term should be aligned in both 38.306 and 38.304:

Term 1: TN measurement relaxation

Term 2: Skipping TN measurement

* Nokia and HW prefers the second terminology. Telit and MTK agrees
* Adopt the terminology “Skipping TN measurement” in both 38.304 and 38.306

Agreements:

1. Separate capability description for location-based measurement initiation for quasi-earth-fixed system and earth moving system is used in 38.304 to align with the capability definition in 38.306.
2. Adopt the terminology “Skipping TN measurement” in both 38.304 and 38.306

[R2-2313532](file:///C:\Data\3GPP\Extracts\R2-2313532%20-%20Cell%20reselection%20enhancements%20for%20hard%20switch.docx) Cell reselection enhancements for hard switch Ericsson discussion Rel-18 NR\_NTN\_enh-Core

Observation 1 In NTN, for service or feeder link switch, the UE should be aware of the type of switch (hard or soft) to perform neighbour measurements accordingly.

Proposal 1 In case of NTN cell hard switch, UE needs not to start neighbour cell measurements of the new cell before t-service expires.

Proposal 2 The network informs (either implicitly or explicitly) the UE whether the next NTN cell switch is a soft or a hard switch.

Proposal 3 Adopt the text proposal to TS 38.304.

[R2-2313506](file:///C:\Data\3GPP\Extracts\R2-2313506%20VSAT%20mobility%20enhancements.docx) Discussion on mobility enhancements for VSAT THALES discussion Rel-18 NR\_NTN\_enh [R2-2310046](file:///C:\Data\3GPP\archive\RAN2\RAN2%23123bis\Tdocs\R2-2310046.zip) Late

[R2-2311834](file:///C:\Data\3GPP\Extracts\R2-2311834%20Remaining%20Issues%20on%20Cell%20Reselection%20for%20NR%20NTN.docx) Remaining Issues on Cell Reselection for NR NTN vivo discussion Rel-18 NR\_NTN\_enh-Core

[R2-2311967](file:///C:\Data\3GPP\Extracts\R2-2311967%20broadcasting%20TN%20coverage.doc) Discussion on the change of TN coverage information OPPO discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312277](file:///C:\Data\3GPP\Extracts\R2-2312277%20TN%20coverage.doc) Cell coverage info and measurements Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312291](file:///C:\Data\3GPP\Extracts\R2-2312291_NTN-TN%20cell%20reselection%20enhancement_v0.doc) NTN-TN cell reselection enhancement Apple discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312651](file:///C:\Data\3GPP\Extracts\R2-2312651%20Discussion%20on%20NTN-TN%20cell%20reselection.docx) Discussion on NTN-TN cell reselection CMCC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312949](file:///C:\Data\3GPP\Extracts\R2-2312949_TN-NTN%20Mobility.docx) TN-NTN Mobility NEC Telecom MODUS Ltd. discussion

[R2-2312950](file:///C:\Data\3GPP\Extracts\R2-2312950_On%20the%20use%20of%20TN%20coverage%20signalling%20to%20indicate%20non-TN%20areas.docx) On the use of TN coverage signalling to indicate non-TN areas NEC Telecom MODUS Ltd. discussion [R2-2310986](file:///C:\Data\3GPP\archive\RAN2\RAN2%23123bis\Tdocs\R2-2310986.zip)

[R2-2313401](file:///C:\Data\3GPP\Extracts\R2-2313401%20%5bNTN%5d%20Remaining%20issues%20on%20NTN-TN%20cell%20reselection%20enhancement_shared.docx) Remaining issues on NTN-TN cell reselection enhancement LG Electronics France discussion Rel-18 38.331 NR\_NTN\_enh [R2-2309862](file:///C:\Data\3GPP\archive\RAN2\RAN2%23123bis\Tdocs\R2-2309862.zip)

* Revised in R2-2313552

[R2-2313552](file:///C:\Data\3GPP\Extracts\R2-2313552%20%5bNTN%5d%20Remaining%20issues%20on%20NTN-TN%20cell%20reselection%20enhancement_final.docx) Remaining issues on NTN-TN cell reselection enhancement LG Electronics France, Google Inc., Thales discussion Rel-18 38.331 NR\_NTN\_enh

[R2-2313411](file:///C:\Data\3GPP\Extracts\R2-2313411_Discussion%20on%20NTN-TN%20cell%20reselection%20enhancements.docx) Discussion on NTN-TN cell reselection enhancements ETRI discussion Rel-18 NR\_NTN\_enh

#### 7.7.4.2 Connected mode enhancements

[R2-2313080](file:///C:\Data\3GPP\Extracts\R2-2313080%20Discussion%20on%20HO%20enhancements.docx) Discussion on HO enhancements Huawei, HiSilicon, Turkcell discussion Rel-18 NR\_NTN\_enh-Core

##### 7.7.4.2.1 Handover enhancements

RACH-less HO

[R2-2313004](file:///C:\Data\3GPP\Extracts\R2-2313004%20(R18%20NR%20NTN%20WI%20AI%207.7.4.2.1)%20RACH-less%20HO.docx) Remaining open issues: RACH-less handover InterDigital discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1a: If cg-NTN-RACH-less-Configuration is not configured, beam information to monitor target cell PDCCH for dynamic grant for initial UL transmission is always provided in the RACH-less HO command.

Proposal 1b: An SSB index (not TCI-state ID) is provided in the RACH-less HO command to monitor target cell PDCCH for dynamic grant for initial UL transmission.

Proposal 2: UE does not initiate a Random Access procedure if SR is triggered and rach-lessHO is configured (similar to LTE).

Proposal 3: Specify in MAC that upon successful completion of RACH-less HO, UE releases the configured grant configuration used for initial UL transmission.

[R2-2312105](file:///C:\Data\3GPP\Extracts\R2-2312105.docx) Remaining issues on Handover enhancements Samsung discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: An SSB index is indicated in RACH-less HO command for PDCCH monitoring for DG if CG for initial UL transmission is not configured.

Proposal 2: If CG for initial UL transmission is configured, CG occasions mapping to SSB is configured mandatorily.

Proposal 3: If CG for initial UL transmission is configured, UE starts to monitor PDCCH using the selected SSB after initial UL transmission.

Proposal 4: If CG is configured in RACH-less HO, UE uses the earliest available CG occasion associated to the selected SSB for the initial UL transmission.

Proposal 5: If CG is configured in RACH-less HO, RRC releases the CG with SSB association after RACH-less HO completion.

Proposal 6: Support autonomous retransmission with a CG- retransmission timer for the initial UL transmission.

Proposal 7: Both HARQ mode A and B can be configured for the HARQ process of the initial UL transmission using CG, which is up to NW implementation.

Proposal 8: Confirm SUL is not applied in NTN.

* [AT124][301][NR-NTN Enh] RACH-less HO (Interdigital)

Scope: Discuss the remaining open issues for RACH-less HO, based primarily on [R2-2313004](file:///C:\Data\3GPP\Extracts\R2-2313004%20(R18%20NR%20NTN%20WI%20AI%207.7.4.2.1)%20RACH-less%20HO.docx) and [R2-2312105](file:///C:\Data\3GPP\Extracts\R2-2312105.docx) (if time allows)

Intended outcome: offline discussion summary

F2F schedule: Monday 2023-11-13 16:30-17:00 Brk3

Deadline for rapporteur's summary (in R2-2313784): Tuesday 2023-11-14 12:00

[R2-2313784](file:///C:\Data\3GPP\RAN2\Inbox\R2-2313784.zip) Summary of [AT124][301][NR-NTN Enh] RACH-less HO Interdigital discussion

Proposal 1: For dynamic grant case, beam information is mandatorily included in the RACH-less HO command.

* Agreed

Proposal 2: In NTN RACH-less HO, for dynamic grant case, the beam information included in RACH-less HO command is an SSB index (not tci-stateid).

* Agreed

Proposal 3: Similar to LTE, UE shall not trigger RACH for SR when rach-lessHO is configured. Details are FFS.

* Similar to LTE, UE shall not trigger RACH for SR when rach-lessHO is configured. LTE text is used as a baseline

Proposal 4: UE releases preallocated grant after successful RACH-less HO completion without additional signaling from the network. Nothing is needed to address this issue in MAC.

* Agreed

Proposal 5: When CG for initial UL transmission is configured, CG occasions mapping to SSB (i.e. ssb position in burst), is optional. If it is not provided, the RACH-less HO configuration is applicable in all SSBs. Adopt similar wording to CG-SDT in the RRC field description.

* Agreed

Proposal 6: If CG for initial UL transmission is configured, UE starts to monitor PDCCH according to existing DRX behaviour on the selected SSB from RACH-less HO configuration after initial UL transmission.

* QC is not sure this is strictly needed.
* Apple supports p6
* Agreed

Proposal 7: If CG is configured in RACH-less HO, UE uses the earliest available CG occasion associated to the selected SSB for the initial UL transmission. Spec impact is FFS and can use CG-SDT as baseline (if applicable).

* Agreed

Proposal 8: The following aspects were not addressed in the offline and may be further discussed in the main session (e.g., if time allows):

- Proposal: Support autonomous retransmission with a CG-retransmission timer for the initial UL transmission using CG.

- QC thinks this is not applicable for NTN

- vivo don’t see the motivation to have this. IDC agrees

- CATT supports this and we can link this to another timer.

* CB Thursday

- Proposal: Both HARQ mode A and B can be configured for the HARQ process of the initial UL transmission using CG, which is up to NW implementation.

- Oppo thinks that mode A needs to be used for this

* It is up to NW to configure HARQ mode A or B. RAN2 understands that HARQ mode A should be used the HARQ process of the initial UL transmission using CG

- Proposal: Confirm SUL is not applied in NTN.

[R2-2312356](file:///C:\Data\3GPP\Extracts\R2-2312356_Open%20issues%20on%20RACH-less%20in%20NR%20NTN_v0.doc) Open issues on RACH-less in NR NTN Apple discussion Rel-18 NR\_UAV

Proposal 1: For RACH-less HO with dynamic grant, support the threshold-based fallback to RACH-based HO mechanism, i.e., same as the usage of RACH-less HO with pre-allocated grant.

* Nokia and Oppo don’t think this optimization is needed
* HW thinks this is beneficial and aligned to CG case. IDC thinks that in the CG case we have multiple beams and that is the reason for having a threshold. LG agrees with IDC
* We don’t introduce a threshold-based mechanism for Dynamic Grant

Agreements:

1. For dynamic grant case, beam information is mandatorily included in the RACH-less HO command.
2. In NTN RACH-less HO, for dynamic grant case, the beam information included in RACH-less HO command is an SSB index (not tci-stateid).
3. Similar to LTE, UE shall not trigger RACH for SR when rach-lessHO is configured. LTE text is used as a baseline
4. UE releases preallocated grant after successful RACH-less HO completion without additional signaling from the network. Nothing is needed to address this issue in MAC.
5. When CG for initial UL transmission is configured, CG occasions mapping to SSB (i.e. ssb position in burst), is optional. If it is not provided, the RACH-less HO configuration is applicable in all SSBs. Adopt similar wording to CG-SDT in the RRC field description.
6. If CG for initial UL transmission is configured, UE starts to monitor PDCCH according to existing DRX behaviour on the selected SSB from RACH-less HO configuration after initial UL transmission.
7. If CG is configured in RACH-less HO, UE uses the earliest available CG occasion associated to the selected SSB for the initial UL transmission. Spec impact is FFS and can use CG-SDT as baseline (if applicable)
8. It is up to NW to configure HARQ mode A or B. RAN2 understands that HARQ mode A should be used the HARQ process of the initial UL transmission using CG
9. We don’t introduce a threshold-based mechanism for Dynamic Grant

[R2-2311836](file:///C:\Data\3GPP\Extracts\R2-2311836%20Remaining%20Issues%20on%20RACH-less%20for%20R18%20NR%20NTN.docx) Remaining Issues on RACH-less for R18 NR NTN vivo discussion Rel-18 NR\_NTN\_enh-Core

[R2-2311859](file:///C:\Data\3GPP\Extracts\R2-2311859.docx) Remaining Issues on RACH-less for R18 NR NTN Quectel Work Plan Rel-18

[R2-2312057](file:///C:\Data\3GPP\Extracts\R2-2312057%20Discussion%20on%20RACH-less%20HO%20in%20NR%20NTN.docx) Discussion on RACH-less HO in NR NTN CATT discussion

[R2-2312500](file:///C:\Data\3GPP\Extracts\R2-2312500-NTN_Remaining_issue_for_RACH-less.doc) Remaining issue for RACH-less Sharp discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312790](file:///C:\Data\3GPP\Extracts\R2-2312790%20Consideration%20on%20RACH-less%20HO%20remaining%20issues.docx) Consideration on RACH-less HO remaining issues ZTE Corporation, Sanechips discussion

[R2-2313297](file:///C:\Data\3GPP\Extracts\R2-2313297%20Remaining%20open%20issues%20on%20RACH-less%20HO%20for%20NTN.docx) Remaining open issues on RACH-less HO for NTN ETRI discussion Rel-18

CHO Enhancements

[R2-2313051](file:///C:\Data\3GPP\Extracts\R2-2313051%20Remaining%20issues%20for%20IDLE%20and%20CONNECTED%20mode%20mobility%20in%20Rel-18%20NTN.docx) Remaining issues for IDLE and CONNECTED mode mobility in Rel-18 NTN Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_NTN\_enh-Core

Observation 1: The issue related to beam quality for completing the RACH-less CHO is equally applicable to Configured Grant and Dynamic Grant.

Proposal 1: Target cell provides the DG so that the UE can complete the RACH-less CHO within the (t1, t2) time window. FFS when the UE starts monitoring for DG considering the CHO-related execution conditions.

Proposal 2: Threshold (i.e. quality threshold) for dynamic grant in RACH-less CHO is not introduced in Rel-18 NTN.

Proposal 3: ReferenceLocation for source and for each candidate target cell is included in RRC Reconfiguration (CHO command) in EMC.

Proposal 4: In EMC CHO, the UE obtains the ephemeris information for both the serving. and candidate CHO cells from SIB19.

Proposal 5: Alternatively (if Proposal 4 is not pursued), the UE obtains also the ephemeris and epochTime for each candidate CHO cell from RRC Reconfiguration. The corresponding information for the serving cell is still taken from SIB19.

* [AT124][302][NR-NTN Enh] CHO enhancements (Nokia)

Scope: Discuss the remaining open issues for CHO enhancements, based primarily on section 2.2 of [R2-2313051](file:///C:\Data\3GPP\Extracts\R2-2313051%20Remaining%20issues%20for%20IDLE%20and%20CONNECTED%20mode%20mobility%20in%20Rel-18%20NTN.docx) (and section 2.1 if time allows)

Intended outcome: offline discussion summary

F2F schedule: Tuesday 2023-11-14 16:30-17:00 Brk2

NEW F2F schedule: Wednesday 2023-11-15 16:30-17:00 Brk2

Deadline for rapporteur's summary (in R2-2313874): Wednesday 2023-11-15 20:00

R2-2313874 Summary of [AT124][302][NR-NTN Enh] CHO Enhancements Nokia discussion

[R2-2311835](file:///C:\Data\3GPP\Extracts\R2-2311835%20Remaining%20Issues%20on%20CHO%20Enhancements%20for%20NR%20NTN.docx) Remaining Issues on CHO Enhancements for NR NTN vivo discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312053](file:///C:\Data\3GPP\Extracts\R2-2312053%20Configuration%20for%20location-based%20CHO%20for%20earth-moving%20cell.docx) Configuration for location-based CHO for earth-moving cell CATT discussion

[R2-2312292](file:///C:\Data\3GPP\Extracts\R2-2312292_CHO%20enhancement%20to%20earth%20moving%20target%20cell.doc) CHO enhancement to earth moving target cell Apple discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312840](file:///C:\Data\3GPP\Extracts\R2-2312840.docx) Signaling overhead reduction during NTN-NTN HOs Sony discussion Rel-18 NR\_NTN\_enh

[R2-2313005](file:///C:\Data\3GPP\Extracts\R2-2313005%20(R18%20NR%20NTN%20WI%20AI%207.7.4.2.1)%20Earth%20moving%20CHO.docx) Remaining open issues: CHO for Earth-moving cells InterDigital discussion Rel-18 NR\_NTN\_enh-Core

[R2-2313190](file:///C:\Data\3GPP\Extracts\R2-2313190%20Discussion%20on%20CHO%20configuration%20for%20moving%20cell%20location.docx) Discussion on CHO configuration for moving cell location ASUSTeK discussion Rel-18 NR\_NTN\_enh-Core

All issues

[R2-2311966](file:///C:\Data\3GPP\Extracts\R2-2311966%20NTN%20HO%20enh.doc) Discussion on handover enhancement for NR NTN OPPO discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312278](file:///C:\Data\3GPP\Extracts\R2-2312278%20HO%20enhancement.doc) Open issues for handover enhancements Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312463](file:///C:\Data\3GPP\Extracts\R2-2312463%20Some%20remaining%20issues%20for%20CHO%20and%20RACH-less%20HO%20in%20NTN%20(Revision%20of%20R2-2309962).docx) Some remaining issues for CHO and RACH-less HO in NTN Lenovo discussion Rel-18

[R2-2312763](file:///C:\Data\3GPP\Extracts\R2-2312763%20Discussion%20on%20the%20remaining%20issues%20for%20the%20handover%20enhancements.doc) Discussion on the remaining issues for the handover enhancements Xiaomi discussion

[R2-2313399](file:///C:\Data\3GPP\Extracts\R2-2313399%20%5bNTN%5d%20Remaining%20issues%20on%20handover%20enhancements.docx) Remaining issues on handover enhancements LG Electronics France discussion Rel-18 38.331 NR\_NTN\_enh

##### 7.7.4.2.2 Unchanged PCI satellite switch

Including report of [Post123bis][312][NR-NTN Enh] Unchanged PCI (CMCC/Apple). Company contributions on aspects handled in [Post123bis][312] might be down-prioritized.

[R2-2313206](file:///C:\Data\3GPP\Extracts\R2-2313206%20Report%20of%20%5bPost123bis%5d%5b312%5d%5bNR-NTN%20Enh%5d%20Unchanged%20PCI.docx) Report of [Post123bis][312][NR-NTN Enh] Unchanged PCI CMCC, Apple discussion Rel-18 NR\_NTN\_enh-Core

List of proposals for agreement:

Proposal A-1: it is proposed to introduce one new target satellite configuration, e.g. ntn-TargetSatConfig, and provide the NTN-config of the target satellite in it for the the specific signaling format about the target satellite information in SIB19. (14/15)

* Apple thinks this is already aligned to the running CR
* Agreed (we can keep the current terminology in the running CR)
* The presence of this information indicates that satellite switch without PCI change is supported

Proposal A-2 : At least for soft switch, support SMTC configuration of target satellite can be different from that in source. (15/15) FFS for hard switch.(10/15)

* QC thinks this should only refer to STMC offset
* At least for soft switch, there needs to be an “SSB time offset” between the source and the target satellite (CB Thursday to clarify the definition of “SSB time offset” and the relationship with SMTC offset)

< Proposal from session Chair: “SSB time offset” is specified as a new IE, with the same format as offset in SSB-MTC4

>

Proposal A-3: SMTC configuration adjustment should be handled by UE. (12/15)

* target satellite SSB tracking is handled autonomously by the UE based on the provided SSB time offset

< Proposal from session Chair: revise agreement above as:

~~SMTC offset adjustment for~~ Target satellite ~~switch~~ SSB tracking is handled autonomously by the UE based on the provided SSB time offset

>

Proposal A-4: the SMTC configuration of target satellite should be provided in SIB19 (if needed). FFS whether an indication to indicate the SMTC configuration of target satellite is same with that of serving satellite can be provided in SIB19.

* QC is not sure we need to signal the SMTC offset of the target satellite
* CATT thinks the NW needs to provide the time difference between the source and the target satellites
* The “SSB time offset” between the source and the target satellite should be provided in SIB19

Proposal A-5: Support implicit indication (e.g. soft switching if T-start is configured) to inform UE it is hard switch or soft switch case.

* Support implicit indication to inform UE it is hard switch or soft switch case.

Proposal A-7: For hard satellite switch, there is no need to provide the SSB information of the target satellite. (13/15)

* HW thinks it would be beneficial to send this info also in the hard-switch case

< UE operation during satellite switching>

Proposal B-1: PHR procedure is not impacted by the satelliete switching procedure.

Proposal B-2: During satellite switching procedure, UE should reset the L3 filter for serving cell RRM measurement and RLM, and it’s up to UE implementation (i.e. no RAN2 spec impact).

Proposal B-3: The satellite switching failure is detected by the legacy RLF mechanism, i.e no need to introduce new timer based failure detection mechanism.

Proposal B-4: UE initiates the UE connection reestablishment procedure when the satellite switching failure is detected.

Proposal B-8: For RACH-less satellite switching, no additional beam information is provided to UE for the UL transmission in target satellite.

Proposal B-9: For RACH-less satellite switching, there is no dedicated preallocated UL grant provided to UE for the 1st UL transmission in target satellite.

Proposal B-10: For RACH-less satellite switching, there is no case to fallback to RACH-based satellite switching procedure based on radio quality.

Proposal B-11: For RACH-less satellite switching procedure, UE sets Nta value to 0.

Proposal B-12: For RACH-less satellite switching, UE resumes the UE dedicated UL/DL transmission after UE aquires the DL sync in target satellite.

< Coexistence with L3 mobility scheme>

Proposal B-13: If UE receive the HO command before UE initiates the satellite switching procedure (i.e. before the time point of satellite switching), UE will initiate the HO procedure immediately.

Proposal B-14: Both CHO and satellite switching procedure can be configured simultaneously.

Proposal B-15a : Intra-cell CHO and satellite switching procedure should not be configured simultaneously.

Proposal B-15b : When both CHO and satellite switching procedure are configured, RAN2 is proposed to discuss which option should be adopted:

- Option 1: UE always follows CHO;

- Option 2: UE initiates the procedure that triggers earlier; it's up to UE implementation if both procedures are triggered at the same time.

List of proposals that require online discussions:

Proposal A-6: For soft satellite switch, regarding the target satellite SSB information, we could further discuss the following options:

Option 1: Indicating a time offset/information for the target satellite

Option 2: Indicating a different SSB index for the target satellite

Option 3: ssb-PositionsInBurst of the target satellite

Option 4: option 1+2

Option 5: SMTC offset is enough

< proposal from session Chair (along the lines of option 1+2):

Proposal A-6rev: For soft satellite switch, as a baseline, the SSB time offset of the target satellite is provided (in SIB19). Optionally a different SSB index for the target satellite can also be provided.

>

* For soft satellite switch, as a baseline, it is sufficient to provide the “SSB time offset” of the target satellite in SIB19. CB Thursday to check if a different SSB index for the target satellite can also be provided.

Proposal A-8: The detail signaling of t-star can be discussed online.

< proposal from session Chair:

Proposal A-8rev: Adopt one of the following solutions:

* T-start is explicitly signalled (same format as T-service). If T-start is not signalled, T-start is assumed to be equal to T-service, i.e. hard switch.
* T-start is derived from “T-offset” (T-start = T-service-T-offset), where T-offset only has positive values (or zero) and reserved values for possible future use (e.g. negative values). If T-overlap is not signalled, T-overlap is assumed to be zero, i.e. hard switch

>

Proposal A-9: Further discuss whether T-start is needed for hard satellite switch.

< proposal from session Chair:

Proposal A-9rev: If T-start will be explicitly signalled, discuss whether to specify that the NW should not signal a T-start higher than T-service (If T-offset will be signalled, we simply don’t introduce negative values for it)

>

Proposal B-1a (for discussion): Discuss whether UE triggers TA reporting upon satellite switching.

<RACH-less satellite switching>

< proposal from session Chair:

Proposal B-1a\_rev: Upon satellite switching the triggering of TA reporting is based on legacy procedures

>

Proposal B-5 (for discussion): Discuss whether UE that supports satellite switching is mandatory to support RACH-less satellite switching.

< proposal from session Chair:

Proposal B-5\_rev: UE supporting satellite switching with re-sync mandatorily supports RACH-less satellite switching.

>

Proposal B-6 (for discussion): Support the explicit configuration of RACH-less satellite switching in SIB19.

Proposal B-6a (for discussion): If proposal B-6 is not agreed, RAN2 is proposed to discuss the following two issues:

- Issue 1: How does the UE determine whether to trigger RACH-less or RACH-based procedure?

- Issue 2: Does the network always support the RACH-less apprach for satellite switching?

Proposal B-7 (discussed after proposal B-5 and B-6): If UE does not support RACH-less satellite switching, UE will only perform RACH-based procedure regardless of whether the network configured RACH-less or RACH-based satellite switching procedure.

Agreements:

1. introduce one new target satellite configuration, e.g. ntn-TargetSatConfig, (but we can keep the current terminology in the running CR) and provide the NTN-config of the target satellite in it for the specific signaling format about the target satellite information in SIB19. The presence of this information indicates that satellite switch without PCI change is supported
2. At least for soft switch, there needs to be an “SSB time offset” between the source and the target satellite
3. SMTC offset adjustment for satellite switch is handled autonomously by the UE
4. The “SSB time offset” between the source and the target satellite should be provided in SIB19
5. Support implicit indication to inform UE it is hard switch or soft switch case
6. For soft satellite switch, as a baseline, it is sufficient to provide the “SSB time offset” of the target satellite in SIB19. Come back to check if a different SSB index for the target satellite can also be provided.

Moved here from 7.7.4.2

[R2-2313529](file:///C:\Data\3GPP\Extracts\R2-2313529%20-%20Remaining%20issues%20with%20connected%20mode%20enhancements.docx) Remaining issues with connected mode enhancements Ericsson discussion Rel-18 NR\_NTN\_enh-Core

* Unchanged PCI
  + Feature name

Proposal 4 Adopt the name satellite switch with re-sync for the unchanged PCI feature.

* + TAT handling

Proposal 7 For satellite switch with re-sync, network implementation can solve the issue with TAT expiration before the UE is synchronized to the target satellite.

* Duplicated info in SIB19

Proposal 10 UE shall assume when a PCI associated to an NTN carrier frequency is included in a measurement object but it is not present in the neighbour cell list in SIB19, this PCI is provided by the serving satellite.

Proposal 11 Adopt the text proposal to TS 38.331 in Section 3.

* [AT124][303][NR-NTN Enh] Unchanged PCI (Apple)

Scope: Discuss the RACH-less satellite switching aspects

Intended outcome: offline discussion summary

F2F schedule: Wednesday 2023-11-15 10:30-11:00 Brk3

Deadline for rapporteur's summary (in R2-2313785): Wednesday 2023-11-15 22:00

R2-2313785 Summary of [AT124][303][NR-NTN Enh] Unchanged PCI Apple discussion

[R2-2311837](file:///C:\Data\3GPP\Extracts\R2-2311837%20Remaining%20Issues%20on%20Service%20Link%20Switching%20with%20Unchanged%20PCI.docx) Remaining Issues on Service Link Switching with Unchanged PCI vivo discussion Rel-18 NR\_NTN\_enh-Core

[R2-2311849](file:///C:\Data\3GPP\Extracts\R2-2311849.docx) Discussion on unchanged PCI mechanism Quectel discussion Rel-18

[R2-2311989](file:///C:\Data\3GPP\Extracts\R2-2311989_Signaling%20design%20of%20satellite%20switching%20with%20PCI%20unchanged.doc) Signalling design of satellite switching with PCI unchanged China Telecom discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312047](file:///C:\Data\3GPP\Extracts\R2-2312047%20Leftover%20issues%20on%20the%20unchanged%20PCI%20satellite%20switch.docx) Leftover issues on the unchanged PCI satellite switch Google Inc. discussion

[R2-2312058](file:///C:\Data\3GPP\Extracts\R2-2312058%20Discussion%20on%20unchanged%20PCI%20mechanism.docx) Discussion on unchanged PCI mechanism CATT discussion

[R2-2312106](file:///C:\Data\3GPP\Extracts\R2-2312106.docx) Remaining issues on PCI unchanged satellite switch Samsung discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312120](file:///C:\Data\3GPP\Extracts\R2-2312120%20HO%20enhancement%20in%20LEO-NTN_124.docx) On Outstanding Issues in Unchanged PCI in LEO NTN MediaTek Inc. discussion

[R2-2312279](file:///C:\Data\3GPP\Extracts\R2-2312279%20PCI%20unchanged.docx) Major issues for satellite switch with PCI unchanged Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312293](file:///C:\Data\3GPP\Extracts\R2-2312293_Satellite%20switching%20with%20unchanged%20PCI_v0.doc) Satellite switching with unchanged PCI Apple discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312464](file:///C:\Data\3GPP\Extracts\R2-2312464%20On%20some%20remaining%20issues%20for%20PCI-unchanged%20scenario%20(Revision%20of%20R2-2309961).docx) On some remaining issues for PCI-unchanged scenario Lenovo discussion Rel-18

[R2-2312546](file:///C:\Data\3GPP\Extracts\R2-2312546_unchanged_PCI.docx) Discussions on SMTC configuration for satellite switch without PCI change ITRI discussion NR\_NTN\_enh-Core

Moved here from 7.7.4.2

[R2-2312609](file:///C:\Data\3GPP\Extracts\R2-2312609%20FFS%20issue%20on%20unchanged%20PCI%20solution%20v2.docx) FFS issues of unchanged PCI solution NEC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312645](file:///C:\Data\3GPP\Extracts\R2-2312645_Usage%20and%20signaling%20of%20t-start.docx) Usage and signaling of t-start ZTE Corporation, Sanechips discussion Rel-18 NR\_NTN\_enh-Core

[R2-2312646](file:///C:\Data\3GPP\Extracts\R2-2312646%20Discussion%20on%20remainging%20issues%20of%20soft%20and%20hard%20staellite%20switch%20with%20PCI%20unchanged.doc) Discussion on remaining issues of soft and hard satellite switch with PCI unchanged Transsion Holdings discussion Rel-18

[R2-2313006](file:///C:\Data\3GPP\Extracts\R2-2313006%20(R18%20NR%20NTN%20WI%20AI%207.7.4.2.2)%20same%20PCI.docx) Remaining open issues: Satellite switching without PCI change InterDigital discussion Rel-18 NR\_NTN\_enh-Core

Moved here from 7.7.4.2

[R2-2313052](file:///C:\Data\3GPP\Extracts\R2-2313052%20Remaining%20Issues%20for%20Satellite%20Switching%20without%20L3%20Mobility.docx) Remaining Issues for Satellite Switching without L3 Mobility Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_NTN\_enh-Core

[R2-2313191](file:///C:\Data\3GPP\Extracts\R2-2313191%20Discussion%20on%20remaining%20issue%20for%20unchanged%20PCI%20switch.docx) Discussion on remaining issue for unchanged PCI switch ASUSTeK discussion Rel-18 NR\_NTN\_enh-Core

[R2-2313279](file:///C:\Data\3GPP\Extracts\R2-2313279.docx) Remaining issues on Unchanged PCI ITL discussion Rel-18

[R2-2313400](file:///C:\Data\3GPP\Extracts\R2-2313400%20%5bNTN%5d%20Remaining%20issues%20on%20unchanged%20PCI.docx) Remaining issues on unchanged PCI LG Electronics France discussion Rel-18 38.331 NR\_NTN\_enh

[R2-2313475](file:///C:\Data\3GPP\Extracts\R2-2313475_Unchanged%20PCI%20satellite%20switch%20considerations.docx) Unchanged PCI satellite switch considerations Sequans Communications discussion Rel-18 NR\_NTN\_enh-Core

Withdrawn

R2-2312632 Discussion on remaining issues of soft and hard satellite switch with PCI unchanged Transsion Holdings discussion Rel-18 Withdrawn

### 7.25.4 Self-Evaluation NTN

(FS\_IMT-2020\_Sat\_eval; leading Group: TSG RAN; REL-18; WID: [RP-230736](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_99/Docs/RP-230736.zip))

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.

[R2-2312865](file:///C:\Data\3GPP\Extracts\R2-2312865%20Discussion%20self-evaluation%20latency.docx) Discussion on IMT-2020 Satellite self-evaluation for Latency THALES discussion Rel-18 NR\_NTN\_enh-Core

Observation 1: The maximum RTD for GEO scenario with an elevation angle of 10° for service link and feeder link is 541 ms

Proposal 1: The Satellite Radio Interface supports larger latencies up to 650 ms for user plane dataflows

Proposal 2: The Satellite Radio Interface supports larger latencies up to 1.15 s for control plane signalling

Proposal 3: Consider the above text proposal for TP for TR 37.911

# Summary

In-Principle Agreed CRs

NR-NTN

IoT-NTN

Approved LSs out

[Post124] Email discussions

Short

* [Post124][301][NR-NTN Enh] 38.300 CR (Thales)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313771): short

* [Post124][302][NR-NTN Enh] 38.331 CR (Ericsson)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313772): short

* [Post124][303][NR-NTN Enh] 38.321 CR (Interdigital)

Scope: update the NTN MAC CR (for other aspects than RACH-less HO) with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313773): short

* [Post124][304][NR-NTN Enh] 38.304 CR (ZTE)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313774): short

* [Post124][305][NR-NTN Enh] 37.355 CR (CATT)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313777): short

* [Post124][306][NR-NTN Enh] 38.305 CR (Qualcomm)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313778): short

* [Post124][307][IoT-NTN Enh] 36.300 CR (Ericsson)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313779): short

* [Post124][308][IoT-NTN Enh] 36.331 CR (Huawei)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313780): short

* [Post124][309][NR-NTN Enh] 36.321 CR (Mediatek)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313781): short

* [Post124][310][IoT-NTN Enh] 36.304 CR (Nokia)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313782): short

* [Post124][311][IoT-NTN Enh] 36.306 CR (Qualcomm)

Scope: update the running CR with meeting agreements

Intended outcome: Agreed CR

Deadline for agreed CR (in R2-2313783): short

Medium

Long