3GPP TSG-RAN WG2 Meeting #128 R2-2410913

Orlando, USA, Nov 18th – 22nd, 2024

**Agenda item: 9.3**

**Source: Session Chair (ZTE Corporation)**

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

**Document for: Approval**

Organizational

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

* [AT128][300] Organizational – NR-NTN and IoT-NTN session

Scope:

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

Schedule/Plan

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Main room** | **Brk 1 room** | **Brk 2 room** | **Brk 3 room** |
| **Monday** | | | | |
| 09:00 – 10:30 | **[1], [2], [3],**  **[7.0] R18 common (Diana)**  [7.0.1] UE capabilities  **Break out**  [7.0.2.11] Others (including multi WI issues)  **[8.0] NR19 General**  **@NR151617 UP (Diana)**  **[7.0.2] Other Rel-18 corrections cont** | Breakout to start after completion of 7.0.1  **NR1617 SL (Kyeongin)**  [5.2] NR R16 V2X  [6.6] NR R17 SL  **[7.6] NR18 SL (Kyeongin)** | Breakout to start after completion of 7.0.1  **NRLTE151617 Pos (Nathan)**  [4.3] LTE positioning  [5.3] NR Rel-16 and earlier  [6.3] NR Rel-17  **[7.1] NR18 Pos (Nathan)** |  |
| 11:00 – 13:00 |
| 14:30 – 16:30 | **[7.0.2] Other Rel-18 corrections cont**  **SDT related topics**  **[7.7] NR TEI18**  **[7.8] Other Rel-18 corrections** | **[7.6] NR18 SL cont (Kyeongin)** (if needed)  **[7.2] NR18 Mob (Kyeongin)** | **[6.2][7.5] NR1718 SL Relay (Nathan)**  **[7.1] NR18 Pos (Nathan)** |
| 17:00 – 19:00 | **[8.1.2.4] NR19 AI/ML PHY (LS response)**  **[8.2] NR19 Ambient IoT [2.5] (Diana)** | **[7.2] NR18 Mob** (**Kyeongin)** | **NR18 MIMO (Erlin)**  **[7.0.2.13]** PHR related topic can go directly offline, other proposals will be discussed based on contribution  **[8.12] NR19 MIMO (Erlin)**  [8.12.1], [8.12.2]  [8.12.3], if time allows |
| **Tuesday** | | | | |
| 08:30 – 10:25 | **[8.3] NR19 AI/ML Mobility [2] (Diana)** | **[8.4] NR19 LP-WUS [1] (Erlin)**  [8.4.2]  [8.4.3]  [8.4.4] if time allows | **[8.13] NR19 SL Relay (Nathan)**  [8.13.2] Discovery/(re)selection  [8.13.3] Control plane/SRAP |  |
|  |
| 10:55 – 12:50 | **[8.6] NR19 Mob [2] (Kyeongin)** | **[8.7] NR19 XR [2] (Dawid):**  [8.7.1] Organizational, LSin, discussion on reply to S2-2411253  [8.7.3] RRM measurement gaps/restrictions  [8.7.5] RLC enhancements (start with discussion on reply to S2-2410999, continue with other aspects) | **[7.0.2.11] NR18 SONMDT (Mattias)**  **[8.10] NR19 SONMDT [0.5] (Mattias)**  [8.10.2], [8.10.5] |  |
| 14:50 -16:40 | **[8.1] NR19 AI/ML PHY [2.5] (Diana)** | **NR18 NTN NR /IoT(Sergio)**  [6.1.1], [6.1.3] R17 NTN corrections  [7.3.0], [7.3.1], [7.3.2] R18 IoT NTN corrections  [7.4.0], [7.4.1], [7.4.2] R18 NR NTN corrections | **EUTRA&NR151617 (Mattias)**  Except NR17 NTN related Tdoc, which will be handled in Sergio´s session.  [4.1.0], [4.1.1]  [5.1.1.0], [5.1.1.1], [5.1.3.0], [5.1.3.1], [5.1.3.2], [5.1.3.3]  [6.1.1.0], [6.1.1.1], [6.1.3.0], [6.1.3.1], [6.1.3.2], [6.1.3.3] |  |
| 17:10– 19:10 | **[8.2] NR19 Ambient IoT [2] (Diana)** | **[8.8] NR19 NR NTN (Sergio) [2]**  [8.8.1] Organizational  [8.8.6] LTE to NR NTN mobility  [8.8.4] Support of Broadcast service | **NR18 MBS/QoE (Dawid)**  [7.0.2.15] QoE (max 15 minutes)  [7.0.2.14] MBS |  |
| **Wednesday** | | | | |
| 08:30 – 10:20 | **[8.6] NR19 Mob [2] Kyeongin** | **[8.7] NR19 XR [2] (Dawid)**  [8.7.6] XR rate control  [8.7.4] LCP enhancements, DSR enhancements |  |  |
| 10:45 – 12:15 | **[8.3] NR19 AI/ML Mobility [2] (Diana)** | **[8.5] NR19 Network Energy Saving [1] (Kyeongin)** | **[8.11] NR19 SBFD [0.75] (Erlin)**  [8.11.2]  [8.11.3] if time allows |  |
| 14:30 -16:30 | **[8.1] NR19 AI/ML PHY [2.5] (Diana)** | **[8.9] NR19 IoT NTN [1] (Sergio)**  [8.9.1] Organizational  [8.9.2] Support of Store and Forward  [8.9.3] Uplink Capacity Enhancements | **[6.2][7.5] NR1718 SL relay CB (Nathan)**  **[8.13] NR19 SL relay (Nathan)**  [8.13.3] Control plane/SRAP (continued)  [8.13.4] Service continuity |  |
|  |
| 17:00– 19:00 | **[8.18] TEI19** | **[8.9] NR19 IoT NTN [1] (continued)**  **[8.8] NR19 NR NTN [2] (Sergio)**  [8.8.4] Support of Broadcast service (cont)  [8.8.2] Downlink coverage enhancements | **[8.16] NR19 BDS Pos [0.25] (Nathan)**  **[8.15] NR19 NavIC Pos [0.5] (Nathan)**  **[7.1] NR18 Pos (Nathan) and TEI18 positioning con’t** |  |
|  |
| **Thursday** | | | | |
| **Colourful Polo day** | | | | |
| 08:30 – 10:30 | **[8.1] NR19 AI/ML PHY [2.5] (Diana) CB time if need** | **[7.3] R18 IoT NTN / [8.9] R19 IoT NTN CB (Sergio)**  [7.3.2] issues marked CB Thursday  [8.9.3] Uplink Capacity Enhancements (cont)  [8.9.4] Support of PWS  **[8.18] TEI 19**  R2-2411085, R2-2410480 | CB Nathan  **[7.1] NR18 Positioning**  **[7.5] NR18 SL relay (if needed)** |  |
|  |  |
| 11:00 – 13:00 | **[8.2] NR19 Ambient IoT [2.5] (Diana)** | **[7.4] NR18 NR NTN / [8.8] NR19 NR NTN CB (Sergio)**  [7.4.2] issues marked CB Thursday  [8.8.2] Downlink coverage enhancements (cont)  [8.8.5] Support of regenerative payload  [8.8.3] Uplink Capacity/Throughput Enhancement | **CB Mattias**  **CB EUTRA&NR151617 (Mattias)**  **[8.10] CB SON/MDT R19** |  |
| 14:30 -16:30 | **@14:30-15:30 CB AIoT**  **@15:30-16:30 CB** **NR19 AI/ML Mobility (if needed)** | **CB NR161718 SL** **(Kyeongin)**  **[8.5] NR19 NES CB (Kyeongin)** | CB Erlin  **CB for R18 MIMOevo (PHR-related, others if needed)**  **[8.4] CB NR19 LP-WUS (Erlin)**  [8.4.4]  Other CB for LP-WUS if needed |  |
|  |
| 17:00 – 19:00 | **CB NR 18 Diana** | **[7.2] CB NR18 Mob (Kyeongin)**  **[8.6] CB NR19 Mob (Kyeongin)** | CB Dawid:  **NR18 MBS/QoE**  **[8.7] NR19 XR CB:** |  |
| **Friday** | | | | |
| 08:30 – 10:30 | CB Diana  **@9:30-10:30 CB Ambient IoT**  Report from Mattias breakout session | **CB Sergio**  **NTN**  [8.9.2] issues marked CB Thursday  TBD | CB Kyongin  CB Nathan (TBD) |  |
| 11:00 – 13:00 | CB Diana  @11-12 R19 Ambient IoT  Other CBs  Reports from other breakout sessions  EoM |  |  |
| 14:30 – 16:00 |  |  |  |
| 16:00 – 17:00 |  |  |  |  |

**Breaks**

Morning coffee: 10:30 to 11:00

Lunch: 13:00 to 14:30

Afternoon coffee: 16:30 to 17:00

List and details of [AT128] offline discussions

NOTE: No offline email discussions will be kicked off before Monday Nov 18th, 09:00 local time

* [AT128][301][R18 NR NTN] SMTC issues (Huawei)

Scope: Continue the discussion on p2 and p3 from R2-2410750

Intended outcome: Report of the offline discussion

F2F offline time and location: FFS

Deadline for rapporteur's summary (in R2-2410971): Thursday 2024-11-22 08:00

* [AT128][302][R18 NR NTN] LS to RAN3 on RACH-less HO (Nokia)

Scope: Draft an LS to RAN3 on RACH-less HO in NTN

Intended outcome: Draft LS

Deadline for draft LS (in R2-2410967): Thursday 2024-11-22 08:00

* [AT128][303][R19 NR NTN] reply LS to RAN3 on MBS broadcast service for NTN (Xiaomi)

Scope: Draft a reply LS to RAN3 on MBS broadcast service for NTN

Intended outcome: Draft LS

Deadline for draft LS (in R2-2410972): Thursday 2024-11-22 08:00

* [AT128][304][R19 IoT NTN] LS to SA2 on satellite IDs for S&F (CATT)

Scope: Discuss RAN2 assumption on use of satellite IDs for S&F and draft LS to SA2

Intended outcome: Report of offline discussion and draft LS

Deadline for rapporteur's summary (in R2-2410974): Friday 2024-11-23 08:00

## 6.1 Common

### 6.1.1 Stage 2 and Organisational

#### 6.1.1.1 Other

[R2-2410807](file:///C:\Data\3GPP\Extracts\R2-2410807%20Correction%20on%20TDD%20support%20in%20NTN.docx) Correction on TDD support in NTN Huawei, HiSilicon CR Rel-17 38.300 17.10.0 0942 - F NR\_NTN\_solutions-Core

* QC thinks we should also clarify that CA/DC is not supported
* Ericsson thinks this is already clear as there are no TDD bands for this so far. Nokia agrees
* NEC thinks it makes sense to align to the description for IoT NTN
* CATT supports the CR
* Agreed

[R2-2410808](file:///C:\Data\3GPP\Extracts\R2-2410808%20Correction%20on%20TDD%20support%20in%20NTN.docx) Correction on TDD support in NTN Huawei, HiSilicon CR Rel-18 38.300 18.3.0 0943 - A NR\_NTN\_solutions-Core

* Agreed

### 6.1.3 Control Plane corrections

#### 6.1.3.1 NR RRC

Corrections to 38331, and related change to other TS if applicable, except UE caps.

[R2-2409781](file:///C:\Data\3GPP\Extracts\R2-2409781%20Corrections%20on%20UL%20polarization%20parameter%20in%20NR%20NTN.docx) Corrections on UL polarization parameters in NR NTN CATT CR Rel-17 38.331 17.10.0 5117 - F NR\_NTN\_solutions-Core

* LG supports the CR
* Ericsson does not support the CR and thinks this is due to some RAN1 agreement. CATT thinks the RAN1 agreement is for DL polarization, but this CR is about UL. ZTE agrees with Ericsson
* QC agrees with the intention but thinks we can add some text about NW behaviour
* Samsung also agrees with the intention but thinks nothing is really broken even if we don’t change anything
* HW thinks we need to change at least the need code. Ericsson agrees but thinks this could go to the rapporteur CR
* Not pursued
* RAN2 understands that UL polarization is not needed for neighbour cells for RRM measurements
* CB Thursday to check whether we need to change the need code from Need R to Need S (in case this will be captured in the RRC rapporteur CR)

[R2-2409782](file:///C:\Data\3GPP\Extracts\R2-2409782%20Corrections%20on%20UL%20polarization%20parameter%20in%20NR%20NTN.docx) Corrections on UL polarization parameters in NR NTN CATT CR Rel-18 38.331 18.3.0 5118 - A NR\_NTN\_solutions-Core

* Not pursued

[R2-2410028](file:///C:\Data\3GPP\Extracts\R2-2410028%2038331_CR5132%20Correction%20on%20NTN%20in%20FR1-NTN%20Bands.docx) Correction on NTN in FR1-NTN Bands vivo CR Rel-17 38.331 17.10.0 5132 - F NR\_NTN\_solutions-Core

* Ericsson thinks this should also go into the RRC rapporteur CR. Nokia agrees but also thinks that additional details should be added
* Vivo thinks we could also remove the reference to the specific table
* Not pursued
* Remove the reference to the specific table (correction to be included in the RRC rapporteur CR)

[R2-2410029](file:///C:\Data\3GPP\Extracts\R2-2410029%2038331_CR5133%20Correction%20on%20NTN%20in%20FR1-NTN%20Bands.docx) Correction on NTN in FR1-NTN Bands vivo CR Rel-18 38.331 18.3.0 5133 - A NR\_NTN\_solutions-Core

* Not pursued

[R2-2410362](file:///C:\Data\3GPP\Extracts\R2-2410362%20Corrections%20to%20NTN%20SMTC%20Configuration.docx) Corrections to NTN SMTC configuration ZTE Corporation, Sanechips CR Rel-17 38.331 17.10.0 5159 - F NR\_NTN\_solutions-Core

* LG supports the CR
* Vivo agrees with the intention but thinks we should revise the actual change
* QC thinks this is not needed
* CATT agrees with the CR but thinks that in idle mode is up to UE implementation
* Ericsson thinks that if we need to clarify something for idle mode it should go into the idle mode spec
* CB Thursday to check if any change is needed to any spec

[R2-2410363](file:///C:\Data\3GPP\Extracts\R2-2410363%20Corrections%20to%20NTN%20SMTC%20Configuration.docx) Corrections to NTN SMTC configuration ZTE Corporation, Sanechips CR Rel-18 38.331 18.3.0 5160 - A NR\_NTN\_solutions-Core

#### 6.1.3.2 UE capabilities

UE cap corrections 38306, 38331.

[R2-2410030](file:///C:\Data\3GPP\Extracts\R2-2410030%2038306_CR1207%20Correction%20on%20Capability%20Reporting%20in%20FR1-NTN%20Bands.docx) Correction on Capability Reporting in FR1-NTN Bands vivo CR Rel-17 38.306 17.10.0 1207 - F NR\_NTN\_solutions-Core

* Vivo thinks we can remove the last change on the specific sub-clause
* Revised in R2-2410961 to remove the last change

R2-2410961 Correction on Capability Reporting in FR1-NTN Bands vivo CR Rel-17 38.306 17.10.0 1207 1 F NR\_NTN\_solutions-Core

* CB Thursday

[R2-2410031](file:///C:\Data\3GPP\Extracts\R2-2410031%2038306_CR1208%20Correction%20on%20Capability%20Reporting%20in%20FR1-NTN%20Bands.docx) Correction on Capability Reporting in FR1-NTN Bands vivo CR Rel-18 38.306 18.3.0 1208 - A NR\_NTN\_solutions-Core

* Revised in R2-2410970

R2-2410970 Correction on Capability Reporting in FR1-NTN Bands vivo CR Rel-18 38.306 18.3.0 1208 1 A NR\_NTN\_solutions-Core

* CB Thursday

## 7.3 IoT NTN enhancements

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

Time budget: 0 TU

Tdoc Limitation: 1 tdocs

### 7.3.0 In-principle agreed CRs

Contributions agreed in principle at RAN2#127bis.

36.300

[R2-2410884](file:///C:\Data\3GPP\Extracts\R2-2410884%20-%2036300_CR1409r1_(Rel-18)%20-%20IoT%20NTN%20Stage%202%20correction%20to%20eMTC%20CHO.docx) IoT NTN Stage 2 correction to eMTC CHO Ericsson (Rapporteur) CR Rel-18 36.300 18.3.0 1409 1 F IoT\_NTN\_enh-Core [R2-2409178](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2409178.zip)

* Agreed

[R2-2410810](file:///C:\Data\3GPP\Extracts\R2-2410810%20Corrections%20on%20measurement.docx) Correction on measurement Huawei, HiSilicon CR Rel-18 36.300 18.3.0 1414 - F IoT\_NTN\_enh-Core

* Revised in R2-2410962 to reflect the change suggested in [R2-2409590](file:///C:\Data\3GPP\Extracts\R2-2409590%20Corrections%20on%20the%20reference%20of%20satellite%20ID.docx)

R2-2410962 Correction on measurement Huawei, HiSilicon CR Rel-18 36.300 18.3.0 1414 - F IoT\_NTN\_enh-Core

* Agreed

36.331

[R2-2410422](file:///C:\Data\3GPP\Extracts\R2-2410422%20Miscellaneous%20corrections%20to%20TS%2036.331%20for%20IoT%20NTN.docx) Miscellaneous corrections to TS 36.331 for IoT NTN Huawei, HiSilicon CR Rel-18 36.331 18.3.0 5054 1 F IoT\_NTN\_enh-Core [R2-2408342](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2408342.zip)

* Agreed

[R2-2409589](file:///C:\Data\3GPP\Extracts\R2-2409589%20Corrections%20on%20location%20based%20mearurements%20and%20need%20code%20for%20IoT%20NTN.docx) Corrections on location based measurements and need code for IoT NTN CATT CR Rel-18 36.331 18.3.1 5052 2 F IoT\_NTN\_enh-Core [R2-2409233](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2409233.zip)

* CATT indicates that the coversheet needs to be updated to remove the reference to the impacted 5G architecture
* Revised in R2-2410963

R2-2410963 Corrections on location based measurements and need code for IoT NTN CATT CR Rel-18 36.331 18.3.1 5052 3 F IoT\_NTN\_enh-Core

* Agreed

36.306

[R2-2410056](file:///C:\Data\3GPP\Extracts\R2-2410056_36306_CR1894_R2_R18-IoT%20NTN%20UE%20cap.docx) Applicability of optional UE Capabilities for NB-IoT Qualcomm Inc. CR Rel-18 36.306 18.3.0 1894 2 F IoT\_NTN\_enh-Core [R2-2409232](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2409232.zip)

* Lenovo thinks that in clause 4 the capability ntn-UplinkHarq-ModeB-MultiTB-r18 (4.3.38.35) is missing.
* Revised in R2-2411113 to add the missing capability

[R2-2411113](file:///C:\Data\3GPP\RAN2\Inbox\R2-2411113.zip) Applicability of optional UE Capabilities for NB-IoT Qualcomm Inc. CR Rel-18 36.306 18.3.0 1894 3 F IoT\_NTN\_enh-Core

* Agreed

[R2-2410867](file:///C:\Data\3GPP\Extracts\R2-2410867%20-%2036306_CR1902_(Rel-18)%20-%20IoT%20NTN%20UE%20capabilities%20correction%20for%20GNSS%20and%20HARQ%20enhancements.docx) IoT NTN UE capabilities correction for GNSS and HARQ enhancements Ericsson CR Rel-18 36.306 18.3.0 1902 - F IoT\_NTN\_enh-Core

* Agreed

36.304

[R2-2410860](file:///C:\Data\3GPP\Extracts\R2-2410860%20Corrections%20on%20distance-based%20measurements%20during%20T-Service%20for%20IoT%20NTN.docx) Corrections on distance-based measurements during T-Service for IoT NTN Samsung CR Rel-18 36.304 18.2.0 0876 1 F IoT\_NTN\_enh-Core [R2-2409235](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2409235.zip)

* Agreed

Withdrawn

R2-2410488 Corrections on distance-based measurements during T-service for IoT NTN Samsung CR Rel-18 36.304 18.2.0 0877 - F IoT\_NTN\_enh-Core

* Withdrawn

### 7.3.1 Organizational

LSs, rapporteur inputs.

Editorials/clarifications should not be included in any tdoc but sent to the WI spec rapporteurs

[R2-2409518](file:///C:\Data\3GPP\Extracts\R2-2409518_R3-245819.doc) Reply LS on UE Location Information for NB-IoT NTN (R3-245819; contact: Nokia) RAN3 LS in Rel-18 IoT\_NTN\_enh To:SA2 Cc:RAN2, CT1, SA1, SA3-LI

* Noted

### 7.3.2 Corrections

Corrections for all specifications.

RRC

* SIB33

[R2-2410308](file:///C:\Data\3GPP\Extracts\R2-2410308%20Correction%20on%20SIB33(-NB)%20for%20IoT%20NTN.docx) Correction on SIB33(-NB) for IoT NTN Nokia, Nokia Shanghai Bell CR Rel-18 36.331 18.3.1 5076 - F IoT\_NTN\_enh-Core

- Xiaomi and vivo support the CR but the coverpage should be fixed to add the impact analysis

* Add impact analysis and clauses affected
* Add the agreed change (p2) from R2-2410481
* Revised in R2-2410964

[R2-2410964](file:///C:\Data\3GPP\RAN2\Inbox\R2-2410964.zip) Correction on SIB33(-NB) for IoT NTN Nokia, Nokia Shanghai Bell CR Rel-18 36.331 18.3.1 5076 1 F IoT\_NTN\_enh-Core

* CB Thursday

[R2-2410481](file:///C:\Data\3GPP\Extracts\R2-2410481%20Various%20corrections%20to%20IoT%20NTN%20Rel-18.docx) Various corrections for IoT NTN Rel-18 Samsung discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: Introduce capability for eMTC to indicate that the UE is capable of acquiring and maintaining SIB33 in connected mode.

- Xiaomi thinks this is not needed. ZTE agrees. Nokia also agrees

* CB Thursday

Proposal 2: Add SystemInformationBlockType33(-NB) to NOTE1 of 5.3.18.

* Add SystemInformationBlockType33(-NB) to NOTE1 of 5.3.18 (To be included in CR 5076)
* Satellite ID

[R2-2410866](file:///C:\Data\3GPP\Extracts\R2-2410866%20-%2036331_CR5081_(Rel-18)%20-%20Correction%20to%20satellite%20ID%20in%20system%20infromation.docx) Correction to satellite ID in system infromation Ericsson, Samsung CR Rel-18 36.331 18.3.0 5081 - F IoT\_NTN\_enh-Core

- HW thinks that this is not essential, after agreeing the Stage2 CR

- Ericsson thinks this is still useful

- vivo supports the CR. Apple agrees

* Agreed

[R2-2410857](file:///C:\Data\3GPP\Extracts\R2-2410857_satellite_id.docx) Scope and uniqueness of satelliteId Nordic Semiconductor, Samsung discussion Rel-18

* Revised in R2-2410892

[R2-2410892](file:///C:\Data\3GPP\RAN2\Docs\R2-2410892.zip) Scope and uniqueness of satelliteId Nordic Semiconductor, Samsung discussion Rel-18

Proposal 1 Clarify in the specifications that the satelliteId-r17 and the satelliteId-r18 share the same number space.

- QC has the same understanding and think this is obvious. ZTE agrees that no further clarification is needed. Vivo also agrees

Proposal 2 A satelliteId is unique within a PLMN, in other words satelliteID+PLMN code may be considered a global identifier for a satellite.

- QC agrees with the intention and we should fix this, for instance sending an LS to SA2/CT4

- ZTE wonders if we can leave this to NW implementation

- vivo think the current space is sufficient for R18 and we might need to discuss this issue only for R19 S&F

- Nordic thinks this is an issue also in Rel18 and linking the satelliteID and PLMN would be a solution to fix this

- Xiaomi thinks we need to address this explicitly only for R19

* We first continue the discussion on satellite ID for Rel19 S&F and then check whether we need to send any LS to any group

Proposal 3 Multiple satelliteId+PLMN codes can identify the same satellite as long as the satelliteId is the same.

[R2-2410480](file:///C:\Data\3GPP\Extracts\R2-2410480%20Clarification%20on%20TN-NTN%20mobility%20for%20IoT%20NTN.docx) Clarification on TN-NTN mobility for IoT NTN ZTE Corporation, Sanechips discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 2: For SIB3, it can be clarified that, when satellite ID is absent, the cell type of the intra-frequency neighbor cells are same as that of the serving cell. The example change is as below:

* CB Thursday

36.306

[R2-2409947](file:///C:\Data\3GPP\Extracts\R2-2409947_36306_CR1901_(Rel-18)_UE%20IOT%20NTN%20feature%20of%20SIB33(-NB)%20reception%20in%20TN.docx) UE feature for SIB33(-NB) reception in RRC\_IDLE state in a TN cell Apple, Qualcomm Incorporated, Samsung, Huawei, HiSilicon, Ericsson, CATT, MediaTek Inc. CR Rel-18 36.306 18.3.0 1901 - F IoT\_NTN\_enh-Core

- ZTE thinks this is not needed

- vivo thinks we should have a general capability, also for when the UE is in a NTN cell. ZTE thinks we already discussed this. Apple thinks this is a new case

- ZTE can compromise and have this

* Revised in R2-2410965 to add the impact analysis

R2-2410965 UE feature for SIB33(-NB) reception in RRC\_IDLE state in a TN cell Apple, Qualcomm Incorporated, Samsung, Huawei, HiSilicon, Ericsson, CATT, MediaTek Inc. CR Rel-18 36.306 18.3.0 1901 1 F IoT\_NTN\_enh-Core

* CB Thursday

Stage 2

[R2-2409543](file:///C:\Data\3GPP\Extracts\R2-2409543%2036300_CR1410%20Correction%20on%20UE%20Location%20Information%20Reporting%20in%20IoT-NTN.docx) Correction on UE Location Information for IoT-NTN vivo, Ericsson, Nokia, Nokia Shanghai Bell CR Rel-18 36.300 18.3.0 1410 - F IoT\_NTN\_enh-Core

- Xiaomi wonders if we need to cover the RAN3 aspects. Nokia thinks this is not clashing with the RAN3 agreed CR and the two CRs can be merged during the CR implementation phase

* Agreed

[R2-2409590](file:///C:\Data\3GPP\Extracts\R2-2409590%20Corrections%20on%20the%20reference%20of%20satellite%20ID.docx) Corrections on the reference of satellite ID Huawei, HiSilicon, Apple CR Rel-18 36.300 18.3.0 1411 - F IoT\_NTN\_enh-Core

- Xiaomi agrees with the CT and thinks a Stage 2 change is sufficient

- Samsung supports the CR but thinks this can be merged with the previous IPA CR

* Change is agreed and merged into CR 1414
* CR is not pursued

## 7.4 NR NTN enhancements

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

Time budget: 0 TU

Tdoc Limitation: 1 tdocs

### 7.4.0 In-principle agreed CRs

Contributions agreed in principle at RAN2#127bis.

38.300

[R2-2410541](file:///C:\Data\3GPP\Extracts\R2-2410541.docx) Miscellaneous corrections to NR NTN Samsung CR Rel-18 38.300 18.3.0 0922 2 F NR\_NTN\_enh-Core [R2-2409244](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2409244.zip)

* Revised in R2-2410966 to add the impact analysis

R2-2410966 Miscellaneous corrections to NR NTN Samsung CR Rel-18 38.300 18.3.0 0922 3 F NR\_NTN\_enh-Core [R2-2409244](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2409244.zip)

* Agreed

### 7.4.1 Organizational

LSs, rapporteur inputs.

Editorials/clarifications should not be included in any tdoc but sent to the WI spec rapporteurs

[R2-2409505](file:///C:\Data\3GPP\Extracts\R2-2409505_R1-2407406.docx) LS on FR2-NTN inclusion to specifications (R1-2407406; contact: vivo) RAN1 LS in Rel-18 NR\_NTN\_enh-Core To:RAN2, RAN4

* Noted

### 7.4.2 Corrections

Corrections for all specifications.

RRC related

* FR2 related

[R2-2410364](file:///C:\Data\3GPP\Extracts\R2-2410364%20Miscellaneous%20corrections%20on%20NTN%20in%20FR2%20bands.docx) Miscellaneous corrections on NTN in FR2 bands ZTE Corporation, Vivo, Sanechips CR Rel-18 38.331 18.3.0 5161 - F NR\_NTN\_enh-Core

- QC would like to check change 4. Ericsson also

* Changes other than change 4 are agreed
* Continue the discussion on change 4
* CB Thursday on change 4.
* Reference location

[R2-2410865](file:///C:\Data\3GPP\Extracts\R2-2410865%20-%2038331_CR5193_(Rel-18)%20-%20Clarification%20of%20reference%20location%20within%20the%20MO%20for%20NR%20NTN%20Rel-18.docx) Clarification of reference location within the MO for NR NTN Rel-18 Ericsson CR Rel-18 38.331 18.3.0 5193 - F NR\_NTN\_enh-Core

* CB Thursday
* Satellite switch with resync

[R2-2410878](file:///C:\Data\3GPP\Extracts\R2-2410878_Remaining%20open%20issues%20of%20satellite%20switch%20with%20resync.docx) Remaining open issues of satellite switch with resync Sequans Communications discussion Rel-18 NR\_NTN\_enh-Core

Observation 1: Service link PDD simultaneous reports at satellite switch seems avoidable by NW implementation

- Ericsson agrees with the observation, in the considered scenario (LEO 600km) but wonders if this would be different in other scenarios (higher altitudes) and whether the feature would work in that case

Proposal 1: Consider soft switch where SSB-timeOffset is applied only between t-serviceStart and t-service

[R2-2410750](file:///C:\Data\3GPP\Extracts\R2-2410750%20Remaining%20issues%20on%20SMTC.docx) Remaining issues on SMTC Huawei, HiSilicon discussion Rel-18 NR\_NTN\_enh-Core

Observation 1: Network can configure suitable threshPropDelayDiff to avoid PDD report during satellite switch with resync.

Proposal 1: No further enhancement to PDD reporting during satellite switch with resync.

- QC wonder if we need to clarify the UE behaviour for PDD reporting during the transition phase. CMCC thinks this is a similar case to the HO scenario in Rel-17.

* Can further check whether we need to clarify the UE behaviour for PDD reporting during the transition phase

Proposal 2: The target satellite uses different SSB transmission pattern with source satellite during [t-Start, t-Service], and then change back to the source satellite SSB pattern after t-Service.

- QC thinks the UE should not resync another time to the target cell and does not support this solution

- LG thinks this can be done without the need to resync

- CMCC also support this

* Continue in offline 301

Proposal 3: RAN2 to determine whether PCI list in SMTC4 is mandatory, and choose from the following:

• Option 1: Clarify in the field description of pci-List of SSB-MTC4 that “The network shall always configure this field when SSB-MTC4-r17 is configured”;

• Option 2: Add the following description in 38.331 clause 5.5.2: “If pci-List parameter is absent in an SSB-MTC4 in SIB2/SIB4, it is up to UE implementation to detect neighbour cells associated with the SMTC, based on the ephemeris information in SIB19.”

* Continue in offline 301
* [AT128][301][R18 NR NTN] SMTC issues (Huawei)

Scope: Continue the discussion on p2 and p3 from R2-2410750

Intended outcome: Report of the offline discussion

F2F offline time and location: FFS

Deadline for rapporteur's summary (in R2-2410971): Thursday 2024-11-22 08:00

[R2-2410971](file:///C:\Data\3GPP\RAN2\Inbox\R2-2410971.zip) Report of [AT128][301][NR NTN] SMTC issues Huawei discussion Rel-19 NR\_NTN\_enh-Core

* CB Thursday

[R2-2410973](file:///C:\Data\3GPP\RAN2\Inbox\R2-2410973.zip) Draft LS soft satellite switch with resync (Huawei) LSout To:RAN4, RAN1 NR\_NTN\_enh-Core

* CB Thursday
* RACH-less HO and SIB19 reception

[R2-2410527](file:///C:\Data\3GPP\Extracts\R2-2410527.docx) Discussion on some corrections Samsung discussion Rel-18 NR\_NTN\_enh-Core

Observation 1: RRCReconfiguration message for RACH-less HO can be prepared by the target gNB using the existing mechanism and/or by implementation. Inter-gNB RACH-less HO in NTN can be supported without RAN3 impact.

Proposal 1: Add the following sentence in TS 38.300 clause 9.2.3.6 RACH-less handover.

“In NTN, RACH-less handover can be supported for intra/inter-satellite handover with same gateway/gNB and intra/inter-satellite handover with gateway/gNB switch.”

- Ericsson thinks this is not for RAN2 to decide and should be discussed in RAN3

- Nokia understands this is doable with the existing RAN3 specs

* RAN2 assumes that, in NTN, RACH-less handover can be supported for intra/inter-satellite handover with same gateway/gNB and intra/inter-satellite handover with gateway/gNB switch. We send a LS to RAN3 (cc RAN1) asking if there is any problem with this
* Draft an LS to RAN3 in offline 302

Observation 2: In TS 38.133 clause 4.2.2.12, RAN4 has already specified measurement requirements for TN-NTN cell reselection in both directions.

Proposal 2: RAN2 understands that there are RAN4 requirements regarding measurements on a NTN cell while the UE is camping or being connected to a TN cell. This reverts the agreement in the last meeting.

* CB Thursday

Agreements:

1. RAN2 assumes that, in NTN, RACH-less handover can be supported for intra/inter-satellite handover with same gateway/gNB and intra/inter-satellite handover with gateway/gNB switch. We send a LS to RAN3 (cc RAN1) asking if there is any problem with this

[R2-2410438](file:///C:\Data\3GPP\Extracts\R2-2410438%20Various%20Corrections%20and%20Open%20Points%20for%20Rel-18%20NTN.docx) Various Corrections and Open Points for Rel-18 NTN Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: RAN2 assumes the requirements and parameters for FR2-1 are generally applicable to FR2-NTN, unless specified otherwise.

Proposal 2: Consider a general statement in RAN2 Technical Specifications or a pointer to TS 38.101 to reflect which requirements apply to FR2-NTN.

Proposal 3: If Proposal 2 is not agreeable, RAN2 agrees a single CR fixing the FR2-NTN requirements for all affected fields/IEs.

Proposal 4: Support RACH-less HO also in inter-gNB scenarios for NTN.

Proposal 5: RAN2 reopens the discussion on whether the UE can measure an NTN cell while camping or being connected to a TN cell. RAN2 reflects RAN4 requirements in the appropriate specifications.

Proposal 6: Align with RAN4 regarding the requirements for SIB19 acquisition in TN cell.

* [AT128][302][R18 NR NTN] LS to RAN3 on RACH-less HO (Nokia)

Scope: Draft an LS to RAN3 on RACH-less HO in NTN

Intended outcome: Draft LS

Deadline for draft LS (in R2-2410967): Thursday 2024-11-22 08:00

R2-2410967 Draft LS on RACH-less HO in NTN (Nokia) LSout To:RAN3, Cc:RAN1 NR\_NTN\_enh-Core

* CB Thursday

38.306

[R2-2409544](file:///C:\Data\3GPP\Extracts\R2-2409544%2038306_CR1200%20Correction%20on%20NTN%20in%20FR2%20bands.docx) Correction on NTN in FR2 bands vivo, ZTE Corporation, Sanechips CR Rel-18 38.306 18.3.0 1200 - F NR\_NTN\_enh-Core

* CB Thursday

[R2-2409948](file:///C:\Data\3GPP\Extracts\R2-2409948_38306_CR1206_(Rel-18)_UE%20NTN%20feature%20of%20SIB19%20reception%20in%20TN.docx) UE feature for SIB19 reception in RRC\_IDLE/RRC\_INACTIVE state in a TN cell Apple, Qualcomm Incorporated, Samsung, Huawei, HiSilicon, CATT, MediaTek Inc. CR Rel-18 38.306 18.3.0 1206 - F NR\_NTN\_enh-Core

* CB Thursday

Stage 2

[R2-2409606](file:///C:\Data\3GPP\Extracts\R2-2409606%20Correction%20on%20coexistence%20between%20CHO%20and%20satellite%20switching%20with%20re-synchronization.docx) Correction on coexistence between CHO and satellite switching with re-synchronization CATT, Nokia, Nokia Shanghai Bell, Ericsson CR Rel-18 38.300 18.3.0 0903 1 F NR\_NTN\_enh-Core [R2-2407968](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2407968.zip)

* CB Thursday

[R2-2410642](file:///C:\Data\3GPP\Extracts\R2-2410642%2038300_CR0904%20Correction%20on%20RACH-less%20HO%20in%20NR-NTN.docx) Correction on RACH-less HO in NR-NTN vivo, Samsung, Nokia, Nokia Shanghai Bell, THALES, Huawei, HiSilicon, CATT CR Rel-18 38.300 18.3.0 0904 1 F NR\_NTN\_enh-Core [R2-2408013](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2408013.zip)

* Postponed

## 8.8 NTN for NR Ph3

(NR\_NTN\_Ph3-Core; leading WG: RAN2; REL-19; WID: RP-241789)

LTE\_TN\_NR\_NTN\_mob, leading WG: RAN2, Rel-19 WID: [RP-240924](http://ftp.3gpp.org/tsg_ran/TSG_RAN/TSGR_104/Docs/RP-240924.zip))

Time budget: 2 TU

Tdoc Limitation: 3 tdocs

### 8.8.1 Organizational

LS, Rapporteur input, including workplan, etc.

For the LTE\_TN\_NR\_NTN\_mob WI, including endorsed draft CRs from the WI spec rapporteurs.

Rapporteur inputs do not count towards the tdoc limitation.

Incoming LSs

* Common TA

[R2-2409512](file:///C:\Data\3GPP\Extracts\R2-2409512_R1-2409258.docx) Reply LS on common TA in a regenerative payload scenario (R1-2409258; contact: CMCC) RAN1 LS in Rel-19 NR\_NTN\_Ph3-Core To:RAN2 Cc:RAN4

* Noted

[R2-2409522](file:///C:\Data\3GPP\Extracts\R2-2409522_R4-2416920.docx) Reply LS on common TA in a regenerative payload scenario (R4-2416920; contact: CMCC) RAN4 LS in Rel-19 NR\_NTN\_Ph3-Core To:RAN2 Cc:RAN1

* Noted
* We to stick to 0 as minimum possible value for TA common without introducing the negative value for ta-Common.

Agreements:

1 We to stick to 0 as minimum possible value for TA common without introducing the negative value for ta-Common.

* MBS broadcast service

[R2-2409519](file:///C:\Data\3GPP\Extracts\R2-2409519_R3-245844.docx) LS on Supporting MBS broadcast service for NR NTN (R3-245844; contact: Xiaomi) RAN3 LS in Rel-19 NR\_NTN\_Ph3-Core To:RAN2, SA2, CT4

* Noted
* Draft a reply LS in R2-2410972 based on meeting agreements
* [AT128][303][R19 NR NTN] reply LS to RAN3 on MBS broadcast service for NTN (Xiaomi)

Scope: Draft a reply LS to RAN3 on MBS broadcast service for NTN

Intended outcome: Draft LS

Deadline for draft LS (in R2-2410972): Thursday 2024-11-22 08:00

R2-2410972 Draft reply on Supporting MBS broadcast service for NR NTN (Xiaomi) LSout To:RAN3, SA2; Cc: CT4 NR\_NTN\_Ph3-Core

* CB Thursday

Rapporteurs’ inputs for LTE\_TN\_NR\_NTN\_mob

[R2-2409536](file:///C:\Data\3GPP\Extracts\R2-2409536%20Introduction%20of%20LTE%20TN%20to%20NR%20NTN%20Mobility%20UE%20Capability.docx) Introduction of LTE TN to NR NTN Mobility UE Capability vivo CR Rel-19 36.306 18.3.0 1900 - B LTE\_TN\_NR\_NTN\_mob-Core

* Endorsed

[R2-2409669](file:///C:\Data\3GPP\RAN2\Docs\R2-2409669.zip) Introduction of LTE TN to NR NTN IDLE mode mobility CATT CR Rel-19 36.331 18.3.1 5065 - B LTE\_TN\_NR\_NTN\_mob [R2-2407963](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2407963.zip) Late

- CATT indicates this is a clean-up, adding latest agreements

* Revised in R2-2410968 to take meeting agreements into account

R2-2410968 Introduction of LTE TN to NR NTN IDLE mode mobility CATT CR Rel-19 36.331 18.3.1 5065 1 B LTE\_TN\_NR\_NTN\_mob

* CB Thursday

[R2-2409938](file:///C:\Data\3GPP\Extracts\R2-2409938%20Introduction%20of%20Stage%202%20for%20E-UTRAN%20to%20NR%20NTN%20idle%20mode%20mobility.docx) Introduction of stage 2 for LTE to NR NTN idle mode mobility Samsung CR Rel-19 36.300 18.3.0 1412 - B LTE\_TN\_NR\_NTN\_mob

* Revised in R2-2410969 to take meeting agreements into account

R2-2410969 Introduction of stage 2 for LTE to NR NTN idle mode mobility Samsung CR Rel-19 36.300 18.3.0 1412 1 B LTE\_TN\_NR\_NTN\_mob

* CB Thursday

Rapporteurs’ inputs for NR\_NTN\_Ph3

[R2-2410861](file:///C:\Data\3GPP\Extracts\R2-2410861%20-%2038331_CR5192_(Rel-19)%20-%20Running%20RRC%20CR%20for%20NR%20NTN%20phase%203.docx) Running RRC CR for NR NTN phase 3 Ericsson CR Rel-19 38.331 18.3.0 5192 - B NR\_NTN\_Ph3-Core

### 8.8.2 Downlink coverage enhancements

Contributions should focus on RAN2 aspects of DL coverage enhancements (e.g. cell level / beam level DTX/DRX mechanism, etc.).

Impact with extended SSB periodicity

* Access Control and Cell reselection enhancement

[R2-2409666](file:///C:\Data\3GPP\Extracts\R2-2409666Discussion%20on%20downlink%20coverage%20enhancement.docx) Discussion on downlink coverage enhancements LG Electronics Inc. discussion

* Access Control

Proposal 1 If we need to bar UEs supporting DL-CE, a new bar bit should be introduced in SIB1 to control access of UEs supporting DL-CE.

- Apple thinks we should refer to UEs not supporting extended SSB periodicity rather than supporting DL-CE. Xiaomi thinks that we should refer to DL-CE for now

- Ericsson thinks there is no need to kick out UEs that can connect to the network

- Sequans still thinks we did not discuss whether there is a real need to bar UEs

* If we need to bar UEs not supporting DL-CE (via legacy mechanism), we introduce a new barring in SIB1 to be able to selectively bar “UEs supporting DL-CE” (FFS if we will finally refer to “UEs supporting extended SSB periodicity” instead). FFS on the details (e.g. how many bits, etc.)

Proposal 2 The new bar bit shall be present in a cell operating with DL-CE, with code points {barred, notBarred}.

Proposal 3 If the new bar bit is absent in SIB1, UE supporting DL-CE considers that the cell does not support DL-CE and follows cellBarredNTN.

* Cell reselection enhancement

Proposal 4 Network can use the existing neighbor cell list, such as ExcludedCellList in SIB3,4 and ntn-NeighCellConfigList in SIB19, to prevent UEs not supporting DL-CE from reselecting DL-CE cells, without backward compatibility issue.

Proposal 5 RAN2 should introduce a new neighbor cell list, either/both a new ExcludedCellList in SIB3,4 or/and a new ntn-NeighCellConfigList in SIB19, to allow UEs supporting DL-CE to reselect DL-CE cells.

Proposal 6 If new ExcludedCellList for DL-CE is present, UEs supporting DL-CE only consider new ExcludedCellList for DL-CE and ignore existing ExcludedCellList.

Proposal 7 If new ntn-NeighCellConfigList for DL-CE is present, UEs supporting DL-CE consider both new ntn-NeighCellConfigList for DL-CE and existing ntn-NeighCellConfigList.

* SMTC impacts

Observation 1 The decision regarding the extension of the SSB periodicity is still ongoing and there is no progress on beam hopping in RAN1.

Observation 2 If the network properly configures beam hopping for SSB transmission, the current number of SMTCs will be sufficient for neighbor cells measurement.

Proposal 8 From RAN2's perspective, there is no SMTC issue related to beam hopping or SSB periodicity extension unless further input is provided by RAN1.

* DTX

Proposal 9 RAN2 postpones the discussion on DTX operation until it receives sufficient input from RAN1 regarding the DTX operation.

[R2-2410267](file:///C:\Data\3GPP\Extracts\R2-2410267%20Cell%20barring%20and%20reselection%20for%20NTN%20DL-CE.docx) Cell barring and reselection for NTN DL-CE Lenovo discussion Rel-19

* Access control

Proposal 1: RAN2 to discuss the following options of cell barring for an NTN-capable UE supporting DL-CE.

Option 1: [Explicit] By a new cell barring indication cellBarredNTN\_DLCE with configurable value “barred” and “not barred”.

Option 2A: [Explicit] By presence of a new flag indication cellBarredNTN\_DLCE.

Option 2B: [Explicit] By presence of a new flag indication cellAllowedNTN\_DLCE is introduced.

Option 3: [Implicit] By presence of DL-CE configuration (e.g., SSB periodicity extension larger than 160ms).

Proposal 2: RAN2 to consider cell barring enhancement based on the validity duration of cell barring status for NTN DL-CE.

* Cell reselection enhancement

Proposal 3: If a neighboring NTN cell operating in DL-CE is considered as not barred, an NTN-capable UE supporting DL-CE prioritizes the frequency of the cell for cell reselection.

Proposal 4: If a neighboring NTN cell operating in DL-CE is considered as barred, an NTN-capable UE supporting DL-CE considers the cell as barred or deprioritizes the frequency of the cell for cell reselection.

Proposal 5: If a neighboring NTN cell operating in DL-CE is considered as barred, an NTN-capable UE NOT supporting DL-CE considers the cell as barred or deprioritizes the frequency of the cell for cell reselection.

[R2-2409821](file:///C:\Data\3GPP\Extracts\R2-2409821%20Discussion%20on%20the%20DL%20coverage%20enhancement%20at%20system%20level.docx) Discussion on the DL coverage enhancement at system level Google Ireland Limited discussion Rel-19 NR\_NTN\_Ph3-Core

* The necessity of extending the SSB periodicity:

Observation 1 The increased SSB periodicity due to the beam hopping can be known to the UE based on the original SSB periodicity (i.e., the SSB periodicity before beam hopping) plus the DTX configuration.

Observation 2 The existing values for ssb-periodicityServingCell, SSB-MTC, SSB-MTC4, and mgrp can remain the same if the DTX pattern is signaled to support the beam hopping mechanism.

Observation 3 The DTX configuration offers more flexible beam hopping options, due to the configurable ON duration in the DTX configuration.

Proposal 1 RAN2 neither extends the values for ssb-periodicityServingCell (and other SSB related parameters) nor extends the SMTC list, but introduces the DTX configuration instead to support the system level DL coverage enhancement.

* The provision of the DTX configuration:

Observation 4 The beam hopping mechanism may have the impact to the UE in idle/inactive state, as when the UE wakes up at its paging occasions, it may not detect anything including the SSB burst.

Proposal 2 The DTX configuration can be provided in the system information for idle/inactive UEs, and covers the Tx state where the beam/cell is not transmitting anything.

Observation 5 Providing beam DTX configuration can support most of the mapping options between the satellite beam and the NR beam/cell, and the cell DTX configuration can be considered as a special case of the beam DTX configure.

Proposal 3 The DTX configuration can be a beam-specific configuration, and can be associated to an SSB index.

Proposal 4 If a DTX configuration is not associated with an SSB index, it is applicable for the entire cell.

* The impact on the legacy UEs:

Observation 6 It is unlikely the legacy UE can obtain a meaningful measurement result from the cell operating with DL-CE per Tmeasure,NR\_Inter or Tmeasure,NR\_Intra.

Proposal 5 RAN2 neither introduces a new barring mechanism to bar the Rel-19 UE supporting DL-CE, nor introduces a new method for the UE not supporting DL-CE to down-prioritize the cell reselection to cells operating with DL-CE.

* The impact on the RRC\_CONNECTED UE:

Proposal 6 The connected UE is not required to monitor the PDCCH, perform the RLM/BFD, and perform the serving cell measurement during the OFF periods configured by the DTX configuration.

Proposal 7 The connected UE is expected to receive a c-DRX configuration whose the cycle length is equal to one or multiple times of the DTX cycle length.

[R2-2410549](file:///C:\Data\3GPP\Extracts\R2-2410549%20(R19%20NR%20NTN%20WI%20AI%208.8.2)%20DL%20coverage.docx) Downlink coverage enhancement for NTN InterDigital discussion Rel-19 NR\_NTN\_Ph3-Core

* Access Control

Proposal 1a: A new barring bit is introduced to control access of UEs supporting Rel-19 NTN DL-CE.

Proposal 1b: Confirm that UEs supporting Rel-19 NTN DL-CE will not consider the existing NTN barring bit.

* Cell reselection enhancement

Proposal 2: Define absolute priority information for DL-CE capable UEs.

* Dynamic power sharing

Proposal 3: UE can be notified of changes to beam power sharing/pattern/size for both serving and neighbouring cell(s).

Proposal 4: Satellite assistance information (e.g., within SIB19) can be used to predict future changes to beam power sharing/pattern/size.

Proposal 5: UE can consider a future change to beam power sharing/pattern/size during mobility and cell (re)selection.

Agreements:

1. If we need to bar UEs not supporting DL-CE (via legacy mechanism), we introduce a new barring in SIB1 to be able to selectively bar “UEs supporting DL-CE” (FFS if we will finally refer to “UEs supporting extended SSB periodicity” instead). FFS on the details (e.g. how many bits, etc.)

* SMTC impacts

[R2-2410804](file:///C:\Data\3GPP\Extracts\R2-2410804_Dowlink%20coverage%20enhancements%20SMTC%20impacts.docx) Downlink coverage enhancement SMTC impacts Sequans Communications discussion Rel-19 NR\_NTN\_Ph3-Core [R2-2408970](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2408970.zip)

Proposal 1: RAN2 assumes that the number of configured SMTCs may increase due to beam-hopping / larger SSB periodicity (depending on RAN1/4 solution)

Proposal 2: RAN2 investigates related additional power consumption impact (including legacy UEs)

Proposal 3: RAN2 considers signaling DL CE cells SMTCs separately (e.g. new SMTC5 list)

Observation 1: The UE should ideally consider only SMTCs corresponding to the closest neighbor cells

Proposal 4: Consider enhancements to allow location-based UE SMTC selection (broadcast of neighbor cells reference location / SSB indexes associated with SMTCs)

Observation 2: In connected, NW may not have UE location information needed to configure SMTCs to UE

Observation 3: R18 location-based CHO without associated measurement avoids SMTCs configuration, but adds complexity and may increase handover interruption time

Proposal 5: Consider location-based UE SMTC selection also in connected

[R2-2410213](file:///C:\Data\3GPP\Extracts\R2-2410213%20Downlink%20coverage%20enhancement.docx) Discussion on NTN downlink coverage enhancement Nokia discussion NR\_NTN\_Ph3-Core [R2-2408699](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2408699.zip)

* RAN1 reply related

Proposal 1: RAN2 should refrain from using the term “Beam hopping” and instead focus on defining terms related to beam footprints and their activity.

Proposal 2: RAN2 to focus on defining signals and procedures that allows for the situation of a satellite not being able to have all satellite beams simultaneously active.

* MIB impact

Proposal 3: RAN2 to include in the study the impact on MIB transmission and reception due to the SSB periodicity extension e.g. allowing MIB periodicity to follow SSB even for periods lower than 80 ms, and to prevent a joint configuration of CORESET multiplexing pattern 1 together with SSB periods longer than 20 ms.

* SMTC impacts

Observation 1: SMTC configuration using the existing number of SMTC windows is not possible.

Observation 2: Configuring SMTC windows covering group of SSB measurements will be very energy inefficient.

Proposal 4: RAN2 to assume that there is no distinct pattern to be configured e.g. for SMTC windows and at least the number of SMTC windows must be extended.

Observation 3: SMTC window configuration of all possible SSB transmissions of neighbouring cells is energy inefficient.

Observation 4: Location based SMTC configuration may be a solution to optimising the energy consumption of an NR NTN UE performing neighbour cell measurements on a subset of the configured SMTC windows.

Observation 5: Location based SMTC configuration provide additional signalling overhead and requires a UE to be aware of the relative location between not only the gNB but also all neighbouring cells.

Observation 6: Optimal SMTC window configuration may be dynamic for a given UE if we account not only for SSB transmission but also data transmission.

Proposal 5: RAN2 to study at least four aspects of downlink coverage enhancements

• Increasing the number and duration of SMTC windows;

• Allowing a UE can do a scan for neighboring cells over a period and to limit the measurements afterwards to the relevant cells

• Setting the SSB period to a lower value during mobility events in case of Earth Fixed Cells.

* Access Control

Observation 7: The need for a barring bit may also depend on whether RAN1 believes the MIB can be read by non DL-CE enabled UEs, but this is up to RAN1

Proposal 6: RAN2 ask RAN1 whether the MIB can be read by non DL-CE enabled UEs.

Cell DTX/ Beam DTX

[R2-2410066](file:///C:\Data\3GPP\Extracts\R2-2410066%20Discussion%20on%20DL%20coverage%20enhancement.doc) Discussion on DL coverage enhancement Xiaomi discussion Rel-19 NR\_NTN\_Ph3-Core

* Cell DTX/DRX

Proposal 1: for cell level DTX/DRX for NTN DL coverage enhancement, same as cell DTX/DRX for NES, cell transmission/reception state is modelled into two states: "cell DTX/DRX Active period" state and "Cell DTX/DRX inactive period" state.

Proposal 2: If beam level DTX/DRX for NTN DL coverage enhancement is supported, beam transmission/reception state is modelled into two states: "beam DTX/DRX Active period" state and "beam DTX/DRX inactive period" state.

Proposal 3: During cell/beam level DTX inactive period for NTN DL coverage enhancement, UE is not expected to receive any signal from the cell/beam.

Proposal 4: During cell/beam level DRX inactive period for NTN DL coverage enhancement, UE is not expected to receive any signal from the cell/beam.

Proposal 5: The configuration for cell level DTX/DRX for NTN DL coverage enhancement should be separate from cell DTX/DRX configuration for NES.

* Access Control

Proposal 6: For intra-freq/inter-freq cell reselection, introduce a DL CE UE specific intraFreqExcludedCellList/interFreqExcludedCellList.

Proposal 7: For inter-freq cell reselection, introduce a DL CE UE specific interFreqCarrierFreqList.

* LL coverage enhancements

Proposal 8: If msg4 PDSCH repetition is agreed to support, Msg3 is used to carry the indication of msg4 PDSCH repetition capability/request.

[R2-2410671](file:///C:\Data\3GPP\Extracts\R2-2410671%20RAN2%20Impact%20on%20DL%20coverage%20enhancements.docx) RAN2 Impact on DL coverage enhancements CMCC discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: for senario1, i.e. Different PCIs for mutiple beam footprints in one satellite cell (1-to-1 mapping), the current periodic cell DTX/DRX pattern (i.e. active and non-active periods) in Rel-18 NES for reducing gNB downlink transmission/uplink reception active time seems can be utilized for the DL system level enhancement (i.e., beam hopping) use case.

Proposal 2: for senario2, i.e. Single PCI for Multi-beam footprints in one satellite cell (multiple-to-1 mapping), the current periodic cell DTX/DRX pattern (i.e. active and non-active periods) in Rel-18 NES for reducing gNB downlink transmission/uplink reception active time seems can be enhanced for the DL system level enhancement (i.e., beam hopping) use case:

Alt 1. Extend the granularity of periodic cell DTX/DRX pattern in NES from cell to beam footprint

Alt 2. Reuse current periodic cell DTX/DRX pattern with more domain information, e.g. beam footprint or geographical information

Proposal 3: As for NES, no impact to idle UE, e.g., RACH, paging, SIBs and SSB transmission, it is proposed to define different UE behavior is different in the non-actvie status when reusing the current periodic cell DTX/DRX pattern (i.e. active and non-active periods) in Rel-18 NES.

[R2-2409671](file:///C:\Data\3GPP\Extracts\R2-2409671%20Discussion%20on%20downlink%20coverage%20enhancements.docx) Further discussion on downlink coverage enhancements CATT discussion

[R2-2409848](file:///C:\Data\3GPP\Extracts\R2-2409848%20Discussions%20on%20cell%20DTX%20during%20satellite%20dynamic%20power%20sharing.doc) Discussions on cell DTX during satellite dynamic power sharing Fujitsu discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409978](file:///C:\Data\3GPP\Extracts\R2-2409978_DL%20coverage%20enhancement.doc) DL coverage enhancement in NTN Apple discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410048](file:///C:\Data\3GPP\Extracts\R2-2410048%20Cell%20DTX.docx) Discussion on cell DTX Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410107](file:///C:\Data\3GPP\Extracts\R2-2410107_NR%20NTN%20coverage%20enhancement.doc) NR NTN coverage enhancement China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410122](file:///C:\Data\3GPP\Extracts\R2-2410122%20Discussion%20on%20DL%20coverage%20enhancement%20for%20NTN.doc) Discussion on DL coverage enhancement for NTN OPPO discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410293](file:///C:\Data\3GPP\Extracts\R2-2410293%20Consideration%20on%20downlink%20coverage%20enhancement.docx) Consideration on downlink coverage enhancement NEC Corporation discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410365](file:///C:\Data\3GPP\Extracts\R2-2410365%20Consideration%20on%20DL%20coverage%20enhancements.doc) Consideration on downlink coverage enhancements ZTE Corporation, Sanechips discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410386](file:///C:\Data\3GPP\Extracts\R2-2410386.docx) SMTC impacts due to NTN downlink coverage enhancements Sony discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410525](file:///C:\Data\3GPP\Extracts\R2-2410525.docx) Discussion on Downlink Coverage Enhancement Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410677](file:///C:\Data\3GPP\Extracts\R2-2410677%20NTN%20DL%20coverage%20enhancements.docx) NTN DL coverage enhancements NERCDTV discussion

[R2-2410691](file:///C:\Data\3GPP\Extracts\R2-2410691%20Discussion%20on%20downlink%20coverage%20enhancement.docx) Discussions on downlink coverage enhancement HONOR discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410699](file:///C:\Data\3GPP\Extracts\R2-2410699-Discussion_for_DL_coverage_enhancement.docx) Discussion on Downlink Coverage Enhancements Sharp discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410715](file:///C:\Data\3GPP\Extracts\R2-2410715_Discussion%20on%20downlink%20coverage%20enhancement%20in%20NR-NTN.docx) Discussion on downlink coverage enhancements in NR NTN ETRI, Korea University discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410806](file:///C:\Data\3GPP\Extracts\R2-2410806_Dowlink%20coverage%20enhancements%20Access%20Control.docx) Downlink coverage enhancement access control Sequans Communications discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410870](file:///C:\Data\3GPP\Extracts\R2-2410870%20Discussion%20on%20DL%20Coverage%20enhancement_v2.docx) Discussion on RAN2 Aspects for system-level Downlink Coverage enhancements THALES discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410881](file:///C:\Data\3GPP\Extracts\R2-2410881%20-%20DL%20coverage%20enhancements.docx) DL coverage enhancements Ericsson discussion Rel-19 IoT\_NTN\_Ph3-Core

### 8.8.3 Uplink Capacity/Throughput Enhancement

Contributions can be submitted on the possible RAN2 aspects of the agreements reached in RAN1.

[R2-2410434](file:///C:\Data\3GPP\Extracts\R2-2410434%20Discussion%20on%20Uplink%20Capacity%20Enhancements.docx) Discussion on Uplink Capacity Enhancements Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

Observation 1: If RAN1 agrees on Option 1 (inter-slot with OCC length 4 to multiplex up to 4 UEs), OCC scheme does not need to be indicated to the UE, since only one OCC scheme (i.e. inter-slot OCC) will be supported.

Observation 2: If RAN1 agrees on Option 3 (combination of Inter-slot OCC with OCC length 2 and intra-symbol pre-DFT OCC with OCC length 2 to multiplex up to 4 UEs), OCC length does not need to be indicated to the UE, since only OCC length 2 is supported.

Observation 3: Regardless of which option is adopted by RAN1, OCC index (i.e. the line index of the OCC matrix) needs to be indicated to the UE.

Proposal 1: At least OCC index (i.e., the line index of the OCC matrix) needs to be indicated to the UE, RAN2 will further consider whether OCC scheme or OCC length is also indicated to the UE depending on RAN1 progress.

Proposal 2: For configured grant Type 1, OCC configuration (i.e. at least OCC index) is provided to the UE via RRC signalling. FFS what OCC configuration should be provided for dynamic grant or configured grant type 2.

Proposal 3: RAN2 introduce UE capability for OCC support. Whether separate UE capabilities are used for different OCC length/OCC scheme is pending RAN1 agreement.

[R2-2410067](file:///C:\Data\3GPP\Extracts\R2-2410067%20Discussion%20on%20UL%20capacity%20enhancement.doc) Discussion on uplink capacity enhancement Xiaomi discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410330](file:///C:\Data\3GPP\Extracts\R2-2410330%20Discussion%20on%20uplink%20capacity%20and%20throughput%20enhancement%20for%20NR%20NTN.docx) Discussion on uplink capacity/throughput enhancement for NR NTN CMCC discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410367](file:///C:\Data\3GPP\Extracts\R2-2410367%20Consideration%20on%20NTN%20miscellaneous%20issues.doc) Consideration on NTN miscellaneous issues ZTE Corporation, Sanechips discussion Rel-19 NR\_NTN\_Ph3-Core

### 8.8.4 Support of Broadcast service

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

Moved here from 8.8.1

[R2-2410638](file:///C:\Data\3GPP\Extracts\R2-2410638.doc) Discussion on the reply LS to RAN3 on supporting MBS broadcast service for NR NTN Xiaomi discussion

Proposal 1: The encoding of TN coverage introduced in Rel-18 in TS38.331, including tn-ReferenceLocation-r18 and tn-DistanceRadius-r18, is reused for the geographical area of the circle.

* Agreed

Proposal 2: The encoding of Polygon in TS37.355 is reused for the geographical area of the Polygon.

- LG supports this. ZTE also supports this

* Agreed

Proposal 3: The IntendedServiceArea can be considered as the IE name of the geographical area.

- LG suggests to add MBMS in front

* Agreed (we can still update the name in the CR implementation if needed)

Proposal 4: If the proposals 1-3 are agreed, the draft reply LS in the annex can be considered.

* Draft a reply LS to RAN3 and SA2 in offline 303

[R2-2410526](file:///C:\Data\3GPP\Extracts\R2-2410526.docx) Discussion on MBS Broadcast Service Intended Area Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

* Signalling of intended service area

Observation 1: The geographic area information for the intended service areas is assumed to be semi-static which does not cause frequent SIB update.

* RAN2 understands that the geographic area information for the intended service areas can be semi-static and not cause frequent updates.

Proposal 1: Introduce a new SIB to include a list of intended service areas and related IDs.

- CATT could agree on this if we no longer discuss about possible misalignment between SIB and MCCH. Samsung thinks that if the information is semi-static there should be no issues

- IDC supports this also to limit the usage of radio resources. CATT thinks the problem will be similar with SIB

- Oppo prefers a MCCH-based solution as the UE would only have to read MCCH

- Xiaomi thinks that the UE could skip MCCH reading also with a MCCH based solution.

- Samsung thinks that using MCCH also might have an impact on legacy UEs

- LG thinks we don’t necessarily need to use IDs but can rely on bitstrings

- CATT thinks we could use the list index rather thsn an ID

- ZTE thinks we need IDs to refer to multiple intendedServiceAreas.

* Introduce a new SIB to include a list of intended service areas and related pointer (FFS if we point to the intended services areas via the index in the list or with an ID or another way)

Proposal 2: The legacy SIB modification procedure is applied to update the intended service area information in the new SIB.

* Agreed

Proposal 3: Circles and polygons are used to describe an intended area only in the case that the intended service area does not cover a whole cell. If any service is provided for the whole cell, the cell ID can be indicated and associated to the intended service area ID.

Proposal 4: Discuss for earth moving cell how to avoid NW frequent update and UE frequent acquisition of information on MBS broadcast service and the intended area.

* Service Continuity

Proposal 5: Discuss how an intended service area is provided.

Option 1: An intended service area for a MBS BC service includes all geographic areas across the current serving cell and neighbor cell(s), and NW ensures the current serving and all neighbor cells that provide the same service signal the same intended service area information.

Option 2: For a MBS BC service, the current serving cell provides the intended service area only within the current cell.

Option 3: Up to NW implementation, i.e., both option 1 and 2 are possible.

Option 2: For a MBS BC service, the current serving cell provides the intended service area only within the current cell.

* A signalled intended service area for a MBS BC service may include geographic areas across the current serving cell and overlapping neighbor cell(s).

Proposal 6: For option 2 and 3, consider to support service continuity by signaling the mapping between intended service area and frequency/neighbor cell.

[R2-2410331](file:///C:\Data\3GPP\Extracts\R2-2410331%20Considerations%20on%20broadcast%20service%20for%20NR%20NTN.docx) Considerations on broadcast service for NR NTN CMCC discussion Rel-19 NR\_NTN\_Ph3-Core

* Intended service areas

Proposal 1: Using MCCH based solution to include the intended service areas (and related IDs) information.

Proposal 2: A new SIB should be considered last, unless the MCCH based solution is determined unworkable.

Proposal 3: It could be also up to UE implementation to allow UE skipping MCCH re-acquisition when UE is not within intended service area of any interested broadcast service based on the intended service areas provision by network.

Proposal 4: Not to pursue the MBS service announcement solution in R19.

* MCCH information update

Proposal 5: For MCCH update due to service area information changing, we could consider to leverage the existing mechanism and just add some clarification under “The LSB in the 2-bit bitmap” part to include the service area information changing (e.g. service areas modification).

* Service continuity

Proposal 6: It is proposed to provide intended service area within each neighbor cell for each MBS broadcast service session in MBSBroadcastConfiguration.

Proposal 7: It is proposed to provide intended service area for each MBS broadcast service session in SIB21.

* MBS interest indication

Proposal 8: It is proposed not to pursue that a R19 UE supporting the feature may initiate the MBS Interest Indication procedure when UE is entering or leaving the intended area.

* Signaling format of service area

Proposal 9: For the referenceLocation + radius solution, the following new IE format could be discussed:

IntendedServiceAreaInfo-r19 ::= SEQUENCE {

intendedServiceAreaId-r19 IntendedServiceAreaId-r19,

intendedServiceArea-ReferenceLocation-r19 ReferenceLocation-r17,

intendedServiceArea-DistanceRadius-r19 INTEGER(0..65536)

Proposal 10: It is proposed to use “CHOICE” signaling structure to support both the service area format solutions.

[R2-2410862](file:///C:\Data\3GPP\Extracts\R2-2410862%20-%20Support%20for%20broadcast%20services%20in%20NR%20NTN.docx) Support for broadcast services in NR NTN Ericsson discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1 MBS Service Announcement is used to indicate the intended service area for MBS broadcast in NTN cells.

Proposal 2 If the ISA is to be sent using AS-protocols, the definition of the intended service area is provided in a new SIB.

Proposal 3 If ISA is sent in SIB, the ISA ID is provided in the MBS Service Announcement to facilitate MCCH acquisition relaxation. RAN2 sends an LS to SA2.

- Apple wonders if this means that ISA ID should become a globally unique identifier

- ZTE sees some benefit and is fine to further discuss this

* CB Thursday

Proposal 4 A UE interested in an MBS broadcast service may skip MCCH acquisition when it is located outside the intended service area where this service is provided.

Proposal 5 A UE may use, by implementation, its location, the ISA definition in SIB, and mapping between ISA ID and MBS Service ID (TMGI) in the USD/Service Announcement to decide whether to skip MCCH acquisition.

Proposal 6 RAN2 focuses on service continuity for the scenario where the quasi-Earth-fixed cells are replaced due to satellite movement.

Proposal 7 In a quasi-Earth fixed cell, the network provides information about the MBS broadcast configuration and services of the upcoming satellite that will serve the area.

Proposal 8 Introduce geographic information in ETWS notification for geo-fencing in NTN cells.

[R2-2410521](file:///C:\Data\3GPP\Extracts\R2-2410521%20Discussion%20on%20MBS%20broadcast%20over%20NTN.docx) Discussion on MBS broadcast over NTN Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: Provide the intended service area ID(s) via SIB20 for the power saving purpose.

Proposal 2: Both current serving cell and neighbour cells MBS session specific intended area ID(s) should be indicated in the MCCH.

Proposal 3: Based on the neighbour cells MBS session specific intended area, the UE can request unicast reception of the service of interestif moving to a cell not providing the MBS session in the UE location area.

Proposal 4: The UE can decide to consider an MBS frequency as the highest priority frequency for cell reselection based on its location and on the intended area info/ID(s) provided per MBS frequency via SIB21 .

Proposal 5: The intended service area (composed of one or multiple circles or polygons) is provided in a new SIB, along with an area ID for each area. The area ID is used in all places requiring service area info, as mentioned in previous proposals.

[R2-2410871](file:///C:\Data\3GPP\Extracts\R2-2410871%20Discussion%20on%20intended%20service%20area_v2.docx) Discussion on MBS Broadcast service area signaling THALES discussion Rel-19 NR\_NTN\_Ph3-Core [R2-2408488](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2408488.zip)

Proposal 1 RAN2 focus on defining a RAN-level solution to indicate the intended service area for MBS broadcast service in NR NTN system

<Location-dependent MBS broadcast and Service Announcement>

Proposal 2a The MBS Service Announcement can be used for NTN MBS broadcast but is not sufficient for service area smaller than a cell.

Proposal 2b The MBS Service Announcement using the target location area to indicate the intended service area for MBS broadcast in NTN cells cannot be used as it.

Proposal 2c If MBS Service Announcement is adopted for location dependent MBS broadcast in NTN, a location description based on geographical coordinates should be defined. FFS on 5G MBS architecture impacts.

Proposal 3 If a RAN-level mechanism is defined for geo-filtering MBS services, Service Announcement with location for location-dependent MBS broadcast service may be unnecessary but the information could be provided to the MBS-aware application to know the MBS service is limited to the current geographical area. FFS how to align the geographical information broadcasted in the cell and the geographical information in the Service Announcement

<Intended service area signaling in MCCH>

Proposal 4 The MBS intended service area should be restricted to NTN cells for NTN-capable UEs.

Proposal 5 The intended service area geographical coordinates are included in the MCCH.

<UE skipping MCCH (re-)acquisition enhancement>

Proposal 6a A non-related to a MBS session unique MBS broadcast services area is included in SIB20, corresponding to the sum of MBS broadcast services area signaled in the MCCH to allow user outside this zone to skip the (re-)acquisition of the MCCH.

Proposal 6b By default, if the SIB20 does not contain an intended service area, then the whole NTN cell is covered by at least one MBS broadcast service and the UE is needed to acquire MCCH for MBS session related intended service area.

Proposal 6c It comes if the SIB20 is not broadcasted, then there is not MBS broadcast service in the NTN cell.

<Geographical Area coding>

Observation 7 SIB8 for CMAS signaling uses the Warning Area Coordinated IE to encode geographical region

Proposal 7 Re-use the Warning Area Coordinates coding for MBS Broadcast service intended service area

Proposal 8 Consider the MBS-IntendedServiceAreaCoordinates presented in Table 1 to describe MBS broadcast service intended area for Rel-19 NTN.

<Service continuity and UE behaviour>

Proposal 9 RAN2 will not define the UE behaviour for MBS Interest Indication and the left how to handle it to the network implementation.

Proposal 10 The intended service area ID associated to MBS FSAI in SIB21 could be beneficial for MBS service continuity.

Agreements:

1. The encoding of TN coverage introduced in Rel-18 in TS38.331, including tn-ReferenceLocation-r18 and tn-DistanceRadius-r18, is reused for the geographical area of the circle.

2. The encoding of Polygon in TS37.355 is reused for the geographical area of the Polygon.

3. The IntendedServiceArea is considered as the IE name of the geographical area (we can still update the name in the CR implementation if needed)

4. A signalled intended service area for a MBS BC service may include geographic areas across the current serving cell and overlapping neighbor cell(s).

5. RAN2 understands that the geographic area information for the intended service areas can be semi-static and not cause frequent updates.

6. Introduce a new SIB to include a list of intended service areas and related pointer (FFS if we point to the intended services areas via the index in the list or with an ID or another way)

7. The legacy SIB modification procedure is applied to update the intended service area information in the new SIB.

[R2-2409537](file:///C:\Data\3GPP\Extracts\R2-2409537%20Further%20Discussion%20on%20MBS%20Broadcast%20Service%20Area%20Provision.docx) Further Discussion on MBS Broadcast Service Area Provision vivo discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409538](file:///C:\Data\3GPP\Extracts\R2-2409538%20Discussion%20on%20MBS%20Broadcast%20Service%20Continuity%20in%20NTN.docx) Discussion on MBS Broadcast Service Continuity in NTN vivo discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409615](file:///C:\Data\3GPP\Extracts\R2-2409615%20NTN%20Discussion%20on%20support%20of%20broadcast%20service%20in%20NTN_final.docx) Discussion on support of broadcast service in NTN LG Electronics France discussion Rel-19 38.331 NR\_NTN\_Ph3

[R2-2409670](file:///C:\Data\3GPP\Extracts\R2-2409670%20Further%20discussion%20on%20support%20of%20broadcast%20service%20in%20NR%20NTN.docx) Further discussion on support of broadcast service in NR NTN CATT, CBN discussion

[R2-2409849](file:///C:\Data\3GPP\Extracts\R2-2409849%20Discussions%20on%20supporting%20broadcast%20intended%20to%20serve%20partial%20cell.doc) Discussions on supporting broadcast intended to serve partial cell Fujitsu discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409893](file:///C:\Data\3GPP\Extracts\R2-2409893%20Discussion%20on%20providing%20MBS%20service%20area%20in%20NTN%20network.docx) Discussion on providing MBS service area in NTN network OPPO discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409977](file:///C:\Data\3GPP\Extracts\R2-2409977_MBS%20over%20NTN.doc) Intended broadcast service area provision over NTN Apple discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410011](file:///C:\Data\3GPP\Extracts\R2-2410011_Discussion%20on%20intended%20service%20area%20signalling.docx) Discussion on intended service area signalling NEC discussion

[R2-2410046](file:///C:\Data\3GPP\Extracts\R2-2410046%20MBS%20broadcast%20in%20NTN.docx) Signaling of MBS broadcast service area information Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410108](file:///C:\Data\3GPP\Extracts\R2-2410108_Broadcast%20service%20area%20information%20in%20NR%20NTN.doc) Broadcast service area information in NR NTN China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410231](file:///C:\Data\3GPP\Extracts\R2-2410231_NTN_MBS.docx) Discussions on configuration of intended service areas ITRI discussion NR\_NTN\_Ph3-Core

[R2-2410268](file:///C:\Data\3GPP\Extracts\R2-2410268%20NTN%20broadcast%20service%20area%20indication%20and%20service%20continuity.docx) NTN broadcast service area indication and service continuity Lenovo discussion Rel-19

[R2-2410366](file:///C:\Data\3GPP\Extracts\R2-2410366%20Consideration%20on%20broadcast%20service%20enhancements.doc) Consideration on broadcast service enhancements ZTE Corporation, Sanechips discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410440](file:///C:\Data\3GPP\Extracts\R2-2410440%20On%20the%20Open%20Points%20for%20Supporting%20MBS%20in%20Rel-19%20NR%20NTN.docx) On the Open Points for Supporting MBS in Rel-19 NR NTN Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410597](file:///C:\Data\3GPP\Extracts\R2-2410597%20(R19%20NR%20NTN%20WI%20AI%208.8.4)%20Broadcast.docx) Support for broadcast service in non-terrestrial networks InterDigital, Inc. discussion Rel-19

[R2-2410639](file:///C:\Data\3GPP\Extracts\R2-2410639.doc) Discussion on the support of broadcast service Xiaomi discussion

[R2-2410662](file:///C:\Data\3GPP\Extracts\R2-2410662.docx) Further Discussion on Support of MBS Broadcasting over NTN TCL discussion

[R2-2410700](file:///C:\Data\3GPP\Extracts\R2-2410700-discussion%20for%20UE%20behaviors%20within%20intended%20service%20area.docx) Discussion on UE behaviours within intended service area Sharp discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410713](file:///C:\Data\3GPP\Extracts\R2-2410713_Discussion%20on%20the%20support%20of%20broadcast%20service%20in%20NR-NTN.docx) Discussion on the support of broadcast service in NR-NTN ETRI discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410764](file:///C:\Data\3GPP\Extracts\R2-2410764.docx) Further considerations on intended broadcast service area provision Continental Automotive discussion Rel-19

### 8.8.5 Support of regenerative payload

Contributions, if any, should focus on the needed updates for Stage 2 description and on whether any other existing essential features (not considered so far) would be affected - and potentially need any modifications - in a regenerative payload architecture.

[R2-2410880](file:///C:\Data\3GPP\Extracts\R2-2410880%20-%20Regenerative%20payload.docx) Regenerative payload Ericsson discussion Rel-19 IoT\_NTN\_Ph3-Core

Observation 1 The timing and synchronization in 38.300 section 16.14.2.1 is out of RAN3’s scope.

Observation 2 RAN3 has endorsed a baseline CR for 38.300 that includes almost all changes needed.

Proposal 1 Clarify that the 38.300 figure in 16.14.2.1 is for transparent payload.

Proposal 2 Consider the text proposal in section 4.

Proposal 3 Specific configurations of common TA and Kmac in regenerative architecture are not captured in Stage 2.

[R2-2410590](file:///C:\Data\3GPP\Extracts\R2-2410590%20Discussion%20on%20regenerative%20payload.docx) Discussion on regenerative payload Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

Observation 1: Neither RAN1 nor RAN4 reached any consensus on introducing negative values for common TA parameters.

Proposal 1: Capture in TS 38.300 for regenerative payload, the RP is located at the satellite gNB and the value of common TA and Kmac can be configured as zero.

[R2-2409981](file:///C:\Data\3GPP\Extracts\R2-2409981%20Regenerative%20payload%20for%20NTN%20for%20NR%20Ph3.docx) Regenerative payload for NTN for NR Ph3 TOYOTA Info Technology Center discussion

[R2-2410123](file:///C:\Data\3GPP\Extracts\R2-2410123%20Discussion%20on%20satellite%20switch%20with%20resynch%20for%20regenerative%20payload.doc) Discussion on satellite switch with resynch for regenerative payload OPPO discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410269](file:///C:\Data\3GPP\Extracts\R2-2410269%20UE%20location%20verification%20in%20NTN%20regenerative%20architecture%20(Revision%20of%20R2-2408302).docx) UE location verification in NTN regenerative architecture Lenovo discussion Rel-19

[R2-2410384](file:///C:\Data\3GPP\Extracts\R2-2410384.docx) Satellite switch with re-sync in regenerative payload Sony discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410649](file:///C:\Data\3GPP\Extracts\R2-2410649_NTN_Regenerative.docx) Discussion on regenerative payload Fujitsu Limited discussion Rel-19 NR\_NTN\_Ph3-Core

### 8.8.6 LTE to NR NTN mobility

Contributions, if any, should focus on any possible missing aspects for the support of idle mode mobility between LTE and NR NTN.

[R2-2410047](file:///C:\Data\3GPP\Extracts\R2-2410047%20mobility%20LTE%20to%20NR%20NTN.docx) Frequency priorities and redirection from LTE to NR NTN Qualcomm Incorporated discussion Rel-19 LTE\_TN\_NR\_NTN\_mob

Proposal 1 Clarify that the UE ignores the dedicated frequency priority for NR NTN frequency that is associated with satellite ID.

Proposal 2 Clarify that the EUTRA network does not include NR NTN frequency in redirectedCarrierInfo in the RRCConnectionRelease message.

- QC thinks that at least for legacy UEs (R17 and R18) we cannot have any different behaviour, but we can discuss for R19

- Samsung thinks basic redirection should be supported without any capability. But we can discuss capability for enhancements. Xiaomi agrees.

- HW thinks that redirection is not part of this WI. LG also agrees

- ZTE wonders about the use case.

- HW wonders where we would put the UE capability in case we introduce it. Samsung thinks this would be conveyed in the NR capability. QC/CATT do not agree.

* RAN2 understands that the UE behaviour is currently not clear if the network includes a NR NTN frequency in redirectedCarrierInfo in the RRCConnectionRelease message in a TN cell. We can further discuss whether we want to clarify the UE behaviour and in case whether we need to introduce a new UE capability.

[R2-2410640](file:///C:\Data\3GPP\Extracts\R2-2410640.doc) Discussion on the NR NTN frequency configured by the RRC connection release message Xiaomi discussion

Proposal 1: If the NR NTN frequencies configured by the RRC connection release message are also included in the SIB24, the corresponding satellite information in SIB33 is used for the redirection and cell reselection (UE specific frequency priority).

Proposal 2: If the NR NTN frequencies configured by the RRC connection release message is not included in the SIB24, the satellite information (e.g., satellite ID) is configured by the RRC connection release message for the redirection and cell reselection (UE specific frequency priority).

Proposal 3: Introduce a UE capability to support receiving the NR NTN frequency and satellite information (e.g., satellite ID) by the RRC connection release message.

[R2-2410485](file:///C:\Data\3GPP\Extracts\R2-2410485%20Further%20issues%20on%20E-UTRAN%20to%20NR%20NTN%20idle%20mode%20mobility.docx) Further issues on E-UTRAN to NR NTN idle mode mobility Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: E-UTRAN to NR NTN re-direction via RRCConnectionRelease is considered supported if UE supports Rel-17 NTN and no new UE capability is required for this.

Proposal 2: RAN2 can discuss new assistance information for E-UTRAN to NR NTN redirection, for which a new capability can be considered to be required.

Proposal 3: Polarization should not be signalled per satellite in satelliteInfoList-r19.

- vivo thinks the current model is ok

Proposal 4: RAN2 to discuss how the polarization mode can be signalled per cell or whether it is needed at all.

Proposal 5: In regenerative payload scenario, RAN2 confirms common TA value is 0.

[R2-2410394](file:///C:\Data\3GPP\Extracts\R2-2410394.docx) Clarification on NR Satellite Info Provision NEC discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: RAN2 confirm the idle mode mobility from IOT NTN to NR NTN is not supported

Proposal 2: Clarify NR satellite info provision (IE NeighSatelliteInfoNR-r19) is only signalled in a LTE TN cell but not NTN cell

* Add a clarification in Stage 2 that only LTE to NR NTN is supported (and not eMTC NTN to NR NTN). Also add in the field description that NeighSatelliteInfoNR-r19 is only signalled in a LTE TN cell but not IoT NTN cell

[R2-2409539](file:///C:\Data\3GPP\Extracts\R2-2409539%20Discussion%20on%20Redirection%20from%20E-UTRA%20TN%20to%20NR-NTN.docx) Discussion on Redirection from E-UTRA TN to NR-NTN vivo discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409672](file:///C:\Data\3GPP\Extracts\R2-2409672%20Discussion%20on%20remaing%20issue%20for%20LTE%20TN%20to%20NR%20NTN%20IDLE%20mode%20mobility.docx) Discussion on remaing issue for LTE TN to NR NTN IDLE mode mobility CATT discussion

[R2-2409982](file:///C:\Data\3GPP\Extracts\R2-2409982_Panasonic_Improvements_to_LTE-TN-to-NTN_mobility.docx) Improvements\_to\_LTE-TN-to-NTN\_mobility PANASONIC discussion Rel-19

[R2-2410109](file:///C:\Data\3GPP\Extracts\R2-2410109_Remaining%20issue%20for%20NTN%20mobility%20redirection.doc) Remaining issue for NTN mobility redirection China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2410439](file:///C:\Data\3GPP\Extracts\R2-2410439%20On%20LTE%20TN%20to%20NR%20NTN%20reselection%20using%20redirection%20in%20Release%20message.docx) On LTE TN to NR NTN reselection using redirection in Release message Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_NTN\_Ph3-Core

Agreements:

1. RAN2 understands that the UE behaviour is currently not clear if the network includes a NR NTN frequency in redirectedCarrierInfo in the RRCConnectionRelease message in a TN cell. We can further discuss whether we want to clarify the UE behaviour and in case whether we need to introduce a new UE capability.

2. Add a clarification in Stage 2 that only LTE to NR NTN is supported (and not eMTC NTN to NR NTN). Also add in the field description that NeighSatelliteInfoNR-r19 is only signalled in a LTE TN cell but not IoT NTN cell

## 8.9 IoT NTN Ph3

(IoT\_NTN\_Ph3-Core; leading WG: RAN2; REL-19; WID: RP-242397)

Time budget: 1 TU

Tdoc Limitation: 3 tdocs

### 8.9.1 Organizational

LS, Rapporteur input, including workplan, etc.

Rapporteur inputs do not count towards the tdoc limitation.

Incoming LSs

[R2-2409529](file:///C:\Data\3GPP\Extracts\R2-2409529_S2-2411250.doc) Reply LS on FS\_5GSAT\_Ph3\_ARCH conclusions (S2-2411250; contact: Sateliot) SA2 LS in Rel-19 5GSAT\_Ph3\_ARCH To:SA3 Cc:RAN2, SA3-LI

* Noted

[R2-2409530](file:///C:\Data\3GPP\Extracts\R2-2409530_s3i240703.docx) Reply LS on FS\_5GSAT\_Ph3\_ARCH conclusions (s3i240703; contact: Tridea Works) SA3-LI LS in Rel-18 5GSAT\_Ph3\_ARCH To:SA2 Cc:RAN2, SA3

* Noted

[R2-2409524](file:///C:\Data\3GPP\Extracts\R2-2409524_S2-2410918.docx) Reply LS on Support of Regenerative-based Satellite Access (S2-2410918; contact: Qualcomm) SA2 LS in Rel-19 NR\_NTN\_Ph3-Core, 5GSAT\_Ph3\_ARCH To:RAN3, RAN Cc:RAN2

* Noted

Rapporteurs’ inputs

[R2-2410813](file:///C:\Data\3GPP\Extracts\R2-2410813%20RRC%20Running%20CR%20for%20IoT%20NTN.docx) RRC Runing CR for IoT NTN Huawei, HiSilicon draftCR Rel-19 36.331 18.3.1 B IoT\_NTN\_Ph3-Core

[R2-2410883](file:///C:\Data\3GPP\Extracts\R2-2410883%20-%2036300_(Rel-19)%20-%20Draft%20Introduction%20of%20IoT%20NTN%20phase%203.docx) Draft Introduction of IoT NTN phase 3 Ericsson draftCR Rel-19 36.300 18.3.0 B IoT\_NTN\_Ph3-Core

### 8.9.2 Support of Store & Forward

Contributions should focus on possible impacts to the radio interface.

[R2-2409822](file:///C:\Data\3GPP\Extracts\R2-2409822%20Discussion%20on%20the%20S&F%20operation%20indication.docx) Discussion on the S&F operation indication Google Ireland Limited discussion Rel-19 IoT\_NTN\_Ph3-Core

* Access Control

Proposal 1 A Rel-19 UE can inform eNB of its S&F capability in details (e.g., full S&F support including the NAS-layer support, or only limited S&F support in the RRC layer) via MSG3.

Proposal 2 A remaining duration associated with the current feeder link status can be broadcast by the cell supporting the S&F operation.

- Xiaomi agrees some additional time indication is beneficial but we need to discuss the details

- Samsung is not so convinced this is needed

- QC thinks that we could use Tservice

- ZTE thinks some time related information is useful but prefers to have some absolute time and doesn’t think that Tservice would do.

- IDC thinks this might be useful but indeed we need to clarify the UE behaviour in case. Vivo agrees

- Nokia supports this and thinks that Tservice is not sufficient. Sequans agrees. Telit also agrees

- HW supports this and agrees we need to clarify UE behaviour.

- Samsung thinks that this would trigger SI modification

- Ericsson thinks we need to discuss the UE behaviour

* Time information can be broadcasted to indicate when the current satellite operation mode will transit from “S&F operation” mode to real-time/normal mode. RAN2 assumes that a R19 UE could use this information at least to delay some NAS procedures until the feeder link is resumed (FFS what we specify in RAN2 specs for this and if we differentiate the behaviour for R19 UEs supporting and not supporting S&F mode, also considering the relation to the Wait Timer). FFS which SIB is used (SIB1 or SIB31). FFS if absolute or relative time is used. FFS on the opposite transition (i.e. whether to indicate when the “S&F operation” will start)

Proposal 3 When the S&F operation indication is present, the remaining duration indicates when the feeder link will become available.

- Google thinks this could help to freeze some AS/NAS functions

- HW thinks a R19 UE supporting S&F could use this information to delay some NAS procedures until the feeder link is resumed

Proposal 4 When the S&F operation indication is absent, the remaining duration indicates when the feeder link will become unavailable.

- Xiaomi thinks this could be useful for R19 UEs not supporting the S&F mode to trigger cell reselection.

* Impact on cell reselection

Proposal 5 While camping on the cell indicating when the feeder link will become unavailable, the Rel-19 UE can trigger the intra-/inter-frequency measurement before the feeder link becomes unavailable.

Proposal 6 Rel-19 UE can be provided with a list of cells that are not operating in the S&F mode.

Proposal 7 If being provided with the list of cells not operating in the S&F mode, the Rel-19 UE supporting the S&F operation can trigger the intra-/inter-frequency measurement, upon detecting the presence of the S&F operation indication.

* RRC release

Proposal 8 When the feeder-link is not available, eNB can suspend UE’s RRC and NAS by transmitting an RRC Connection Release message to the UE with full S&F support. FFS whether a new release cause is needed.

- ZTE is fine with this and thinks we could have a new case

- Ericsson wonders what is meant by suspend RRC

- vivo thinks there is no need to suspend RRC

- CATT agrees on this under the assumption that we are not introducing a new RRC state.

- Samsung thinks this is not needed

* It is FFS whether we need to introduce a new release cause when the NW wants to release a R19 UE to RRC idle because the feeder link becomes unavailable

[R2-2409585](file:///C:\Data\3GPP\Extracts\R2-2409585_S&F.doc) Discussion on Store and Forward operation Xiaomi discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1: “S&F operation” indication is provided in SIB1.

* “S&F operation” indication is provided in SIB1

Proposal 2: Time information can be broadcasted in SIB1 to indicate when the current satellite operation mode will transit, e.g. from “S&F operation” mode to real-time/normal mode, or vice versa. Absolute time is used.

Proposal 3: Existing intraFreqExcludedCellList in SIB4 and interFreqExcludedCellList in SIB5 can be used if network want to prevent legacy UEs and Rel-19 UEs not supporting S&F from reselecting to an S&F NTN neighbor cell.

- IDC and MTK thinks this is not needed. CATT also agree

Proposal 4: Introduce S&F specific intraFreqAllowedCellList in SIB4 and interFreqAllowedCellList in SIB5 to include S&F NTN neighbor cells for Rel-19 UEs supporting S&F to perform measurement and cell reselection.

- Samsung thinks this would imply frequent updates

- MTK is ok to consider this but agrees it would imply frequent changes

- CATT thinks we need to wait before discussing this

* Can come back in the next meeting

[R2-2410468](file:///C:\Data\3GPP\Extracts\R2-2410468-Store-Forward-RAN-Aspects.docx) Radio Interface Impacts of SF operation Nokia, Nokia Shanghai Bell discussion

* Remaining issues related to SF Operation Indication and Transition

Observation 1: Use of system Information modification procedure for switching between SF operation and normal operation is not signaling efficient considering the short duration of normal operation window for SF mode cell.

Proposal 1: New parameter T-Service-SF is introduced to support the transition of SF operation from SF mode to Normal and vice-versa.

Proposal 2: On expiry of the T-Service-SF the UE reads the new value of T-Service-SF and also the new SF operation related parameters to start the validity timer for the new mode.

Proposal 3: FFS need for system information value tag in addition to T-Service-SF parameter.

Proposal 4: Additional information related to maximum delay impact of SF operation is not broadcasted in system information. UE can deduce this information from other parameters related SF operation provided in NAS level procedures.

* RAN2 Impacts for CN Architecture Options

Observation 2: For CIoT-CP operation the RAN2 signalling procedure for CIOT data transmission is not impacted for both MME-Split and Full-CN Architecture options.

Observation 3: RAN2 assumes Store-forward PLMN operates with same architecture option across all NTN cells.

Proposal 5: RAN2 signalling is not needed to indicate the architecture option (Split MME or Full CN).

* RAN2 assumes that AS signalling is not needed to indicate the architecture option (Split MME or Full CN).

Proposal 6: RAN2 checks with SA2 to address the unknown UE mobility scenario in which the UE does not find the target SAT for completing the remaining network procedure after the waiting time but another SAT instead.

* CIoT User Plane for SF Operation

Observation 4: CIoT-UP solution support will require additional RAN impacts for the user plane data forwarding for MME split option.

Observation 5: SA2 Technical report only focus on CIoT-CP solution as the basis for the store-forward study.

Proposal 7: RAN2 to discuss and conclude on the need for support of CIOT-UP solution for SF operation.

- Ericsson does not want to exclude the possibility to support CIOT-UP solution for SF operation

* We wait for further progress in SA2, if any, before working on RAN2 aspects of a CIoT-UP solution for SF operation
* Access control and Paging procedure for SF Operation

Proposal 8: RAN2 to consider inclusion of additional information for access control for MO or MT in SF operation

Proposal 9: RAN2 to consider paging enhancements in SF mode for delivering ACK for MO Traffic and MT Traffic towards IoT-NTN UE.

Proposal 10: RAN2 to consider idle mode procedure enhancements, when there is no MT data to be delivered by a store & forward satellite.

[R2-2410049](file:///C:\Data\3GPP\Extracts\R2-2410049%20store%20and%20forward.docx) Discussion on S&F mode operation Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

* Switching S&F mode

Proposal 1 RAN2 assume that the cell operating in S&F mode uses MME on board and cell operating in normal mode uses MME on the ground and switching of the operation mode is supported.

Proposal 2 The existing cell stop time is used as switching time between S&F mode and normal mode operation.

Proposal 3 For new UEs, additional indication is provided to associate the existing cell stop time with the switching time between S&F mode and normal mode operation.

* S&F indication and cell barring

Proposal 4 The cell operating in S&F mode sets the cellBarred-NTN-r17 to “barred”.

* Cell reselection

Proposal 5 When connected to S&F mode cell, it can be left to UE in RRC\_IDLE to periodically search for better and normal mode cell (i.e., cells with feeder link connection available).

Proposal 6 When in RRC\_IDLE and waiting to connect to a S&F mode satellite, it can be left to UE to prioritize the search for better and normal mode cell (i.e., cells with feeder link connection available).

[R2-2410591](file:///C:\Data\3GPP\Extracts\R2-2410591%20Further%20consideration%20on%20Store%20and%20Forward.docx) Further consideration on Store and Forward Huawei, HiSilicon, Turkcell discussion Rel-19 IoT\_NTN\_Ph3-Core

* Normal mode based on S&F architecture

Proposal 1: Clarify that the Normal mode agreed in the S&F context refers to the S&F architecture with eNB and partial MME/whole CN on board.

* Remaining time of current operating mode

Proposal 2: RAN2 discusses the usage and impact of the indication of the remaining time of current operating mode before introducing it, e.g., UE may delay some procedure until NW operates in the normal mode and legacy s-service may need to be set to this remaining time

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

Proposal 3: UE can be released to RRC\_IDLE when service link is not available. FFS on whether UE can be released to RRC\_INACTIVE or kept in RRC\_CONNECTED with the AS operation suspended.

* Paging in S&F satellite operation

Proposal 4: If the NW doesn’t have any MT data buffered for an area, it informs the UE so that the UE doesn’t need to monitor paging or initiate RRC connection.

* Access control

Proposal 5: S&F NW should prioritize the access of the UE, if it is subsequently re-attempting the access to the NW. The re-attempt from the UE can be indicated to the network while performing RRC Connection Establishment procedure.

[R2-2409674](file:///C:\Data\3GPP\Extracts\R2-2409674%20Discussion%20on%20RAN2%20impacts%20due%20to%20the%20Satellite%20ID%20List%20from%20MME%20in%20S&F%20operation.docx) Discussion on RAN2 impacts due to the satellite ID list from MME in S&F operation CATT discussion

Observation 1: For both split MME architecture and full CN on-board architecture, SA2 agreed that MME can provide a list of Satellite IDs for UE to monitor and access, and the format of the Satellite ID aligns with the satellite ID indicated in the system information.

Observation 2: The reason for CN to signal a satellite ID list for the UE is that the CN can only transfer UE context and/or MT data/singling on these indicated satellites; only if the UE connects with these satellites, can it finish the Attach/TAU procedure and avoid missing MT data/singling.

Proposal 1a: If the UE determines that it is out of coverage of all target satellite(s) indicated by MME, the UE operating in S&F mode need not perform idle mode tasks related to S&F operation (e.g. cell (re)selection, paging monitoring, etc.). The determination of "in coverage/out of coverage" of a target satellite is up to UE implementation.

- Apple wonders if this indication from the MME implies that there are no other satellites, providing normal mode operation, that this makes sense. But is this the case? Samsung agrees

- MTK thinks we should ask SA2 to clarify the usage of this information

- Samsung this looks like discontinuous coverage

- QC thinks this makes sense as long as the UE decides to stay in S&F mode, but the UE should still be allowed to consider other satellites providing normal mode operation

* Discuss in offline 304 whether we can confirm the RAN2 assumption that:

if the R19 UE supporting S&F determines that it is out of coverage of all target satellite(s) indicated by MME, a UE operating in S&F mode may not need to perform NTN idle mode tasks related to S&F operation (e.g. cell (re)selection, paging monitoring, etc.). The determination of "in coverage/out of coverage" of a target satellite is up to UE implementation. This does not prevent a UE to perform a network selection

* Also discuss a possible LS to SA2 to check RAN2 assumption

Proposal 1b: Once the UE determines that it is in coverage of a target satellite indicated by MME, the UE shall perform idle mode tasks related to S&F operation (e.g. cell (re)selection, paging monitoring, etc.).

Observation 3: If the SatelliteInfo-r17 in SIB32 were directly reused for S&F operation, the number of the satellites may be limited, and the configured satellites might not meet the S&F requirement of the UE, thus bringing unnecessary UE power consumption.

Proposal 2: Introduce a separate list in system information to provide the satellite assistance information for S&F operation, i.e., used for UE to predict the coverage time of the satellites indicated by MME.

Proposal 3: Take signalling format of SatelliteInfo-r17 in SIB32 as the baseline for assistance information of the satellite(s) indicated by MME for S&F operation.

Observation 4: To avoid missing MT data and signalling, UE should camp on the cells belonging to the satellites indicated by MME (if detected). However, existing cell (re-)selection mechanism based on RSRP/RSRQ cannot ensure that.

Proposal 4: Enhance cell (re-)selection mechanism to ensure that UE operating in S&F mode (re-)selects a cell belonging to the satellites indicated by MME to camp on (e.g., prioritizing the frequencies served by the indicated satellites, selecting the certain cell which belongs to the indicated satellite to camp on, etc.).

* [AT128][304][R19 IoT NTN] Satellite IDs for S&F (CATT)

Scope: Discuss RAN2 assumption on use of satellite IDs for S&F and draft LS to SA2

Intended outcome: report of offline discussion and draft LS

Deadline for rapporteur's summary (in R2-2410974): Friday 2024-11-23 08:00

R2-2410974 Report of [AT128][304][R19 IoT NTN] Satellite IDs for S&F CATT discussion Rel-19 IoT\_NTN\_Ph3-Core

* CB Friday

R2-2410975 Draft LS on Satellite IDs for S&F (CATT) LSout To:SA2 IoT\_NTN\_Ph3-Core

* CB Friday

Agreements:

1. Time information can be broadcasted to indicate when the current satellite operation mode will transit from “S&F operation” mode to real-time/normal mode. RAN2 assumes that a R19 UE could use this information at least to delay some NAS procedures until the feeder link is resumed (FFS what we specify in RAN2 specs for this and if we differentiate the behaviour for R19 UEs supporting and not supporting S&F mode, also considering the relation to the Wait Timer). FFS which SIB is used (SIB1 or SIB31). FFS if absolute or relative time is used. FFS on the opposite transition (i.e. whether to indicate when the “S&F operation” will start)

2. It is FFS whether we need to introduce a new release cause when the NW wants to release a R19 UE to RRC idle because the feeder link becomes unavailable

3. “S&F operation” indication is provided in SIB1

4. RAN2 assumes that AS signalling is not needed to indicate the architecture option (Split MME or Full CN).

5. RAN2 waits for further progress in SA2, if any, before working on RAN2 aspects of a CIoT-UP solution for SF operation

[R2-2409540](file:///C:\Data\3GPP\Extracts\R2-2409540%20Further%20Discussion%20on%20S&F%20Operation.docx) Further Discussion on S&F Operation vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2409676](file:///C:\Data\3GPP\Extracts\R2-2409676.docx) Considerations on S&F operation from device perspective Telit Communications S.p.A., Novamint, Sateliot, Thales discussion Rel-19 [R2-2408244](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2408244.zip)

[R2-2409689](file:///C:\Data\3GPP\Extracts\R2-2409689%20Further%20consideration%20on%20S&F%20operation%20in%20IoT%20NTN.docx) Further consideration on S&F operation in IoT NTN ZTE Corporation, Sanechips discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2409799](file:///C:\Data\3GPP\Extracts\R2-2409799%20(R19%20IoT-NTN%20AI%208.9.2)%20-%20Support%20of%20S+F.docx) Support of Store and Forward. Interdigital, Inc. discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2409876](file:///C:\Data\3GPP\Extracts\R2-2409876%20-%20S&F%20open%20issue.docx) Discussion on Store & Forward satellite operation OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2409889](file:///C:\Data\3GPP\Extracts\R2-2409889.docx) Discussion on support of Store&Forward Transsion Holdings discussion Rel-19

[R2-2409935](file:///C:\Data\3GPP\Extracts\R2-2409935_IoT-NTN_S&F.docx) Discussion on Store & Forward operation DENSO CORPORATION discussion IoT\_NTN\_Ph3-Core

[R2-2409976](file:///C:\Data\3GPP\Extracts\R2-2409976_Store%20and%20Forward.doc) Support of S&F operation in IoT NTN Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410110](file:///C:\Data\3GPP\Extracts\R2-2410110_IoT%20NTN%20Store%20&%20Forward.doc) Further discussion of IoT NTN Store & Forward China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410181](file:///C:\Data\3GPP\Extracts\R2-2410181%20Discussion%20on%20assistance%20information%20for%20S&F.docx) Discussion on assistance information for S&F ASUSTeK discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410270](file:///C:\Data\3GPP\Extracts\R2-2410270%20Further%20considerations%20on%20S&F%20operation.docx) Further considerations on S&F operation Lenovo discussion Rel-19

[R2-2410314](file:///C:\Data\3GPP\Extracts\R2-2410314.docx) Discussion on Support of Store & Forward TOYOTA Info Technology Center discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410346](file:///C:\Data\3GPP\Extracts\R2-2410346%20Discussion%20on%20IoT%20NTN%20Store%20and%20Forward.docx) Discussion on IoT NTN Store and Forward CMCC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410395](file:///C:\Data\3GPP\Extracts\R2-2410395.docx) Radio Interface Aspect of S&F NEC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410482](file:///C:\Data\3GPP\Extracts\R2-2410482%20Discussion%20on%20Store%20and%20Forward%20operation.docx) Discussion on Store and Forward operation Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410596](file:///C:\Data\3GPP\Extracts\R2-2410596%20-%20Considerations%20on%20multi-satellite%20for%20S&F%20Satellite%20operation.docx) Considerations on multi-satellite for S&F Satellite operation NOVAMINT, Sateliot, Thales discussion

[R2-2410599](file:///C:\Data\3GPP\Extracts\R2-2410599.doc) Suspend/resume procedure for Store and Forward satellite operation SHARP Corporation discussion

[R2-2410636](file:///C:\Data\3GPP\Extracts\R2-2410636%20RAN2%20impact%20on%20SF%20mode.docx) RAN2 impact on S&F mode MediaTek Inc. discussion IoT\_NTN\_Ph3-Core [R2-2408622](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2408622.zip)

[R2-2410687](file:///C:\Data\3GPP\Extracts\R2-2410687%20Discussion%20on%20the%20Store%20and%20Forward%20satellite%20operation.docx) Discussion on the Store and Forward satellite operation HONOR discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410765](file:///C:\Data\3GPP\Extracts\R2-2410765.docx) Further considerations on S&F operations Continental Automotive discussion Rel-19

[R2-2410854](file:///C:\Data\3GPP\Extracts\R2-2410854_Support%20of%20Store%20&%20Forward.docx) Support of Store & Forward Sequans Communications discussion Rel-19 IoT\_NTN\_Ph3-Core [R2-2408971](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2408971.zip)

[R2-2410863](file:///C:\Data\3GPP\Extracts\R2-2410863%20-%20Support%20for%20store%20and%20forward%20in%20IoT%20NTN.docx) Support for store and forward in IoT NTN Ericsson discussion Rel-19 IoT\_NTN\_Ph3-Core

### 8.9.3 Uplink Capacity Enhancement

Contributions should focus on the possible enhancements to reduce the necessary uplink and downlink signaling to complete an EDT transaction (Msg3 transmission without msg1/RAR; efficient delivery of msg4 / RRCEarlyDataComplete).

[R2-2409541](file:///C:\Data\3GPP\Extracts\R2-2409541%20Discussion%20on%20CB-Msg3%20Mechanism.docx) Discussion on CB-Msg3 Mechanism vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

CB-Msg3 configuration:

Proposal 1: Only system Information is used to provide cell-specific CB-Msg3 PUSCH resources.

- Xiaomi support this

- HW wonders about the TA validation parameters

* Only system Information is used to provide cell-specific CB-Msg3 PUSCH resources (FFS if anything is needed in dedicated signalling for the TA validation parameters, if needed, for the case of 15kHz SCS NB-IoT and eMTC CE mode B)

Proposal 2: Taking the UL/DL resources related configuration fields in PUR-Config-r16 as a baseline reference for CB-Msg3resources configuration.

Proposal 3: Send an LS to RAN1 to check RAN2’s assumption that the existing TBS size for PUR and CE level/RSRP threshold configuration applicable to EDT can be reused for CB-Msg3.

CB-Msg3 triggering:

Proposal 4: Reuse the existing CE level selection procedure for CB-Msg3.

* Reuse the existing CE level selection procedure for CB-Msg3, at least for the initial selection. FFS whether we can reuse the same thresholds. FFS on the number of levels

Proposal 5: The UE triggers CB-Msg3 only if the size of pending UL data is less than the configured TBS for the selected CE level.

- QC thinks we should further think about this to make it more useful

- Samsung thinks we should have the same TBS size for the different CE levels

- ESA thinks the maximum TBS should be the same for different CE levels

* The UE triggers CB-Msg3 only if the size of pending UL data is less than the configured maximum TBS (FFS if the maximum TBS is same or different for different CE levels)

Proposal 6: Except for the RSRP thresholds corresponding to CE levels, do not introduce an RSRP threshold that determines whether CB-Msg3 can be used.

- Xiaomi thinks that the combination with OCC might lead to the need for an additional threshold

- QC thinks we need a threshold also for the last CE level

* There will be a RSRP threshold that determines whether CB-Msg3 can be used (if the RSRP is below such threshold, PRACH will have to be used) (FFS if we need a separate set of thresholds, including a different minimum threshold, in case CB-msg3 EDT is combined with OCC)

Proposal 7: It is up to network implementation to associate CB-Msg3 resources with a specific CE level.

Proposal 8: If there are no CB-Msg3 resources available for the selected CE level, the UE cannot use CB-Msg3 regardless of whether there are other CB-Msg3 resources available other CE levels.

DSA modelling:

Proposal 9: DSA with at most 2 replicas is considered in Rel-19 IoT-NTN.

- QC is not sure we need to restrict to 2

- ZTE thinks we could have some configurable value but we should have a limited maximum value

- IDC wonders in the number is related to the CE level. ZTE thinks it should be general. ESA thinks it should be per CE-level. Vivo thinks the level of UEs can be different in different levels so it makes sense to have this per CE-level to control the load

* The number of replicas for DSA will be configured by the NW: 1 (SA), 2, 3, 4. The configuration of the number of replicas is CE-level specific

Proposal 10: DSA can be enabled on a per CE level basis.

Proposal 11: RAN2 to define a configurable or pre-defined time window for DSA CB-Msg3 occasion selection.

- Xiaomi thinks something like this is needed

- CATT and HW are not convinced this is needed

- ESA agrees we need a time window. QC agrees

* There will be a configurable time window for DSA CB-Msg3 occasion selection. FFS on the details (e.g. when the time window starts)

Proposal 12: MAC considers each replica transmission as a new transmission.

Proposal 13: HARQ entity obtains the MAC PDU from the HARQ process buffer for the secondary replica.

Proposal 14: HARQ process id 0 and RV 0 are used for CB-Msg3.

Response reception:

Proposal 15: For SA case, after the end of all repetition of CB-Msg3 PUSCH transmission, UE starts a window for response reception taking UE-eNB RTT into account.

* For SA case (single replica), after the end of all repetition of CB-Msg3 PUSCH transmission, UE starts a window for response reception taking UE-eNB RTT into account. FFS if we need to consider additional delay e.g. for the processing time

Proposal 16: For DSA case, only one PDCCH monitoring window is started for response reception.

- IDC wonders if this one or multiple windows per each replica

- Apple thinks the UE might still need to monitor multiple RNTI. Samsung agrees

- ESA thinks we should avoid that the UE waits for additional responses if it receives a response for one replica

- Ericsson thinks the UE could have multiple windows

- MTK thinks we should discuss msg4 before agreeing on this

* For DSA case, FFS if we only have one or multiple PDCCH monitoring window(s) (i.e. one window per each replica) for response reception. FFS when the window(s) is/are started (or restarted) and stopped. FFS on the window length. FFS if the UE needs to monitor only one RNTI or multiple RNTIs)
* The UE stops the PDCCH monitoring window(s) once it receives a CB-msg4 containing a matching Contention Resolution Identity (FFS if there is no RRC message together with the CB-msg4)
* Assuming that there will be scenarios where it’s possible to receive a CB-msg4 before the UE transmits some replicas, a UE stops transmitting the remaining replicas if it has received a CB-msg4 containing a matching Contention Resolution Identity (FFS if there is no RRC message together with the CB-msg4)

Response reception:

Proposal 17: Support re-attempt after backoff time (like PRACH) for CB-Msg3.

[R2-2410882](file:///C:\Data\3GPP\Extracts\R2-2410882%20-%20UL%20capacity%20enhancements%20for%20IoT%20NTN.docx) UL capacity enhancements for IoT NTN Ericsson discussion Rel-19 IoT\_NTN\_Ph3-Core Late

Proposal 10 The UE may skip monitoring CB-msgB (Msg4) once it receives a CB-msgB containing a matching Contention Resolution Identity.

Proposal 11 A UE may stop transmitting the remaining replicas if it has received a CB-msgB (msg4) containing a matching Contention Resolution Identity.

[R2-2409690](file:///C:\Data\3GPP\Extracts\R2-2409690%20Further%20consideration%20on%20UL%20capacity%20enhancements%20in%20IoT%20NTN.docx) Further consideration on UL capacity enhancements in IoT NTN ZTE Corporation, Sanechips discussion Rel-19 IoT\_NTN\_Ph3-Core

CB-Msg3 configuration:

Proposal 1a: RAN2 can discuss the following resources types for shared resources configuration for CB-msg3 EDT:

* Time domain resources for (N)PUSCH occasions: periodicity and start time (e.g., start subframe, start SFN)
* Frequency domain resources for (N)PUSCH occasions: PRB index and PRB number for eMTC; Carrier index, a list of subcarrier set index and RU number for NB-IoT
* OCC resources
* repetition number
* (N)PDCCH resource

Proposal 1b: The periodicity of the time domain resources for (N)PUSCH occasions could be with the unit of SFN, the detailed value range can be FFS.

Efficient delivery of Msg4

Proposal 2a: For CB-msg3 EDT procedure, a contention resolution window needs to be introduced, which starts at the subframe of Msg3 transmission plus 4 subframes plus UE-eNB RTT.

Proposal 2b: The same value range as pur-ResponseWindowTimer can be used to configure the length of contention resolution window for CB-msg3 EDT procedure.

Proposal 3a: The following parameters can be taken into account in the RNTI calculation for CB-msg3 EDT:

* Time domain resource: SFN index, no need of subframe index
* Frequency domain resource: PRB index for eMTC; subcarrier set index and carrier index for NB-IoT
* Code domain resource: OCC index

Proposal 3b: For the RNTI calculation for CB-msg3 EDT, to avoid a too large RNTI, it can be considered to compress the part where SFN index is involved, for example, the SFN index can be divided by the minimum periodicity, or modulo by the length of contention resolution window.

Proposal 4: The contention resolution scheme in legacy random access procedure can be reused for CB-msg3 EDT procedure, e.g., a UE Contention Resolution Identity can be included in the DL MAC PDU and UE checks whether the UE Contention Resolution Identity matches the 48 first bits of the CCCH SDU transmitted in Msg3.

Proposal 5a: RAN2 is suggested to support backoff scheme for CB-msg3 EDT (e.g., when CB-msg3 EDT fails, after a backoff time, UE can choose an occasion to perform another Msg3 transmission), FFS details.

Proposal 5b: The fallback mechanism can also be considered for CB-msg3 EDT (e.g., fallback to EDT or legacy RACH when CB-msg3 EDT fails), FFS details.

DSA

Proposal 6: For DSA, a replica selection window for selecting time domain transmission occasions needs to be introduced. UE could select randomly multiple transmission occasions within this replica select window for multiple replicas transmission. And in each time domain transmission occasions, UE could select randomly a frequency domain resource.

Proposal 7a: For DSA, once the eNB receives any one of the multiple replicas, it can respond it immediately without waiting for the remaining replica(s).

Proposal 7b: For DSA, UE needs to start monitoring the possible Msg4 after sending the first replica.

Proposal 8a: For DSA, if eNB receives remaining replica, whether or not to respond it can be left to eNB’s implementation. It’s expected for network not to respond Msg4 for duplicated replicas.

Proposal 8b: The knowledge of replica selection window could give assistance to the eNB to determine whether a replica is duplicated replica, so it’s suggested that the replica selection window can be configured by eNB.

Proposal 9a: The DSA could be enabled/disabled by eNB per CE level.

Proposal 9b: For DSA, the number of replicas (e.g., 2 by default) can be configured by eNB.

Proposal 9c: In DSA, RAN2 is suggested to discuss the following alternatives for applying the replica selection window:

• Alt1: a sliding replica selection window, its start time is determined by the first selected transmission occasion.

• Alt2: a fix replica selection window, its start time is determined by the configured start time of transmission occasion.

Proposal 10: For DSA, the RNTI used to schedule Msg4 transmission is derived only based on the resource associated to the transmission occasion used for the corresponding replica.

Proposal 11: For DSA, RAN2 is suggested to discuss the following alternatives for applying contention resolution window:

• Alt1: multiple contention resolution window: within each window, UE monitors a RNTI which is derived based on transmission occasion of a replica.

• Alt2: one contention resolution window: within this window, UE monitors all RNTIs, one of which is derived based on transmission occasion of a replica.

[R2-2409975](file:///C:\Data\3GPP\Extracts\R2-2409975_Contention%20based%20MSG3.doc) Uplink capacity enhancement in IoT NTN Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

Msg3 transmission:

Proposal 1: RAN2 to discuss whether to exclude UE specific CB-msg3 EDT PUSCH resource by RRCConnectionRelease message.

Proposal 2: Support fallback mechanism when EDT PUSCH transmission on contention based Msg3 fails. UE can fallback to RACH based EDT procedure upon:

- Reaching to a number of failed CB-Msg3 transmission attempts

- Condition for using contention based Msg3 resource is not met

Msg4 delivery:

Observation 1: If Msg4 reception windows for two different Msg3 resources with the same Msg3-RNTI are overlapped, extra indication of its associated Msg3 resource is needed in Msg4.

Observation 2: In 2-step RACH, at most one 'MAC subPDU for successRAR' indicating presence of 'MAC subPDU(s) for MAC SDU' (containing RRC message response to RRC message in Msg3) is included in MsgB MAC PDU.

Proposal 3: Aim to guarantee that the Msg4 reception windows for two different Msg3 resources with the same Msg3-RNTI are not overlapped.

Proposal 4: Msg4 should be able to comprise of the following parts:

1) Contention resolution indication on successfully received Msg3 from a certain UE;

2) RRC message part in response to the RRC message contained in received Msg3;

3) MAC subheader with Backoff indicator to other UE(s) whose Msg3 transmission do not succeed.

Proposal 5: Contention resolution is done by echoing back UE Contention Resolution Identity (48 first bits of the CCCH SDU transmitted in Msg3).

Proposal 6: Support multiplexing of multiple contention resolution(s) for multiple UE(s) in Msg4.

Proposal 7: RAN2 to discuss whether to support the following operation within Msg4 MAC PDU:

- Multiplexing of contention resolution indication and Msg4-RRC message part

- Multiplexing of multiple Msg4-RRC messages for more than one UE(s)

DSA:

Proposal 8: In DSA scheme, UE randomly selects multiple resources based on the configured replica number within the resource pool.

Proposal 9: RAN2 to discuss whether to initiate one or multiple Msg4 reception windows in DSA for multiple Msg3 replica(s). Potential enhancement should be considered to allow UE skip Msg4 monitoring.

[R2-2409591](file:///C:\Data\3GPP\Extracts\R2-2409591%20%20Further%20consideration%20on%20UL%20capacity%20enhancement.docx) Discussion on the RAN2 solutions for uplink capacity enhancement Huawei, HiSilicon discussion Rel-19 IoT\_NTN\_Ph3-Core

SA

Observation 1: There is no RAN4 requirement for configuring RSRP-based validation parameter in IoT NTN.

Proposal 1: The RSRP-based validation parameter is not needed for CB-msg3 EDT in IoT NTN.

Proposal 2: For 15kHz SCS NB-IoT and eMTC CE mode B, at least TA validation parameters need to be acquired via RRC dedicated signalling.

Proposal 3: A MAC CE including UE ID information is used for contention resolution for CB-msg3 EDT. FFS on the detailed design of the MAC CE.

Proposal 4: The backoff parameters are provided to UE via system information and UE randomly selects a backoff time based on the backoff parameters before another attempt.

Proposal 5: After a number of failed CB-msg3 EDT attempts, the UE falls back to 4-step random access EDT.

Proposal 6: RNTI used for Msg4 in CB-MSG3 EDT can take the formula for RA-RNTI calculation as baseline. FFS on the exact parameters.

Proposal 7: NW should allocate one C-RNTI in Msg4 for the UE to receive the scheduling after MSG4.

DSA

Proposal 8: PUSCH resource for CB-msg3 EDT can be reused for DSA.

Proposal 9: The network indicates how many copies the UE sends for DSA and whether DSA is enabled or not.

Proposal 10: In DSA, one common RNTI is used for monitoring multiple MSG4s which correspond to multiple MSG3 copies. FFS on how the common RNTI is decided.

OCC

Proposal 11: Postpone RAN2 discussion on OCC before receiving feedback from RAN1.

[R2-2410050](file:///C:\Data\3GPP\Extracts\R2-2410050%20EDT%20enh.docx) CB-Msg3 and Msg4 enhancements Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

CB-Msg3 transmission procedure

Proposal 1 For DSA solution, a separate dedicated resource is configured via system information.

Proposal 2 Grouping of Msg3 transmission occasions in time domain is defined.

Proposal 3 Number of occasions for CB-Msg3 transmission group, i.e., N and optionally K occasions out of N allowed for replica transmission, is configured via system information.

Proposal 4 The number of occasions, i.e., N > 0 indicates the size of group of Msg3 transmission occasions in time domain.

Proposal 5 The starting point of the first transmission occasion of the group is configured. The transmission occasions for replicas within the group are defined w.r.t. the first transmission occasion.

Proposal 6 When a UE transmits a copy of the CB-Msg3 in a transmission occasion, a mechanism is defined to help network determine the location of the other copy(ies). FFS on details of how to do it.

Proposal 7 For DSA, RNTI(s) is also derived based on the time/frequency/occ resource associated with CB-msg3 transmission occasion(s). FFS on details.

Proposal 8 For Msg4, existing contention resolution procedure can be used, i.e., contention resolution timer and contention resolution MAC CE.

Proposal 9 The contention resolution timer is started or restarted after the last repetition of the transmission of a msg3 transmission plus UE-eNB RTT.

Proposal 10 Based on the configuration of DSA resource UE knows the network’s capability. Based on the use of the DSA resource, network knows the UE’s capability to support DSA.

Proposal 11 Allow the CB-Msg3 establishment cause to be mo-Data or mo-Signalling or mo-ExceptionData or delayTolerantAccess or mo-VoiceCall.

Proposal 12 Send LS to RAN1 informing potential alignment work associated with the CB-Msg3 transmission for DSA and non-DSA.

CB-Msg3 transmission attempt

Proposal 13 A new RSRP threshold to define the CE level for CB-Msg3 transmission is defined.

Proposal 14 A lowest RSRP threshold is defined for each CE level.

Proposal 15 The UE uses the CE level with the highest RSRP threshold among those CE levels for which the measured RSRP is higher that threshold. If none of the RSRP thresholds are met, the UE does not use CB-msg3.

Proposal 16 If CB-Msg3 transmission fails, network configures via system information the maximum number of re-attempts allowed for CB-Msg3 transmission before falling back to 4 step RACH-based procedure.

Proposal 17 If the total UL data volume is greater than the data volume threshold defined for CB-Msg3 transmissions, the UE does not use CB-Msg3 procedure.

Proposal 18 After CB-Msg3 transmission, if a UE is moved to RRC\_CONNECTED, a new C-RNTI is provided to the UE.

Proposal 19 Support network indication of backoff or fallback to 4 step RACH procedure.

Msg4 enhancements

Proposal 20 For the second objective, a PUR-like L1 ACK concept, as a response to the EDT transmission, can be considered.

Proposal 21 For the second objective, multicast Msg4 (multi-user Msg4 multiplexing, similar to RAR or NR 2-step RACH response) or multi-user Msg4 scheduled by a single DCI (as in multi-TB Msg4 scheduling) can be studied as a solution.

Proposal 22 The enhancements done for Msg4 transmission can be applicable to normal 4 step RACH or CB-Msg3 or DSA transmission.

Proposal 23 RAN2 study the mechanism that upon detection of collision, e.g., based on signal level, the network may respond with Msg4 for the UE whose Msg3 is decoded and scheduling Msg4 retransmission or fallback indication for the other UEs whose Msg3 transmissions were not successfully decoded.

[R2-2410875](file:///C:\Data\3GPP\Extracts\R2-2410875.docx) Implicit pointer for locating DSA replicas for EDT of CB-Msg3 DLR, ESA, Inmarsat, Viasat discussion

Observation 1: When DSA is supported for CB-msg3 transmissions, UEs shall pick the EDT occasions over which to send their replicas randomly.

Observation 2: Allowing the gNB to determine the positions of the DSA replicas sent by a UE upon decoding one of them can lead to resource savings in the downlink (e.g., avoid multiple unnecessary Msg4 acknowledgements).

Observation 3: The use of an implicit pointer can make the gNB aware of the positions of the DSA replicas sent by the UE as soon as one of them is decoded. The solution requires no modification to the CB-msg3 and entails no cost in terms of overhead.

Proposal 1: RAN2 to consider the use of an implicit pointer to allow the network infer the positions of the DSA replicas sent by a UE over the available set of EDT occasions.

Agreements:

1. Only system Information is used to provide cell-specific CB-Msg3 PUSCH resources (FFS if anything is needed in dedicated signalling for the TA validation parameters, if needed, for the case of 15kHz SCS NB-IoT and eMTC CE mode B)

2. Reuse the existing CE level selection procedure for CB-Msg3, at least for the initial selection. FFS whether we can reuse the same thresholds. FFS on the number of levels

3. The UE triggers CB-Msg3 only if the size of pending UL data is less than the configured maximum TBS (FFS if the maximum TBS is same or different for different CE levels)

4. There will be a RSRP threshold that determines whether CB-Msg3 can be used (if the RSRP is below such threshold, PRACH will have to be used) (FFS if we need a separate set of thresholds, including a different minimum threshold, in case CB-msg3 EDT is combined with OCC)

5. The number of replicas for DSA will be configured by the NW: 1 (SA), 2, 3, 4. The configuration of the number of replicas is CE-level specific

6. There will be a configurable time window for DSA CB-Msg3 occasion selection. FFS on the details (e.g. when the time window starts)

7. For SA case (single replica), after the end of all repetition of CB-Msg3 PUSCH transmission, UE starts a window for response reception taking UE-eNB RTT into account. FFS if we need to consider additional delay e.g. for the processing time

8. For DSA case, FFS if we only have one or multiple PDCCH monitoring window(s) (i.e. one window per each replica) for response reception. FFS when the window(s) is/are started (or restarted) and stopped. FFS on the window length. FFS if the UE needs to monitor only one RNTI or multiple RNTIs)

9. The UE stops the PDCCH monitoring window(s) once it receives a CB-msg4 containing a matching Contention Resolution Identity (FFS if there is no RRC message together with the CB-msg4)

10. Assuming that there will be scenarios where it’s possible to receive a CB-msg4 before the UE transmits some replicas, a UE stops transmitting the remaining replicas if it has received a CB-msg4 containing a matching Contention Resolution Identity (FFS if there is no RRC message together with the CB-msg4)

[R2-2409586](file:///C:\Data\3GPP\Extracts\R2-2409586%20UL%20capacity%20IoT%20NTN.doc) Discussion on uplink capacity enhancements for IoT NTN Xiaomi discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2409673](file:///C:\Data\3GPP\Extracts\R2-2409673%20Further%20consideration%20on%20UL%20capacity%20enhancements.docx) Further consideration on UL capacity enhancements CATT discussion

[R2-2409800](file:///C:\Data\3GPP\Extracts\R2-2409800%20(R19%20IoT-NTN%20AI%208.9.3)%20-%20EDT%20enhancements.docx) EDT/PUR enhancements. Interdigital, Inc. discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2409877](file:///C:\Data\3GPP\Extracts\R2-2409877-%20Discussion%20on%20CB-msg3%20EDT%20and%20msg4%20enhancement.docx) Discussion on CB-msg3 EDT and msg4 enhancement OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2409937](file:///C:\Data\3GPP\Extracts\R2-2409937%20Further%20considerations%20on%20retransmission%20and%20finite%20buffer%20for%20DSA.docx) Further considerations on retransmission and finite buffer for DSA NTU discussion Rel-19

[R2-2410111](file:///C:\Data\3GPP\Extracts\R2-2410111_Contention-based%20Msg3-EDT%20in%20IoT%20NTN.doc) Contention-based Msg3-EDT in IoT NTN China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410271](file:///C:\Data\3GPP\Extracts\R2-2410271%20EDT%20for%20uplink%20capacity%20enhancement%20in%20NTN%20(Revision%20of%20R2-2408304).docx) EDT for uplink capacity enhancement in NTN Lenovo discussion Rel-19

[R2-2410291](file:///C:\Data\3GPP\Extracts\R2-2410291%20Consideration%20on%20UL%20capacity%20enhancement%20for%20IoT-NTN.docx) Consideration on UL capacity enhancement for IoT-NTN NEC Corporation discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410309](file:///C:\Data\3GPP\Extracts\R2-2410309%20Further%20discussion%20on%20UL%20capacity%20enhancement%20for%20IoT%20NTN.docx) Further discussion on UL capacity enhancement for IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410332](file:///C:\Data\3GPP\Extracts\R2-2410332%20Considerations%20on%20uplink%20capacity%20enhancement%20for%20IoT-NTN.docx) Considerations on uplink capacity enhancement for IoT-NTN CMCC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410347](file:///C:\Data\3GPP\Extracts\R2-2410347.docx) Discussion on Uplink Capacity Enhancement TOYOTA Info Technology Center discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410483](file:///C:\Data\3GPP\Extracts\R2-2410483%20Procedures%20for%20contention-based%20Msg3.docx) Procedures for contention-based Msg3 Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410641](file:///C:\Data\3GPP\Extracts\R2-2410641%20Discussion%20on%20enhanced%20EDT.docx) Discussion on enhanced EDT MediaTek Inc. discussion IoT\_NTN\_Ph3-Core [R2-2408623](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2408623.zip)

[R2-2410725](file:///C:\Data\3GPP\Extracts\R2-2410725.docx) Discussion on EDT Enhancements for IOT NTN Skylo Technologies discussion Rel-19

Withdrawn

R2-2410296 Discussion on the use of an implicit pointer for locating DSA replicas for EDT of CB-Msg3 DLR, ESA discussion Withdrawn

* Withdrawn

### 8.9.4 Support of PWS

Contributions should focus on the introduction of support for broadcast of PWS messages for NB-IoT, re-using the LTE mechanisms.

[R2-2409801](file:///C:\Data\3GPP\Extracts\R2-2409801%20(R19%20IoT-NTN%20AI%208.9.4)%20-%20Support%20of%20PWS.docx) Support of PWS. Interdigital, Inc. discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1: Clarify in 36.300 section 4.10 that in general a NB-IoT UE may not support all PWS requirements.

Proposal 2: Extend the existing ETWS/CMAS notification RRC procedures to NB-IoT. No further clarification to “immediate” is therefore required.

Proposal 3: Add the following PWS indication in Paging-NB:

- etws-Indication;

- cmas-Indication.

Proposal 4: PWS reception in RRC\_CONNECTED is not supported for NB-IoT. It is up to the network implementation to release RRC\_CONNECTED UEs to RRC\_IDLE if a PWS message needs to be broadcast.

[R2-2409691](file:///C:\Data\3GPP\Extracts\R2-2409691%20Further%20consideration%20on%20PWS%20support%20for%20NB-IoT%20over%20NTN.docx) Further consideration on PWS support for NB-IoT over NTN ZTE Corporation, Sanechips discussion Rel-19 IoT\_NTN\_Ph3-Core

* PWS acquisition for UE in idle mode

Proposal 1: It’s suggested to delete the dummy IE for SystemInformationBlockType10-NB.

Proposal 2: It’s suggested not to introduce etws-Indication and cmas-Indication in Paging message.

Proposal 3: Upon receiving the PWS notification from NB-IoT cell, the PWS-capable NB-IoT UE firstly needs to re-acquire schedulingInfoList contained in SIB1 immediately without waiting until the next system information modification period boundary, and then acquire the corresponding PWS messages.

Proposal 4: For NB-IoT UE, the ETWS, CMAS, PWS requirement may not be met in some scenarios, e.g. when the UE is in eDRX, or when the UE is configured with a large DRX cycle (e.g., rf512, rf1024), or when PSM is enabled.

* PWS acquisition for UE in connected mode

Proposal 5: If RAN2 agrees to support ETWS/CMAS acquisition in connected mode for NB-IoT, RAN2 check with RAN1 whether it’s feasible for NB-IoT UE in connected mode to monitor NPDCCH CSS to receive etws-indication and/or cmas-indication.

[R2-2410643](file:///C:\Data\3GPP\Extracts\R2-2410643%20Discussion%20on%20supporting%20PWS%20for%20NB-IoT.docx) Discussion on supporting PWS for NB-IoT MediaTek Inc. discussion IoT\_NTN\_Ph3-Core [R2-2408624](file:///C:\Data\3GPP\archive\RAN2\RAN2%23127bis\Tdocs\R2-2408624.zip)

Proposal 1: Introduce new ETWS indication and CMAS indication in the Paging-NB message.

Proposal 2: Send an LS to RAN1 for new Direct Indication Information that includes ETWS indication and CMAS indication in RRC Connected mode.

Proposal 3: Introduce a new dedicated RRC configuration to receive new Direct Indication Information in RRC Connected mode.

Proposal 4: Introduce a new UE capability to receive new Direct Indication Information in RRC Connected mode.

[R2-2409587](file:///C:\Data\3GPP\Extracts\R2-2409587_PWS%20for%20NB-IoT.doc) PWS support for NB-IoT over NTN Xiaomi discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1: Add PWS indication (i.e. etws-Indication and cmas-Indication) in Paging-NB.

Proposal 2: RAN2 intend to support PWS acquisition for NB-IoT NTN UEs in Connected mode.

Proposal 3: RAN2 assume that NPDCCH can include the PWS indication for NB-IoT UEs in connected mode. RAN2 send LS to RAN1 to confirm whether this is feasible and can be supported in Rel-19.

Proposal 4: RAN2 further discuss UE behaviors due to PWS acquisition in Connected mode, e.g. whether UL transmission needs to be suspended or stopped.

Proposal 5: Introduce two separate capabilities for NB-IoT UE to support ETWS reception and CMAS reception. These two capabilities do not differentiate NTN and TN.

Proposal 6: RAN2 wait for RAN1’s design on NPDCCH before discussing whether to introduce separate UE capabilities for PWS reception in Connected mode, or to have common UE capabilities for Idle mode and Connected mode.

[R2-2409542](file:///C:\Data\3GPP\Extracts\R2-2409542%20Further%20Discussion%20on%20PWS%20Support%20for%20NB-IoT.docx) Further Discussion on PWS Support for NB-IoT vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2409675](file:///C:\Data\3GPP\Extracts\R2-2409675%20Support%20of%20PWS%20for%20NB-Iot%20NTN.docx) Support of PWS for NB-IoT NTN UE CATT discussion

[R2-2409896](file:///C:\Data\3GPP\Extracts\R2-2409896%20Discussion%20on%20supporting%20PWS%20in%20IOT-NTN%20network.docx) Discussion on supporting PWS in IOT-NTN network OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410051](file:///C:\Data\3GPP\Extracts\R2-2410051%20PWS%20NB-IoT.docx) Discussion on PWS in NB-IoT NTN Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410272](file:///C:\Data\3GPP\Extracts\R2-2410272%20PWS%20broadcast%20support%20for%20NB-IoT%20in%20NTN%20(Revision%20of%20R2-2408305).docx) PWS broadcast support for NB-IoT in NTN Lenovo discussion Rel-19

[R2-2410289](file:///C:\Data\3GPP\Extracts\R2-2410289%20Discussion%20on%20PWS%20for%20NB-IoT_v1.docx) Discussion on PWS for NB-IoT Google discussion Rel-19

[R2-2410292](file:///C:\Data\3GPP\Extracts\R2-2410292%20Consideration%20on%20PWS%20broadcast%20for%20NB-IoT.docx) Consideration on PWS broadcast for NB-IoT NEC Corporation discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410304](file:///C:\Data\3GPP\Extracts\R2-2410304%20consideration%20on%20PWS%20support%20for%20NB-IoT.docx) Further considerations on PWS support for NB-IoT Huawei, HiSilicon, Turkcell discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410310](file:///C:\Data\3GPP\Extracts\R2-2410310%20Further%20discussion%20on%20support%20of%20PWS%20for%20NB-IoT%20NTN.docx) Further discussion on support of PWS Nokia, Nokia Shanghai Bell discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410333](file:///C:\Data\3GPP\Extracts\R2-2410333%20Support%20of%20PWS%20messages%20for%20NB-IoT.docx) Support of PWS messages for NB-IoT CMCC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410484](file:///C:\Data\3GPP\Extracts\R2-2410484%20Discussion%20on%20impact%20of%20PWS%20broadcasting%20for%20NB-IoT.docx) Impact of PWS signalling for NB-IoT Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2410864](file:///C:\Data\3GPP\Extracts\R2-2410864%20-%20Support%20for%20PWS%20in%20NB-IoT%20NTN.docx) Support for PWS in NB-IoT NTN Ericsson discussion Rel-19 IoT\_NTN\_Ph3-Core

## 8.17 IoT-NTN TDD mode

(IoT\_NTN\_TDD; leading WG: RAN1; REL-19; WID RP-242415)

Time budget: 0.5 TU

Tdoc Limitation: 0 tdoc

No contributions are expected for this meeting. The agenda is open only for possible discussions based on urgent LSs, if any.

[R2-2409694](file:///C:\Data\3GPP\Extracts\R2-2409694%20IOT_NTN_TDD%20WP.docx) Work plan for WID: introduction of IoT-NTN TDD mode Iridium Satellite LLC Work Plan Rel-19 Late

## 8.18 TEI19

Time budget: 1 TU

Tdoc Limitation: 1 tdoc

Companies are encouraged to submit co-sourced contributions, which will have priority for discussion in RAN2#128. Tdoc limit applies to all contributions and primary co-sourcing company (if co-sourced).

Including incoming LS from CT1 C1-245500. No input expected in this meeting.

[R2-2410793](file:///C:\Data\3GPP\RAN2\Docs\R2-2410793.zip) Inclusion of the NB-IoT satellite information in E-UTRAN Google, Samsung, MediaTek Inc. discussion Rel-19

* Revised in R2-2411085

R2-2411085 Inclusion of the NB-IoT satellite information in E-UTRAN Google, Samsung, MediaTek Inc. discussion Rel-19

# Summary

Agreed CRs

NR-NTN

IoT-NTN

Approved LSs out

[Post128] Email discussions

Short

Long