3GPP TSG-RAN WG2 Meeting #121bis-e R2-2304201

Online, Apr 17th-26th, 2023

**Agenda item: 8.1**

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

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

**Document for: Approval**

General

Recording of voice or video at meetings is not used in 3GPP. This applies also to this e-Meeting. At this e-Meeting, no specific actions are taken to prevent the recording of web conferences. Companies that have concerns related to recordings, if any, may express those by email in the main meeting organizational thread [AT121bis-e][000]

Organizational

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

* [AT121bis-e][100] Organizational – NR-NTN and IoT-NTN session (RAN2 VC)

Scope:

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

Schedule/Plan

**WEEK 1:**

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| **Time Zone UTC** | **Web Conference R2 - Main** | **Web Conference R2 - BO1** | **Web Conference R2 - BO2** | **Offline GTW Session**  **(limited use, only specific issues if needed, need approval by session chair)** |
| **Monday** |  |  |  |  |
| 12:30-13:30 | NR18 Mobility Enh [2] (Johan) | NR18 XR [2] (Tero)  - 7.5.1: Work plan ([R2-2302715](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302715.zip)), SA2/SA4 status ([R2-2302716](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302716.zip)/[R2-2302717](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302717.zip)), Stage-2 running CR ([R2-2302718](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302718.zip))  - 7.5.4.1: BSR tables for XR (e.g.[R2-2302515](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302515.zip), [R2-2303862](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303862.zip), [R2-2302851](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302851.zip))  - 7.5.2: TSCAI vs. PIN DB reporting (e.g. [R2-2303800](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303800.zip), [R2-2303986](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303986.zip)) | NR18 SL Relay [1.5] (Nathan)  - 7.9.1 Organizational (R2-2302442, R2-2302994)  - 7.9.4 Multi-path (R2-2303857, R2-2302924, aspects of R2-2303342) |  |
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| 13:30-14:30 | NR18 Mobile IAB [0.5] (Johan) | NR18 UAV [1] (Diana)  7.8.1: LSs  7.8.2: Email discussion 313  7.8.3: Email discussion 314 | NR18 Pos [2] (Nathan)  - 7.2.1 Organizational (R2-2302449, R2-2302738 / R2-2302739)  - 7.2.2 Sidelink positioning (R2-2302740, R2-2304033, R2-2304005) |  |
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| 14:30-15:30 | NR18 AIML [1] (Johan) | NR18 NCR [0.5] (Sasha)  7.1.1 (LS from RAN1 and baseline CRs)  7.1.2 (agenda item summary)  7.1.3 (R2-2303288, R2-2302788, agenda item summary for issues not covered in 3288) | Maintenance Early items (Nathan Qianxi)  Rel-17 relay:  - 6.5.2 CP (R2-2304189)  - 6.5.3 UP (R2-2304191)  Rel-17 positioning:  - 6.7.2 RRC (R2-2302638, R2-2302992)  - 6.7.4 MAC (R2-2302991, R2-2304049)  - 6.7.5 UE cap (R2-2302745)  - 6.7.3 LPP (R2-2304192)  R16 SL  - 5.2: R2-2303211/3212  R17 SL:  - 6.10.1: R2-2302410 (R1 LS reply on default CBR)  - 6.10.3: R2-2303744/3745 |  |
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| **Tuesday** |  |  |  |  |
| 12:30-13:30 | NR18 LP WUS [0.5] (Johan) | **NR18 NTN enh [1] (Sergio)**  **- 7.7.1**  **- 7.7.4.1.1**  **- 7.7.4.1.2: report of [Post121][106]** | NR18 SL evolution [1] (Qianxi)  7.15.1, 7.15.2, 7.15.3 |  |
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| 13:30-14:30 | NR18 Other [2] (Johan) | **NR18 NTN enh [1] (Sergio)**  **- 7.7.4.2**  **- 7.7.3**  **AI 7.25.3:**  **- R2-2304184 Work plan for SI on self-evaluation towards the IMT-2020 submission of the 3GPP Satellite Radio Interface Technology** | NR18 SL evolution [1] (Qianxi)  7.15.3 (cont.), 7.15.4 |  |
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| 14:30-15:30 | NR18 Mobility Enh [2] (Johan) | LTE legacy (Tero) (14:30-15:00)  - 4.1: [R2-2303818](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303818.zip) (+ [R2-2303821](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303821.zip), [R2-2303822](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303822.zip) - QoE configuration release)  NR18 MUSIM (Tero)  - 7.17.4: [R2-2302430](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302430.zip) (RAN4 LS for MUSIM gap priority)  **R17 NR/IoT NTN (Sergio) (15:00-15:30)**  **R17 NR NTN:**  **- 6.6.1**  **- 6.6.3**  **R17 IoT NTN:**  **- 4.2.1**  **- 4.2.2** | NR18 SL evolution [1] (Qianxi)  7.15.4 (cont.), 7.15.5, 7.15.6 |  |
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| **Wednesday** |  |  |  |  |
| 12:30-13:30 | NR18 AIML [1] (Johan) | NR18 QoE [1] (Tero)  - 7.14.1: Work plan ([R2-2304084](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304084.zip)), LSs from RAN3/SA5 ([R2-2302425](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302425.zip), [R2-2302461](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302461.zip), [R2-2302463](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302463.zip)), running CRs ([R2-2303676](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303676.zip))  - 7.14.2: RRC configuration and area scope (e.g. [R2-2303363](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303363.zip), [R2-2303596](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303596.zip), [R2-2303642](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303642.zip)), AS layer buffer size (e.g. [R2-2303677](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303677.zip), [R2-2302886](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302886.zip)) | NR18 SL Relay [1.5] (Nathan)  - 7.9.2 U2U (summary in R2-23xxxxx)  - 7.9.3 Service continuity (R2-2303110 / R2-2302923, R2-2303006) |  |
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| 13:30-14:30 | – TBD (Johan) | NR18 Network Energy Saving [1] Early items (Diana)  7.3.2: DTX/DRX email discussions 312, 311 | NR18 SL Relay [1.5] (Nathan)  - 7.9.3 Service continuity (continued from above)  - 7.24.2 TEI18 (R2-2303746)  - 7.9.5 DRX (if time: R2-2303488) |  |
| NR18 MBS UP [0.75] (Dawid)  - Summary of [Post121][607][eMBS] |  |
| 14:30-15:30 | NR18 MBS UP/CP [0.75] (Dawid)  - Summary of [Post121][607][eMBS], cont.  - Summary of [Post121][606][eMBS] | NR18 URLLC [0.5] (Diana) | NR18 Pos [2] (Nathan)  - 7.2.3 RAT-dependent integrity (summary in R2-23xxxxx)  - 7.2.4 LPHAP (start if time: summary in R2-23xxxxx) |  |
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| **Thursday** |  |  |  |  |
| 03:30-04:30 | NR18 Other [2], NR18 TEI [1] (Johan) | NR18 XR [2] (Tero)  - 7.5.3: DRX for XR (e.g. [R2-2303861](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303861.zip), [R2-2302514](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302514.zip), [R2-2303755](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303755.zip)) , SFN wrap-around (e.g. [R2-2302583](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302583.zip), [R2-2303302](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303302.zip))  - 7.5.4.3: Report of [210] ([R2-2304391](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304391.zip)) | **LTE18 IoT NTN [1] (Sergio)**  **- 7.6.1**  **- 7.6.2.1: Report of [103]**  **- 7.6.2.2: Report of [104]** |  |
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| 04:30-05:30 | NR18 Mobility Enh [2] (Johan) | NR18 XR [2] (Tero)  - 7.5.2: UL assistance information for XR (e.g. [R2-2302909](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302909.zip), [R2-2302756](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302756.zip), [R2-2302513](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302513.zip), [R2-2302719](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302719.zip))  - 7.5.4.2: Discard operation in XR (e.g. [R2-2303303](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303303.zip), [R2-2303722](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303722.zip)) | **LTE18 IoT NTN [1] (Sergio)**  **- 7.6.3.1: Report of [Post121][105]**  **- 7.6.3.2**  **- 7.6.4** |  |
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| **Friday** |  |  |  |  |
| 03:30-04:30 | NR18 MIMO evo [0.5] (Erlin) | eRedcap [1] (Mattias)  7.19.1 Organizational  7.19.2 Enhanced eDRX in RRC\_INACTIVE  Incl. AT-meeting email disc summary  7.19.3 Further reduced UE complexity in FR1  Incl. AT-meeting email disc summary | NR18 SONMDT [0.5] (HuNan) |  |
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| 04:30-05:30 | NR18 fCovEnh [0.5] (Eswar) | NR18 Pos [2] (Nathan)  - 7.2.4 LPHAP (summary in R2-23xxxxx)  - 7.2.5 RAN1 topics (R2-2302818)  - 7.24.1 TEI18 (if time: R2-2302413 / R2-2303498 / R2-2303499 / R2-2303500) |  |
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**WEEK 2:**

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| **Time Zone UTC** | **Web Conference R2 - Main** | **Web Conference R2 - BO1** | **Web Conference R2 - BO2** | **Offline GTW Session**  **(limited use, only specific issues if needed, need approval by session chair)** |
| **Monday** |  |  |  |  |
| 12:30-13:30 | NR18 Mobility Enh [2] (Johan) | NR18 XR [2] (Tero)  - Email discussion report(s) (if any)  - Untreated topics from week 1  IF time allows:  - 7.5.4.3: Further discussion on CG for XR | NR18 Pos [2] (Nathan)  - Email discussion checkpoint  - 7.24.1 TEI18 (if not done Friday week 1)  - 7.24.2 TEI18 (new proposals: R2-2303123, R2-2304007) |  |
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| 13:30-14:30 | Maintenance CB (Johan) | NR18 MUSIM [0.5] (Tero)  - 7.17.1: Running CRs ([R2-2303266](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303266.zip))  - 7.17.2: Reactive/proactive mechanisms (e.g. [R2-2302781](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2302781.zip), [R2-2303639](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303639.zip)), UE-initiated Scell/SCG (de)activation (e.g. [R2-2303455](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303455.zip), [R2-2303779](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303779.zip))  IF time allows:  - 7.17.3: Report of [230]: UE capability restrictions ([R2-2304397](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304397.zip)) | NR18 UAV [1] (Diana)  - 7.8.5. – BRID (AT meeting email 304)  - 7.8.4 – subscription based aerial UE ID (if time permits) |  |
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| 14:30-15:30 | Maintenance CB (Johan) | NR18 MUSIM CB (Tero)  - 7.17.3: Report of [230]: UE capability restrictions ([R2-2304397](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304397.zip))  - 7.17.3: Report of [231]: RAN4 aspects of MUSIM ([R2-2304398](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304398.zip))  **R17 NR/IoT NTN (Sergio) (15:00-15:30)**  **R17 NR NTN:**  **- 6.6.1: Report of [111] (if needed)**  **- 6.6.2: Report of [102] (if needed)**  **- 6.6.3: Report of [112],[113](if needed)**  **R17 IoT NTN:**  **- 4.2.3: Report of [101] (if needed)**  **- 4.2.1/4.2.2: Report of [111] (if needed)** | NR18 Network Energy Saving [1] (Diana)  - continuation of email discussion 311 (if needed)  - 7.3.5 Mobility (AT meeting email 303) |  |
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| **Tuesday** |  |  |  |  |
| 12:30-13:30 | Maintenance CB (Johan) | NR18 QoE [1] (Tero)  - 7.14.2: Report of [220]: SRB5 details ([R2-2304395](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2304395.zip))  - 7.14.2: RVQoE in NR-DC (e.g. [R2-2303511](https://www.3gpp.org/ftp/TSG_RAN/WG2_RL2/TSGR2_121bis-e/Docs/R2-2303511.zip)) | Maintenance CB (Diana)  - R15-17 UP - AT meeting email output and CRs (301)  - R17 SDT related items – AT meeting email output and CRs (302) |  |
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| 13:30-14:30 | NR18 CBs (Sasha) | **NR18 NTN enh CBs (Sergio)**  **- 7.7.4.1.1: Report of [106],[107]**  **- 7.7.4.1.2: Report of [108],[109],[110]**  **- 7.7.2: Report of [105]**  **- 7.7.3**  **(some topics might be moved to the Wednesday CB session)** | NR18 CB (Diana) |  |
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| 14:30-15:30 | NR18 CBs | NR17/18 CBs (Dawid) | CBs (Qianxi) |  |
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| **Wednesday** |  |  |  |  |
| 03:30-04:30 | NR18 CBs (All?) | NR18 CBs (Mattias?) | NR18 CBs (Nathan) |
| 04:30-05:30 | CB (All) | **LTE18 IoT NTN CBs (Sergio)**  **- 7.6.2.1: Report of [103]**  **- 7.6.2.2: Report of [104]**  **- 7.6.3.1: Report of [114]**  **- 7.6.4: Report of [115]**  **NR18 NTN enh CBs (Sergio)**  **- remaining topics from Tuesday CB session** | CB (Nathan?) |

List and status of offline email discussions

NOTE: No offline email discussions will be kicked off before Monday Apr 17th, 07:00 UTC

* [AT121bis-e][101][IoT NTN] CP corrections (Huawei)

Initial scope: Discuss corrections in 4.2.3 (apart those on location info in RLF Report)

Initial intended outcome: Summary of the offline discussion with list of agreeable corrections/CRs

Deadline for companies' feedback: Friday 2023-04-21 08:00 UTC

Deadline for rapporteur's summary (in R2-2304241): Friday 2023-04-21 10:00 UTC

Proposals marked "for agreement" in R2-2304241 not challenged until Monday 2023-04-24 10:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online).

Status: Ongoing

* [AT121bis-e][102][NR NTN] UP corrections (Apple)

Initial scope: Discuss corrections in 6.6.2

Initial intended outcome: Summary of the offline discussion with list of agreeable corrections/CRs

Deadline for companies' feedback: Friday 2023-04-21 08:00 UTC

Deadline for rapporteur's summary (in R2-2304242): Friday 2023-04-21 10:00 UTC

Proposals marked "for agreement" in R2-2304242 not challenged until Monday 2023-04-24 10:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online).

Status: Ongoing

* [AT121bis-e][103][IoT NTN Enh] HARQ enhancements (Oppo)

Updated scope: Discuss the remaining proposals from R2-2304243 and draft an LS to RAN1 on RAN2 meeting agreements and agreed questions to RAN1

Updated intended outcome: Summary of the offline discussion and Draft LS to RAN1

Deadline for companies' feedback: Tuesday 2023-04-25 06:00 UTC

Deadline for rapporteur's summary (in R2-2304254) and draft LS (in R2-2304255): Tuesday 2023-04-25 08:00 UTC

Proposals marked "for agreement" in R2-2304254 not challenged until Tuesday 2023-04-25 20:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Wednesday CB session).

Status: Ongoing

* [AT121bis-e][104][IoT NTN Enh] GNSS operation enhancements (Mediatek)

Updated scope: Discuss the remaining proposals from R2-2304244

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

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

Deadline for companies' feedback: Tuesday 2023-04-25 02:00 UTC

Deadline for rapporteur's summary (in R2-2304256): Tuesday 2023-04-25 04:00 UTC

Proposals marked "for agreement" in R2-2304256 not challenged until Tuesday 2023-04-25 20:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Wednesday CB session).

Status: Ongoing

* [AT121bis-e][105][NR NTN Enh] Coverage enhancements (Interdigital)

Initial scope: Discuss the proposals in the submitted contributions in AI 7.7.2

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

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

Deadline for companies' feedback: Monday 2023-04-24 18:00 UTC

Deadline for rapporteur's summary (in R2-2304245): Monday 2023-04-24 20:00 UTC

Status: Ongoing

* [AT121bis-e][106][NR NTN Enh] Signaling of TN coverage (Nokia)

Initial scope: Continue the discussion on the signaling of TN coverage: signaling details for area center+radius (e.g. reuse of *Ellipsoid-PointWithUncertaintyCircle*?), which SIB, whether additional information in dedicated signalling is needed, validity of the TN coverage area information, how to associate TN coverage info and frequency

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

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

Deadline for companies' feedback: Monday 2023-04-24 12:00 UTC

Deadline for rapporteur's summary (in R2-2304246): Monday 2023-04-24 18:00 UTC

Proposals marked "for agreement" in R2-2304246 not challenged until Tuesday 2023-04-25 08:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Tuesday CB session).

Status: Ongoing

* [AT121bis-e][107][NR NTN Enh] NW type information (Samsung)

Initial scope: discussion p4 and p5 from [R2-2303766](file:///C:\Data\3GPP\Extracts\R2-2303766.docx) and p1 from [R2-2303736](file:///C:\Data\3GPP\Extracts\R2-2303736%20-%20TN%20NTN%20mobility%20enhancements.docx)

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

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

Deadline for companies' feedback: Monday 2023-04-24 12:00 UTC

Deadline for rapporteur's summary (in R2-2304247): Monday 2023-04-24 18:00 UTC

Proposals marked "for agreement" in R2-2304247 not challenged until Tuesday 2023-04-25 08:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Tuesday CB session).

Status: Ongoing

* [AT121bis-e][108][NR NTN Enh] Common (C)HO configuration (Ericsson)

Initial scope: Continue the discussion on potential pros and cons of a broadcast common (C)HO configuration

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

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

Deadline for companies' feedback: Monday 2023-04-24 12:00 UTC

Deadline for rapporteur's summary (in R2-2304248): Monday 2023-04-24 18:00 UTC

Proposals marked "for agreement" in R2-2304248 not challenged until Tuesday 2023-04-25 08:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Tuesday CB session).

Status: Ongoing

* [AT121bis-e][109][NR NTN Enh] RACH-less HO (Samsung)

Initial scope: Continue the discussion on RACH-less HO, e.g. based on proposals in [R2-2303768](file:///C:\Data\3GPP\Extracts\R2-2303768.docx). Also discuss interactions between RACH-less HO and CHO

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

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

Deadline for companies' feedback: Monday 2023-04-24 12:00 UTC

Deadline for rapporteur's summary (in R2-2304249): Monday 2023-04-24 18:00 UTC

Proposals marked "for agreement" in R2-2304249 not challenged until Tuesday 2023-04-25 08:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Tuesday CB session).

Status: Ongoing

* [AT121bis-e][110][NR NTN Enh] LS to RAN1 on unchanged PCI (CATT)

Initial scope: Discuss the possible content of an LS to RAN1 on Satellite switch without changing PCI

Initial intended outcome: Agreeable LS to RAN1

Deadline for companies' feedback: Tuesday 2023-04-25 08:00 UTC

Deadline for Draft LS (in R2-2304250): Monday 2023-04-25 10:00 UTC

Status: Ongoing

* [AT121bis-e][111][NR NTN] Stage 2 corrections (Oppo)

Initial scope: Discuss Stage 2 CRs for NR NTN and IoT NTN

Initial intended outcome: Summary of the offline discussion with list of agreeable corrections/CRs

Deadline for companies' feedback: Friday 2023-04-21 08:00 UTC

Deadline for rapporteur's summary (in R2-2304251): Friday 2023-04-21 10:00 UTC

Proposals marked "for agreement" in R2-2304251 not challenged until Monday 2023-04-24 10:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online).

Status: Ongoing

* [AT121bis-e][112][NR NTN] CP corrections 1 (Huawei)

Initial scope: Discuss corrections in 6.6.3 (apart those on “capability”)

Initial intended outcome: Summary of the offline discussion with list of agreeable corrections/CRs

Deadline for companies' feedback: Friday 2023-04-21 08:00 UTC

Deadline for rapporteur's summary (in R2-2304252): Friday 2023-04-21 10:00 UTC

Proposals marked "for agreement" in R2-2304252 not challenged until Monday 2023-04-24 10:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online).

Status: Ongoing

* [AT121bis-e][113][NR NTN] CP corrections 2 (Intel)

Initial scope: Discuss corrections in 6.6.3 on “capability”

Initial intended outcome: Summary of the offline discussion with list of agreeable corrections/CRs

Deadline for companies' feedback: Friday 2023-04-21 08:00 UTC

Deadline for rapporteur's summary (in R2-2304253): Friday 2023-04-21 10:00 UTC

Proposals marked "for agreement" in R2-2304253 not challenged until Monday 2023-04-24 10:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online).

Status: Ongoing

* [AT121bis-e][114][IoT NTN Enh] Neighbour cell measurements (Qualcomm)

Scope: Discuss the remaining proposals from R2-2303652 and whether recent RAN2#121bis-e agreements for NR NTN can be extended to IoT-NTN

Intended outcome: Summary of the offline discussion with e.g.:

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

Deadline for companies' feedback: Tuesday 2023-04-25 02:00 UTC

Deadline for rapporteur's summary (in R2-2304257): Tuesday 2023-04-25 04:00 UTC

Proposals marked "for agreement" in R2-2304257 not challenged until Tuesday 2023-04-25 20:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Wednesday CB session).

Status: To be started

* [AT121bis-e][115][IoT NTN Enh] Discontinuous coverage enhancements (Interdigital)

Scope: Discuss possible discontinuous coverage enhancements based on [R2-2303716](file:///C:\Data\3GPP\Extracts\R2-2303716%20(R18%20IoT-NTN%20WI%20AI%207.6.4)%20-%20discontinuous%20coverage.docx) and possibly including proposals from other contributions as well ([R2-2302822](file:///C:\Data\3GPP\Extracts\R2-2302822%20RAN2%20enhancements%20for%20discontinuous%20coverage.docx), [R2-2303193](file:///C:\Data\3GPP\Extracts\R2-2303193-Discontinuous%20coverage%20for%20IoT%20NTN.docx))

Intended outcome: Summary of the offline discussion with e.g.:

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

Deadline for companies' feedback: Tuesday 2023-04-25 06:00 UTC

Deadline for rapporteur's summary (in R2-2304258): Tuesday 2023-04-25 08:00 UTC

Proposals marked "for agreement" in R2-2304258 not challenged until Tuesday 2023-04-25 20:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Wednesday CB session).

Status: To be started

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

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

Tdoc Limitation: 2 tdocs

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

### 4.2.1 General and Stage 2 corrections

LSs and Stage 2 corrections.

Incoming LSs

[R2-2302422](file:///C:\Data\3GPP\Extracts\R2-2302422_R3-230951.docx) LS on UE capability signalling for IoT-NTN (R3-230951; contact: Vodafone) RAN3 LS in Rel-17 LTE\_NBIOT\_eMTC\_NTN To:SA2, RAN2 Cc:CT1

Stage 2

[R2-2302677](file:///C:\Data\3GPP\Extracts\R2-2302677%20Stage-2%20Corrections%20for%20Supporting%20Emergency%20Calls%20in%20IoT%20NTN.docx) Stage-2 Corrections for Supporting Emergency Calls in IoT NTN MediaTek Inc CR Rel-17 36.300 17.4.0 1382 - F LTE\_NBIOT\_eMTC\_NTN-Core

* Discuss in offline 111

[R2-2303832](file:///C:\Data\3GPP\Extracts\R2-2303832%20-%2036300_CR1383_(Rel-17)%20-%20Correction%20for%20R17%20IoT%20NTN.docx) Correction for R17 IoT NTN Ericsson CR Rel-17 36.300 17.4.0 1383 - F LTE\_NBIOT\_eMTC\_NTN

* Discuss in offline 111

[R2-2303665](file:///C:\Data\3GPP\Extracts\R2-2303665%20Clarification%20on%20Kmac%20definition.docx) Clarification on Kmac definition ZTE Corporation, Sanechips discussion Rel-17 LTE\_NBIOT\_eMTC\_NTN-Core

* Noted

Moved here from 4.2.2

### 4.2.2 UP corrections

A single CR 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

[R2-2302530](file:///C:\Data\3GPP\Extracts\R2-2302530%20-%20MAC%20correction%20on%20TDD%20support%20for%20IoT%20NTN.doc) MAC correction on TDD support for IoT NTN OPPO CR Rel-17 36.321 17.4.0 1560 2 F LTE\_NBIOT\_eMTC\_NTN [R2-2300358](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121\Tdocs\R2-2300358.zip)

* ZTE thinks this is not needed.
* Oppo has a different understanding. QC would be ok to correct this and supports the CR
* Ericsson this is not really necessary as it is clear from Stage 2 that TDD is not supported in IoT NTN in Rel-17.
* Continue in offline 111

[R2-2303980](file:///C:\Data\3GPP\Extracts\R2-2303980%20Corrections%20on%20MAC%20procedure%20upon%20validity%20timer%20expiry%20for%20IoT%20NTN.docx) Corrections on MAC procedure upon validity timer expiry for IoT NTN Nokia, Nokia Shanghai Bell CR Rel-17 36.321 17.4.0 1565 - F LTE\_NBIOT\_eMTC\_NTN

* Align to the outcome of the ongoing discussion for NR NTN UP corrections (offline 102)

### 4.2.3 CP corrections

A single CR 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

Location info in RLF Report

Discussed together with [R2-2303696](file:///C:\Data\3GPP\Extracts\R2-2303696%20-%20UE%20location%20in%20RLF%20report%20for%20NB-IoT.doc) and [R2-2303717](file:///C:\Data\3GPP\Extracts\36331_CR4906_(Rel-17)_R2-2303717%20RLF%20report.docx) in AI 6.9.3!

[R2-2303667](file:///C:\Data\3GPP\Extracts\R2-2303667%20User%20consent%20for%20location%20info%20in%20RLF-Report.docx) User consent for location info in RLF-Report ZTE Corporation, Sanechips discussion Rel-17 LTE\_NBIOT\_eMTC\_NTN-Core

[R2-2303961](file:///C:\Data\3GPP\Extracts\R2-2303961%20UE%20location%20information%20in%20NB-IoT%20RLF%20report.doc) UE location information in NB-IoT RLF report Huawei, HiSilicon discussion Rel-17 LTE\_NBIOT\_eMTC\_NTN

[R2-2304136](file:///C:\Data\3GPP\Extracts\R2-2304136%20On%20reporting%20location%20in%20NB-IoT%20RLF%20Report.docx) On reporting location in NB-IoT RLF Report Samsung R&D Institute UK discussion Rel-17 LTE\_NBIOT\_eMTC\_NTN

Other

[R2-2302676](file:///C:\Data\3GPP\Extracts\R2-2302676%20Corrections%20in%20TS%2036.331%20for%20Supporting%20Emergency%20Calls%20in%20IoT%20NTN.docx) Corrections in TS 36.331 for Supporting Emergency Calls in IoT NTN MediaTek Inc. CR Rel-17 36.331 17.4.0 4921 - F LTE\_NBIOT\_eMTC\_NTN-Core

* Discussed in offline 101

[R2-2303040](file:///C:\Data\3GPP\Extracts\36331_CR4922_(Rel-17)_R2-2303040%20GSO%20indication.docx) Indication of GSO-NGSO cell type in SIB1 Qualcomm Incorporated CR Rel-17 36.331 17.4.0 4922 - F LTE\_NBIOT\_eMTC\_NTN

* Discussed in offline 101

[R2-2303194](file:///C:\Data\3GPP\Extracts\R2-2303194-Discussion%20on%20NPRACH%20in%20RRC.docx) Alignment of NPRACH preamble descriptions with RAN1 specification for IoT-NTN parameters Nokia, Nokia Shanghai Bell discussion

* Discussed in offline 101

[R2-2303981](file:///C:\Data\3GPP\Extracts\R2-2303981%20CR%20to%2036.331%20on%20T317%20and%20T318.docx) CR to 36.331 on T317 and T318 Huawei, HiSilicon CR Rel-17 36.331 17.4.0 4928 - F LTE\_NBIOT\_eMTC\_NTN Revised

* Discussed in offline 101

[R2-2304082](file:///C:\Data\3GPP\Extracts\R2-2304082%20CR%20to%2036.331%20on%20T317%20and%20T318.docx) CR to 36.331 on T317 and T318 Huawei, HiSilicon CR Rel-17 36.331 17.4.0 4928 1 F LTE\_NBIOT\_eMTC\_NTN [R2-2303981](file:///C:\Data\3GPP\Extracts\R2-2303981%20CR%20to%2036.331%20on%20T317%20and%20T318.docx)

* Discussed in offline 101
* [AT121bis-e][101][IoT NTN] CP corrections (Huawei)

Initial scope: Discuss corrections in 4.2.3 (apart those on location info in RLF Report)

Initial intended outcome: Summary of the offline discussion with list of agreeable corrections/CRs

Deadline for companies' feedback: Friday 2023-04-21 08:00 UTC

Deadline for rapporteur's summary (in R2-2304241): Friday 2023-04-21 10:00 UTC

Proposals marked "for agreement" in R2-2304241 not challenged until Monday 2023-04-24 10:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online).

R2-2304241 [offline-101] CP corrections Huawei discussion Rel-17 LTE\_NBIOT\_eMTC\_NTN

## 6.6 NR Non-Terrestrial Networks (NTN)

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

Tdoc Limitation: 2 tdocs

### 6.6.1 General and Stage 2 corrections

LSs and Stage 2 corrections.

[R2-2302540](file:///C:\Data\3GPP\Extracts\R2-2302540-stage-2%20NTN%20CR-v2.docx) NTN Stage-2 correction OPPO, Ericsson, Thales CR Rel-17 38.300 17.4.0 0647 - F NR\_NTN\_solutions-Core Late

* Oppo, Intel think the reference to 38.211 should be changed to 38.213
* QC needs more time to check this
* Continue in offline 111, also to cover the corresponding CR for 36.300

[R2-2302654](file:///C:\Data\3GPP\Extracts\R2-2302654.docx) Corrections to 38.300 related to Section Scheduling and Timing THALES CR Rel-17 38.300 17.4.0 0630 1 D NR\_NTN\_solutions-Core [R2-2301445](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121\Tdocs\R2-2301445.zip)

* Revised in [R2-2302765](file:///C:\Data\3GPP\Extracts\R2-2302765.docx)

[R2-2302765](file:///C:\Data\3GPP\Extracts\R2-2302765.docx) Corrections to 38.300 related to Section Scheduling and Timing THALES CR Rel-17 38.300 17.4.0 0630 2 D NR\_NTN\_solutions-Core [R2-2302654](file:///C:\Data\3GPP\Extracts\R2-2302654.docx)

* Continue in offline 111

[R2-2303764](file:///C:\Data\3GPP\Extracts\R2-2303764.docx) Correction on Stage-2 descriptions for NR NTN Samsung CR Rel-17 38.300 17.4.0 0659 - F NR\_NTN\_solutions-Core

* Continue in offline 111
* [AT121bis-e][111][NR NTN] Stage 2 corrections (Oppo)

Initial scope: Discuss Stage 2 CRs for NR NTN and IoT NTN, as well as [R2-2302530](file:///C:\Data\3GPP\Extracts\R2-2302530%20-%20MAC%20correction%20on%20TDD%20support%20for%20IoT%20NTN.doc)

Initial intended outcome: Summary of the offline discussion with list of agreeable corrections/CRs

Deadline for companies' feedback: Friday 2023-04-21 08:00 UTC

Deadline for rapporteur's summary (in R2-2304251): Friday 2023-04-21 10:00 UTC

Proposals marked "for agreement" in R2-2304251 not challenged until Monday 2023-04-24 10:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online).

R2-2304251 [offline-111] Stage 2 corrections Oppo discussion Rel-17 NR\_NTN\_solutions-Core

Withdrawn

R2-2303835 Correction for R17 NR NTN Ericsson CR Rel-17 38.300 17.4.0 0660 - F NR\_NTN\_solutions Withdrawn

### 6.6.2 UP corrections

A single CR 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

Validity timer expiry

[R2-2303413](file:///C:\Data\3GPP\Extracts\R2-2303413_38.321CR1588_(Rel-17)_Clarification%20on%20UE%20operation%20upon%20validity%20timer%20expiry_v0.docx) Clarification on UL operation upon validity timer expiry Apple CR Rel-17 38.321 17.4.0 1588 - F NR\_NTN\_solutions-Core

* Discussed in offline 102

[R2-2303960](file:///C:\Data\3GPP\Extracts\R2-2303960%20UE%20behaviour%20related%20to%20SR%20and%20RACH%20after%20validity%20timer%20expires.docx) UE behaviour related to SR and RACH after validity timer expires Huawei, HiSilicon discussion Rel-17 NR\_NTN\_solutions-Core Late

* Discussed in offline 102

[R2-2303979](file:///C:\Data\3GPP\Extracts\R2-2303979%20Corrections%20on%20MAC%20procedure%20upon%20validity%20timer%20expiry%20for%20NR%20NTN.docx) Corrections on MAC procedure upon validity timer expiry for NR NTN Nokia, Nokia Shanghai Bell CR Rel-17 38.321 17.4.0 1606 - F NR\_NTN\_solutions-Core

* Discussed in offline 102

[R2-2304001](file:///C:\Data\3GPP\Extracts\R2-2304001_Discussion%20on%20the%20UE%20behaviour%20when%20the%20validity%20timer%20expires.DOCX) Discussion on the UE behaviour when the validity timer expires LG Electronics Inc. discussion NR\_NTN\_solutions-Core

* Discussed in offline 102

Other

[R2-2303820](file:///C:\Data\3GPP\Extracts\R2-2303820%20Corrections%20to%20NR%20NTN%20for%2038.321.docx) Corrections to NR NTN for 38.321 CATT, Turkcell, Huawei, HiSilicon, Quectel, CAICT CR Rel-17 38.321 17.4.0 1597 - F NR\_NTN\_solutions-Core

* Discussed in offline 102

[R2-2303833](file:///C:\Data\3GPP\Extracts\R2-2303833%20-%2038321_CR1598_(Rel-17)%20-%20Correction%20for%20R17%20NR%20NTN%20description%20of%20HARQ%20mode.docx) Correction for R17 NR NTN description of HARQ mode Ericsson CR Rel-17 38.321 17.4.0 1598 - F NR\_NTN\_solutions

* Discussed in offline 102

[R2-2304000](file:///C:\Data\3GPP\Extracts\R2-2304000_Discussion%20on%20the%20restriction%20on%20the%20usage%20of%20the%20same%20HARQ%20mode%20to%20the%20configured%20grant_r1.DOCX) Discussion on the restriction on the usage of the same HARQ mode to the configured grant LG Electronics Inc. discussion NR\_NTN\_solutions-Core

* Discussed in offline 102
* [AT121bis-e][102][NR NTN] UP corrections (Apple)

Initial scope: Discuss corrections in 6.6.2

Initial intended outcome: Summary of the offline discussion with list of agreeable corrections/CRs

Deadline for companies' feedback: Friday 2023-04-21 08:00 UTC

Deadline for rapporteur's summary (in R2-2304242): Friday 2023-04-21 10:00 UTC

Proposals marked "for agreement" in R2-2304242 not challenged until Monday 2023-04-24 10:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online).

R2-2304242 [offline-102] UP corrections Apple discussion Rel-17 NR\_NTN\_solutions-Core

### 6.6.3 CP corrections

A single CR 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

Kmac definition

[R2-2302755](file:///C:\Data\3GPP\Extracts\R2-2302755.docx) Correction to 38.331 for kmac definition           THALES   CR       Rel-17 38.331 17.4.0  3962    -           D   NR\_NTN\_solutions-Core

Moved here from 6.1.3

* Come back after the discussion on the Stage 2 CR

Capabilities

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

* Discuss in offline 113

[R2-2302868](file:///C:\Data\3GPP\Extracts\R2-2302868_R17_NTN-TN_Diff-UE-Capabitlies.docx) Features with different UE capability support in TN and NTN Intel Corporation discussion Rel-17 NR\_NTN\_solutions-Core

* Discuss in offline 113

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

* Discuss in offline 113

[R2-2303785](file:///C:\Data\3GPP\Extracts\38331_CR4027_(Rel-17)_R2-2303785%20Clarification%20on%20feature%20configurations%20upon%20TN%20NTN%20mobility%20in%20RRC_INACTIVE.docx) Clarification on feature configurations upon TN NTN mobility in RRC\_INACTIVE Ericsson CR Rel-17 38.331 17.4.0 4027 - F NR\_NTN\_solutions-Core

* Discuss in offline 113
* [AT121bis-e][113][NR NTN] CP corrections 2 (Intel)

Initial scope: Discuss corrections in 6.6.3 on “capability”

Initial intended outcome: Summary of the offline discussion with list of agreeable corrections/CRs

Deadline for companies' feedback: Friday 2023-04-21 08:00 UTC

Deadline for rapporteur's summary (in R2-2304253): Friday 2023-04-21 10:00 UTC

Proposals marked "for agreement" in R2-2304253 not challenged until Monday 2023-04-24 10:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online).

R2-2304253 [offline-113] CP corrections 2 Intel discussion Rel-17 NR\_NTN\_solutions-Core

Measurement related

PDD

[R2-2303035](file:///C:\Data\3GPP\Extracts\38331_CR3980_(Rel-17)_R2-2303035%20PDD%20value.docx) Clarification on rounding the propagation delay difference value Qualcomm Incorporated CR Rel-17 38.331 17.4.0 3980 - F NR\_NTN\_solutions-Core

* Discuss in offline 112

SMTC

[R2-2303096](file:///C:\Data\3GPP\Extracts\R2-2303096%20Remaining%20issues%20on%20SMTC.doc) Remaining issues on SMTC Huawei, HiSilicon, Google discussion Rel-17 NR\_NTN\_solutions-Core

Proposal 1: On handling the feeder link delay difference of SMTC in SIB2/4, RAN2 to choose from the following options:

- Option 2: Feeder link delay (including common TA parameters and Kmac) difference is compensated by the UE

- Option 4: Kmac part of the feeder link delay is compensated by the NW, and the time variant part (i.e. common TA) of feeder link delay difference is compensated by the UE.

- Huawei indicates that we have now reduced the options to option 2 and 4 and we need to decide.

- Oppo thinks option 2 is what we agreed. MTK, ZTE, Samsung agree with Oppo. Also Intel supports p2

- Google prefers option 4 but can accept to go for option 2

- QC thinks we need to consider the behaviour specified in the current specs and then don’t think they can agree with option 2. LGE agrees

- Apple think option 4 is easier from UE side. On the other hand, Kmac needs to be very accurate if we go for option 2. If this is confirmed, Apple can accept to go for option 2

- Ericsson think that option 2 is the only thing we can do as the NW may need to set Kmac for other reasons the SMTC alignment.

- HW thinks option 2 takes only one additional step in the UE calculation on top of option 4 so there should be no real problem for the UE.

* Continue in offline 112

Proposal 2: On SMTC configuration in MeasurementTimingConfiguration, RAN2 to choose from the following options:

- Understanding a: The SMTC configuration is based on the assumption that transmitting node’s feeder link delay = 0 ms

- Understanding b: The SMTC configuration is based on the assumption that the common TA of transmitting node = 0 ms (but Kmac part is already considered by the transmitting node)

* Continue in offline 112

Proposal 3: For PDD reporting, the configured threshold by the NW and the reported PDD value by the UE refer to the one-way propagation delay.

* Continue in offline 112

Proposal 4: Approve the corresponding TP in the annex.

* Continue in offline 112

[R2-2303412](file:///C:\Data\3GPP\Extracts\R2-2303412_Clarification%20on%20the%20relationship%20between%20SMTC%20and%20satellite_v0.doc) Clarification on the relationship between SMTC and satellite Apple discussion Rel-17 NR\_NTN\_solutions-Core

Observation 1: IDLE/INACTIVE UE performs the SMTC adjustment based on the propagation delay difference.

Observation 2: The propagation delay is different for different satellite.

Observation 3: According to current spec description, there is no restriction on the relationship between SMTC configuration and satellite.

Observation 4: If one SMTC is associated with multiple satellites, the SMTC adjustment in UE side cannot work well.

Proposal: Clarify that one SMTC configuration is only associated with one satellite in 38.300.

* Discuss in offline 112

[R2-2303765](file:///C:\Data\3GPP\Extracts\R2-2303765.docx) Correction on SMTC for NR NTN Samsung CR Rel-17 38.331 17.4.0 4025 - F NR\_NTN\_solutions-Core

* Discuss in offline 112

Neighbour cell measurement

[R2-2303164](file:///C:\Data\3GPP\Extracts\R2-2303164%20Correction%20to%20indicate%20the%20NTN%20cells%20belonging%20to%20the%20same%20satellite.docx) Correction to indicate the NTN cells belonging to the same satellite Nokia, Nokia Shanghai Bell CR Rel-17 38.331 17.4.0 3995 - F NR\_NTN\_solutions-Core

* Discuss in offline 112

38.304

[R2-2303296](file:///C:\Data\3GPP\Extracts\38304_CR0326r1_(Rel-17)_R2-2303296%20Conditions%20to%20Skip%20Neighbor%20Cell%20Measurement%20in%20NTN.docx) Conditions to Skip Neighbor Cell Measurement in NTN Google Inc. CR Rel-17 38.304 17.4.0 0326 1 F NR\_NTN\_solutions-Core [R2-2301703](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121\Tdocs\R2-2301703.zip)

* Discuss in offline 112

SFTD

[R2-2303819](file:///C:\Data\3GPP\Extracts\R2-2303819.docx) Discussion on SFTD Application for NTN cell CATT discussion Rel-17 NR\_NTN\_solutions-Core

* Discuss in offline 112

Misc changes

[R2-2303460](file:///C:\Data\3GPP\Extracts\38331_CR4010_(Rel-17)_R2-2303460%20Corrections%20for%20RLC-Config%20in%20TS%2038.331.docx) Corrections for RLC-Config in TS 38.331 vivo CR Rel-17 38.331 17.4.0 4010 - F NR\_NTN\_solutions-Core

* Discuss in offline 112

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

* Discuss in offline 112

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

* Discuss in offline 112

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

* Discuss in offline 112

Missing referencing

[R2-2303671](file:///C:\Data\3GPP\Extracts\R2-2303671%2038306_CR0894_(Rel-17)_Correction%20on%20missing%20referencing%20of%20the%20NTN%20spec%20in%2038.306_v1.docx) Correction on missing referencing of the NTN spec in 38.306 MediaTek CR Rel-17 38.306 17.4.0 0894 - F NR\_NTN\_solutions-Core

* Continue in offline 112

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

* Continue in offline 112
* [AT121bis-e][112][NR NTN] CP corrections 1 (Huawei)

Initial scope: Discuss corrections in 6.6.3 (apart those on “capability”)

Initial intended outcome: Summary of the offline discussion with list of agreeable corrections/CRs

Deadline for companies' feedback: Friday 2023-04-21 08:00 UTC

Deadline for rapporteur's summary (in R2-2304252): Friday 2023-04-21 10:00 UTC

Proposals marked "for agreement" in R2-2304252 not challenged until Monday 2023-04-24 10:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online).

R2-2304252 [offline-112] CP corrections 1 Huawei discussion Rel-17 NR\_NTN\_solutions-Core

## 7.6 IoT NTN enhancements

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

Time budget: 1 TU

Tdoc Limitation: 4 tdocs

### 7.6.1 Organizational

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

Running CRs

[R2-2303097](file:///C:\Data\3GPP\Extracts\R2-2303097%2036331%20running%20CR%20for%20IOT%20NTN.docx) 36331 running CR for IOT NTN Huawei, HiSilicon draftCR Rel-18 36.331 17.4.0 B IoT\_NTN\_enh-Core

* Noted

[R2-2303838](file:///C:\Data\3GPP\Extracts\R2-2303838%20-%2036300_(Rel-18)%20-%20Running%20CR%20for%20R18%20IoT%20NTN.docx) Running CR for R18 IoT NTN Ericsson discussion Rel-18 36.300 IoT\_NTN\_enh

* Noted

[R2-2303950](file:///C:\Data\3GPP\Extracts\R2-2303950%20Running%20CR%20MAC_36.321_IoT-NTN.docx) Stage-3 running CR for TS 36.321 for Rel-18 IoT-NTN MediaTek Inc. draftCR Rel-17 36.321 17.4.0 IoT\_NTN\_enh

* Noted

Withdrawn

[R2-2302675](file:///C:\Data\3GPP\Extracts\R2-2302675%20Running%20CR%20MAC_36.321_IoT-NTN.docx) Stage-3 running CR for TS 36.321 for Rel-18 IoT-NTN MediaTek Inc. CR Rel-18 36.321 17.4.0 1564 - C LTE\_NBIOT\_eMTC\_NTN-Core Withdrawn

### 7.6.2 Performance Enhancements

#### 7.6.2.1 HARQ enhancements

[R2-2302533](file:///C:\Data\3GPP\Extracts\R2-2302533%20-%20Discussion%20on%20HARQ%20enhancement%20for%20IoT%20NTN.doc) Discussion on HARQ enhancement for IoT NTN OPPO discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2302534](file:///C:\Data\3GPP\Extracts\R2-2302534%20-%20Draft%20LS%20to%20RAN1%20on%20HARQ%20enhancement%20for%20IoT%20NTN.docx) Draft LS to RAN1 on HARQ enhancement for IoT NTN OPPO LS out Rel-18 IoT\_NTN\_enh-Core To:RAN1

[R2-2302557](file:///C:\Data\3GPP\Extracts\R2-2302557.DOCX) Discussion on the HARQ enhancements in IoT NTN CATT discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2302672](file:///C:\Data\3GPP\Extracts\R2-2302672%20On%20Disabling%20HARQ%20Feedback%20in%20IoT-NTN.docx) On Disabling HARQ Feedback in IoT-NTN MediaTek Inc. discussion

[R2-2302819](file:///C:\Data\3GPP\Extracts\R2-2302819%20Further%20discussion%20on%20HARQ%20enhancements.docx) Further discussion on HARQ enhancements ZTE Corporation, Sanechips discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2303041](file:///C:\Data\3GPP\Extracts\R2-2303041%20IoT%20HARQ%20process.doc) Enhancement for UL and DL HARQ processes Qualcomm Incorporated discussion Rel-18 IoT\_NTN\_enh-Core [R2-2300889](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121\Tdocs\R2-2300889.zip)

[R2-2303517](file:///C:\Data\3GPP\Extracts\R2-2303517%20Discussion%20on%20the%20HARQ%20enhancement%20for%20IoT-NTN.docx) Discussion on the HARQ enhancement for IoT-NTN CMCC discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2303644](file:///C:\Data\3GPP\Extracts\R2-2303644%20Discussion%20on%20Timing%20Advance%20Report%20MAC%20CE%20transmission%20in%20eMTC%20NTN.docx) Discussion on Timing Advance Report MAC CE transmission in eMTC NTN Nokia, Nokia Shanghai Bell, Huawei, HiSilicon discussion Rel-18 IoT\_NTN\_enh-Core [R2-2301659](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121\Tdocs\R2-2301659.zip)

[R2-2303713](file:///C:\Data\3GPP\Extracts\R2-2303713%20(R18%20IoT-NTN%20WI%20AI%207.6.2.1)%20-%20disabling%20HARQ%20feedback.docx) Disabling HARQ feedback for IoT-NTN Interdigital, Inc. discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2303837](file:///C:\Data\3GPP\Extracts\R2-2303837%20-%20R18%20IoT%20NTN%20HARQ%20enhancements.docx) R18 IoT NTN HARQ enhancements Ericsson discussion Rel-18 IoT\_NTN\_enh

[R2-2303964](file:///C:\Data\3GPP\Extracts\R2-2303964%20Discussion%20on%20HARQ%20enhancements.doc) Discussion on HARQ enhancements Huawei, HiSilicon discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2304030](file:///C:\Data\3GPP\Extracts\R2-2304030%20Discussion%20on%20HARQ%20enhancement.doc) Discussion on HARQ enhancement Xiaomi discussion Rel-18

[R2-2304032](file:///C:\Data\3GPP\Extracts\R2-2304032%20LS%20on%20NPDCCH%20monitoring%20for%20HARQ%20mode%20B.docx) LS on NPDCCH monitoring for HARQ mode B Xiaomi LS out Rel-18 To:RAN1

* [AT121bis-e][103][IoT NTN Enh] HARQ enhancements (Oppo)

Initial scope: Discuss the proposals in the submitted contributions in AI 7.6.2.1

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

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

Deadline for companies' feedback: Wednesday 2023-04-19 12:00 UTC

Deadline for rapporteur's summary (in R2-2304243): Wednesday 2023-04-19 16:00 UTC

Updated scope: Discuss the remaining proposals from R2-2304243 and draft an LS to RAN1 on RAN2 meeting agreements and agreed questions to RAN1

Updated intended outcome: Summary of the offline discussion and Draft LS to RAN1

Deadline for companies' feedback: Tuesday 2023-04-25 06:00 UTC

Deadline for rapporteur's summary (in R2-2304254) and draft LS (in R2-2304255): Tuesday 2023-04-25 08:00 UTC

Proposals marked "for agreement" in R2-2304254 not challenged until Tuesday 2023-04-25 20:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Wednesday CB session).

[R2-2304243](file:///C:\Data\3GPP\RAN2\Inbox\R2-2304243.zip) [offline-103] HARQ Enhancements Oppo discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: [9/13] RAN2#121’s agreement is revised to “For NB-IoT NTN with single HARQ process when the HARQ feedback is disabled, the UE will start/restart drx-inactivity timer in the subframe containing the last repetition of the corresponding PDSCH reception plus 12 subframes plus deltaPDCCH”.

* Ericsson thinks this is an optimization, but legacy has this issue too: if the PDCCH indicates a new transmission (DL, UL or SL): - except for an NB-IoT UE configured with a single DL and UL HARQ process and when PDCCH indicates the transmission is not for multiple TBs: - start or restart drx-InactivityTimer.
* ZTE supports this and not so sure legacy has this issue.
* Agreed
* Can further check in the NB-IoT session if anything needs to be done for legacy NB-IoT as well, as some timers don’t take deltaPDCCH into account

Proposal 2: [13/14] Wait for RAN1’s decision on the RRC signalling of enabling DCI-based solution to indicate HARQ feedback enabled/disabled, and the signalling granularity, e.g. per UE or per HARQ process.

* Agreed (we wait)

Proposal 3: [11/13] P2 in R2-2302557 is not agreed.

* CATT would like to further discuss this
* P2 is about checking which option is RAN1 agreement “[1) If one HARQ process is disabled and the other not, UE should still monitor NPDCCH after NPDSCH (for other HARQ processes). 2) If one HARQ process is disabled and the other not, UE should stop monitoring NPDCCH for “Y=12(ms)” after NPDSCH (for all HARQ processes).”
* CATT thinks some update to legacy behaviour is needed
* ZTE has a different understanding on option 2 (this is only for HARQ process with disabled HARQ feedback) and no need to change anything. Nokia agrees
* Continue offline

Proposal 4: On DCI indication overriding RRC configuration for the HARQ feedback enabled/disabled, wait for RAN1’s progress on DCI-based solution before discussing related DRX impact in RAN2.

* Agreed (we wait)

Proposal 5: [11/14] On DL multiple TB scheduling, wait for RAN1’s progress before discussing related DRX impact in RAN2.

* QC wonders if RAN1 is also discussion this. MTK thinks there is no progress and most likely there will be no progress at this meeting
* Agreed (we wait)

Proposal 6: [11/14] P4 in R2-2302557 is not agreed, i.e. no special handling for single HARQ process for eMTC.

* Agreed

Proposal 7: [13/13] For eMTC NTN, a parameter harq-FeedbackEnablingforSPSactive could be configured for a UE. If harq-FeedbackEnablingforSPSactive is configured to enable HARQ feedback, UE reports ACK/NACK for the first SPS PDSCH after activation, regardless of if HARQ feedback is enabled or disabled corresponding to the first SPS PDSCH after activation.

* Agreed

Proposal 8: [11/14] For a NB-IoT UE configured with a single HARQ process in HARQ mode B, send LS to RAN1 and ask for the additional processing time for starting drx-InactivityTimer (i.e. start to monitor NPDCCH).

* QC thinks RAN1 has to update this because they still need to consider HARQ disabled.
* Oppo thinks we’d better send the LS to RAN1. Ericsson agrees
* For a NB-IoT UE configured with a single HARQ process in HARQ mode B, send LS to RAN1 and ask for the “processing time for starting drx-InactivityTimer (i.e. start to monitor NPDCCH)”. (can further check the detailed wording of the question)

Proposal 9: [12/14] Network implementation resolves the issue of ambiguity on start of DRX inactivity timer after the PUSCH transmission by not scheduling the NPDCCH back-to-back during the ambiguity period (i.e., Koffset – UE’s TA).

* Oppo confirms this has no spec impact
* Agreed

Proposal 10: Send LS to RAN1 to check for UL multiple TB scheduling, which UL HARQ mode combination(s) are to be supported.

* Agreed

Proposal 11: For the UL HARQ mode, at least RRC configuration is supported. Send LS to RAN1 and ask whether RAN1 intends to introduce the DCI-based solution.

* HW would like to reword as: “Proposal 11: Send an LS to RAN1 and ask whether similar mechanism as for DL HARQ feedback disabling can be used for indication UL HARQ mode, i.e., both RRC based and DCI based solutions are supported.”
* Mediatek prefers the original Proposal 11 and objects the modifications suggested by HW: 1. First of all RRC and DCI solutions in RAN1 are still under Working Assumption and final agreements in RAN1 are not made yet. 2. RAN1 has not discussed about UL HARQ yet. So “whether RAN1 intends to introduce the DCI-based solution” makes more sense.
* HW can agreed with original p11
* QC thinks RAN1 is not working on this and we shouldn’t trigger work on this in RAN1
* Oppo thinks this is RAN1 domain and a number of companies would like to have a unified solution for UL and DL. Nokia agrees
* Samsung agrees with QC. ZTE agrees. MTK agrees
* Don’t send an explicit question to RAN1 on this

Proposal 12a: (14/14) UL transmission using SPS can be configured with HARQ mode B.

* Agreed

Proposal 12b: (13/14) UL transmission using PUR can be configured with HARQ mode B.

* Samsung wonders what is the need for HARQ mode B for PUR.
* MTK thinks this is to support blind retx
* Continue offline

Proposal 13: (10/13) For eMTC NTN, it can be left to eNB’s implementation to enable HARQ feedback if mpdcch-UL-HARQ-ACK-FeedbackConfig is configured.

* Ericsson thinks that if we do this then this is not applicable to eMTC
* Continue offline

Proposal 14: (4:4:5) Discuss online for IoT NTN whether to enhance the TAR MAC CE transmission which was discussed in Rel-17 NR NTN.

* Nokia would like to clarify that it is for eMTC NTN instead of IoT NTN, i.e. as

“New Proposal 14: Discuss online for ~~IoT~~eMTC NTN whether to enhance the TAR MAC CE transmission to avoid or mitigate the outdated TA and Koffset impact in Rel-18. ~~which was discussed in Rel-17 NR NTN.~~”

* Nokia thinks we need to discuss this in Rel-18 in IoT-NTN
* Continue in the next meeting

Proposal 15: (13/14) P1 in R2-2303713 is not agreed, i.e. do not enhance the LCP restriction based on uplinkHARQ-Mode for different RLC PDU types.

* Agreed

Proposal 16: (13/13) Send LS to RAN1 informing RAN2’s agreements and also including potential questions to be checked with RAN1, e.g.:

• the additional processing time for starting drx-InactivityTimer for NB-IoT UE with single HARQ process in HARQ mode B;

• which UL HARQ mode combination(s) are supported for UL multiple TB scheduling;

• whether RAN1 intends to introduce the DCI-based solution for indicating UL HARQ mode.

* Send LS to RAN1 informing RAN2’s agreements and also including potential questions to be checked with RAN1

Agreements:

1. RAN2#121’s agreement is revised to “For NB-IoT NTN with single HARQ process when the HARQ feedback is disabled, the UE will start/restart drx-inactivity timer in the subframe containing the last repetition of the corresponding PDSCH reception plus 12 subframes plus deltaPDCCH” (Can further check in the NB-IoT session if anything needs to be done for legacy NB-IoT as well, as some timers don’t take deltaPDCCH into account)
2. Wait for RAN1’s decision on the RRC signalling of enabling DCI-based solution to indicate HARQ feedback enabled/disabled, and the signalling granularity, e.g. per UE or per HARQ process
3. On DCI indication overriding RRC configuration for the HARQ feedback enabled/disabled, wait for RAN1’s progress on DCI-based solution before discussing related DRX impact in RAN2.
4. On DL multiple TB scheduling, wait for RAN1’s progress before discussing related DRX impact in RAN2.
5. P4 in R2-2302557 is not agreed, i.e. no special handling for single HARQ process for eMTC.
6. For eMTC NTN, a parameter harq-FeedbackEnablingforSPSactive could be configured for a UE. If harq-FeedbackEnablingforSPSactive is configured to enable HARQ feedback, UE reports ACK/NACK for the first SPS PDSCH after activation, regardless of if HARQ feedback is enabled or disabled corresponding to the first SPS PDSCH after activation.
7. For a NB-IoT UE configured with a single HARQ process in HARQ mode B, send LS to RAN1 and ask for the “processing time for starting drx-InactivityTimer (i.e. start to monitor NPDCCH)”. (can further check the detailed wording of the question)
8. Network implementation resolves the issue of ambiguity on start of DRX inactivity timer after the PUSCH transmission by not scheduling the NPDCCH back-to-back during the ambiguity period (i.e., Koffset – UE’s TA)
9. Send LS to RAN1 to check for UL multiple TB scheduling, which UL HARQ mode combination(s) are to be supported.
10. In the LS to RAN1, we don’t include a question on whether RAN1 intends to introduce the DCI-based solution for the UL HARQ mode
11. UL transmission using SPS can be configured with HARQ mode B
12. P1 in R2-2303713 is not agreed, i.e. do not enhance the LCP restriction based on uplinkHARQ-Mode for different RLC PDU types
13. Send LS to RAN1 informing RAN2’s agreements and also including potential questions to be checked with RAN1

R2-2304254 [offline-103] HARQ Enhancements – second round Oppo discussion Rel-18 IoT\_NTN\_enh-Core

R2-2304255 Draft LS on HARQ Enhancements Oppo LSout To:RAN1 Rel-18 IoT\_NTN\_enh-Core

#### 7.6.2.2 GNSS operation enhancements

[R2-2302543](file:///C:\Data\3GPP\Extracts\R2-2302543%20GNSS%20operation.doc) Discussion on GNSS operation for IoT NTN OPPO discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2302558](file:///C:\Data\3GPP\Extracts\R2-2302558.docx) Discussion on GNSS operation in connected mode CATT discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2302673](file:///C:\Data\3GPP\Extracts\R2-2302673%20Enhancements%20on%20GNSS%20operation.docx) GNSS operation enhancements MediaTek Inc. discussion

[R2-2302820](file:///C:\Data\3GPP\Extracts\R2-2302820%20Procedure%20of%20GNSS%20reacquisition.docx) Procedure of GNSS reacquisition ZTE Corporation, Sanechips discussion IoT\_NTN\_enh-Core

[R2-2303044](file:///C:\Data\3GPP\Extracts\R2-2303044%20GNSS%20operation.doc) GNSS fix in RRC\_CONNECTED Qualcomm Incorporated discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2303250](file:///C:\Data\3GPP\Extracts\R2-2303250%20On%20GNSS%20position%20fix%20in%20RRC_CONNECTED%20for%20IoT%20NTN.docx) On GNSS position fix in RRC\_CONNECTED for IoT NTN Lenovo discussion Rel-18

[R2-2303297](file:///C:\Data\3GPP\Extracts\R2-2303297%20Discussion%20on%20the%20GNSS%20Validity%20Reporting%20in%20Connected%20State.docx) Discussion on the GNSS Validity Reporting in Connected State Google Inc. discussion Rel-18

[R2-2303330](file:///C:\Data\3GPP\Extracts\R2-2303330%20GNSS%20fix.docx) GNSS fix in connected mode NEC discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2303404](file:///C:\Data\3GPP\Extracts\R2-2303404_Improved%20GNSS%20Operation.doc) Improved GNSS Operation Apple discussion Rel-18 IoT\_NTN\_enh

[R2-2303518](file:///C:\Data\3GPP\Extracts\R2-2303518%20Discussion%20on%20GNSS%20enhancement%20for%20IoT-NTN.docx) Discussion on GNSS enhancement for IoT-NTN CMCC discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2303645](file:///C:\Data\3GPP\Extracts\R2-2303645%20Discussion%20on%20enhancements%20on%20GNSS%20operation%20for%20IoT%20NTN.docx) Discussion on enhancements on GNSS operation for IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2303714](file:///C:\Data\3GPP\Extracts\R2-2303714%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

* Revised in [R2-2304183](file:///C:\Data\3GPP\Extracts\R2-2304183%20(R18%20IoT-NTN%20WI%20AI%207.6.2.2)%20GNSS%20enhancements.docx)

[R2-2304183](file:///C:\Data\3GPP\Extracts\R2-2304183%20(R18%20IoT-NTN%20WI%20AI%207.6.2.2)%20GNSS%20enhancements.docx) GNSS acquisition and reporting for IoT NTN InterDigital, Europe, Ltd. discussion Rel-18 IoT\_NTN\_enh-Core [R2-2303714](file:///C:\Data\3GPP\Extracts\R2-2303714%20(R18%20IoT-NTN%20WI%20AI%207.6.2.2)%20GNSS%20enhancements.docx)

[R2-2303836](file:///C:\Data\3GPP\Extracts\R2-2303836%20-%20R18%20IoT%20NTN%20GNSS%20operation%20enhancements.docx) R18 IoT NTN GNSS operation enhancements Ericsson discussion Rel-18 IoT\_NTN\_enh

[R2-2303965](file:///C:\Data\3GPP\Extracts\R2-2303965%20Discussion%20on%20GNSS%20operation%20enhancements.doc) Discussion on GNSS operation enhancements Huawei, HiSilicon discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2304017](file:///C:\Data\3GPP\Extracts\R2-2304017%20On%20improved%20GNSS%20operation%20for%20IoT%20NTN.docx) On improved GNSS operation for IoT NTN Samsung R&D Institute UK discussion Rel-18 IoT\_NTN\_enh

[R2-2304029](file:///C:\Data\3GPP\Extracts\R2-2304029%20Discussion%20on%20GNSS%20operation%20enhancement.doc) Discussion on GNSS operation enhancement Xiaomi discussion Rel-18

* [AT121bis-e][104][IoT NTN Enh] GNSS operation enhancements (Mediatek)

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

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

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

Deadline for companies' feedback: Wednesday 2023-04-19 18:00 UTC

Deadline for rapporteur's summary (in R2-2304244): Wednesday 2023-04-19 20:00 UTC

Updated scope: Discuss the remaining proposals from R2-2304244

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

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

Deadline for companies' feedback: Tuesday 2023-04-25 02:00 UTC

Deadline for rapporteur's summary (in R2-2304256): Tuesday 2023-04-25 04:00 UTC

Proposals marked "for agreement" in R2-2304256 not challenged until Tuesday 2023-04-25 20:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Wednesday CB session).

[R2-2304244](file:///C:\Data\3GPP\RAN2\Inbox\R2-2304244.zip) [offline-104] GNSS operation enhancements Mediatek discussion Rel-18 IoT\_NTN\_enh-Core

- Proposals with Consensus

Proposal 2 (20/20): There is no need for UE to provide GNSS position fix time duration in Msg3.

* Agreed

Proposal 11 (19/19): RAN2 selects “Option 1: Suspend the RLM” for addressing the issue of possible RLF during the measurement gap.

* Agreed: RLM is suspended during the GNSS measurement gap while the UE is measuring GNSS

- Proposals with Majority

Proposal 3 (16/19): RAN2 will wait for further progress in RAN1 about UE’s reporting of GNSS position fix time duration in RRC connected state.

* ZTE thinks we should decide. QC agrees. Ericsson agrees
* Further discuss if we can take an Agreement/Working Assumption that the UE does not need to report GNSS position fix time duration in RRC connected state as this value doesn’t change and then send LS to RAN1 to check this

Proposal 4 (15/19): UE can stay in RRC\_CONNECTED state when current GNSS position becoming out-of-date if the UE has initiated a new measurement

* Continue offline

Proposal 5 (16/19): RAN2 will wait for further progress in RAN1 about UE’s reporting of GNSS position fix time duration in RRC connected state???

* VC assumes the intended proposal was something like:

Proposal 5 (16/20) “GNSS validity duration UE reported after GNSS measurement is the remaining validity duration”

* ZTE has strong concerns on this as this would cause additional signalling: the UE would have to send this every time. HW agrees. Samsung does not see this problem: there is no need to report every time
* Continue offline

Proposal 6 (17/20): UE will report the GNSS validity duration by using a MAC CE.

* QC and MTK think that RRC does not work for NB-IoT NTN
* Continue offline

Proposal 8 (15/19): RAN2 will not discuss allowing multiple attempts of GNSS measurement.

* Xiaomi thinks this depend on how we configure the measurement gap
* Continue offline

Proposal 9 (15/19): There is no need to send LS to RAN1/SA3 for RAN2’s security concern about using MAC CE for aperiodic triggering.

* Continue offline

Proposal 10 (17/19): RAN2 will postpone the discussion of UE autonomously reacquire GNSS during inactive state of C-DRX until there is some more progress in RAN1.

* Continue offline

Proposal 12 (16/19): RAN2 will use “Option 2: Postpone reading SIB31 until GNSS measurement is completed” to resolve the conflict between reading SIB31 in connected and GNSS measurement.

* Continue offline

- Proposals for further discussions

Proposal 1: RAN2 will discuss if UE should report the GNSS position fix duration in RRCReestablishmentComplete(-NB) and RRCConnectionReconfigurationComplete messages.

Proposal 7: RAN2 will further discuss if the UE will always report the GNSS validity duration after GNSS measurement.

Agreements:

1. There is no need for UE to provide GNSS position fix time duration in Msg3.
2. RLM is suspended during the GNSS measurement gap while the UE is measuring GNSS

R2-2304256 [offline-104] GNSS operation enhancements – second round Mediatek discussion Rel-18 IoT\_NTN\_enh-Core

### 7.6.3 Mobility Enhancements

#### 7.6.3.1 Enhancements for neighbour cell measurements

Including outcome of:

[Post121][105][IoT NTN Enh] Neighbour cell assistance information (Qualcomm)

[R2-2303652](file:///C:\Data\3GPP\Extracts\R2-2303652%20neighbor%20cell%20info_report.docx) Report of [POST121][105][IoT NTN Enh] Neighbour cell assistance information Qualcomm Technologies Ireland discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1 In addition to ephemeris and optional epoch time of the satellite associated with a neighbor cell, following parameters can be optionally broadcast as neighbor cell assistance information:

- (15/18) Validity duration.

- (15/18) Common TA parameters.

- (12/18) For fixed cell, cell start time.

- (9/18) FFS, cell stop time for fixed cell.

- (8/18) FFS, reference location and distance threshold for moving cell.

- Samsung would like to discuss how the validity duration is used first

- Oppo thinks we need to discuss the need for common TA parameter as there is no SMTC in LTE. QC thinks this is needed. HW also think this is needed otherwise the UE would have to blindly detect the neighbour cell reference signals. Intel agrees with HW. Oppo wonders if source cell and target cells are always in sync, otherwise the UE would anyway have to perform blind detection. QC thinks the UE would have to maintain the knowledge about the time offset between the cells

- Oppo wonders about kmac. HW thinks this is needed

* Continue offline (main focus is on Validity duration and Common TA parameters)

Proposal 2 (15/18) In SIB, list of neighbor satellites is provided. For each satellite, list of frequencies/cells is included. FFS on clarification of the absence case of ephemeris and frequencies/cells.

* QC thinks this the simplest but indeed the list of frequencies consume a large number of bits
* ZTE agrees that the list of frequencies consume a large number of bits and wonders if the UE would also have to acquire SIB5 in this case. QC thinks this is the case.
* Apple wonders if adding a satellite ID to the frequency lists in SIB5 would impact of UE not supporting NTN
* HW wonders if it’s possible to have NTN and TN on the same frequency. QC thinks this scenario would have to be avoided.
* Continue offline

Proposal 3 (14/18) Introduce satellite ID for the satellite in a list.

* Continue offline

Proposal 4 (17/18) New SIBxx is introduced to broadcast the neighbor cell/satellite information.

* Agreed

Agreements:

1. New SIBxx is introduced to broadcast the neighbor cell/satellite information.

\*\*\* Check whether recent agreements for NR NTN mobility enhancements can also be applied to IoT NTN enhancements \*\*\*

- RAN2#121 agreements for IoT NTN enhancements:

1. Location-based connected mode measurement initiation is supported in quasi-Earth-fixed cell (UE is not required to update the GNSS location for this). A serving cell reference location and a distance threshold/radius for detecting when to trigger connected mode measurements will be broadcast for quasi-Earth-fixed cell. FFS on whether the R17 IEs are reused or not. FFS if the same mechanism can also be used in idle (like in NR-NTN)

* Continue offline on the highlighted FFS (i.e. if the same mechanism can also be used in idle)

2. Location-based connected mode measurement initiation is supported in earth-moving cell (UE is not required to update the GNSS location for this). A serving cell reference location and a distance threshold/radius for detecting when to trigger connected mode measurements will be broadcast for earth-moving cell. FFS on whether the R17 IEs are reused or not. FFS on whether additional information needs to be broadcast to inform the UE how the reference location moves over time or if this can be derived from other information (e.g. Epoch time and ephemeris). FFS if the same mechanism can also be used in idle (like in NR-NTN)

* Continue offline on the highlighted FFSs, taking into account the recent RAN2#121bis-e agreements for NR NTN

- RAN2#121bis-e agreements for NR NTN enhancements:

1. RAN2 understands that for earth-moving cell reselection, the UE can derive the trajectory of serving cell with rough accuracy based on serving satellite ephemeris and epochTime, with the assumption that the serving cell reference location broadcast by the network is the one at Epoch time (FFS whether a new epochTime IE is needed). RAN2 understanding is that both PVT and orbital parameters can be used for this. FFS if additional information is needed to allow more accurate measurements.

* Check offline if this can be extended to IoT NTN

2. For earth-moving cell, new IE is introduced to indicate the reference location of serving cell.

* No need to check this (broadcast of serving cell reference location for earth-moving cell has already been agreed also for IoT-NTN, and clearly this will be a new IE)

3. For cell (re)selection in earth-moving system, a distance threshold is introduced for location-based measurement initiation, which reuses distanceThresh in SIB19.

* Check offline if “distanceThresh in SIB19” can also be used for IoT-NTN

4. For cell (re)selection in earth-moving system, time-based measurement initiation is used to address feeder-link switch case.

* Check offline if this can be extended to IoT NTN

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* [AT121bis-e][114][IoT NTN Enh] Neighbour cell measurements (Qualcomm)

Scope: Discuss the remaining proposals from R2-2303652 and whether recent RAN2#121bis-e agreements for NR NTN can be extended to IoT-NTN

Intended outcome: Summary of the offline discussion with e.g.:

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

Deadline for companies' feedback: Tuesday 2023-04-25 02:00 UTC

Deadline for rapporteur's summary (in R2-2304257): Tuesday 2023-04-25 04:00 UTC

Proposals marked "for agreement" in R2-2304257 not challenged until Tuesday 2023-04-25 20:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Wednesday CB session).

R2-2304257 [offline-114] Neighbour cell measurements Qualcomm discussion Rel-18 IoT\_NTN\_enh-Core

Neighbour cell measurements before RLF

[R2-2303715](file:///C:\Data\3GPP\Extracts\R2-2303715%20(R18%20IoT-NTN%20WI%20AI%207.6.3.1)%20-%20measurements%20before%20RLF.docx) Neighbour cell measurements before RLF Interdigital, Inc. discussion Rel-18 IoT\_NTN\_enh-Core

- For quasi-earth fixed cells:

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

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

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

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

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

- For earth-moving cells:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

[R2-2303192](file:///C:\Data\3GPP\Extracts\R2-2303192-IoT-NTN-Mobility-Enhancements-V2.docx) connected mode measurement triggering conditions and RLF enhancements for IoT-NTN Nokia, Nokia Shanghai Bell discussion

Proposal 7: Fast RLF declaration based on measurement availability is considered for LEO scenario for NB-IoT NTN.

Proposal 8: RLF declaration and the start of re-establishment is linked to service time in EFC for NB-IoT-NTN.

[R2-2302512](file:///C:\Data\3GPP\Extracts\R2-2302512_121bis-e_NTNNTN_mobility_enhancements_earth-moving_ito_measurement_initiation_cell_reselection_handover.docx) NTN mobility enhancements for earth-moving cell scenario ito. measurement initiation, cell reselection and handover PANASONIC R&D Center Germany discussion IoT\_NTN\_enh

[R2-2302535](file:///C:\Data\3GPP\Extracts\R2-2302535%20-%20Discussion%20on%20measurement%20enhancement%20for%20IoT%20NTN.doc) Discussion on measurement enhancement for IoT NTN OPPO discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2302559](file:///C:\Data\3GPP\Extracts\R2-2302559.docx) Discussion on the mobility enhancements for IoT NTN UE CATT discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2302674](file:///C:\Data\3GPP\Extracts\R2-2302674%20Enhancements%20on%20neighbour%20cell%20measurement.docx) Enhancements for neighbour cell measurements MediaTek Inc. discussion

[R2-2302700](file:///C:\Data\3GPP\Extracts\R2-2302700%20Discussion-on-neighbour-cell-measurements-in-IoT-NTN.docx) Discussion on neighbour cell measurements in IoT NTN Intel Corporation discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2302821](file:///C:\Data\3GPP\Extracts\R2-2302821%20Details%20of%20new%20triggers%20for%20neighbor%20cell%20measurement.docx) Details of new triggers for neighbor cell measurement ZTE Corporation, Sanechips discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2303043](file:///C:\Data\3GPP\Extracts\R2-2303043%20neighbor%20cell%20info.doc) Satellite and coverage information signalling Qualcomm Incorporated discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2303098](file:///C:\Data\3GPP\Extracts\R2-2303098%20Discussion%20on%20mobility%20enhancements.doc) Discussion on mobility enhancements Huawei, HiSilicon, Turkcell discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2303251](file:///C:\Data\3GPP\Extracts\R2-2303251%20Further%20considerations%20on%20neighbour%20cell%20measurement%20in%20RRC_CONNECTED.docx) Further considerations on neighbour cell measurement in RRC\_CONNECTED Lenovo discussion Rel-18

[R2-2303436](file:///C:\Data\3GPP\Extracts\R2-2303436%20Consideration%20on%20enhancements%20for%20the%20neighbour%20cell%20measurement.doc) Consideration on enhancements for the neighbour cell measurement Xiaomi discussion

[R2-2303519](file:///C:\Data\3GPP\Extracts\R2-2303519%20Discussion%20on%20mobility%20enhancements%20for%20IoT-NTN.docx) Discussion on mobility enhancements for IoT-NTN CMCC discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2304016](file:///C:\Data\3GPP\Extracts\R2-2304016%20On%20enhancements%20for%20neighbour%20cell%20measurements.docx) On enhancements for neighbour cell measurements Samsung R&D Institute UK discussion Rel-18 IoT\_NTN\_enh

#### 7.6.3.2 Other

[R2-2303252](file:///C:\Data\3GPP\Extracts\R2-2303252%20IDLE%20mobility%20for%20moving%20cells%20in%20IoT%20NTN%20(Revision%20of%20R2-2300981).docx) IDLE mobility for moving cells in IoT NTN Lenovo discussion Rel-18

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

[R2-2304018](file:///C:\Data\3GPP\Extracts\R2-2304018%20On%20IoT%20NTN%20CHO%20and%20other%20mobility%20enhancements.docx) On IoT NTN CHO and other mobility enhancements Samsung R&D Institute UK discussion Rel-18 IoT\_NTN\_enh

### 7.6.4 Enhancements to discontinuous coverage

[R2-2303716](file:///C:\Data\3GPP\Extracts\R2-2303716%20(R18%20IoT-NTN%20WI%20AI%207.6.4)%20-%20discontinuous%20coverage.docx) IoT-NTN discontinuous coverage enhancements Interdigital, Inc. discussion Rel-18 IoT\_NTN\_enh-Core

- RRC\_IDLE and RRC\_INACTIVE

Proposal 1: For eMTC and NB-IoT: A UE in R17 is allowed not to perform RRC\_IDLE mode tasks during a UE unreachability period. Consider whether to explicitly clarify that this means that if a UE in RRC\_IDLE or RRC\_INACTIVE determines it is in a UE unreachability period, the UE may choose not to perform measurements of the serving cell or neighbour cells, and may postpone moving to “any cell selection” state, and is allowed not to attempt to monitor paging occasions which occur during a UE unreachability period.

* Continue offline

- Paging

Proposal 2: PTW can be adjusted with co-ordination between UE and NW to account for UE unreachability periods.

* Apple wonders how to interpret co-ordination in this case.
* QC thinks that this is not in RAN2 scope and we need input from SA2. MTK agrees
* HW suggests to use the wording: “PTW configuration should take into account for UE unreachability periods. (Also agreed by SA2)”
* IDC wonders can existing configuration avoid coverage gap?
* Intel thinks RAN2 can still enhance the calculation of PTW to align with in-coverage time
* Continue offline to check whether anything needs to be done / can be done in RAN2, in line with the SA2 agreement on this

Proposal 3: RAN2 to down select between the following options for PTW adjustment:

* Option 1 (configurable offset)
* Option 2 (updated PTW calculation)
* Option 3 (UE/NW autonomous adjustment)
* Option 4 (other?)

- HW thinks this does not cover all the options, we could also consider to configure more than one PTW. IDC thinks this is covered by option2 (evenly distribute taking coverage window into account)

- ZTE thinks that option 3 is not feasible

* Continue offline

- RLM, RLF

Proposal 4: For eMTC and NB-IoT: RLM, RLF detection, and RRC re-establishment are suspended during a UE unreachability period.

- QC wonders what unreachability period means

* Continue offline

- RRC Reconfiguration

Proposal 5: For eMTC: To avoid always sending the UE to RRC\_IDLE/RRC\_INACTIVE during a UE unreachability period, introduce an activation time in RRC Reconfiguration to allow handover between cells occurring before and after a UE unreachability period.

* Continue offline

Proposal 6: For eMTC: Consider how discontinuous coverage impacts CHO.

* Continue offline

- Reporting of UE unreachability period

Proposal 7: RAN2 to discuss whether it can be assumed that reporting of UE unreachability period in Registration Request can be kept sufficiently (i.e. to support AS based solutions) up to date and takes into consideration UE mobility, or whether this needs to be confirmed with SA2.

- MTK wonders if this only for eMTC or NB-IoT NTN as well

* Continue offline

[R2-2302822](file:///C:\Data\3GPP\Extracts\R2-2302822%20RAN2%20enhancements%20for%20discontinuous%20coverage.docx) RAN2 enhancements for discontinuous coverage ZTE Corporation, Sanechips discussion IoT\_NTN\_enh-Core [R2-2301057](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121\Tdocs\R2-2301057.zip)

- Potential RAN2 impacts for idle mode UEs

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

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

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

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

- Potential RAN2 enhancements for connected mode UEs

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

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

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

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

* (a subset of) these proposals can be considered in offline discussion 115

[R2-2303193](file:///C:\Data\3GPP\Extracts\R2-2303193-Discontinuous%20coverage%20for%20IoT%20NTN.docx) On RAN impacts for Discontineous coverage enhancements Nokia, Nokia Shanghai Bell discussion

- On the scope of RAN2 work

Observation 1: The signalling of unreachability periods is out of RAN2’s scope.

Observation 2: SA2 conclusions require the UE has satellite assistance information to predict the discontinuous coverage.

Observation 3: SA2 conclusions require a UE capability to predict unreachability periods and determining of related timers & parameters.

- Assistance Information for DC related enhancements

Observation 4: UE may determine that the SIB32 satellite assistance information is not relevant for the future location(s) of the UE.

Proposal 1: RAN2 to discuss the provisioning of additional satellites’ ephemeris via dedicated RRC signalling.

Observation 5: The SIB does not provide information, which enables the UE to estimate the end of coverage, for the serving cell in the discontinuous coverage scenario.

Proposal 2: RAN2 to include footprint information for the earth-moving cell in discontinuous coverage as an optional field in SIB31.

- Idle mode functionality impacts for DC related enhancements

Observation 6: The UE unreachability period can be used to configure the PSM. SA2 is responsible for ensuring the PSM timers T3412 and T3324 has the appropriate granularity.

Proposal 3: The PSM and eDRX configurations can be configured to align with the estimated UE unreachability period

Observation 8: UE prediction error and UE movement may result in misalignment of the paging window and the coverage window/unreachability period.

Proposal 4: Network can extend the paging before/after the coverage window if the UE does not respond to paging within the estimated coverage window.

Proposal 5: UE can extend the paging monitoring outside the estimated coverage window if radio coverage is available. UE may report to the network to realign the paging monitoring and coverage windows.

Observation 9: UE movement within the same TA may result in failed and delayed paging if the UE is in coverage during a different reachability period than the one agreed with the core network.

Proposal 6: RAN2 to discuss how to handle UE movement within the same TA during discontinuous coverage.

Proposal 7: RAN2 to consider provisioning cell availability information to enable moving and cold start UEs to determine cell search and reselection measurement period(s) to enhance energy-saving potential.

- Connected mode functionality impacts for DC related enhancements

Proposal 8: RAN2 to discuss support for UE request for RRC connection release based on DC estimation. FFS support for implicit RRC connection release.

Proposal 9: RAN2 to discuss UE behaviour when the UE has limited remaining GNSS validity duration and the remaining discontinuous coverage time is also short.

* (a subset of) these proposals can be considered in offline discussion 115
* [AT121bis-e][115][IoT NTN Enh] Discontinuous coverage enhancements (Interdigital)

Scope: Discuss possible discontinuous coverage enhancements based on [R2-2303716](file:///C:\Data\3GPP\Extracts\R2-2303716%20(R18%20IoT-NTN%20WI%20AI%207.6.4)%20-%20discontinuous%20coverage.docx) and possibly including proposals from other contributions as well ([R2-2302822](file:///C:\Data\3GPP\Extracts\R2-2302822%20RAN2%20enhancements%20for%20discontinuous%20coverage.docx), [R2-2303193](file:///C:\Data\3GPP\Extracts\R2-2303193-Discontinuous%20coverage%20for%20IoT%20NTN.docx))

Intended outcome: Summary of the offline discussion with e.g.:

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

Deadline for companies' feedback: Tuesday 2023-04-25 06:00 UTC

Deadline for rapporteur's summary (in R2-2304258): Tuesday 2023-04-25 08:00 UTC

Proposals marked "for agreement" in R2-2304258 not challenged until Tuesday 2023-04-25 20:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Wednesday CB session).

R2-2304258 [offline-115] Discontinuous coverage enhancements Interdigital discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2302560](file:///C:\Data\3GPP\Extracts\R2-2302560.docx) Discussion on enhancements to discontinuous coverage CATT discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2303042](file:///C:\Data\3GPP\Extracts\R2-2303042%20DC%20enhancement.doc) RRC release procedure in discontinuous coverage Qualcomm Incorporated discussion Rel-18 IoT\_NTN\_enh-Core [R2-2300890](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121\Tdocs\R2-2300890.zip)

[R2-2303052](file:///C:\Data\3GPP\Extracts\R2-2303052.docx) Enhancements to discontinuous coverage Samsung R&D Institute UK discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2303111](file:///C:\Data\3GPP\Extracts\R2-2303111%20Considerations%20on%20Supporting%20Discontinuous%20Coverage.docx) Considerations on Supporting Discontinuous Coverage NEC Europe Ltd discussion Rel-18 IoT\_NTN\_enh-Core [R2-2300878](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121\Tdocs\R2-2300878.zip)

[R2-2303253](file:///C:\Data\3GPP\Extracts\R2-2303253%20On%20mobility%20and%20power%20saving%20issues%20for%20discontinuous%20coverage%20(Revision%20of%20R2-2300982).docx) On mobility and power saving issues for discontinuous coverage Lenovo discussion Rel-18

[R2-2303407](file:///C:\Data\3GPP\Extracts\R2-2303407_Discontinuous%20coverage%20in%20IoT%20NTN.doc) Support on discontinuous coverage in IoT NTN Apple discussion Rel-18 IoT\_NTN\_enh

[R2-2303437](file:///C:\Data\3GPP\Extracts\R2-2303437%20Enhancements%20to%20discontinuous%20coverage.doc) Enhancements to discontinuous coverage Xiaomi discussion

[R2-2303476](file:///C:\Data\3GPP\Extracts\R2-2303476.docx) Discussion on enhancement to discontinuous coverage for IoT NTN Transsion Holdings discussion Rel-18

[R2-2303520](file:///C:\Data\3GPP\Extracts\R2-2303520%20Discussion%20on%20the%20discontinuous%20coverage%20for%20IoT-NTN.docx) Discussion on the discontinuous coverage for IoT-NTN CMCC discussion Rel-18 IoT\_NTN\_enh-Core

[R2-2303576](file:///C:\Data\3GPP\Extracts\R2-2303576.doc) Discussion on power saving enhancements for supporting discontinuous coverage Spreadtrum Communications discussion Rel-18

[R2-2303735](file:///C:\Data\3GPP\Extracts\R2-2303735%20-%20Enhancements%20to%20discontinuous%20coverage.docx) Enhancements to discontinuous coverage Ericsson discussion Rel-18 IoT\_NTN\_enh

[R2-2303963](file:///C:\Data\3GPP\Extracts\R2-2303963%20Discussion%20on%20discontinuous%20coverage.doc) Discussion on discontinuous coverage Huawei, HiSilicon discussion Rel-18 NR\_NTN\_enh-Core Late

[R2-2304081](file:///C:\Data\3GPP\Extracts\R2-2304081%20Discussion%20on%20the%20UE%20Unreachability%20Periods.docx) Discussion on the UE Unreachability Periods Google Inc. discussion Rel-18

[R2-2304160](file:///C:\Data\3GPP\Extracts\R2-2304160%20Discussion%20on%20Enhancements%20related%20to%20discontinuous%20coverage%20in%20NB-IoT%20NTN.docx) Discussion on Enhancements related to discontinuous coverage Rakuten Mobile, Inc discussion Rel-18 [R2-2208663](file:///C:\Data\3GPP\archive\RAN2\RAN2%23119\Tdocs\R2-2208663.zip)

## 7.7 NR NTN enhancements

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

Time budget: 1 TU

Tdoc Limitation: 4 tdocs

### 7.7.1 Organizational

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

Workplan

[R2-2303162](file:///C:\Data\3GPP\Extracts\R2-2303162.docx) R18 WI NR-NTN-enh work plan at RAN1, 2 and 3 THALES Work Plan Rel-18 NR\_NTN\_enh

* Noted

Incoming LSs

[R2-2302428](file:///C:\Data\3GPP\Extracts\R2-2302428_R4-2303239.docx) Reply LS on RACH-less handover in NTN (R4-2303239; contact: OPPO) RAN4 LS in Rel-18 NR\_NTN\_enh-Core To:RAN1 Cc:RAN2

* Noted

UE capabilities

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

Running CRs

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

* Noted

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

* Noted

[R2-2303137](file:///C:\Data\3GPP\Extracts\R2-2303137%20Stage-3%20running%20304%20CR%20for%20NTN.docx) Stage-3 running 304 CR for NTN ZTE Corporation, Sanechips draftCR Rel-18 38.304 17.4.0 NR\_NTN\_enh-Core

* Noted

[R2-2303726](file:///C:\Data\3GPP\Extracts\R2-2303726%20(R18%20NR%20NTN%20WI%20AI%207.7.1)%20NTN%20MAC%20running%20CR_121bise.docx) Stage 3 NTN running CR for 38.321 - RAN2#121bise InterDigital draftCR Rel-18 38.321 17.4.0 B NR\_NTN\_enh-Core

* Noted

[R2-2303737](file:///C:\Data\3GPP\Extracts\R2-2303737%20-%2038331_CR4023_(Rel-18)%20-%20Stage%203%20Running%20RRC%20CR%20for%20NR%20NTN%20Rel-18.docx) Stage 3 Running RRC CR for NR NTN Rel-18 Ericsson CR Rel-18 38.331 17.4.0 4023 - B NR\_NTN\_enh

* Noted

### 7.7.2 Coverage Enhancements

[R2-2302536](file:///C:\Data\3GPP\Extracts\R2-2302536%20-%20Discussion%20on%20initial%20blind%20Msg3%20retransmission%20for%20NTN.doc) Discussion on initial blind Msg3 retransmission for NTN OPPO discussion Rel-18 NR\_NTN\_enh-Core

[R2-2302798](file:///C:\Data\3GPP\Extracts\R2-2302798%20Discussion%20on%20blind%20Msg3%20retransmission.doc) Discussion on blind Msg3 retransmission Huawei, HiSilicon discussion Rel-18 NR\_NTN\_enh

[R2-2303326](file:///C:\Data\3GPP\Extracts\R2-2303326%20Discussion%20on%20coverage%20enhancement%20for%20R18%20NTN.docx) Discussion on coverage enhancement for R18 NTN vivo discussion

[R2-2303727](file:///C:\Data\3GPP\Extracts\R2-2303727%20(R18%20NR%20NTN%20WI%20AI%207.7.2)%20Msg3%20blind%20retx.docx) Blind Msg3 retransmission in Rel-18 NTN InterDigital discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303834](file:///C:\Data\3GPP\Extracts\R2-2303834%20-%20R18%20NR%20NTN%20Coverage%20enhancements.docx) R18 NR NTN Coverage enhancements Ericsson discussion Rel-18 NR\_NTN\_enh

[R2-2303997](file:///C:\Data\3GPP\Extracts\R2-2303997_Discussion%20on%20inital%20blind%20Msg3%20retransmssion.DOCX) Discussion on inital blind Msg3 retransmssion LG Electronics Inc. discussion NR\_NTN\_enh-Core

* [AT121bis-e][105][NR NTN Enh] Coverage enhancements (Interdigital)

Initial scope: Discuss the proposals in the submitted contributions in AI 7.7.2

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

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

Deadline for companies' feedback: Monday 2023-04-24 18:00 UTC

Deadline for rapporteur's summary (in R2-2304245): Monday 2023-04-24 20:00 UTC

R2-2304245 [offline-105] Coverage enhancements Interdigital discussion Rel-18 NR\_NTN\_enh-Core

Withdrawn

R2-2303458 Discussion on coverage enhancement for R18 NTN vivo discussion Withdrawn

### 7.7.3 Network verified UE location

Inactive support/ mirror points/ UE capabilities

[R2-2302848](file:///C:\Data\3GPP\Extracts\R2-2302848%20-%20discussion%20on%20network%20verified%20UE%20location.docx) Discussion on network verified UE location Ericsson discussion Rel-18 NR\_NTN\_enh-Core

* Revised in [R2-2304188](file:///C:\Data\3GPP\Extracts\R2-2304188%20-%20discussion%20on%20network%20verified%20UE%20location.docx)

[R2-2304188](file:///C:\Data\3GPP\Extracts\R2-2304188%20-%20discussion%20on%20network%20verified%20UE%20location.docx) Discussion on network verified UE location Ericsson discussion Rel-18 NR\_NTN\_enh-Core

Observation 1 In Uu Rel-17, UE in RRC INACTIVE can perform positioning measurements and report the measurement results to the LMF via SDT procedure.

Observation 2 Signaling overhead and long latency may be caused for UE to complete a positioning procedure if UE sends measurement results to LMF using SDT.

Proposal 1 NTN UE doesn’t support positioning measurement and report in RRC INACTIVE i.e., UE transitions to RRC CONNECTED to complete a positioning procedure whenever the positioning procedure is triggered.

Proposal 2 In order to resolve the mirror point ambiguity issue, the network relies on the legacy signaling and procedure to configure NTN UE to measure and report neighbor cells (e.g., neighbour cells in the opposite side of a satellite beam). No spec changes are needed.

Proposal 3 Network verified UE location is a NW-feature which does not require any additional UE behaviour (beyond RAT-dependent positioning), e.g., no additional UE capability is needed for indicating whether UE supports the feature of network verified UE location.

[R2-2303962](file:///C:\Data\3GPP\Extracts\R2-2303962%20Discussion%20on%20the%20network%20verified%20UE%20location.doc) Discussion on the network verfied UE location Huawei, HiSilicon discussion Rel-17 NR\_NTN\_enh-Core

Observation 1: Positioning in RRC\_INACTIVE is supported in legacy.

Proposal 1: Location verification can be performed in RRC\_INACTIVE.

Proposal 2: The gNB can configure different reference signals towards the real UE location and the mirror point and then, based on UE’s beam measurement report, tell which one is the correct UE location.

Proposal 3: RAN2 to discuss how to handle the UEs that do not support the new feature of location verification.

Proposal 4: RAN2 to discuss whether the UE location verification procedure in SA2’s LS is sufficient to fulfil the requirements and use cases identified by RAN.

Assistance information

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

Observation 1:

The geometry relating the UE and positioning anchor points (TRP) affects the network verified UE location based on Multi-RTT method.

Proposal 1:

For multi-RTT based positioning in NTN, the UE should include the calculated N\_"TA,adj" ^"common" to the measurement results that need be transferred from UE to the LMF.

Proposal 2:

For multi-RTT based positioning in NTN, the UE includes the position of the satellite when DL-PRS measurements are performed to the measurement results that need be transferred from UE to the LMF.

Proposal 3:

For multi-RTT based positioning in NTN, the following assistance data may be transferred from gNB to the LMF:

The value of the value of 𝑘mac used by gNB

The value of TACommon when the gNB Rx – Tx time difference measurement is performed

Proposal 4:

For multi-RTT based positioning in NTN, the gNB includes the position of the satellite when UL-SRS measurements are performed to the assistance data that may be transferred from gNB to the LMF.

Proposal 5:

For multi-RTT based positioning in NTN, the gNB may provide the LMF with assistance data including:

Satellite ID

Cell/beam reference point

The ephemeris data in PVT state vector format or Keplerian format along with the associated epoch time.

Proposal 6:

For multi-RTT based positioning in NTN, the LMF indicates to the UE the vTRP positions or the time intervals at which the PRS should be measured.

Proposal 7:

For multi-RTT based positioning in NTN, the LMF indicates to the UE the vTRP positions or the time intervals at which the aperiodic SRS should be activated.

Signalling design

[R2-2303438](file:///C:\Data\3GPP\Extracts\R2-2303438%20Discussion%20on%20network%20verified%20UE%20location.doc) Discussion on network verified UE location Xiaomi discussion

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

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

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

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

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

Proposal 6: If the UE location verification procedures is triggered when UE is in RRC Inactive or RRC Idle, the UE should transit to RRC Connected and then performs UE location verification.

[R2-2302679](file:///C:\Data\3GPP\Extracts\R2-2302679-Network%20verification%20of%20UE%20location.docx) On Network Verified UE Location in NR NTN MediaTek Inc. discussion

[R2-2303036](file:///C:\Data\3GPP\Extracts\R2-2303036%20Multi%20RTT.doc) Single satellite Multi-RTT based positioning Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303524](file:///C:\Data\3GPP\Extracts\R2-2303524%20Discussion%20on%20network%20verified%20UE%20location.doc) Discussion on network verified UE location CMCC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2302556](file:///C:\Data\3GPP\Extracts\R2-2302556%20Discussion%20on%20multiple-RTT%20based%20positioning%20in%20NTN.docx) Discussion on multiple-RTT based positioning in NTN Quectel discussion

[R2-2302561](file:///C:\Data\3GPP\Extracts\R2-2302561.docx) Discussion on Network Verified UE Location CATT discussion Rel-18 NR\_NTN\_enh-Core

[R2-2302794](file:///C:\Data\3GPP\Extracts\R2-2302794%20Network%20verified%20UE%20location.docx) On Network verified UE location Nokia, Nokia Shanghai Bell discussion NR\_NTN\_enh-Core [R2-2301354](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121\Tdocs\R2-2301354.zip)

[R2-2303138](file:///C:\Data\3GPP\Extracts\R2-2303138%20Consideration%20on%20NW%20verified%20UE%20location.doc) Consideration on NW verified UE location ZTE Corporation, Sanechips discussion Rel-18

[R2-2303299](file:///C:\Data\3GPP\Extracts\R2-2303299%20Discussion%20on%20NTN%20NW%20verified%20UE%20location.docx) Discussion on NTN NW verified UE location Lenovo discussion Rel-18

[R2-2303666](file:///C:\Data\3GPP\Extracts\R2-2303666.docx) Network Verified UE Location in NTN Samsung R&D Institute UK discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303955](file:///C:\Data\3GPP\Extracts\R2-2303955.docx) Discussion on Network Verified UE Location TCL Communication Ltd. discussion Rel-18 [R2-2301837](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121\Tdocs\R2-2301837.zip)

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

#### 7.7.4.1 Cell reselection enhancements

##### 7.7.4.1.1 NTN-TN enhancements

TN coverage details / signalling detail

[R2-2303168](file:///C:\Data\3GPP\Extracts\R2-2303168%20On%20TN%20Coverage%20Area%20Information%20-%20signaling,%20validity%20and%20definition%20aspects.docx) On TN Coverage Area Information - signaling, validity and definition aspects Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_NTN\_enh-Core

* Definition of TN coverage area

Observation 1: The UE needs to know if it is close to the TN but does not require the exact coverage area.

Observation 2: To avoid excessive signaling, a single TN coverage area does not require broadcasting more than coordinates for a single geolocation.

Observation 3: If TN coverage is represented according to Option 1, TN area’s center is represented using Ellipsoid-Point, and the minimum and maximum radius is equal to 1 km and 50 km, respectively then 54 bits are required to signal a single TN coverage area.

Observation 4: Other options (i.e. option 2 and option 6) are less efficient when bit consumption is considered.

Proposal 1: For signaling the TN coverage the corresponding geographical area information is provided by the network via location coordinates of area center and the radius.

- Nokia thinks we could have a single area center + radius information for TN areas (but we could have multiple TN areas)

- VDF thinks this would only provide a rough TN coverage information

- IDC wonders if these areas can overlap? Nokia agrees this should be just a rough information (to tell the UE when to measure); to IDT: Nokia thinks they can overlap

- QC thinks we could broadcast a list of areas (center + radius)

* For signaling the TN coverage, the corresponding geographical area information is provided by broadcast signalling by the network via a list of (possibly overlapping) areas where each area is defined using center location coordinates + radius (where the area is meant to describe a group of cells, not just a single one). FFS on the SIB. FFS on whether additional information in dedicated signalling is needed/useful

- IDC thinks this is a very easy compromise

- ZTE thinks we could use an ellipse rather than a circle

- Huawei has some concerns on dedicated signalling. Nokia agrees. VDF agrees. QC disagrees

- Ericsson can compromise on this proposal

* Continue in offline 106 on the FFSs

Proposal 2: RAN2 shall further discuss which IE to use for representing the TN area’s center and what is the required range and granularity of the TN area’s radius.

* Signalling of TN coverage area

Observation 5: A single SIB can have a size of nearly 3k bits, so should be sufficient for signalling more than a single TN coverage area information requiring ~50 bits.

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

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

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

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

* Validity of the TN coverage area information

Observation 8: TN coverage area represented according to Option 1 (i.e. TN area’s center and radius) is not problematic in terms of the UE storage capabilities when bit consumption is considered.

Proposal 5: RAN2 is asked to discuss how the information acquired from SIB in one cell can remain valid even if the UE has already moved few cells away.

* Continue in offline 106

Proposal 6: RAN2 is asked to discuss in what circumstances the UE may not acquire the new TN coverage information (e.g. UE is stationary or UE is within the TN coverage) and when the UE shall search for new TN coverage (e.g. UE moves significantly).

* Continue in offline 106

How to associate TN coverage info and frequency / TN measurement relaxation

[R2-2303100](file:///C:\Data\3GPP\Extracts\R2-2303100%20Discussion%20on%20the%20NTN-TN%20cell%20reselection%20enhancements.doc) Discussion on the NTN-TN cell reselection enhancements Huawei, HiSilicon, Turkcell discussion Rel-18 NR\_NTN\_enh

Proposal 1: The TN coverage information is illustrated by the location coordinates of area center and radius (Option 1).

Proposal 2: Add a list of frequencies under each TN area information.

- CATT thinks the TN area is associated with frequency information, or AllowedCellList or ExcludedCellList

* Continue in offline 106

Proposal 3: Providing TN coverage information through dedicated signalling is not supported.

Proposal 4: If the NTN cell is unable to obtain the TN coverage information, whether to relax TN measurements depends on whether the UE can detect TN neighbour cells for a given amount of time.

[R2-2303037](file:///C:\Data\3GPP\Extracts\R2-2303037%20TN%20coverage.doc) TN cell coverage info and measurement relaxation Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1 TN coverage information in system information includes a list of reference locations and their corresponding radius distance.

Proposal 2 Introduce coverage Area identity.

* Continue in offline 106

Proposal 3 In SIB4/5, if the frequency is TN frequency, the one or more area IDs are provided as inter-frequency carrier information for UE to decide whether the UE is required to perform measurement on this TN frequency.

Proposal 4 Extend the PLMN-IdentityInfo in PLMN-IdentityInfoList to include Area ID for PLMN specific coverage information.

Proposal 5 The TN coverage information with high accuracy can be in the form of list of TN coverage area, i.e., a reference location and area in ellipsoid coordinates, i.e., semi major axis, semi minor axis and orientation.

Proposal 6 The TN coverage information per PLMN with high accuracy can be provided via UE specific RRC signaling.

Proposal 7 Introduce relaxed measurement for TN frequency for which the reselection priority is higher than current NTN cell reselection priority if the UE does not detect the cell for X number of measurement occasions.

Agreements:

1. For signaling the TN coverage, the corresponding geographical area information is provided by broadcast signalling by the network via a list of (possibly overlapping) areas where each area is defined using center location coordinates + radius (where the area is meant to describe a group of cells, not just a single one). FFS on the SIB. FFS on whether additional information in dedicated signalling is needed/useful

* [AT121bis-e][106][NR NTN Enh] Signaling of TN coverage (Nokia)

Initial scope: Continue the discussion on the signaling of TN coverage: signaling details for area center+radius (e.g. reuse of *Ellipsoid-PointWithUncertaintyCircle*?), which SIB to usse, whether additional information in dedicated signalling is needed, validity of the TN coverage area information, how to associate TN coverage info and frequency

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

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

Deadline for companies' feedback: Monday 2023-04-24 12:00 UTC

Deadline for rapporteur's summary (in R2-2304246): Monday 2023-04-24 18:00 UTC

Proposals marked "for agreement" in R2-2304246 not challenged until Tuesday 2023-04-25 08:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Tuesday CB session).

R2-2304246 [offline-106] Signalling of TN coverage Nokia discussion Rel-18 NR\_NTN\_enh-Core

NW type information

[R2-2303766](file:///C:\Data\3GPP\Extracts\R2-2303766.docx) Discussion on NTN-TN Cell Reselection Enhancements Samsung Research America discussion Rel-18 NR\_NTN\_enh-Core

* TN coverage information

Proposal 1: For broadcasting TN coverage information, location coordinates of area center and radius are provided for UE to determine a TN coverage area.

Proposal 2: When TN coverage information is broadcasted, UE is not required to measure TN neighbor cells if the distance from UE to a TN reference location is larger than a distance threshold.

Proposal 3: If Proposal 1 and Proposal 2 are agreed, the center coordinates and the radius are used as the reference location and the distance threshold for UE to determine distance to the TN area.

* TN neighbour cell measurement in NR band n1

Observation 1: For HAPS, NR operating band n1 is used, the UE cannot distinguish TN cell and HAPS cell by the frequency band number.

Observation 2: The UE cannot know the neighbor cell is NTN (HAPS) or TN from the serving cell’s system information if the neighbor cell’s NTN-specific assistance information is not included in the serving cell’s system information.

Observation 3: For intra-frequency and inter-frequency neighbor cells configured in SIB3/4 on NR band n1 but without NTN-specific assistance information or TN coverage information provided, UE cannot know whether such a neighbor cell belongs NTN or TN.

Proposal 4: RAN2 to discuss for intra-frequency and inter-frequency neighbor cells configured in SIB3/4 on NR band n1 but without NTN-specific assistance information or TN coverage information provided, if UE needs to know a neighbor cell belongs to TN.

* Continue in offline 107

Proposal 5: If UE needs to know a neighbor cell belongs to TN in the case of Proposal 4, the type of a neighbor cell (i.e., TN) is provided for intra- and inter-frequency neighbor cell measurement of an NTN serving cell.

* Continue in offline 107

[R2-2303736](file:///C:\Data\3GPP\Extracts\R2-2303736%20-%20TN%20NTN%20mobility%20enhancements.docx) TN NTN mobility enhancements Ericsson discussion Rel-18 NR\_NTN\_enh

Observation 1 Band number 1 allows operation of TN and HAPS.

Observation 2 Band number alone is not sufficient to differentiate between TN and NTN access.

Observation 3 UE can use PCI to match satellite assistance information in SIB19 with neighbour cell information in SIB3 and SIB4.

Observation 4 UE camping on NTN can rely on implicit indication to differentiate TN and NTN neighbour cells.

Observation 5 The presence of SIB19 implies that serving cell is non-Terrestrial.

Observation 6 It is up to UE implementation to measure an NTN neighbour cell if the corresponding satellite assistance information is not available.

Observation 7 RRC\_IDLE mode mobility from TN to NTN may be restricted due to the lack of means to provide a UE with the corresponding satellite assistance information.

Proposal 1 Satellite assistance information, i.e., NTN-config-r17, for NTN neighbour cells is provided in SIB3/SIB4 of TN cells.

Observation 8 If Proposal 1 is agreed, it is assumed that satellite assistance information provided in SIB3/SIB4 of TN cells is used to determine whether a neighbour cell is TN or NTN.

* Continue in offline 107
* [AT121bis-e][107][NR NTN Enh] NW type information (Samsung)

Initial scope: discussion p4 and p5 from [R2-2303766](file:///C:\Data\3GPP\Extracts\R2-2303766.docx) and p1 from [R2-2303736](file:///C:\Data\3GPP\Extracts\R2-2303736%20-%20TN%20NTN%20mobility%20enhancements.docx)

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

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

Deadline for companies' feedback: Monday 2023-04-24 12:00 UTC

Deadline for rapporteur's summary (in R2-2304247): Monday 2023-04-24 18:00 UTC

Proposals marked "for agreement" in R2-2304247 not challenged until Tuesday 2023-04-25 08:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Tuesday CB session).

R2-2304247 [offline-107] NW type information Samsung discussion Rel-18 NR\_NTN\_enh-Core

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

[R2-2302562](file:///C:\Data\3GPP\Extracts\R2-2302562.docx) Discussion on Cell Reselection Enhancements in NTN-TN CATT discussion Rel-18 NR\_NTN\_enh-Core

[R2-2302680](file:///C:\Data\3GPP\Extracts\R2-2302680%20TN-NTN%20cell%20reselection.doc) On TN-NTN Cell Selection Re-selection in NR NTN MediaTek Inc. discussion

[R2-2302699](file:///C:\Data\3GPP\Extracts\R2-2302699%20Discussion-on-TN-NTN-cell-reselection-enhancements.docx) Discussion on TN-NTN cell reselection enhancements Intel Corporation discussion Rel-18 NR\_NTN\_enh-Core

[R2-2302780](file:///C:\Data\3GPP\Extracts\R2-2302780%20Discussion%20on%20TN-NTN%20cell%20reselection%20enhancements.docx) Discussion on TN-NTN cell reselection enhancements CAICT discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303086](file:///C:\Data\3GPP\Extracts\R2-2303086.docx) Cell selection/reselection enhancements in NTN-TN Sony discussion Rel-18 NR\_NTN\_enh

[R2-2303139](file:///C:\Data\3GPP\Extracts\R2-2303139%20Consideration%20on%20cell%20reselection%20enhancements%20for%20NTN-TN.docx) Consideration on cell reselection enhancements for NTN-TN ZTE Corporation, Sanechips discussion Rel-18

[R2-2303255](file:///C:\Data\3GPP\Extracts\R2-2303255%20Indication%20of%20TN%20area%20for%20neighbour%20cell%20measurement%20in%20NTN.docx) Indication of TN area for neighbour cell measurement in NTN Lenovo discussion Rel-18

Moved here from 7.7.4.1.2

[R2-2303300](file:///C:\Data\3GPP\Extracts\R2-2303300%20Signaling%20the%20TN%20Coverage%20Information%20with%20a%202-Step%20Approach.docx) Signaling the TN Coverage Information with a 2-step Approach Google Inc. discussion Rel-18

[R2-2303318](file:///C:\Data\3GPP\Extracts\R2-2303318_Details%20of%20the%20TN%20coverage%20data%20signalling.docx) Details of the TN coverage data signalling NEC Telecom MODUS Ltd. discussion

[R2-2303325](file:///C:\Data\3GPP\Extracts\R2-2303325%20Discussion%20on%20power%20saving%20for%20NTN-TN%20mobility.docx) Discussion on Power saving for NTN-TN mobility vivo discussion

[R2-2303334](file:///C:\Data\3GPP\Extracts\R2-2303334_TN_area_description.docx) Discussion on the assistance information for NTN-TN cell reselection ITRI discussion NR\_NTN\_enh-Core

[R2-2303415](file:///C:\Data\3GPP\Extracts\R2-2303415_%20NTN-TN%20cell%20reselection%20enhancement_v0.doc) NTN-TN cell reselection enhancement Apple discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303439](file:///C:\Data\3GPP\Extracts\R2-2303439%20Cell%20reselection%20enhancements%20for%20NTN-TN%20mobility.doc) Cell reselection enhancements for NTN-TN mobility Xiaomi discussion

[R2-2303477](file:///C:\Data\3GPP\Extracts\R2-2303477%20Discussion%20on%20NR%20NTN-TN%20cell%20reselection%20enhancements.doc) Discussion on NR NTN-TN cell reselection enhancements Transsion Holdings discussion Rel-18

[R2-2303525](file:///C:\Data\3GPP\Extracts\R2-2303525%20NTN-TN%20cell%20reselection%20enhancements.docx) NTN-TN cell reselection enhancements CMCC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303724](file:///C:\Data\3GPP\Extracts\R2-2303724.docx) NTN-TN Mobility Cell Reselection and PCI Values SHARP Corporation discussion

[R2-2303728](file:///C:\Data\3GPP\Extracts\R2-2303728%20(R18%20NR%20NTN%20WI%20AI%207.7.4.1.1)%20NTN-TN%20mobility.docx) NTN-TN mobility and service continuity InterDigital discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303790](file:///C:\Data\3GPP\Extracts\R2-2303790_Further%20discussion%20on%20NTN-TN%20cell%20reselection%20enhancements.doc) Further discussion on NTN-TN cell reselection enhancements NTT DOCOMO, INC. discussion

[R2-2303975](file:///C:\Data\3GPP\Extracts\R2-2303975%20%5bNTN%5d%20Discussion%20on%20NTN-TN%20cell%20reselection%20enhancements_v1.docx) Discussion on NTN-TN cell reselection enhancements LG Electronics France discussion Rel-18 NR\_NTN\_enh-Core

[R2-2304014](file:///C:\Data\3GPP\Extracts\R2-2304014.docx) Discussion on NTN-TN Cell re-selection ITL discussion Rel-18

Withdrawn

R2-2303457 Discussion on Power saving for NTN-TN mobility vivo discussion Withdrawn

##### 7.7.4.1.2 NTN-NTN enhancements

Including outcome of:

[Post121][106][NR NTN Enh] NTN-NTN cell reselection (ZTE)

Other contributions in this AI might not be treated at RAN2#121bis

[R2-2303140](file:///C:\Data\3GPP\Extracts\R2-2303140%20Report%20of%20%5bPost121%5d%5b106%5d%5bNR%20NTN%20enh%5d%20NTN-NTN%20cell%20reselection%20(ZTE).docx) Report of [Post121][106][NR NTN enh] NTN-NTN cell reselection (ZTE) ZTE Corporation, Sanechips discussion Rel-18

Proposal 1: RAN2 understands for earth-moving cell reselection, UE can derive the trajectory of serving cell with rough accuracy based on serving satellite ephermeris and epochTime. ffs if additional information is needed to allow more accurate measurements. (17/25)

- QC agrees with p1. MTK also agrees

* Agreed, with the assumption that the serving cell reference location broadcast by the network is the one at Epoch time (FFS whether a new epochTime IE is needed). RAN2 understanding is that both PVT and orbital parameters can be used for this

- LGE thinks we need to clarify the ephemeris format, i.e. only for orbital parameters

- ZTE thinks that RAN1 explained that the different parameters can be converted into each other. MTK, Nokia, Ericsson, Lenovo, HW agree.

- Intel thinks it’s not clear how long UE can convert PVT to orbital parameters

- QC thinks there is validity duration so both formats are ok

- Thales thinks PVT and orbital parameters can be converted and are both accurate enough for several hours (depending on the propagator).

Proposal 2: If confirmed additional information is needed to allow more accurate measurements, RAN2 further discuss which of below information is used to assist UE derive the trajectory of serving cell reference location for earth-moving system:

* Antenna angles (4)
* relative distance from RP to sub-satellite point (2)
* Others

Proposal 3: For earth-moving cell, new IE is introduced to indicate the reference location of serving cell. (22/25)

* Agreed

Proposal 4: For cell (re)selection in earth-moving system, a distance threshold is introduced for location-based measurement initiation, which reuses distanceThresh in SIB19. (24/25)

- Panasonic wonders which distanceThresh is considered? The one in SIB19? ZTE thinks this is what the proposal says

* Agreed

Proposal 5: For cell (re)selection in earth-moving system, time-based measurement initiation is used to address feeder-link switch case. (22/24)

* Agreed

Proposal 6: RAN2 further discuss whether to support location-based cell reselection criteria. (6 support vs 17 not support).

- CATT, Lenovo, VDF, MTK, Nokia thinks there is not so much support for this and it could be down-prioritized

- Intel thinks we can have a final discussion in the next meeting.

* Discuss one more time at the next meeting whether to support location-based cell reselection criteria (based on contributions from the proponents, showing the benefits) and take a final decision for Rel-18

Proposal 7: Time-based cell reselection criteria is not pursued in R18. (20/24)

* Agreed

Proposal 8: If positive outcome has reached in P6, RAN2 select among below options for location-based cell reselection criteria enhancements(6/7)

* Option 1: Introduce a distance threshold. Cell ranked on R-criterion first and then the distance threshold applies to down scope the candidate cells for reselection.
  + For cells not provided with reference location:
    - Alt.1: Not considered as candidate cell for reselection
    - Alt.2: Considered as candidate cell for reselection
* Option 2: Introduce a distance threshold. Distance threshold applies to decide the candidate cells and then rank the candidate cells based on R-criterion to decide the target cell for reselection.
  + For cells not provided with reference location:
    - Alt.1: Not considered as candidate cell for reselection
    - Alt.2: Considered as candidate cell for reselection
* Option 3: Cell ranked on R-criterion first and then the distance criteria applies to decide the target cell for reselection.

Agreements:

1. RAN2 understands that for earth-moving cell reselection, the UE can derive the trajectory of serving cell with rough accuracy based on serving satellite ephemeris and epochTime, with the assumption that the serving cell reference location broadcast by the network is the one at Epoch time (FFS whether a new epochTime IE is needed). RAN2 understanding is that both PVT and orbital parameters can be used for this. FFS if additional information is needed to allow more accurate measurements.
2. For earth-moving cell, new IE is introduced to indicate the reference location of serving cell.
3. For cell (re)selection in earth-moving system, a distance threshold is introduced for location-based measurement initiation, which reuses distanceThresh in SIB19.
4. For cell (re)selection in earth-moving system, time-based measurement initiation is used to address feeder-link switch case.
5. Time-based cell reselection criteria is not pursued in R18.

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

[R2-2303169](file:///C:\Data\3GPP\Extracts\R2-2303169%20On%20NTN-NTN%20Reselections%20in%20EMC.docx) On NTN-NTN Reselections in EMC Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_NTN\_enh-Core

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

Moved here from 7.7.4.1.1

[R2-2303324](file:///C:\Data\3GPP\Extracts\R2-2303324%20Discussion%20on%20cell%20reselection%20enhancements%20for%20earth-moving%20cell.docx) Discussion on cell reselection enhancement for earth-moving cell vivo discussion

[R2-2303416](file:///C:\Data\3GPP\Extracts\R2-2303416_%20NTN-NTN%20cell%20reselection%20enhancement_v0.doc) NTN-NTN cell reselection enhancement Apple discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303440](file:///C:\Data\3GPP\Extracts\R2-2303440%20Cell%20reselection%20enhancements%20for%20NTN-NTN%20mobility.doc) Cell reselection enhancements for NTN-NTN mobility Xiaomi discussion

[R2-2303577](file:///C:\Data\3GPP\Extracts\R2-2303577.doc) Discussion on NTN-NTN mobility enhancements Spreadtrum Communications discussion Rel-18

[R2-2303729](file:///C:\Data\3GPP\Extracts\R2-2303729%20(R18%20NR%20NTN%20WI%20AI%207.7.4.1.2)%20Earth%20moving%20cell.docx) Cell reselection enhancements for Earth moving cell InterDigital discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303767](file:///C:\Data\3GPP\Extracts\R2-2303767.docx) Discussion on NTN-NTN Cell Reselection Enhancements Samsung Research America discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303976](file:///C:\Data\3GPP\Extracts\R2-2303976%20%5bNTN%5d%20Discussion%20on%20NTN-NTN%20cell%20reselection%20enhancements.docx) Discussion on NTN-NTN cell reselection enhancements LG Electronics France discussion Rel-18 NR\_NTN\_enh-Core [R2-2300799](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121\Tdocs\R2-2300799.zip)

Withdrawn

R2-2303456 Discussion on cell reselection enhancement for earth-moving cell vivo discussion Withdrawn

#### 7.7.4.2 Handover enhancements

Common (C)HO configuration / RACH-less HO

[R2-2303734](file:///C:\Data\3GPP\Extracts\R2-2303734%20-%20Handover%20enhancements.docx) Handover enhancements Ericsson discussion Rel-18 NR\_NTN\_enh

* Reduction of signalling overhead during handover

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

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

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

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

Proposal 1 RAN2 to prioritize CHO enhancements over group-based handover.

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

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

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

Observation 8 The potential gain of providing common target cell configuration in the source cell does not offset the increased complexity for the network and UEs.

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

- NEC, Intel, IDC, LGE support p2

- Nokia also support p2, although for quasi EFC, maybe for a limited number of target's it makes sense. But what about the need to signal anyway the UE-specific delta?

- CMCC does not support p2 and thinks we should optimize the signalling overhead for this. Oppo also does not agree with p2.

- VDF thinks that, as it is broadcast signalling, it should be significant saving to support common signalling

* Continue the discussion on potential pros and cons of a broadcast common (C)HO configuration in offline 108
* RACH-less HO

Observation 9 In NTN, the mechanism to acquire the Timing Advance of the target cell is identical for regular and RACH-less handover.

Proposal 3 No further enhancements are needed for a UE to acquire the Timing Advance of the target cell in NTN RACH-less handover.

Proposal 4 Like in LTE, network indicates explicitly when the Timing Advance of the target cell is identical to the source cell upon NTN RACH-less handover.

Proposal 5 RAN2 to study the combination of RACH-less handover and time-based triggered CHO. FFS if location-based triggered CHO can be combined with RACH-less handover.

* Reusing PCI after service link switch

Observation 10 Release 17 UEs are not optimized for hard switches, either service or feeder link.

Proposal 6 Send LS to RAN1 to confirm the suitability of the service hard link switch scenario and the possibility to re-use PCI upon hard service link switch.

* [AT121bis-e][108][NR NTN Enh] Common (C)HO configuration (Ericsson)

Initial scope: Continue the discussion on potential pros and cons of a broadcast common (C)HO configuration

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

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

Deadline for companies' feedback: Monday 2023-04-24 12:00 UTC

Deadline for rapporteur's summary (in R2-2304248): Monday 2023-04-24 18:00 UTC

Proposals marked "for agreement" in R2-2304248 not challenged until Tuesday 2023-04-25 08:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Tuesday CB session).

R2-2304248 [offline-108] Common (C)HO configuration Ericsson discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303768](file:///C:\Data\3GPP\Extracts\R2-2303768.docx) Discussion on NTN handover enhancements Samsung Research America discussion Rel-18 NR\_NTN\_enh-Core

* Common (C)HO configuration

Observation 1: The IE ServingCellConfigCommon in ReconfigurationWithSync is cell-specific configuration common to UEs which contains information that can be typically acquired from system information.

Proposal 1: Common (C)HO configuration includes ServingCellConfigCommon in ReconfigurationWithSync.

Proposal 2: Common (C)HO configuration includes up to 4 potential target/candidate cells.

Proposal 3: Common (C)HO configuration is provided by broadcast signaling.

* RACH-less HO

Proposal 4: Rel-18 NTN RACH-less HO is limited to NTN-NTN mobility.

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

Proposal 5: Rel-18 NTN RACH-less HO is supported for intra-satellite with same feeder link.

- HW thinks if we agree on p5 we don’t clarify the situation for other scenarios

* Continue in offline 109

Proposal 6: For initial UL transmission in RACH-less HO, support configured grant in RACH-less HO command.

* For initial UL transmission in RACH-less HO, support pre-allocated grant in RACH-less HO command

Proposal 7: RAN2 to discuss which type of CG is supported for the initial UL transmission of RACH-less HO.

Option 1: only type-1 CG

Option 2: only type-2 CG

Option 3: either type-1 CG or type-2 CG

Option 4: both type-1 CG and type-2 CG

* Continue in offline 109

Proposal 8: For the initial UL transmission in NTN RACH-less HO, UE uses CG if provided in the RACH-less HO command, otherwise, UE monitors PDCCH for DG.

* Continue in offline 109

Proposal 9: RAN2 confirms the overall procedure of NTN RACH-less HO.

1. receive RACH-less HO command including RACH-less HO configuration.
2. start timer T304
3. apply target cell configuration (e.g., C-RNTI) and start timer T430
4. apply N\_"TA" to compute TA for the target cell and start time alignment timer
5. monitor PDCCH if type-1 CG is not configured in RACH-less HO command
6. send initial UL transmission if UL grant is available
7. consider RACH-less HO is completed upon receiving PDCCH in response to the initial UL transmission stop timer T304 and release UL grant for initial UL transmission

* Continue in offline 109

Proposal 10: If type-1 CG is configured for initial UL transmission for RACH-less HO, discuss how to select SSB.

* Continue in offline 109

Proposal 11: RAN2 informs RAN1 the agreements on NTN RACH-less HO and ask RAN1 to identify necessary configuration and impact on PDCCH monitoring for initial UL transmission.

* Continue in offline 109. Also discuss interactions between RACH-less HO and CHO
* Hard Satellite Switch

Proposal 12: RAN2 to discuss the necessity to support hard satellite switch without PCI change considering the interruption and service continuity issue and the limited applicable scenario.

Proposal 13: RAN2 to clarify if DL synchronization is required for hard satellite switch without PCI change.

Proposal 14: RAN2 to confirm UE always perform UL synchronization for hard satellite switch without PCI change.

Agreements:

1. In Rel-18 we don’t aim at RACH-less HO for NTN-TN mobility
2. For initial UL transmission in RACH-less HO, support pre-allocated grant in RACH-less HO command

* [AT121bis-e][109][NR NTN Enh] RACH-less HO (Samsung)

Initial scope: Continue the discussion on RACH-less HO, e.g. based on proposals in [R2-2303768](file:///C:\Data\3GPP\Extracts\R2-2303768.docx). Also discuss interactions between RACH-less HO and CHO

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

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

Deadline for companies' feedback: Monday 2023-04-24 12:00 UTC

Deadline for rapporteur's summary (in R2-2304249): Monday 2023-04-24 18:00 UTC

Proposals marked "for agreement" in R2-2304249 not challenged until Tuesday 2023-04-25 08:00 UTC will be declared as agreed via email by the session chair (for the rest the discussion might continue online in the Tuesday CB session).

R2-2304249 [offline-109] RACH-less HO Samsung discussion Rel-18 NR\_NTN\_enh-Core

PCI unchanged

[R2-2302563](file:///C:\Data\3GPP\Extracts\R2-2302563.docx) Discussion on PCI Unchanged Scenario CATT discussion Rel-18 NR\_NTN\_enh-Core

* Benefit Analysis

Observation 1: Comparing with legacy handover, CHO, RACH-less handover, etc., the benefit brought by PCI unchanged scenario including:

- Signalling overhead reduction, due to handover command is not needed;

- Reduction on data transmission latency and data loss, due to L2 reset is not needed.

* Applicability to hard or soft satellite switching

Observation 2: The interruption issue in hard satellite switch scenario is not a particular issue for PCI unchanged scenario, it’s also existing for legacy handover, due to it is caused by the deployment of satellite constellations.

Proposal 1: Confirm the work assumption that “In quasi-earth fixed cell case, for hard satellite switch in the same SSB frequency and same gNB (no key change), satellite switching without PCI changing (not requiring L3 mobility) is supported”.

- IDC suggests to confirm p1 first.

Proposal 2: Send an LS to RAN1 to confirm the feasibility of soft satellite switch of PCI unchanged scenario.

* Discuss in offline 110 the possible content of an LS to RAN1
* VC suggests to consider the following wording as a starting point (and additional considerations / justifications can be added if needed):

“RAN2 thinks that, from RAN2 perspective, in quasi-earth fixed cell case, for hard satellite switch in the same SSB frequency and same gNB (no key change), satellite switching without PCI change (not requiring L3 mobility) can be supported in Rel-18. RAN2 understands the UE will have to re-acquire DL/UL synchronization after the switch. RAN2 invites RAN1 to provide feedback, if they see any issues with this.

RAN2 would also like to ask RAN1 about the feasibility of soft satellite switch without PCI change (not requiring L3 mobility)”

* Necessity of performing RACH

Proposal 3: At least, RA procedure can be used for UE to re-acquire UL synchronization to the new satellite in PCI unchanged scenario.

Proposal 4: If RACH-less is supported for the scenario of inter-satellite handover with same gateway/gNB, it is feasible for UE to get UL synchronization to the new satellite without RACH in PCI unchanged scenario.

* Impacts on specification

Proposal 5: In PCI unchanged scenario, the NW need to indicate UE the current cell is PCI unchanged cell.

Proposal 6: Further discuss whether provide the indication of PCI unchanged cell via system information or dedicate signalling.

Proposal 7: RAN2 to discuss the following solutions on determine when to perform sync to the upcoming satellite.

- Based on time condition e.g. t-Service;

- Based on signalling triggered indication from NW.

* [AT121bis-e][110][NR NTN Enh] LS to RAN1 on unchanged PCI (CATT)

Initial scope: Discuss the possible content of an LS to RAN1 on Satellite switch without changing PCI

Initial intended outcome: Agreeable LS to RAN1

Deadline for companies' feedback: Tuesday 2023-04-25 08:00 UTC

Deadline for Draft LS (in R2-2304250): Monday 2023-04-25 10:00 UTC

R2-2304250 Draft on Satellite switch without changing PCI CATT LSout To: RAN1 Rel-18 NR\_NTN\_enh-Core

[R2-2302545](file:///C:\Data\3GPP\Extracts\R2-2302545%20NTN%20connected%20mode%20mobility.doc) Discussion on NTN handover enhancements OPPO discussion Rel-18 NR\_NTN\_enh-Core

[R2-2302564](file:///C:\Data\3GPP\Extracts\R2-2302564.docx) Discussion on NTN HO Enhancements CATT discussion Rel-18 NR\_NTN\_enh-Core

[R2-2302678](file:///C:\Data\3GPP\Extracts\R2-2302678_HO%20enhancement%20in%20LEO-NTN_Athens.docx) Handover Enhancement in Earth Moving Cells MediaTek Inc. discussion

[R2-2302697](file:///C:\Data\3GPP\Extracts\R2-2302697%20Discussion-on-NTN-2-step-handover.docx) Discussion on NTN 2-step handover Intel Corporation discussion Rel-18 NR\_NTN\_enh-Core

[R2-2302698](file:///C:\Data\3GPP\Extracts\R2-2302698%20Discussion-on-NTN-RACH-less-handover.docx) Discussion on NTN RACH-less handover Intel Corporation discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303038](file:///C:\Data\3GPP\Extracts\R2-2303038%20RACH-less%20HO.doc) RACH-less handover for NTN Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303039](file:///C:\Data\3GPP\Extracts\R2-2303039%20Mobility%20enhancements.doc) Further handover enhancement for NTN Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303076](file:///C:\Data\3GPP\Extracts\R2-2303076_Consideration%20of%20HO%20common%20signaling%20gain%20in%20NTN.doc) Consideration of HO common signaling gain in NTN China Telecom discussion Rel-18 NR\_NTN\_enh

[R2-2303087](file:///C:\Data\3GPP\Extracts\R2-2303087.docx) Signaling overhead reduction and group handover during NTN-NTN HOs Sony discussion Rel-18 NR\_NTN\_enh

[R2-2303099](file:///C:\Data\3GPP\Extracts\R2-2303099%20Discussion%20on%20NTN%20handover%20enhancements.docx) Discussion on NTN handover enhancements Huawei, HiSilicon, Turkcell discussion Rel-18 NR\_NTN\_enh

[R2-2303141](file:///C:\Data\3GPP\Extracts\R2-2303141%20Consideration%20on%20HO%20enhancements%20in%20NTN.docx) Consideration on HO enhancements in NTN ZTE Corporation, Sanechips discussion Rel-18

[R2-2303142](file:///C:\Data\3GPP\Extracts\R2-2303142%20Consideration%20on%20RACH-less%20HO%20in%20NTN.docx) Consideration on RACH-less HO in NTN ZTE Corporation, Sanechips discussion Rel-18

[R2-2303160](file:///C:\Data\3GPP\Extracts\R2-2303160-Discussion%20on%20NTN%20handover%20enhancements.docx) Discussion on NTN handover enhancements TCL Communication Ltd. discussion

[R2-2303170](file:///C:\Data\3GPP\Extracts\R2-2303170%20Even%20Further%20Aspects%20on%20Connected-mode%20Mobility%20in%20Rel-18%20NTN.docx) Even Further Aspects on Connected-mode Mobility in Rel-18 NTN Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303256](file:///C:\Data\3GPP\Extracts\R2-2303256%20Considerations%20on%20supporting%20RACH-less%20HO%20in%20NTN.docx) Considerations on supporting RACH-less HO in NTN Lenovo discussion Rel-18

[R2-2303258](file:///C:\Data\3GPP\Extracts\R2-2303258_NTN_HO-enh_fj.docx) Discussion on Handover enhancements for NTN Fujitsu Limited discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303327](file:///C:\Data\3GPP\Extracts\R2-2303327%20On%20handover%20enhancement%20for%20siganlling%20overhead%20reduction%20in%20NR%20NTN.docx) On handover enhancement for signalling overhead reduction in NR NTN vivo discussion

[R2-2303331](file:///C:\Data\3GPP\Extracts\R2-2303331%20Satellite%20switch_PCI%20change%20without%20L3%20handover.docx) Satellite switch\_PCI change without L3 handover NEC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303332](file:///C:\Data\3GPP\Extracts\R2-2303332%20Support%20RACH-less%20HO%20and%20CHO.docx) Support RACH-less HO and CHO NEC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303417](file:///C:\Data\3GPP\Extracts\R2-2303417_Signaling%20optimization%20on%20common%20HO%20configuration_v0.doc) Signaling optimization on common HO configuration Apple discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303418](file:///C:\Data\3GPP\Extracts\R2-2303418_NTN%20specific%20handover%20enhancement_v0.doc) NTN specific handover enhancement Apple discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303441](file:///C:\Data\3GPP\Extracts\R2-2303441%20Discussion%20on%20handover%20enhancements%20for%20NTN-NTN%20mobility.doc) Discussion on handover enhancements for NTN-NTN mobility Xiaomi discussion

[R2-2303478](file:///C:\Data\3GPP\Extracts\R2-2303478%20Discussion%20on%20NR%20NTN-NTN%20handover%20enhancements.doc) Discussion on NR NTN-NTN handover enhancements Transsion Holdings discussion Rel-18

[R2-2303526](file:///C:\Data\3GPP\Extracts\R2-2303526%20Discussion%20on%20common%20(C)HO%20configuration,%20RACH-less%20HO%20and%20group%20HO%20for%20NTN.docx) Discussion on common (C)HO configuration, RACH-less HO and group HO for NTN CMCC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303730](file:///C:\Data\3GPP\Extracts\R2-2303730%20(R18%20NR%20NTN%20WI%20AI%207.7.4.2)%20CONN%20mobility%20enh.docx) NTN mobility enhancements for RRC\_CONNECTED InterDigital discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303802](file:///C:\Data\3GPP\Extracts\R2-2303802%20Further%20discussion%20on%20PCI%20unchanged.docx) Further discussion on PCI unchanged CMCC discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303932](file:///C:\Data\3GPP\Extracts\R2-2303932%20Discussion%20on%20RACH-less%20handover%20for%20NTN.docx) Discussion on RACH-less handover for NTN ASUSTeK discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303933](file:///C:\Data\3GPP\Extracts\R2-2303933%20Discussion%20on%20handover%20enhancement%20with%20common%20signalling.docx) Discussion on handover enhancement with common signalling ASUSTeK discussion Rel-18 NR\_NTN\_enh-Core

[R2-2303977](file:///C:\Data\3GPP\Extracts\R2-2303977%20%5bNTN%5d%20Discussion%20on%20handover%20enhancements.docx) Discussion on handover enhancements LG Electronics France discussion Rel-18 NR\_NTN\_enh-Core

[R2-2304079](file:///C:\Data\3GPP\Extracts\R2-2304079_NTN_Discussion_on_handover_enhancements.doc) Discussion on handover enhancements Sharp discussion Rel-18 NR\_NTN\_enh-Core

[R2-2304134](file:///C:\Data\3GPP\Extracts\R2-2304134_NTN-NTN%20handover%20enhancements.docx) NTN-NTN handover enhancements Sequans Communications discussion Rel-18 NR\_NTN\_enh-Core [R2-2301864](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121\Tdocs\R2-2301864.zip)

[R2-2304137](file:///C:\Data\3GPP\Extracts\R2-2304137_HO_CHO%20Signaling%20Overhead%20Reduction%20by%20NTN-config%20omission.docx) HO/CHO Signaling Overhead Reduction by NTN-config omission Sequans Communications discussion Rel-18 NR\_NTN\_enh-Core [R2-2301866](file:///C:\Data\3GPP\archive\RAN2\RAN2%23121\Tdocs\R2-2301866.zip)

[R2-2304147](file:///C:\Data\3GPP\Extracts\R2-2304147_Considerations%20on%20unchanged%20PCI%20solution.docx) Considerations on unchanged PCI solution Sequans Communications discussion Rel-18 NR\_NTN\_enh-Core

Withdrawn

R2-2303459 On handover enhancement for signalling overhead reduction in NR NTN vivo discussion Withdrawn

### 7.25.3 Other

RAN3, SA2, SA3, CT1 led items and others, e.g. eNPN

NTN Self-evaluation SI

Treated in NTN parallel session (Sergio)

[R2-2304184](file:///C:\Data\3GPP\Extracts\R2-2304184%20WI%20work%20plan%20for%20IMT-2020%20Sat.docx) SI work plan for Study on self-evaluation towards the IMT-2020 submission of the 3GPP Satellite Radio Interface Technology Ericsson discussion Rel-18 FS\_IMT2020\_SAT\_eval Late

- Ericsson thinks we need to wait for RAN1 input, possibly in May or August to know what we need to do in RAN2

* RAN2 will wait for progress in RAN1 (and potentially input from RAN1) before starting any work on this

# Summary

Agreed CRs

NR-NTN

IoT-NTN

Approved LSs out

Endorsed CRs

[Post121bis] Email discussions

Short

Long