3GPP TSG-RAN WG2 Meeting #129 R2-2501333

Athens, Greece, Feb. 17th – 21st, 2025

**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

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

* [AT129][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**  **[8.0] NR19 General**  **@NR151617 UP (Diana)**  **[7.0.2] Other Rel-18 corrections cont** | Breakout to start after completion of 7.0.1  **[6.6] NR17 SL (Kyeongin)**  **[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  [6.4] NR Rel-17  **[7.1] NR18 Pos (Nathan)**  - All agenda items in order |  |
| 11:00 – 13:00 |
| 14:30 – 16:30 | **[7.0.2] Other Rel-18 corrections cont**  **[7.0.2.11] NR TEI18**  **[7.8] Other Rel-18 corrections** | **[7.6] NR18 SL cont (Kyeongin)** (if needed)  **[7.2] NR18 Mob (Kyeongin)** | **[7.1] NR18 Pos (Nathan)**  - Any overflow from earlier sessions  **[6.2][7.5] NR1718 SL Relay (Nathan)**  - All agenda items (with documents) in order |
| 17:00 – 19:00 | **[8.2] NR19 Ambient IoT [2.5] (Diana)** | **[8.5] NR19 NES (Kyeongin)**  [8.5] is only to set offline discussion scopes  **[7.2] NR18 Mob** (**Kyeongin)** (17:15 - ) (if needed)  **[8.6] NR19 Mob (Kyeongin)**  [8.6.1] Organizational (including setting offline discussion scopes)  [8.6.4] C-LTM | **[7.0.2.13] NR18 MIMO (Erlin)**  **[8.12] NR19 MIMO (Erlin)**  [8.12.1] Organizational  [8.12.2] MAC CE design, other aspects if time allows  [8.12.3] UE-initiated beam reporting if time allows |
| **Tuesday** | | | | |
| 08:30 – 10:30 | **[8.3] NR19 AI/ML Mobility [2] (Diana)** | **[8.4] NR19 LP-WUS [1] (Erlin)**  [8.4.1] Organizational  [8.4.2] Separate band issues, subgrouping, and issues related to SA2 LS R2-2500050  [8.4.3] RRM relaxation criteria  [8.4.4] if time allows | **[8.13] NR19 SL Relay (Nathan)**  - [8.13.1] Organizational  - [8.13.2] Discovery and (re)selection  - [8.13.3] Control plane and SRAP (start) |  |
|  |
| 11:00 – 13:00 | **[8.1] NR19 AI/ML PHY [2.5] (Diana)** | **NR18 NTN NR /IoT(Sergio)**  [4.1], [6.1.1], [6.1.3] R17 NTN corrections  [7.3] R18 IoT NTN corrections | **NR18 MBS/QoE (Dawid)**  [7.0.2.14] MBS (around 30 minutes)  [7.0.2.15] QoE (around 30 minutes)  **EUTRA&NR151617 (Mattias)**  Except NTN related Tdoc, which will be handled in Sergio´s session.  [4.1]  [5.1.1], [5.1.3.1], [5.1.3.2], [5.1.3.3]  [6.1.1], [6.1.3], [6.1.3.1], [6.1.3.2], [6.1.3.3] |  |
| 14:30 -16:30 | **[8.2] NR19 Ambient IoT [2] (Diana)** | **[8.8] NR19 NR NTN (Sergio) [2]**  [8.8.1] Organizational  [8.8.2] Downlink coverage enhancements  [8.8.4] Support of Broadcast service | **EUTRA&NR151617 (Mattias) cont’**  **NR18 SON/MDT**  [7.0.2.11]  **NR19 SONMDT [0.5] (Mattias)**  [8.10.1], [8.10.2.1], [8.10.2.2], [8.10.3], [8.10.4], [8.10.5.1], [8.10.5.3] |  |
| 17:00– 19:00 | **[8.6] NR19 Mob [2] (Kyeongin)**  [8.6.4] C-LTM (if needed)  [8.6.3] L1 event triggered MR | **[8.7] NR19 XR [2] (Dawid)**  [8.7.1] Organizational, LSin, running CRs  [8.7.3] RRM measurement gaps/restrictions  [8.7.5] RLC enhancements | **NR19 SONMDT [0.5] (Mattias) cont’ if needed** |  |
| **Wednesday** | | | | |
| 08:30 – 10:30 | **[8.6] NR19 Mob [2] (Kyeongin)**  [8.6.3] L1 event triggered MR (if needed)  [8.6.2] Inter-CU LTM | **[8.7] NR19 XR [2] (Dawid)**  [8.7.6] XR rate control  [8.7.4] LCP enhancements, DSR enhancements | **@9:45 [8.19] NR19 NR Other (Erlin)**  Issues related to R4 LS R4-2420410 and R4-2420383 |  |
| 11:00 – 13:00 | **[8.3] NR19 AI/ML Mobility [2] (Diana)** | **[8.5] NR19 NES [1] (Kyeongin)**  [8.5.1] Organizational  [8.5.3] Adaptation of common signal/channel transmissions  [8.5.2] OD-SSB SCell operation | **[8.11] NR19 SBFD [0.75] (Erlin)**  [8.11.1] Organizational  [8.11.2] RACH configuration/procedure  [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  [8.9.3] Uplink Capacity Enhancements  [8.9.4] Support of PWS | **[6.2][7.5] NR1718 SL relay CB (Nathan)**  **[8.13] NR19 SL relay (Nathan)**  - [8.13.4] Control plane and SRAP (cont.)  - [8.13.5] Service continuity |  |
|  |
| 17:00– 19:00 | **[8.18] TEI19** | **[8.17] NR19 IoT NTN TDD mode [0.5]**  **[8.8] NR19 NR NTN [2] (Sergio)**  [8.8.4] Support of Broadcast service (cont)  [8.8.6] LTE to NR NTN mobility  [8.8.3] Uplink Capacity/Throughput Enhancement  [8.8.5] Support of regenerative payload (if time allows) | **[8.16] NR19 BDS Pos [0.25] (Nathan)**  **[8.15] NR19 NavIC Pos [0.5] (Nathan)**  **[7.1] NR18 Pos (Nathan) if needed**  **[8.18][8.19] TEI19 and R19 Other positioning/relay** |  |
|  |
| **Thursday** | | | | |
| **Colourful Polo day** | | | | |
| 08:30 – 10:30 | **[8.1] NR19 AI/ML PHY [2.5] (Diana) CB time if need** | **CB Sergio**  **[4.1] R17 IoT NTN**  issues marked CB Thursday  **[7.3] R18 IoT NTN**  issues marked CB Thursday  **[8.9] R19 IoT NTN CB (Sergio)**  [8.9.2] Support of Store and Forward  [TBD]  **[8.18] TEI 19 / [8.19] NR others**  (NTN related aspects) | 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)** | **CB Sergio**  **[6.1] NR17 NR NTN**  issues marked CB Thursday  **[7.4] NR18 NR NTN**  All issues  **[8.8] NR19 NR NTN CB**  [TBD] | **CB Mattias**  **CB EUTRA&NR151617 (Mattias)**  **[8.10] CB SON/MDT R19** |  |
| 14:30 -16:30 | **@14:30-15:30 CB AIoT (if needed)**  **@15:30-16:30 CB** **NR19 AI/ML Mobility (if needed)** | **CB NR1718 SL** **(Kyeongin)**  **[8.5] NR19 NES CB (Kyeongin)**  Comebacks  [8.5.3] OD-SIB1 | CB Erlin  **CB for R18 MIMOevo**  Details TBD  **[8.4] CB NR19 LP-WUS (Erlin)**  [8.4.4]  Other LP-WUS CB TBD |  |
|  |
| 17:00 – 19:00 | **CB NR 18 Diana** | **[7.2] CB NR18 Mob (Kyeongin)**  **[8.6] CB NR19 Mob (Kyeongin)**  Comebacks | CB Dawid:  **NR18 MBS/QoE**  **[8.7] NR19 XR CB:** |  |
| **Friday** | | | | |
| 08:30 – 10:30 | CB Diana TBD  **@9:30-10:30 CB Ambient IoT** | **CB Sergio**  **NTN** | CB Kyeongin  CB Nathan (TBD)  CB Erlin NR others if needed (TBD) |  |
| 11:00 – 13:00 | CB Diana  @11-12 R19 Ambient IoT  Other CBs  Reports from 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 [AT129] offline discussions

NOTE: No offline email discussions will be kicked off before Monday Feb 17th, 09:00 local time

* [AT129][301][R17 NR NTN] Corrections to ntn-PolarizationUL (Ericsson)

Scope: Revise the CR in [R2-2500882](file:///C:\Data\3GPP\Extracts\R2-2500882%20NTNConfig%20R17.docx)

Intended outcome: Agreeable CR

Deadline for companies' feedback: Wednesday 2025-02-19 20:00

Deadline for revised CR: Thursday 2025-02-20 08:00

* [AT129][302][R17 NR NTN] Correction to smtc2 (Huawei)

Scope: discuss the CR in [R2-2500697](file:///C:\Data\3GPP\Extracts\R2-2500697%20Correction%20to%20smtc2%20(R18).docx)

Intended outcome: Summary/revised CR

Deadline for companies' feedback: Wednesday 2025-02-19 20:00

Deadline for rapporteur's summary/revised CR (in R2-2501411): Thursday 2025-02-20 08:00

* [AT129][303][R17 NR NTN] Corrections to NTN SMTC configuration (ZTE)

Scope: discuss the CR in [R2-2500767](file:///C:\Data\3GPP\Extracts\R2-2500767%20Corrections%20to%20NTN%20SMTC%20Configuration-R17.docx)

Intended outcome: Agreeable CR

Deadline for companies' feedback: Wednesday 2025-02-19 20:00

Deadline for revised CR: Thursday 2025-02-20 08:00

* [AT129][304][R19 NR NTN] LS to RAN1 on DL coverage enhancements (Huawei)

Scope: discuss whether there is anything we can ask RAN1 to help our discussion on the need for possible SMTC enhancements

Intended outcome: summary/draft LS

Deadline for companies' feedback: Wednesday 2025-02-19 20:00

Deadline for rapporteur's summary/draft LS (in R2-2501415): Thursday 2025-02-20 08:00

## 4.1 EUTRA corrections Rel-17 and earlier

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

[R2-2500462](file:///C:\Data\3GPP\Extracts\R2-2500462%20Detection%20of%20consecutive%20HARQ%20feedback%20failures%20in%20NB-IoT%20NTN.docx) Detection of consecutive HARQ feedback failures in NB-IoT NTN Google discussion Rel-17 36.321 LTE\_NBIOT\_eMTC\_NTN

Proposal 1 RAN2 to adopt a mechanism (in TS 36.321 and TS 36.331) allowing an NB-IoT device to detect consecutive HARQ feedback failures and to trigger RLF upon the detection.

Proposal 2 Consider the TP in the Annex as the baseline for further discussion.

- Ericsson thinks we cannot add new functionality in Rel-17 and we think we could address this via NW implementation

- QC agrees there is a problem and thinks this could not be solved by NW implementation. QC thinks the only reliable solution is that the NW could detect the problem and adjust repetitions

- Nokia thinks this is not a new issue and it’s also there for NB-IoT. Samsung agrees and in case this could only be addressed in Rel-19

- Vivo also thinks we should not have a solution for this in Rel-17. HW and ZTE agree

- Xiaomi agrees with others this is not an NTN only issue and could be handled as TEI19 for both TN and IoT-NTN

- Google thinks this is only a problem in NTN

* We don't introduce an optimized behaviour for this in Rel-17
* Ericsson and Nokia thinks this can be solved by NW implementation also in Rel-19. QC disagrees with this
* It’s FFS whether we address this issue as a TEI19 discussion, for NB-IoT in general

[R2-2500938](file:///C:\Data\3GPP\Extracts\R2-2500938%2036331_CR5091%20R17%20Clarification%20on%20Inclination.docx) Clarification on Inclination value description THALES CR Rel-17 36.331 17.11.0 5091 - D LTE\_NBIoT\_eMTC\_NTN\_req-Core

- QC wonders why we need to clarify this. Thales indicates that there were misunderstanding on this in RAN5

- Ericsson think this is correct but the coverpage details should be fixed.

- Nokia wonders if everything is already clear from the external references. Vivo agrees

- ZTE thinks we have different value ranges in 3GPP so we could align but in case RAN1 has to be involved

- HW agrees with the interpretation, ideally we could have used a different range but now we could fit it as suggested in the CR

* Revised in R2-2501402 to fix the coversheet (category F) and to add further clarification on the mapping (if needed)

R2-2501402 Clarification on Inclination value description THALES CR Rel-17 36.331 17.11.0 5091 1 F LTE\_NBIoT\_eMTC\_NTN\_req-Core

* CB Thursday

R2-2501407 Clarification on Inclination value description THALES CR Rel-18 36.331 18.4.0 5092 1 A LTE\_NBIoT\_eMTC\_NTN\_req-Core

* CB Thursday

## 6.1 Common

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

### 6.1.1 Stage 2 and Organisational

Incoming LSs, etc. You should discuss your stage 2 CRs with the specification rapporteurs before submission. Includes impact to 38.300, 37.340, (36.300 if applicable)

[R2-2500597](file:///C:\Data\3GPP\Extracts\R2-2500597_38300_CR0961_(Rel-17)_Definition%20of%20NTN%20Cell_v0.docx) Definition of NTN Cell Apple CR Rel-17 38.300 17.11.0 0961 - F NR\_NTN\_solutions-Core

- Xiaomi is not sure we need the new definition and in any case it would strange to refer to an RRC parameter (or stage 3 details) in the definition. Nokia agrees

- Apple thinks there are other similar cases and still thinks we should have a clear definition for NTN cell

- VDF thinks this is not a RAN2 only discussion

* Not pursued

[R2-2500598](file:///C:\Data\3GPP\Extracts\R2-2500598_36300_CR1416_(Rel-17)_Definition%20of%20NTN%20Cell_v0.docx) Definition of NTN Cell Apple CR Rel-17 36.300 17.9.0 1416 - F LTE\_NBIOT\_eMTC\_NTN

* Not pursued

### 6.1.3 Control Plane corrections

Moved here from 6.1.2

[R2-2500941](file:///C:\Users\panidx\OneDrive%20-%20InterDigital%20Communications,%20Inc\Documents\3GPP%20RAN\TSGR2_129\Docs\R2-2500941.zip) Clarification on Inclination value description THALES CR Rel-17 38.331 17.11.0 5247 - D NR\_NTN\_solutions-Core

* Revised in R2-25001403 to fix at least the coversheet

R2-2501403 Clarification on Inclination value description THALES CR Rel-17 38.331 17.11.0 5247 1 F NR\_NTN\_solutions-Core

* CB Thursday

R2-2501408 Clarification on Inclination value description THALES CR Rel-18 38.331 18.4.0 5248 1 A NR\_NTN\_solutions-Core

* CB Thursday

[R2-2500882](file:///C:\Data\3GPP\Extracts\R2-2500882%20NTNConfig%20R17.docx) Corrections to ntn-PolarizationUL Ericsson CR Rel-17 38.331 17.11.0 5237 - F NR\_NTN\_solutions-Core

* QC is fine with the CR and would just like to check some field description
* HW and Nokia think we don’t necessarily need to dummify
* Continue the discussion in offline 301
* Revised in R2-2501409

R2-2501409 Corrections to ntn-PolarizationUL Ericsson CR Rel-17 38.331 17.11.0 5237 1 F NR\_NTN\_solutions-Core

* CB Thursday

[R2-2500883](file:///C:\Data\3GPP\Extracts\R2-2500883%20NTNConfig%20R18.docx) Corrections to ntn-PolarizationUL Ericsson CR Rel-18 38.331 18.4.0 5238 - A NR\_NTN\_solutions-Core, TEI18

* Continue the discussion in offline 301
* Revised in R2-2501410

R2-2501410 Corrections to ntn-PolarizationUL Ericsson CR Rel-18 38.331 18.4.0 5238 1 A NR\_NTN\_solutions-Core, TEI18

* CB Thursday
* [AT129][301][R17 NR NTN] Corrections to ntn-PolarizationUL (Ericsson)

Scope: Revise the CR in [R2-2500882](file:///C:\Data\3GPP\Extracts\R2-2500882%20NTNConfig%20R17.docx)

Intended outcome: Agreeable CR

Deadline for companies' feedback: Wednesday 2025-02-19 20:00

Deadline for revised CR: Thursday 2025-02-20 08:00

#### 6.1.3.1 NR RRC

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

[R2-2500696](file:///C:\Data\3GPP\Extracts\R2-2500696%20Correction%20to%20smtc2%20(R17).docx) Correction to smtc2 Huawei, HiSilicon CR Rel-17 38.331 17.11.0 5217 - F NR\_NTN\_solutions-Core

- QC is ok to clarify this

- Nokia agrees with the interpretation but not sure we need to have a CR for this

- Vivo thinks we could just capture the understanding in the chairman notes

- Xiaomi thinks the suggested change is not correct

* Continue in offline 302

[R2-2500697](file:///C:\Data\3GPP\Extracts\R2-2500697%20Correction%20to%20smtc2%20(R18).docx) Correction to smtc2 Huawei, HiSilicon CR Rel-18 38.331 18.4.0 5218 - A NR\_NTN\_solutions-Core

* Continue in offline 302
* [AT129][302][R17 NR NTN] Correction to smtc2 (Huawei)

Scope: discuss the CR in [R2-2500697](file:///C:\Data\3GPP\Extracts\R2-2500697%20Correction%20to%20smtc2%20(R18).docx)

Intended outcome: Summary/revised CR

Deadline for companies' feedback: Wednesday 2025-02-19 20:00

Deadline for rapporteur's summary/revised CR (in R2-2501411): Thursday 2025-02-20 08:00

[R2-2500767](file:///C:\Data\3GPP\Extracts\R2-2500767%20Corrections%20to%20NTN%20SMTC%20Configuration-R17.docx) Corrections to NTN SMTC configuration ZTE Corporation, Ericsson, Sanechips CR Rel-17 38.331 17.11.0 5223 - F NR\_NTN\_solutions-Core

- Samsung wonder if the additional procedural text is needed. ZTE thinks this is needed to clarify the behaviour.

- QC agrees with Samsung this the additional procedural text is not needed

- Vivo supports to have description to clarify the UE behaviour in this case

- CATT supports the spirit of the CR

- Sequans thinks it’s good to clarify the UE behaviour.

- Oppo thinks we could have a note in the spec. QC is ok with adding a Note

- HW suggest to split the sentence for the two cases

- Xiaomi thinks we can have a general description covering also the case whether the UE supports all the STMCs.

* Continue in offline 303 to discuss how to revise/split the sentence on UE behaviour when the PCI list is present/not present and to cover also the general case when the UE supports all the SMTCs
* Revised in R2-2501413

R2-2501413 Corrections to NTN SMTC configuration ZTE Corporation, Ericsson, Sanechips CR Rel-17 38.331 17.11.0 5223 1 F NR\_NTN\_solutions-Core

* CB Thursday

[R2-2500768](file:///C:\Data\3GPP\Extracts\R2-2500768%20Corrections%20to%20NTN%20SMTC%20Configuration-R18.docx) Corrections to NTN SMTC configuration ZTE Corporation, Ericsson, Sanechips CR Rel-18 38.331 18.4.0 5224 - A NR\_NTN\_solutions-Core

* Continue in offline 303
* Revised in R2-2501413

R2-2501414 Corrections to NTN SMTC configuration ZTE Corporation, Ericsson, Sanechips CR Rel-18 38.331 18.4.0 5224 1 A NR\_NTN\_solutions-Core

* CB Thursday
* [AT129][303][R17 NR NTN] Corrections to NTN SMTC configuration (ZTE)

Scope: discuss the CR in [R2-2500767](file:///C:\Data\3GPP\Extracts\R2-2500767%20Corrections%20to%20NTN%20SMTC%20Configuration-R17.docx)

Intended outcome: Agreeable CR

Deadline for companies' feedback: Wednesday 2025-02-19 20:00

Deadline for revised CR: Thursday 2025-02-20 08:00

#### 6.1.3.2 UE capabilities

UE cap corrections 38306, 38331.

[R2-2500711](file:///C:\Data\3GPP\Extracts\R2-2500711%20Clarification%20on%20FRx_xDD%20Differentiation%20in%20per%20UE%20Capability%20for%20NTN%20bands.docx) Clarification on FRx\_xDD Differentiation in per UE Capability for NTN bands vivo, Xiaomi CR Rel-17 38.306 17.ｎ11.0 1233 - F NR\_NTN\_solutions-Core

- HW thinks the R18 CR refers to FR2 and then it cannot be a Cat A

- Vivo thinks we could have a separate R18 Cat F CR for FR2

- Ericsson thinks we don’t need the change for the note. QC thinks the change to the not eis fine for R18

- MTK is not sure whether the whole CR is needed. QC thinks the other changes to field description

* Remove the change to the Note
* Revised in R2-2501404

R2-2501404 Clarification on FRx\_xDD Differentiation in per UE Capability for NTN bands vivo, Xiaomi CR Rel-17 38.306 17.ｎ11.0 1233 1 F NR\_NTN\_solutions-Core

* CB Thursday

[R2-2500712](file:///C:\Data\3GPP\Extracts\R2-2500712%20Clarification%20on%20FRx_xDD%20Differentiation%20in%20per%20UE%20Capability%20for%20NTN%20bands.docx) Clarification on FRx\_xDD Differentiation in per UE Capability for NTN bands vivo, Xiaomi CR Rel-18 38.306 18.4.0 1234 - A NR\_NTN\_solutions-Core, NR\_NTN\_enh-Core

* Remove the change to the Note
* Remove the changes regarding FR2 and put them in a separate R18 Cat F CR
* Revised in R2-2501405
* Draft a New R18 Cat F CR for the FR2 case in R2-2501406

R2-2501405 Clarification on FRx\_xDD Differentiation in per UE Capability for NTN bands vivo, Xiaomi CR Rel-18 38.306 18.4.0 1234 1 A NR\_NTN\_solutions-Core, NR\_NTN\_enh-Core

* CB Thursday

R2-2501406 Clarification on FR2\_xDD Differentiation in per UE Capability for NTN bands vivo, Xiaomi CR Rel-18 38.306 18.4.0 XXXX - F NR\_NTN\_enh-Core

* CB Thursday

#### 6.1.3.3 Other

Including idle and inactive behaviour specified in 38.304 or 36.304.

[R2-2500599](file:///C:\Data\3GPP\Extracts\R2-2500599_38304_CR0427_(Rel-17)_Definition%20of%20NTN%20Cell_v0.docx) Definition of NTN Cell Apple CR Rel-17 38.304 17.10.0 0427 - F NR\_NTN\_solutions-Core

[R2-2500600](file:///C:\Data\3GPP\Extracts\R2-2500600_36304_CR0878_(Rel-17)_Definition%20of%20NTN%20Cell_v0.docx) Definition of NTN Cell Apple CR Rel-17 36.304 17.5.0 0878 - F LTE\_NBIOT\_eMTC\_NTN

- Apple thinks at least the change in 5.3.1 should be considered. CATT and Xiaomi wonder if this is correct or if the field is always present.

- Samsung thinks that at least the change to 5.1.2.2 is correct. Ericsson thinks we should wait for the discussion in NR first.

* CB Thursday

## 7.3 IoT NTN enhancements

(IoT\_NTN\_enh-Core; leading WG: RAN1; REL-18; WID: [RP-223519](file:///C:\Data\3GPP\archive\RAN\RAN%2398\Tdocs\RP-223519.zip))

Time budget: 0 TU

Tdoc Limitation: 1 tdocs

### 7.3.1 Organizational

LSs, rapporteur inputs.

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

Incoming LSs

[R2-2500048](file:///C:\Data\3GPP\Extracts\R2-2500048_S2-2412665.docx) Reply LS on UE Location Information for NB-IoT NTN (S2-2412665; contact Qualcomm) SA2 LS in Rel-18 IoT\_NTN\_enh-Core To:RAN2, RAN3 Cc:CT1

- QC thinks we could wait for RAN3 response first.

- Ericsson indicates that RAN3 already discussed this and agreed there is no need to send the UE location in the case SA2 is asking for.

* We can further discuss whether we need to do anything in RAN2 after receiving formal RAN3 feedback.

[R2-2500077](file:///C:\Data\3GPP\Extracts\R2-2500077%20Discussion%20on%20SA2%20LS%20on%20UE%20Location%20Information%20for%20NB-IoT%20NTN.docx) Discussion on SA2 LS on UE Location Information for NB-IoT NTN vivo discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: From RAN2 perspective, the updated UE coarse location report is feasible. The final decision is up to RAN3.

Proposal 2: If the updated UE coarse location report should be supported for NB-IoT, a similar method like eMTC can be reused, i.e, NW requests the UE coarse location via the UEInformationRequest-NB message, and then UE report the coarse location via the UEInformationResponse-NB message.

[R2-2500547](file:///C:\Data\3GPP\Extracts\R2-2500547%20On%20SA2%20LS%20for%20coarse%20UE%20location%20reporting%20in%20NB-IoT%20NTN.docx) On SA2 LS for coarse UE location reporting in NB-IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-18 IoT\_NTN\_enh-Core

Proposal 1: For NB-IoT NTN, reporting Coarse Location Information to eNB via the RRC protocol is not supported in Rel-18.

Proposal 2: RAN2 reply SA2 that there is no need to introduce additional enhancements to report Coarse Location Information to the NB-IoT eNB via the RRC protocol.

[R2-2501309](file:///C:\Data\3GPP\Extracts\R2-2501309%20-%20Location%20information%20reporting%20for%20NB-IoT.docx) Location information reporting for NB-IoT Ericsson discussion Rel-18 IoT\_NTN\_enh-Core

*Proposal 1 NB-IoT coarse UE location is not needed for the procedures “Establishment of S1-U bearer during Data Transport in Control Plane CIoT EPS Optimisation”, “Connection Resume procedure”, and “MT-EDT procedure for User Plane CIoT EPS Optimisation”.*

### 7.3.2 Corrections

Corrections for all specifications.

RRC corrections

[R2-2500939](file:///C:\Data\3GPP\Extracts\R2-2500939%2036331_CR5092%20R18%20Clarification%20on%20Inclination.docx) Clarification on Inclination value description THALES CR Rel-18 36.331 18.4.0 5092 - D IoT\_NTN\_enh-Core

* Revised in R2-2501407

[R2-2501269](file:///C:\Data\3GPP\Extracts\R2-2501269%20Correction%20on%20GNSS%20procedure.docx) Correction on GNSS procedure ZTE Corporation, Sanechips CR Rel-18 36.331 18.4.0 5101 - F IoT\_NTN\_enh-Core

- Vivo thinks both changes are not needed, the first one was already discussed and the second refers to UE internal implementation. ZTE thinks we already address similar cases in the spec

- Xiaomi also doesn’t think this CR is needed.

- Apple thinks the first change needs more discussion

- Google is fine with the second change. Nokia agrees. MTK as well

- Ericsson agrees with the principle of the first change but it’s late to change this now. Also thinks the second change is not needed.

- HW thinks we already discussed the first change while the second is not essential

- ZTE agrees we discussed the first issue but at that time we did not realize this is not aligned to other decisions

- Samsung thinks the second change is not essential and there are other cases where there is some inconsistency.

* CB Thursday

MAC corrections

[R2-2500203](file:///C:\Data\3GPP\Extracts\R2-2500203%20Correction%20on%20drx-inactivityTimer.docx) Correction on drx-inactivityTimer Huawei, HiSilicon CR Rel-18 36.321 18.3.0 1589 - F IoT\_NTN\_enh-Core

* CB Thursday

[R2-2501217](file:///C:\Data\3GPP\Extracts\R2-2501217%20Correction%20on%20HARQ%20process.docx) Correction on HARQ process Samsung CR Rel-18 36.321 18.3.0 1590 - F IoT\_NTN\_enh-Core

* CB Thursday

## 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

### 7.4.1 Organizational

LSs, rapporteur inputs.

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

Incoming LSs

[R2-2500033](file:///C:\Data\3GPP\Extracts\R2-2500033_R4-2419898.docx) LS on simultaneous operation between GNSS and NR NTN (R4-2419898; contact: Huawei) RAN4 LS in Rel-19 NR\_NTN\_enh-Core To:RAN2 Cc:RAN1

[R2-2500042](file:///C:\Data\3GPP\Extracts\R2-2500042_R4-2420476.docx) Reply LS to RAN1 and RAN2 on FR2-NTN inclusion to specifications (R4-2420476; contact: vivo) RAN4 LS in Rel-18 NR\_NTN\_enh-Core To:RAN1, RAN2

### 7.4.2 Corrections

Corrections for all specifications.

Simultaneous operation between GNSS and NR NTN

[R2-2500078](file:///C:\Data\3GPP\Extracts\R2-2500078%20Discussion%20on%20RAN4%20LS%20on%20Simultaneous%20Operation%20between%20GNSS%20and%20NR%20NTN.docx) Discussion on RAN4 LS on Simultaneous Operation between GNSS and NR NTN vivo discussion Rel-18 NR\_NTN\_enh-Core

* FDM solution:

Proposal 1: For simultaneous operation between GNSS and NR NTN, RAN2 concludes that it is not necessary to consider any enhancement to the existing IDC FDM solution.

* TDM solution & Autonomous denial solution:

Observation: The candidate values of cyclelength-r18, activeDuration-r18, autonomousDenialValidity-r18, and autonomousDenialSlots-r18 seem a bit small for representing the GNSS implementation.

Proposal 2: For simultaneous operation between GNSS and NR NTN, RAN2 concludes that enhancement to the existing IDC TDM solution or IDC autonomous denial solution is not considered in Rel-18.

Proposal 3: For simultaneous operation between GNSS and NR NTN, RAN2 can work on value range extension of TDM assistance parameters or autonomous denial parameters as part of TEI19 work (check with RAN4 whether value range extension is beneficial and sufficient).

[R2-2500537](file:///C:\Data\3GPP\Extracts\R2-2500537%20IDC%20issue%20in%20NTN.docx) Discussion on RAN4 LS on IDC issue in NTN Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

Observation 1. Current IDC solutions are not optimized for NTN where a UE needs to perform GNSS measurements for x seconds without IDC problem in every y seconds.

Observation 2. The duty cycle in current autonomous denial configuration is too small for a UE to be able to complete GNSS reading without IDC problem in NTN.

Proposal 1 Introduce a new aggressive denials parameter (i.e., with larger duty cycle) to solve the IDC issue in NTN.

Proposal 2 If proposal 1 is agreed, consider fixing it from Rel-18 and introduce a UE capability.

Proposal 3 Consider a mechanism to reduce signaling overhead for enabling/disabling IDC solutions such as C-DRX based on IDC issue report or aggressive denials parameters.

Moved from 8.8.1

[R2-2500584](file:///C:\Data\3GPP\Extracts\R2-2500584_simultaneous%20GNSS%20and%20NTN%20operations.doc) Discussion on simultaneous GNSS and NTN operations Apple discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: RAN2 assumes current IDC design can address in-device coexistence issue between GNSS reception and NR NTN transmission.

Proposal 2: Reply to RAN4 and ask for more input to justify IDC improvements.

[R2-2500703](file:///C:\Data\3GPP\Extracts\R2-2500703%20Discussion%20on%20simultaneous%20operation%20between%20GNSS%20and%20NR%20NTN.docx) Discussion on simultaneous operation between GNSS and NR NTN Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

Observation 1: For UEs that require a GNSS reception time longer than 10s, the GNSS reception cannot be completed during the sleep/inactive time.

Proposal 1: It is important to discuss whether the GNSS reception time specified in LTE can be directly reused in NR-NTN.

Proposal 2: If Proposal 1 is accepted, a simple solution to resolve the conflict between GNSS reception duration and DRX active time would be to extend the DRX cycle length for IDC-TDM assistance, for example, up to 64 seconds, while also extending the active duration. This would allow for more inactive/sleep time for UEs that need over 10 seconds of GNSS reception.

Observation 2: Only the uplink (UL) power leakage of NR-NTN transmissions interferes with GNSS reception while NR-NTN downlink (DL) reception does not affect the GNSS reception

Observation 3: The current IDC TDM solution utilizing DRX mechanism stops uplink and downlink transmissions during the sleep/inactive time, meaning unaffected downlink transmissions cannot be performed, which will result in low NR-NTN scheduling efficiency.

Proposal 3: Use the enhanced TDM IDC solution only for uplink transmissions for NTN while the DL transmissions can continue without any restrictions even during the inactive/sleep period.

Proposal 4: UL feedback (ACK/NACK) from the UE could be blocked by disabling HARQ when using enhanced TDM IDC solution for uplink.

Soft Satellite with re-sync

[R2-2500329](file:///C:\Data\3GPP\Extracts\R2-2500329%20On%20SSBs%20from%20Source%20and%20Target%20Satellite%20in%20Soft%20Switching%20with%20Resynchronization.docx) On SSBs from Source and Target Satellite in Soft Switching with Resynchronization Nokia, Nokia Shanghai Bell discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: RAN2 to consider relying on NCD-SSBs to mitigate the SSB overlapping issue for soft-satellite switching with resynchronization.

Proposal 2: RAN2 considers extending SatSwitchWithReSync in SIB19 by including NCD-SSB configuration which would be valid from t-ServiceStart to t-Service.

Proposal 3: RAN2 may take the ultimate decision once the responses from RAN1 and RAN4 are received (i.e. at RAN2#129bis).

[R2-2501292](file:///C:\Data\3GPP\Extracts\R2-2501292_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 [R2-2410878](file:///C:\Data\3GPP\archive\RAN2\RAN2%23128\Tdocs\R2-2410878.zip)

* Solution 3

Proposal 1: If solution 3 is adopted, capture that cell timing is unchanged (at gNB)

Proposal 2: If solution 3 is adopted, discuss whether SSBs during [t-Start, t-Service] should be “NSA-only” SSB

* Solution 2b

Observation 1: Neighbor cells from same/previous/next satellite would switch around serving cell switching time, but not at the same time

Observation 2: Neighbor cells from other satellite may have unrelated switching time

Proposal 3: If solution 2b is adopted, SMTCs/gaps related to TN/GSO should not be updated, while other configured SMTCs/gaps should apply SSB-offset

* Way forward

Observation 3: Compared to hard switch/solution 3, solution 2b requires SMTC reconfiguration in SIBs, which partially works, MO (for inbound HO), moreover SSB-offset applied to SMTC only partially works

Proposal 4: In case RAN1/RAN4 doesn’t have a conclusive answer, adopt solution 3

VSAT UE FR2 capability

[R2-2500769](file:///C:\Data\3GPP\Extracts\R2-2500769%20Consideration%20on%20VSAT%20UE%20capability%20report.docx) Consideration on VSAT UE capability report ZTE Corporation, Vivo, Sanechips discussion Rel-18 NR\_NTN\_enh-Core

* Revised in R2-2501401

[R2-2501401](file:///C:\Data\3GPP\RAN2\Inbox\R2-2501401.zip) Consideration on VSAT UE capability report ZTE Corporation, Vivo, Sanechips discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1: RAN2 selects below option 3 to support UE capability report in FR2 NTN bands.

* Option 3: Capture in chairman notes that ‘RAN2 understands that VSAT UEs in this release only supports FR2 FDD mode. And VSAT UEs will not use fr1-Add-UE-NR-Capabilities/fr2-Add-UE-NR-Capabilities/fdd-Add-UE-NR-Capabilities/tdd-Add-UE-NR-Capabilities for UE capability report. ’. Add in the field description of fr2-Add-UE-NR-CapabilitiesNTN that ‘This field is not used in this release of specification’.

Proposal 2: Adopt the TP in Annex 1 if P1 is agreed.

Stage 2

[R2-2500695](file:///C:\Data\3GPP\Extracts\R2-2500695%20Corrections%20to%20NTN%20mobility.docx) Corrections to NTN mobility Huawei, HiSilicon CR Rel-18 38.300 18.4.0 0962 - F NR\_NTN\_enh-Core

RRC Corrections

[R2-2500942](file:///C:\Data\3GPP\Extracts\R2-2500942%2038331_CR5248%20R18%20Clarification%20on%20Inclination.docx) Clarification on Inclination value description THALES CR Rel-18 38.331 18.4.0 5248 - D NR\_NTN\_enh-Core

* Revised in R2-2501408

[R2-2501310](file:///C:\Data\3GPP\Extracts\R2-2501310%20-%20Remaining%20open%20issues%20in%20NR%20NTN.docx) Remaining open issues in NR NTN Ericsson discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1 NB-IoT coarse UE location is not needed for the procedures “Establishment of S1-U bearer during Data Transport in Control Plane CIoT EPS Optimisation”, “Connection Resume procedure”, and “MT-EDT procedure for User Plane CIoT EPS Optimisation”.

## 8.8 NTN for NR Ph3

(NR\_NTN\_Ph3-Core; leading WG: RAN2; REL-19; WID: RP-243300)

LTE\_TN\_NR\_NTN\_mob, leading WG: RAN2, Rel-19 WID: [RP-240924](file:///C:\Data\3GPP\archive\RAN\RAN%23104\Tdocs\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

[R2-2500045](file:///C:\Data\3GPP\Extracts\R2-2500045_S1-244857.docx) Reply LS on requirements for ETWS primary notification (S1-244857; contact: Novamint) SA1 LS in Rel-19 NR\_NTN\_Ph3-Core To:RAN2

* Noted

[R2-2500067](file:///C:\Data\3GPP\Extracts\R2-2500067_S2-2501329.doc) Reply LS on Supporting MBS broadcast service for NR NTN (S2-2501329; contact: Xiaomi) SA2 LS in Rel-19 NR\_NTN\_Ph3-Core, TEI19 To:RAN3, RAN2, CT4

* Noted

Running CRs for LTE\_TN\_NR\_NTN\_mob

[R2-2501284](file:///C:\Data\3GPP\Extracts\R2-2501284%20Introduction%20of%20Stage%202%20for%20LTE%20TN%20to%20NR%20NTN%20idle%20mode%20mobility.docx) Introduction of stage 2 for LTE TN to NR NTN idle mode mobility Samsung CR Rel-19 36.300 18.4.0 1412 2 B LTE\_TN\_NR\_NTN\_mob [R2-2410969](file:///C:\Data\3GPP\archive\RAN2\RAN2%23128\Tdocs\R2-2410969.zip)

* CB after the discussion on the redirection aspects

[R2-2500705](file:///C:\Data\3GPP\Extracts\R2-2500705%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 18.4.0 1900 1 B LTE\_TN\_NR\_NTN\_mob-Core [R2-2409536](file:///C:\Data\3GPP\archive\RAN2\RAN2%23128\Tdocs\R2-2409536.zip)

* CB after the discussion on the redirection aspects

[R2-2500529](file:///C:\Data\3GPP\Extracts\R2-2500529%20Introduction%20of%20LTE%20TN%20to%20NR%20NTN%20IDLE%20mode%20mobility%20(Rev.2).docx) Introduction of LTE TN to NR NTN IDLE mode mobility CATT CR Rel-19 36.331 18.4.0 5065 2 B LTE\_TN\_NR\_NTN\_mob-Core [R2-2410968](file:///C:\Data\3GPP\archive\RAN2\RAN2%23128\Tdocs\R2-2410968.zip) Late

* CB after the discussion on the redirection aspects

Running CRs for NR\_NTN\_Ph3-Core

[R2-2501321](file:///C:\Data\3GPP\Extracts\R2-2501321%20Stage%202%20running%20CR%20for%20NTN%20Ph3.docx) Introduction of NTN Ph3 enhancements THALES (Rapporteur) draftCR Rel-19 38.300 18.4.0 B NR\_NTN\_Ph3-Core

[R2-2501304](file:///C:\Data\3GPP\Extracts\R2-2501304%20-%2038331_(Rel-19)%20-%20Running%20RRC%20CR%20for%20NR%20NTN%20phase%203.docx) Running RRC CR for NR NTN phase 3 Ericsson draftCR Rel-19 38.331 18.4.0 B NR\_NTN\_Ph3-Core

### 8.8.2 Downlink coverage enhancements

Contributions should focus on RAN2 aspects of DL coverage enhancements due to extended SIB periodicity (up to 160ms), including e.g. possible SMTC impacts (while no contributions are expected on cell level / beam level DTX/DRX mechanism).

[R2-2500689](file:///C:\Data\3GPP\Extracts\R2-2500689%20Discussion%20on%20DL%20coverage%20enhancements.docx) Discussion on DL coverage enhancements Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

* SMTC enhancements

Proposal 1: The network should be allowed to configure different periodicities for the multiple SMTCs on a single frequency.

- QC thinks this is already up to NW that should configure the maximum possible periodicity

- Xiaomi also thinks we don’t need this

- Sequans supports this proposal

- Ericsson agrees with QC that we don’t need to configure different periodicities as it would not be a realistic scenario

- HW thinks that adopting this solution would be more flexible.

- CMCC thinks we could at least agree that having different periodicity in the same frequency layer should be supported.

- Fujitsu also supports this proposal

* RAN2 assumes it will be possible to have different SSB periodicity among neighbour cells in the same frequency layer.

- CATT thinks this proposal is also related to the expected hopping patterns

- Google thinks this could be supported today by using the same ARFCN for different configurations. HW thinks the current restriction on MO configuration do not allow this

* Can come back to this proposal

Proposal 2: Send an LS to RAN1 asking the following questions:

Q1: Whether the SSB beams within the cell will be considered as active beam simultaneously?

Q2: Whether the active cells are selected as a cluster or scattered randomly among the footprints?

* RAN2 assumes that in a NR NTN cell, SSB beam sweeping in different spatial directions is possible as in a NR TN cell: the whole cell is covered by the different SSB beams in half-frame
* RAN2 also assumes that, with the current status of RAN1 discussion, if one cell is defined by multiple “satellite beams” (rather than by SSB beam sweeping), the satellite beams are all simultaneously active or inactive (“beam hopping” applies equally to all the satellite beams of a given cell)
* Continue in offline 304 to check whether there is anything we can ask RAN1 to help our discussion on the need for possible SMTC enhancements

Proposal 3: RAN2 should consider UE assistance reporting (e.g. based on reference location), while the responsibility for configuring SMTCs and gaps to the UE remains with the network.

Proposal 4: The number of configured SMTC/gaps will not be increased further.

* The number of SMTC/gaps a UE needs to consider at any time will not be increased further
* Cell barring

Proposal 6: It is up to NW implementation to set cellBarredNTN-r17 to barred to bar UEs not supporting R19 extended SSB periodicity. A new field cellBarredNTN-r19 (value is set to barred or notBarred) is introduced for future use. UEs supporting extended SSB periodicity ignore cellBarredNTN-r17 if the new cellBarredNTN-r19 is present, and follow cellBarredNTN-r17 if the new cellBarredNTN-r19 is absent.

* CB Thursday

[R2-2500100](file:///C:\Data\3GPP\Extracts\R2-2500100%20Discussion%20on%20DL%20coverage%20enhancement.doc) Discussion on DL coverage enhancement Xiaomi discussion Rel-19 NR\_NTN\_Ph3-Core

* Cell barring

Proposal 1: Postpone the discussion on cell barring, and send a LS to RAN1 to ask whether link level enhancement (i.e. PDCCH CSS repetition, SIB1 PDSCH repetition, Msg4 PDSCH repetition) is backward compatible to legacy UE.

* *Cell reselection enhancements*

Proposal 2: Postpone the discussion on the mechanisms to prevent legacy UE from reselecting to a DL CE cell and wait for RAN1 reply LS on the backward compatibility of link level enhancements to legacy UE.

* SMTC enhancements

Observation 1: Four SMTC windows are enough to ensure that no two neighbor cells are illuminated at the same time to avoid neighbor cell interference in scenario of frequency reuse factor 1.

Observation 2: The offset between Multiple SMTC configuration due to beam hopping is fixed, there is no need for UE to acquire its location for SMTC window adjustment. However, location based SMTC selection requires UE to acquire its location, which introduce additional power consumption, making its power saving gain questionable.

Proposal 3: For scenario of multiple SMTC configuration due to beam hopping, do not support UE location based SMTC selection.

Observation 3: Under the assumption that serving cell and neighbor cells are not illuminated at the same time, SSB based SMTC selection has a gain about 12.5% SMTC measurement reduction for the scenario of 4 SSBs in one cell.

Proposal 4: Before RAN2 make decision on whether to introduce SSB based SMTC selection, ask RAN1 on whether it is a typical scenario to avoid illuminating serving cell and neighbour cells at the same time for frequency reuse factor 1.

* *Impact of Link level coverage enhancement*

Proposal 5: If msg4 PDSCH repetition is agreed to support, Msg3 is used to carry the indication of msg4 PDSCH repetition capability/request.

Proposal 6: RAN2 to agree on adding the following code points:

- CCCH of size 48 bits for PUCCH repetition of Msg4 HARQ-ACK & Msg4 PDSCH repetition, except for an (e)RedCap UE;

- CCCH of size 64 bits for PUCCH repetition of Msg4 HARQ-ACK & Msg4 PDSCH repetition, except for an (e)RedCap UE;

- CCCH of size 48 bits for PUCCH repetition of Msg4 HARQ-ACK & Msg4 PDSCH repetition of a RedCap UE;

- CCCH of size 64 bits for PUCCH repetition of Msg4 HARQ-ACK & Msg4 PDSCH repetition of a RedCap UE;

- CCCH of size 48 bits for PUCCH repetition of Msg4 HARQ-ACK & Msg4 PDSCH repetition of an eRedCap UE;

- CCCH of size 64 bits for PUCCH repetition of Msg4 HARQ-ACK & Msg4 PDSCH repetition of an eRedCap UE;

Proposal 7: RAN2 to agree on not adding the following code points:

- CCCH of size 48 bits for Msg4 PDSCH repetition of a RedCap UE;

- CCCH of size 64 bits for Msg4 PDSCH repetition of a RedCap UE;

- CCCH of size 48 bits for Msg4 PDSCH repetition for an eRedCap UE;

- CCCH of size 64 bits for Msg4 PDSCH repetition for an eRedCap UE;

- CCCH of size 48 bits for Msg4 PDSCH repetition, except for an (e)RedCap UE;

- CCCH of size 64 bits for Msg4 PDSCH repetition, except for an (e)RedCap UE;

and send LS to RAN1 to confirm the RAN2 understanding that Msg4 PDSCH channel is always better than PUCCH with Msg4 HARQ-ACK channel.

[R2-2501160](file:///C:\Data\3GPP\Extracts\R2-2501160%20Discussion%20on%20Downlink%20Coverage%20Enhancements%20-%20CSCN.docx) "Discussion on Downlink Coverage Enhancements" CSCN discussion Rel-19

* SMTC enhancements

Proposal 1: To reduce the UE power consumption impact and the requirements on UE capabilities, the network should minimize the SMTC configuration for UEs as much as possible.

Proposal 2: RAN2 to discuss whether SSB index associated SMTC configuration can be supported for UE measurement.

Proposal 3: UE should reacquire the SMTC configuration when SSB index changes.

* Cell barring

Proposal 4: A new NTN bar bit with the value {barred, notBarred} should be introduced to achieve selectively bar UEs supporting DL-CE. The behaviors of UEs supporting DL-CE are as follows:

- Follow the legacy mechanism if the new barring bit is not present;

- Consider the cell is not allowed for access if the new barring bit is set to "barred";

- Consider the cell is allowed for access if the new barring bit is set to "notBarred".

[R2-2501037](file:///C:\Data\3GPP\Extracts\R2-2501037%20Analysis%20on%20DL%20coverage%20enhancements%20due%20to%20extended%20SIB%20periodicity.docx) Analysis on DL coverage enhancements due to extended SIB periodicity CMCC discussion Rel-19 NR\_NTN\_Ph3-Core

* SMTC enhancements

Proposal 1: for senario1, i.e. different PCIs for mutiple beam footprints in one satellite cell (1-to-1 mapping), the current SMTC number and pattern definition is sufficient.

Proposal 2: for senario2, i.e. Single PCI for Multi-beam footprints in one satellite cell (multiple-to-1 mapping), RAN2 should consider the following candidates to address the issue:

Alt 1: introduce multiple SMTC/SSB patterns for each beam/footprint (group) in a single cell with different SSB start offset;

Alt 2: Remaining the current SMTC/SSB pattern defintion with some additial information, e.g., beam/footprint/location information, to enable the UE idle/inactive mode to identity the specific SSB reception location/window to avoid unnecessary power consumption.

[R2-2500615](file:///C:\Data\3GPP\Extracts\R2-2500615%20Cell%20barring%20and%20reselection%20for%20NTN%20DL-CE%20(Revision%20of%20R2-2410267).docx) Cell barring and reselection for NTN DL-CE Lenovo discussion Rel-19

* Cell barring for Rel-19 NTN UEs

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

- Option 1: [2 bits] By a new cell barring indication cellBarredNTN\_DLCE with configurable value “barred” and “not barred”.

- Option 2A: [1 bit] By presence of a new flag indication cellBarredNTN\_DLCE.

- Option 2B: [1 bit] By presence of a new flag indication cellAllowedNTN\_DLCE is introduced.

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

- Cell reselection for Rel-19 NTN UEs

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

[R2-2500532](file:///C:\Data\3GPP\Extracts\R2-2500532%20SSB%20periodicity.docx) Default extended SSB periodicity Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

* Cell barring

Proposal 1 A new barring procedure is not needed for a cell that is using new default SSB periodicity of larger than 20ms.

* Signalling

Proposal 2 Existing signaling ssb-PeriodicityServingCell in serving cell common configuration is sufficient to indicate the default SSB periodicity of a cell.

* SMTC enhancements

Proposal 3 Existing SMTC configuration is sufficient to assist UE for neigbor cell measurements.

* UE capability

Proposal 4 Introduce a UE capability whether the UE supports default SSB periodicity of larger than 20ms.

[R2-2501290](file:///C:\Data\3GPP\Extracts\R2-2501290_Dowlink%20coverage%20enhancements%20SMTC%20impacts.docx) Downlink coverage enhancement SMTC impacts Sequans Communications discussion Rel-19 NR\_NTN\_Ph3-Core [R2-2410804](file:///C:\Data\3GPP\archive\RAN2\RAN2%23128\Tdocs\R2-2410804.zip)

* SMTC enhancements

Proposal 1: Introduce separate optional signaling for DL CE cells SMTCs (e.g. SMTC5 list)

Proposal 2: smtc5list is added to intraFreqCellReselectionInfo (SIB2), and InterFreqCarrierFreqInfo (SIB4)

Proposal 3: Legacy SMTC signaling can still be used for DL CE cells (up to NW configuration)

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

* [AT129][304][R19 NR NTN] LS to RAN1 on DL coverage enhancements (Huawei)

Scope: discuss whether there is anything we can ask RAN1 to help our discussion on the need for possible SMTC enhancements

Intended outcome: summary/draft LS

Deadline for companies' feedback: Wednesday 2025-02-19 20:00

Deadline for rapporteur's summary/draft LS (in R2-2501415): Thursday 2025-02-20 08:00

[R2-2501415](file:///C:\Data\3GPP\RAN2\Inbox\R2-2501415.zip) Report of [AT129][304][R19 NR NTN] LS to RAN1 on DL coverage enhancements Huawei discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: From RAN2 perspective, we support option a (clustered cells illuminated) and option b (scattered cells illuminated) for further discussion on SMTC. No LS is sent to RAN1.

Proposal 2: RAN2 observes that if the cells active simultaneously are in clusters, existing SMTC mechanism (a maximum of 4 SMTCs per frequency) may be sufficient (FFS if any solution identified for option b applies to option a as well).

Proposal 3: RAN2 observes that if the cells active simultaneously are scattered, (for the case of intra-frequency neighbouring cells), the SSBs of surrounding neighbour cells may be transmitted at different times and existing SMTC mechanism may not be enough.

Agreements:

1. RAN2 assumes it will be possible to have different SSB periodicity among neighbour cells in the same frequency layer
2. RAN2 assumes that in a NR NTN cell, SSB beam sweeping in different spatial directions is possible as in a NR TN cell: the whole cell is covered by the different SSB beams in half-frame
3. RAN2 also assumes that, with the current status of RAN1 discussion, if one cell is defined by multiple “satellite beams” (rather than by SSB beam sweeping), the satellite beams are all simultaneously active or inactive (“beam hopping” applies equally to all the satellite beams of a given cell)
4. The number of SMTC/gaps a UE needs to consider at any time will not be increased further

[R2-2500148](file:///C:\Data\3GPP\Extracts\R2-2500148%20Discussion%20on%20downlink%20coverage%20enhancement_final.docx) Discussion on downlink coverage enhancement LG Electronics Inc. discussion Rel-19

[R2-2500219](file:///C:\Data\3GPP\Extracts\R2-2500219%20DL%20CE.docx) Discussion on Downlink Coverage Enhancement Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500459](file:///C:\Data\3GPP\Extracts\R2-2500459%20Discussion%20on%20DL%20coverage%20enhancement%20for%20NTN.doc) Discussion on DL coverage enhancement for NTN OPPO discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500483](file:///C:\Data\3GPP\Extracts\R2-2500483%20Discussions%20on%20downlink%20coverage%20enhancement.doc) Discussions on downlink coverage enhancement Fujitsu discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500524](file:///C:\Data\3GPP\Extracts\R2-2500524%20Discussion%20on%20downlink%20coverage%20enhancements.docx) Further discussion on downlink coverage enhancements CATT discussion

[R2-2500575](file:///C:\Data\3GPP\Extracts\R2-2500575_Further%20discussion%20of%20NR%20NTN%20coverage%20enhancement.doc) Further discussion of NR NTN coverage enhancement China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500582](file:///C:\Data\3GPP\Extracts\R2-2500582_DL%20coverage%20enhancement.doc) DL coverage enhancement in NTN Apple discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500656](file:///C:\Data\3GPP\Extracts\R2-2500656%20Discussion%20on%20downlink%20coverage%20enhancement.docx) Discussion on downlink coverage enhancement HONOR discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500685](file:///C:\Data\3GPP\Extracts\R2-2500685.docx) Downlink coverage enhancement NEC discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500727](file:///C:\Data\3GPP\Extracts\R2-2500727%20Downlink%20coverage%20enhancement.docx) Discussion on NTN downlink coverage enhancement Nokia discussion NR\_NTN\_Ph3-Core [R2-2410213](file:///C:\Data\3GPP\archive\RAN2\RAN2%23128\Tdocs\R2-2410213.zip)

[R2-2500749](file:///C:\Data\3GPP\Extracts\R2-2500749.docx) SMTC impacts due to NTN downlink coverage enhancements Sony discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2501010](file:///C:\Data\3GPP\Extracts\R2-2501010_NTN_DL_CE.docx) Discussion on SMTC for NTN DL coverage enhancements ITRI discussion NR\_NTN\_Ph3-Core

[R2-2501179](file:///C:\Data\3GPP\Extracts\R2-2501179%20(R19%20NR%20NTN%20WI%20AI%208.8.2)%20DL%20coverage.docx) Downlink coverage enhancement for non-terrestrial networks InterDigital Communications discussion Rel-19

[R2-2501182](file:///C:\Data\3GPP\Extracts\R2-2501182-Discussion_on_DL_coverage_enhancement.docx) Discussion on Downlink Coverage Enhancements Sharp discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2501280](file:///C:\Data\3GPP\Extracts\R2-2501280.doc) Discussion on NR NTN Downlink Coverage Enhancements Rakuten Mobile, Inc discussion

[R2-2501291](file:///C:\Data\3GPP\Extracts\R2-2501291_Dowlink%20coverage%20enhancements%20Access%20Control.docx) Downlink coverage enhancement access control Sequans Communications discussion Rel-19 NR\_NTN\_Ph3-Core [R2-2410806](file:///C:\Data\3GPP\archive\RAN2\RAN2%23128\Tdocs\R2-2410806.zip)

[R2-2501318](file:///C:\Data\3GPP\Extracts\R2-2501318%20-%20DL%20coverage%20enhancements.docx) DL coverage enhancements Ericsson discussion Rel-19 NR\_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.

[R2-2500770](file:///C:\Data\3GPP\Extracts\R2-2500770%20Consideration%20on%20DL%20CE%20and%20UL%20capacity%20enhancement.doc) Consideration on DL CE and UL capacity enhancement ZTE Corporation, Sanechips discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 2: RAN2 will design higher layer signalling to provide OOC configuration for both DG and CG. Detailed OOC parameters (e.g., OOC sequence index) needed in RRC signalling for DG/CG respectively can wait for more input from RAN1.

Proposal 3: Confirm RAN1 agreements that separate UE capabilities are introduced for OCC length 2 and OCC length 4, where UE capability for OCC length 2 is a prerequisite for UE capability for OCC length 4.

[R2-2501032](file:///C:\Data\3GPP\Extracts\R2-2501032%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

Proposal 1: Kindly suggest RAN2 to discuss the access control mechanism for R19 UEs supporting OCC between the two options:

Option 1: introduce new bar bit in SIB1

Option 2: reuse the existing cellBarredNTN.

[R2-2500665](file:///C:\Data\3GPP\Extracts\R2-2500665%20UL%20Capacity%20enhancement%20for%20NRNTN.docx) UL Capacity enhancement for NRNTN NEC Corporation discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500690](file:///C:\Data\3GPP\Extracts\R2-2500690%20Discussion%20on%20Uplink%20Capacity%20Enhancements.docx) Discussion on Uplink Capacity Enhancements Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2501281](file:///C:\Data\3GPP\Extracts\R2-2501281.docx) RAN2 related proposals for Uplink Capacity & Throughput Enhancements Rakuten Mobile, Inc discussion

### 8.8.4 Support of Broadcast service

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

[R2-2500079](file:///C:\Data\3GPP\Extracts\R2-2500079%20Further%20Discussion%20on%20MBS%20Broadcast%20Service%20Area%20Provision.docx) Further Discussion on MBS Broadcast Service Area Provision in NTN vivo discussion Rel-19 NR\_NTN\_Ph3-Core

* Network signalling for intended service area:

Proposal 1: In the new SIB, explicit network-indicated area ID is used to label an intended service area in the list.

* Agreed

Proposal 2: A service area ID list is used for the association between the broadcast session (in MCCH) / ETWS primary notification (in SIB6) and the intended service area.

- QC thinks that for ETWS we could use the same solution as for CMAS so that the same format can be used.

- CATT does not support this proposal. Since there is no requirement on latency we could reuse the same solution as for CMAS

- Xiaomi also prefers to use the solution for CMAS

- Ericsson indicates that CT1 is also discussing this

- Nokia thinks we could agree on the CMAS approach

* UE behavior on MCCH (re)acquisition:

Proposal 3: If the MCCH-based solution is adopted, RAN2 considers the following options,

Opt 1: Reuse the Rel-17 MCCH information (re)acquisition procedure, i.e., the UE attempts to acquire MCCH upon receiving a change notification for MCCH or becomes interested in receiving MBS broadcast;

Opt 2: It is up to UE implementation to use the service area info acquired in the received MCCH to avoid re-acquiring the MCCH when the UE is outside the service area.

[R2-2500220](file:///C:\Data\3GPP\Extracts\R2-2500220%20BC%20service%20area.docx) Discussion on Broadcast Service Area Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

* MBS intended service area

Proposal 1: In the new SIB, an ID is used to identify each MBS intended service area.

Proposal 2: If UE is not in any intended service areas, UE does not need to acquire MCCH.

- Ericsson thinks we cannot agree on this as the service announcement is also associated to an area

- Huawei thinks there are cases where the UE knows it’s not in any intended service area and can then skip MCCH

Proposal 3: Discuss for quasi-earth-fixed or earth-moving cells how to avoid NW frequent update and UE frequent acquisition of information on MBS broadcast service and the intended service area.

* ETWS service area

Proposal 4: Introduce warningAreaCoordinatesSegment in ETWS Primary Notification (SIB6) and in ETWS Secondary Notification (SIB7).

* Introduce “warning area coordinates” in ETWS Primary Notification (SIB6) and in ETWS Secondary Notification (SIB7). FFS on the signalling details for “warning area coordinates”
* After the corresponding discussion for PWS for NB-IoT consider sending a LS (Ericsson) to CT1 indicating RAN2 decision also asking if they have any concerns with it

[R2-2500331](file:///C:\Data\3GPP\Extracts\R2-2500331%20Further%20Details%20on%20MBS%20in%20Rel-19%20NR%20NTN.docx) Further Details on MBS in Rel-19 NR NTN Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_NTN\_Ph3-Core

* Signalling for intended service area:

Proposal 1: RAN2 to consider if many-to-many relationship should be supported for NTN MBS service and service area.

* It shall be possible to signal multiple service area IDs to one MBS service (we Insert a list of service area IDs in MCCH)

Proposal 2: Insert a list of service area IDs/indices under each MBS-SessionInfo provided in MCCH.

Proposal 3: RAN2 considers a solution wherein the UE is given the geographical coordinates associated with the ETWS notification area.

* MBS Interest Indication (MII)

Proposal 4: RAN2 does not specify any new behaviour with respect to MBS Interest Indication when Rel-19 NTN capable UE enters or leaves the MBS broadcast service area.

* Service continuity

Proposal 5: RAN2 does not work on providing the intended service area within each neighbor cell for each MBS broadcast service session, as this can be known thanks to mtch-neighbourCell.

Proposal 6: As FSAIs are configured per gNB or per cell, RAN2 does not pursue FSAI to intended service area mapping, which might have impact on core and service announcements (not limited to RAN2) for no major benefits.

* UE behaviour

Proposal 7: Make the RAN2#127 agreement UE-binding and capture that the NTN-capable UE is not allowed to/shall not establish MRBs if it can receive broadcast service, but its location is not within the MBS service area.

Proposal 8: UE may release MRBs when leaving the intended area. However, releasing MRBs is eventually subject to additional conditions, such as the time or distance that has elapsed since leaving the MBS area, as the UE cannot keep the MRBs eternally.

Proposal 9: NTN-capable UE can determine whether it is inside or outside of MBS service area based on the GNSS location it is using for other NTN purposes, i.e. there is no need to update UE’s GNSS location specifically for this purpose.

[R2-2500583](file:///C:\Data\3GPP\Extracts\R2-2500583_MBS%20over%20NTN.doc) Discussion on broadcast serivce over NTN Apple discussion Rel-19 NR\_NTN\_Ph3-Core

* Geofencing on ETWS

Proposal 1: Introduce geofencing info into ETWS Primary Notification, which refers to area index/ID in the new SIB agreed for intended service area provision for MBS broadcast service.

* Service continuity

Observation 1: Alt 2 can enhance UE cell re-selection based on accurate information whether the frequency supports the interested TMGI at UE’s location.

Proposal 2: In SIB21, the intended service area is provided for each MBS broadcast service session or for each FSAI.

Proposal 3: RAN2 can further discuss whether to provide intended service area for each MBS broadcast service session in MBSBroadcastConfiguration (MCCH).

[R2-2500616](file:///C:\Data\3GPP\Extracts\R2-2500616%20Further%20considerations%20on%20broadcast%20service%20area%20information%20in%20NTN.docx) Further considerations on broadcast service area information in NTN Lenovo discussion Rel-19

* MCCH monitoring

Proposal 1: UE may choose to skip MCCH monitoring based on the broadcast service area information provided in the new SIB (e.g., IntendedServiceArea) and its associated MBS session, e.g. when UE is not in any broadcast service area of its interested MBS sessions.

Proposal 2: UE may choose to monitor MCCH based on the broadcast service area information provided in the new SIB (e.g., IntendedServiceArea) and its associated MBS session when UE is in at least one broadcast service area of its interested MBS sessions, e.g. after re-acquiring SIB19 that overlaps with MCCH modification period boundary.

* Service continuity

Proposal 3: A pointer (broadcast service area index or IDs) can be included in SIB21 to associate the neighbor cell frequency with the broadcast service area information for service continuity.

Proposal 4: UE can prioritize a frequency for cell reselection if UE is in the broadcast service area associated to that frequency as in SIB21.

Proposal 5: UE may report its current broadcast service area information or corresponding pointer to gNB for service continuity in RRC\_CONNECTED.

[R2-2500657](file:///C:\Data\3GPP\Extracts\R2-2500657%20Discussion%20on%20the%20support%20of%20broadcast%20service.docx) Discussion on the support of broadcast service HONOR discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: RAN2 to discuss the association of the intended service area and the broadcast service is provided by CN or gNB to UE. LS to SA2/RAN3 may be needed.

Proposal 2: List of ISAs and related index is provided in the new SIB, i.e., there is a corresponding relationship between service area and the index.

Proposal 3：The index of the intended service areas is unified assigned across cells.

Proposal 4: The MBS intended service area mechanism should not be restricted to neither NTN cells nor NTN-capable UEs.

[R2-2500966](file:///C:\Data\3GPP\Extracts\R2-2500966.docx) Discussion on MBS broadcast over NTN Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

* UE behaviour / service continuity

Proposal 1: If the UE knows that ISAs are used for the MBS BC service of interest but does not know which ISA(s) of the current cell apply to the service, the UE may not monitor MCCH as long as it is not in or close to any of the ISAs in the new SIB.

* CB Wednesday

Proposal 2: SIB20 can provide the list of intended service area ID(s) applicable to services that may be broadcast in the serving cell. The UE may not monitor MCCH as long as it is not in or close to any of the ISAs indicated in SIB20.

Proposal 3: If the UE knows the ISAs applicable for the MBS BC service of interest (by reading such information in MCCH previously), the UE may not monitor MCCH as long as it is not in or close to the ISAs applicable for the service.

Proposal 4: Both current serving cell and neighbour cells MBS session specific intended service area ID(s) are indicated in the MCCH.

Proposal 5: To determine the ISA of an ISA ID indicated in MCCH of the serving cell for an MBS service in a neighbour cell, the UE can use the new SIB of the serving or of the neighbour cell.

Proposal 6: SIB21 can indicate the subset of ISAs used for each frequency and the UE needs not prioritize (RRC\_IDLE) or indicate (RRC\_CONNECTED) the frequency of an MBS service of interest if the UE is not in any of the ISAs used in the frequency that provides the service.

[R2-2501306](file:///C:\Data\3GPP\Extracts\R2-2501306%20-%20Support%20for%20broadcast%20services%20in%20NR%20NTN.docx) Support for broadcast services in NR NTN Ericsson discussion Rel-19 NR\_NTN\_Ph3-Core

* Intended Service Area and Service Announcement

Proposal 1 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.

- HW is worried that this would extend the scope of the work and would involve groups we deliberately did not want to include when approving the WID. QC agrees

- Samsung thinks SA2 already agreed a CR for this and also sent an LS to us.

- vivo thinks we should not work on two solution for the same think

Proposal 2 Provide ISA ID in the MBS Service Announcement.

Proposal 3 RAN2 informs SA2. Consider the draft LS in the annex as a baseline.

* CB Wednesday to see whether we can send a LS to SA2, e.g. saying that RAN2 is considering whether to include Service Area ID also in MBS service Announcement if SA2 confirms this can be supported in their specs in Rel-19.
* Service continuity

Proposal 4 Service continuity enhancements due to UE movement between NTN cells are down prioritized in Rel-19.

Proposal 5 RAN2 focuses on service continuity enhancements required due to satellite movement.

Proposal 6 In a quasi-Earth fixed cell, the network provides information about the MBS broadcast configuration and MBS services provided by the upcoming satellite(s) that will serve the area.

* PWS

Proposal 7 Introduce geographic information in ETWS notification for geo-fencing in NTN cells.

Proposal 8 RAN2 to study a common solution to geofence ETWS notifications in both NR NTN and NB-IoT NTN RATs.

* CB Wednesday

Agreements:

1. In the new SIB, explicit network-indicated area ID is used to label an intended service area in the list
2. It shall be possible to signal multiple service area IDs to one MBS service (we Insert a list of service area IDs in MCCH)
3. Introduce “warning area coordinates” in ETWS Primary Notification (SIB6) and in ETWS Secondary Notification (SIB7). FFS on the signalling details for “warning area coordinates”

[R2-2500080](file:///C:\Data\3GPP\Extracts\R2-2500080%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 [R2-2409538](file:///C:\Data\3GPP\archive\RAN2\RAN2%23128\Tdocs\R2-2409538.zip)

[R2-2500252](file:///C:\Data\3GPP\Extracts\R2-2500252.docx) Discussion on Support of MBS Broadcast Service TCL discussion Rel-19

[R2-2500453](file:///C:\Data\3GPP\Extracts\R2-2500453%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

[R2-2500465](file:///C:\Data\3GPP\Extracts\R2-2500465.doc) Discussion on the support of broadcast service Xiaomi discussion

[R2-2500484](file:///C:\Data\3GPP\Extracts\R2-2500484%20Discussions%20on%20supporting%20broadcast%20service.doc) Discussions on supporting broadcast service Fujitsu discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500523](file:///C:\Data\3GPP\Extracts\R2-2500523%20Further%20discussion%20on%20support%20of%20broadcast%20service%20in%20NR%20NTN.docx) Further discussion on support of broadcast service in NR NTN CATT discussion

[R2-2500530](file:///C:\Data\3GPP\Extracts\R2-2500530%20MBS%20broadcast%20in%20NTN.docx) Signaling of MBS broadcast service area information Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500576](file:///C:\Data\3GPP\Extracts\R2-2500576_The%20mapping%20between%20service%20area%20information%20and%20MBS%20session.doc) The mapping between service area information and MBS session China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500675](file:///C:\Data\3GPP\Extracts\R2-2500675.docx) Remaining issues on the support of broadcast service in NTN ETRI discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500771](file:///C:\Data\3GPP\Extracts\R2-2500771%20Consideration%20on%20broadcast%20service%20support.doc) Consideration on broadcast service support ZTE Corporation, Sanechips discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2501005](file:///C:\Data\3GPP\Extracts\R2-2501005%20Discussion%20on%20MII%20procedure%20in%20NTN.docx) Discussion on MII procedure in NTN LG Electronics France discussion Rel-19 38.331

[R2-2501033](file:///C:\Data\3GPP\Extracts\R2-2501033%20Considerations%20on%20broadcast%20service%20for%20NR%20NTN.docx) Considerations on broadcast service for NR NTN CMCC discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2501180](file:///C:\Data\3GPP\Extracts\R2-2501180%20(R19%20NR%20NTN%20WI%20AI%208.8.4)%20Broadcast.docx) Support for broadcast service in non-terrestrial networks InterDigital Communications discussion Rel-19

[R2-2501181](file:///C:\Data\3GPP\Extracts\R2-2501181-Remaining%20issues%20on%20intended%20service%20area.docx) Remaining issues on intended service area Sharp discussion Rel-19 NR\_NTN\_Ph3-Core

### 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.

[R2-2500617](file:///C:\Data\3GPP\Extracts\R2-2500617%20UE%20location%20verification%20in%20NTN%20regenerative%20architecture%20(Revision%20of%20R2-2410269).docx) UE location verification in NTN regenerative architecture Lenovo discussion Rel-19

[R2-2500750](file:///C:\Data\3GPP\Extracts\R2-2500750.docx) Satellite switch with re-sync in regenerative payload Sony discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500904](file:///C:\Data\3GPP\Extracts\8.8.5%20R2-2500904%20Regenerative%20payload%20for%20NTN%20for%20NR%20Ph3.docx) Regenerative payload for NTN for NR Ph3 TOYOTA Info Technology Center discussion Rel-19

[R2-2501066](file:///C:\Data\3GPP\Extracts\R2-2501066_NTN_Regenerative.docx) Discussion on regenerative payload Fujitsu Limited discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2501097](file:///C:\Data\3GPP\Extracts\R2-2501097%20Discussion%20on%20the%20impact%20of%20regenerative%20payload.docx) Discussion on the impact of regenerative payload ETRI 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.

[R2-2500526](file:///C:\Data\3GPP\Extracts\R2-2500526%20Discussion%20on%20redirection%20to%20NR%20NTN%20from%20LTE%20TN.docx) Discussion on redirection from LTE TN to NR NTN CATT discussion

Proposal 1: To resolve the remaining issue of redirection from LTE TN to NR NTN, RAN2 down-selects the following options:

- Option 1: Correct TS 36.306/TS 36.331 since Rel-17 to enable UE capability reporting of supported NR NTN band (i.e. add reference TS 38.101-5 for NR NTN bands in TS 36.306/TS 36.331), without Spec change on UE behavior.

- Option 2: Admit that redirection to NR NTN from LTE TN is not supported before Rel-19 pursuing no Rel-17/18 spec change, and make necessary enhancement to support this feature from Rel-19 with either sub-option below:

- Option 2-a: Only add the reference of TS38.101-5 in TS 36.306/TS 36.331 since Rel-19 (with no additional capability signaling needed);

- Option 2-b: Introduce a new capability signaling for LTE TN to NR NTN redirection purpose and also a satellite ID(s) in RedirectedCarrierInfo.

- Option 3: Confirm redirection to NR NTN from LTE TN is not supported. FFS whether to introduce any restriction in TS 36.331 (e.g. NR NTN frequency cannot be configured in RRCConnectionRelease) or only clarify this in the chair notes.

[R2-2500081](file:///C:\Data\3GPP\Extracts\R2-2500081%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

[R2-2500330](file:///C:\Data\3GPP\Extracts\R2-2500330%20On%20E-UTRAN%20TN%20to%20NR%20NTN%20enhancements.docx) On E-UTRAN TN to NR NTN enhancements Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500460](file:///C:\Data\3GPP\Extracts\R2-2500460%20Discussion%20on%20dedicated%20priority%20and%20redirection%20via%20RRCConnectionRelease.doc) Discussion on dedicated priority and redirection via RRCConnectionRelease OPPO discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500466](file:///C:\Data\3GPP\Extracts\R2-2500466.doc) Discussion on the redirection from LTE to NR NTN Xiaomi discussion

[R2-2500531](file:///C:\Data\3GPP\Extracts\R2-2500531%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

[R2-2500577](file:///C:\Data\3GPP\Extracts\R2-2500577_Signalling%20design%20for%20NTN%20mobility%20redirection.doc) Signalling design for NTN mobility redirection China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500687](file:///C:\Data\3GPP\Extracts\R2-2500687.docx) Redirection from E-UTRN TN to NR NTN NEC discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2500772](file:///C:\Data\3GPP\Extracts\R2-2500772%20Consideration%20on%20LTE%20TN%20to%20NR%20NTN%20mobility.doc) Consideration on LTE TN to NR NTN mobility ZTE Corporation, Sanechips discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2501272](file:///C:\Data\3GPP\Extracts\R2-2501272%20Re-direction%20from%20E-UTRAN%20to%20NR%20NTN.docx) Re-direction from E-UTRAN TN to NR NTN Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2501305](file:///C:\Data\3GPP\Extracts\R2-2501305%20-%20E-UTRAN%20TN%20to%20NR-NTN%20mobility.docx) E-UTRAN TN to NR-NTN mobility Ericsson discussion Rel-19 LTE\_TN\_NR\_NTN\_mob

## 8.9 IoT NTN Ph3

(IoT\_NTN\_Ph3-Core; leading WG: RAN2; REL-19; WID: RP-243278)

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

[R2-2500010](file:///C:\Data\3GPP\Extracts\R2-2500010_R1-2410895.docx) Reply LS on OCC for CB-msg3 NPUSCH (R1-2410895; contact: Sony) RAN1 LS in Rel-19 IoT\_NTN\_Ph3-Core To:RAN2

[R2-2500044](file:///C:\Data\3GPP\Extracts\R2-2500044_S1-244757.docx) Reply LS on PWS support for NB-IoT NTN (S1-244757; contact: Novamint) SA1 LS in Rel-19 IoT\_NTN\_Ph3-Core To:RAN2 Cc:RAN3, CT1, SA2

[R2-2500061](file:///C:\Data\3GPP\Extracts\R2-2500061_S2-2501085.docx) Reply to Reply LS on FS\_5GSAT\_Ph3\_ARCH conclusions (S2-2501085; contact: China Telecom) SA2 LS in Rel-19 5GSAT\_Ph3-ARC To:SA3-LI Cc:SA3, RAN2

Running CRs

[R2-2500204](file:///C:\Data\3GPP\Extracts\R2-2500204%20RRC%20Runing%20CR%20for%20IoT%20NTN.docx) RRC Running CR for IoT NTN Huawei, HiSilicon draftCR Rel-19 36.331 18.4.0 B IoT\_NTN\_Ph3-Core

[R2-2501158](file:///C:\Data\3GPP\Extracts\R2-2501158%20MAC%20Running%20CR%20for%20Rel-19%20IoT%20NTN.docx) MAC Running CR for Rel-19 IoT NTN MediaTek Inc. draftCR Rel-18 36.321 18.3.0 B IoT\_NTN\_Ph3-Core

[R2-2501320](file:///C:\Data\3GPP\Extracts\R2-2501320%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 18.4.0 B IoT\_NTN\_Ph3-Core

### 8.9.2 Support of Store & Forward

Contributions should focus on possible impacts to the radio interface.

[R2-2500309](file:///C:\Data\3GPP\Extracts\R2-2500309%20-%20Discussion%20on%20Store%20&%20Forward%20satellite%20operation.docx) Discussion on Store & Forward satellite operation OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1 Time information on transition from S&F operation mode to normal mode is provided in SIB31.

Proposal 2 Use absolute UTC time to broadcast the time information, and changes of it should result in system information change notifications.

Proposal 3 The time information can also be broadcasted to indicate when the current satellite operation mode will transit from normal mode to S&F operation mode.

Proposal 4 Changes of S&F operation indication should result in system information change notifications.

Proposal 5 For UE in RRC\_CONNECTED mode, from RAN2 perspective, rely on NW implementation for UE handling if NW switches between S&F operation mode and normal mode, and no special AS impact is foreseen. FFS whether there is any AS impact caused by NAS layer.

Proposal 6 No need to introduce a new release cause for feeder link becoming unavailable.

[R2-2501159](file:///C:\Data\3GPP\Extracts\R2-2501159%20RAN2%20impact%20on%20SF%20mode.docx) RAN2 impact on S&F mode MediaTek Inc. discussion IoT\_NTN\_Ph3-Core [R2-2410636](file:///C:\Data\3GPP\archive\RAN2\RAN2%23128\Tdocs\R2-2410636.zip)

* S&F operation indication

Proposal 1: For Rel-19 UEs supporting S&F, if the S&F operation indication is present in SIB1, RRC will notify upper layer that this NTN cell is operating in S&F mode when camping on the cell or receiving updated SIB1 in Connected mode.

* Time information

Proposal 2: For Rel-19 UEs supporting S&F, the RRC will forward the remaining time of S&F mode to the upper layer upon reception and when updated.

Proposal 3: The remaining time of S&F mode is optionally broadcasted in SIB2(-NB).

Proposal 4: The remaining time of S&F mode is broadcasted in IE TimeOffsetUTC-r17.

Proposal 5: The time information when the cell will enter S&F mode can be broadcasted in system information.

* Release Cause

Proposal 6: New RRC release cause when the NW wants to release a R19 UE to RRC idle because the feeder link becomes unavailable is not needed.

* Satellite ID

Proposal 7: The RRC will notify the current satellite ID to upper layer when the UE camping on the cell.

Proposal 8: As an optional feature, during cell selection and cell reselection, UE can prioritize the cell that is included in satellite ID list.

Proposal 9: How UE do the prioritization is up to UE implementation.

Proposal 10: Network ensures that the satellite IDs provided in SIB31(-NB), SIB32(-NB), and SIB33(-NB) are globally unique within PLMN.

[R2-2500586](file:///C:\Data\3GPP\Extracts\R2-2500586_Store%20and%20Forward.doc) Support of S&F operation in IoT NTN Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1: Re-purpose “S&F operation indication” as barring bit for Rel-19 S&F mode capable UE(s).

• Presence: S&F capable UE(s) are barred

• Absence: S&F capable UE(s) are not barred

Proposal 2: Timing info can in addition include the time duration the cell stays in S&F operation mode.

Proposal 3: Do not introduce a new release cause when the NW wants to release a R19 UE to RRC idle because the feeder link becomes unavailable.

Proposal 4: RAN2 to consider paging reception optimization if RRC idle UE can determine there is no MT data for it due to unavailability of feeder link.

[R2-2500929](file:///C:\Data\3GPP\Extracts\R2-2500929%20-%20Support%20for%20store%20and%20forward%20in%20IoT%20NTN.docx) Support of Store & Forward for IoT NTN TURKCELL discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1 Legacy t-service can be used as mode switching time. It indicates the remaining time of the current operating mode.

Proposal 2 UE can be informed via a new timer that the cell should stop serving.

Proposal 3 A new release cause is not needed when the feeder link is unavailable.

Proposal 4 The UE needs to be informed to save power when the network has no mobile terminating data.

Proposal 5 It is beneficial for the eNB to prioritise the UE’s access should it subsequently re-attempt to connect to the network, thereby preventing potential data loss and unnecessary power consumption.

[R2-2501273](file:///C:\Data\3GPP\Extracts\R2-2501273%20Discussion%20on%20Store%20and%20Forward%20operation.docx) Discussion on Store and Forward operation Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

* *Timing information on S&F*

Proposal 1: Send LS to CT1 regarding RAN2 decision on introducing timing information to delay NAS procedures.

Proposal 2: Timing information to delay NAS procedures can be signaled in SIB1 using TimeOffsetUTC-r17.

Proposal 3: RAN2 does not introduce an indication for when the S&F operation will start.

* *Uplink buffer full indication*

Proposal 4: Network implementation can take care of the case where the uplink buffer is full in S&F scenario.

* New release cause

Proposal 5: RAN2 does not introduced a new release cause when the network wants to release a Release 19 UE to RRC idle because the feeder link becomes unavailable, unless SA2/RAN3 indicates the need.

* Relation to discontinuous coverage

Proposal 6: If a satellite has not been indicated in the NAS-signalled S&F Monitoring List, the UE may be allowed to not camp on it.

Proposal 7: If no satellites that have been indicated in the NAS-signalled S&F Monitoring List are in the vicinity, the UE can decide not to perform any idle mode procedures, similar to discontinuous coverage.

Proposal 8: The S&F Monitoring list sent to a UE in NAS shall refer to a long-term ephemeris in SIB32, which can be used for UE behavior similar to discontinuous coverage.

[R2-2500071](file:///C:\Data\3GPP\Extracts\R2-2500071_S&F.doc) Discussion on Store and Forward operation Xiaomi discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500082](file:///C:\Data\3GPP\Extracts\R2-2500082%20Further%20Discussion%20on%20S&F%20Operation.docx) Further Discussion on S&F Operation vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500106](file:///C:\Data\3GPP\Extracts\R2-2500106_Panasonic_SnF_Enhancements.docx) S&F enhancements PANASONIC discussion

[R2-2500366](file:///C:\Data\3GPP\Extracts\R2-2500366%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

[R2-2500418](file:///C:\Data\3GPP\Extracts\R2-2500418%20Discussion%20on%20time%20information%20for%20S&F.docx) Discussion on time information for S&F ASUSTeK discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500467](file:///C:\Data\3GPP\Extracts\R2-2500467%20Open%20issues%20on%20the%20S&F%20operation.docx) Open issues on the S&F operation Google discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500525](file:///C:\Data\3GPP\Extracts\R2-2500525%20Discussion%20on%20RAN2%20impacts%20for%20the%20support%20of%20S&F%20operation.docx) Discussion on RAN2 impacts for the support of S&F operation CATT discussion

[R2-2500533](file:///C:\Data\3GPP\Extracts\R2-2500533%20store%20and%20forward.docx) Switching of S&F mode Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500578](file:///C:\Data\3GPP\Extracts\R2-2500578_Time%20information%20of%20IoT%20NTN%20Store%20&%20Forward.doc) Time information of IoT NTN Store & Forward China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500618](file:///C:\Data\3GPP\Extracts\R2-2500618%20Further%20considerations%20on%20S&F%20operation.docx) Enhancements to support S&F operation Lenovo discussion Rel-19

[R2-2500658](file:///C:\Data\3GPP\Extracts\R2-2500658%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

[R2-2500686](file:///C:\Data\3GPP\Extracts\R2-2500686.docx) Radio Interface Aspect of S&F NEC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500704](file:///C:\Data\3GPP\Extracts\R2-2500704%20Further%20consideration%20on%20Store%20and%20Forward.docx) Further consideration on Store and Forward Huawei, HiSilicon discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500762](file:///C:\Data\3GPP\Extracts\R2-2500762%20Discussion%20on%20support%20of%20Store&Forward.docx) Discussion on support of Store&Forward Transsion Holdings discussion Rel-19

[R2-2500796](file:///C:\Data\3GPP\Extracts\R2-2500796-Store-Forward-RAN-Aspects.docx) RAN2 impacts for SF Operation Nokia , Nokia Shanghai Bells discussion

[R2-2500876](file:///C:\Data\3GPP\Extracts\R2-2500876%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

[R2-2500922](file:///C:\Data\3GPP\Extracts\R2-2500922.docx) Discussion on Paging and Mode Switching TOYOTA Info Technology Center discussion Rel-19 NR\_NTN\_Ph3

[R2-2500980](file:///C:\Data\3GPP\Extracts\R2-2500980.docx) Further considerations on S&F operations Continental Automotive discussion Rel-19

[R2-2501004](file:///C:\Data\3GPP\Extracts\R2-2501004_Discussion_on_Store_and_Forward.docx) Discussion on Store & Forward operation DENSO CORPORATION discussion IoT\_NTN\_Ph3-Core

[R2-2501012](file:///C:\Data\3GPP\Extracts\R2-2501012%20Discussion%20on%20IoT%20NTN%20Store%20and%20Forward.docx) Discussion on IoT NTN Store and Forward CMCC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2501307](file:///C:\Data\3GPP\Extracts\R2-2501307%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).

[R2-2500367](file:///C:\Data\3GPP\Extracts\R2-2500367%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
  + Resource configuration

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

* Time domain resources for (N)PUSCH occasions: periodicity and start time (e.g., start subframe, start SFN)
* Frequency domain resources for (N)PUSCH occasions:
  + for eMTC, to configure a list of combination of a starting RB and a length in terms of contiguously allocated RB for CE mode A; to configure a list of combination of a narrowband index and PRBs within the indicated narrowband for CE mode B;
  + for NB-IoT, to configure carrier index, a RU number and a list of set of subcarriers for single-tone case; to configure a RU number and a list of set of subcarriers for multi-tone case.
* 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 radio frames, the detailed value range can be FFS.

* + CE level configuration

Proposal 2: For CB-msg3 transmission, for eMTC NTN, up to three RSRP thresholds can be supported for achieving at most 4 CE levels; for NB-IoT NTN, up to two RSRP thresholds can be supported for achieving at most 3 CE levels.

Proposal 3a: For CB-msg3 without OCC, a delta RSRP relative to a certain RSRP threshold of EDT can be configured to achieve corresponding RSRP threshold for CE level selection. And CB-msg3 with OCC can share the same RSRP threshold configuration as that for CB-msg3 without OCC.

Proposal 3b: For CB-msg3 without OCC, a maximum TBS needs to be configured for each CE level. And CB-msg3 with OCC can share the same maximum TBS as that for CB-msg3 without OCC.

* *Efficient delivery of Msg4*
  + *Contention resolution window*

Proposal 4a: For CB-msg3 procedure, a contention resolution window starts at the end of the Msg3 transmission plus 4 subframes plus UE-eNB RTT.

Proposal 4b: The same value range as pur-ResponseWindowTimer can be reused for the length of contention resolution window for CB-msg3 procedure.

* + *RNTI calculation*

Proposal 5a: The following parameters can be taken into account in the RNTI calculation for CB-msg3:

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

Proposal 5b: For the RNTI calculation for CB-msg3, 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.

* + CB-Msg4 transmission

Proposal 6a: The contention resolution scheme in legacy random access procedure can be reused for CB-msg3 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 6b: For CB-msg3 for CP solution, a UE Contention Resolution Identity can be used to early terminate the procedure.

Proposal 6c: For msg4 of CB-msg3 procedure, UE Contention Resolution Identity and RRC message could be send together or separately.

Proposal 7a: For CB-msg3 procedure, if the msg4 includes a matching Contention Resolution Identity and also a C-RNTI, UE could stops the contention resolution window, and further monitors the PDCCH for the following RRC message by using the assigned C-RNTI.

Proposal 7b: For CB-msg3 procedure, if the msg4 includes a matching Contention Resolution Identity but without a C-RNTI, UE could stops the contention resolution window, and terminate the RRC procedure.

* + Backoff/fallback

Proposal 8a: RAN2 is suggested to support backoff scheme for CB-msg3. That is, when CB-msg3 fails, after a backoff time indicated by eNB, UE can choose an occasion to perform another CB-Msg3 transmission. FFS details.

Proposal 8b: For CB-msg3 procedure, a stepped fallback to higher CE level and then to RACH based EDT procedure can be considered.

* DSA
  + *Selection time window for DSA*

Proposal 9: For DSA, it’s slightly preferred to support a sliding replica selection window whose start time is determined by the first selected transmission occasion.

* + RNTI calculation

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.

* + Contention resolution window
* Proposal 11: For DSA, UE starts multiple contention resolution windows and monitors each RNTI for Msg4 in corresponding contention resolution window.

[R2-2501319](file:///C:\Data\3GPP\Extracts\R2-2501319%20-%20UL%20capacity%20enhancements%20for%20IoT%20NTN.docx) UL capacity enhancements for IoT NTN Ericsson discussion Rel-19 IoT\_NTN\_Ph3-Core

* terminology

Proposal 1 RAN2 to discuss the terms to be used to describe the EDT improvements in Rel-19, for example the new functionality can be called “contention-based early data transmission” (CB EDT).

Proposal 2 RAN2 to discuss the terms to be used for the first message from UE to eNB in the EDT improvements in Rel-19, it may for example be called “contention-based message A” or CB MsgA.

Proposal 3 RAN2 to discuss the terms to be used for the reply to CB MsgA from eNB to UE in the EDT improvements in Rel-19, it may for example be called “contention-based message B” or CB MsgB.

* End of DSA window and start of CB MsgB window

Proposal 4 There is one CB MsgB window per DSA window and the CB MsgB window start immediately after the DSA window, taking UE-eNB RTT into account.

Proposal 5 If a DSA window NPUSCH transmission end in uplink subframe n or a SA NPUSCH transmission end in uplink subframe n, the UE is not required to monitor NPDCCH in any downlink subframe that overlaps with uplink subframe n+1 to subframe n+Kmac+3. The UE shall start NPDCCH monitoring in the first NPDCCH subframe, after uplink subframe n+Kmac+3, that do not overlap uplink subframe n+Kmac+3.

Proposal 6 The UE shall at most have one ongoing CB EDT procedure at any time.

* DSA window size

Proposal 7 The CB EDT configuration has an indication of uplink subcarrier spacing.

Proposal 8 The CB EDT configuration has an indication of start and end subcarrier, or start and number of subcarriers, per CE level.

Proposal 9 The CB EDT configuration has a MCS index per CE level, indicating TBS, modulation, and number of RUs for CB MsgA.

Proposal 10 The CB EDT configuration has the number of CB MsgA transmission opportunities in time per CE level, that makes up one DSA window.

Proposal 11 The CD EDT configuration has, the number of repetitions of CB MsgA per CE level.

Proposal 12 The DSA window has a start time relative the H-SFN per CE level.

Proposal 13 The DSA window has a DSA window periodicity per CE level.

Proposal 14 RAN2 to discuss how to handle H-SFN wrap around if periodicity do not evenly divide the H-SFN period.

* Mobile terminated EDT

Proposal 15 Mobile terminated EDT is supported.

Proposal 16 The CB MsgB can contain MAC SDUs carrying downlink data for each CB MsgA that is acknowledged.

Proposal 17 For each UE in a CB MsgB, the successful reception of a CB MsgB can be individually acknowledged with a HARQ ACK transmission.

* HARQ ACK for successful CB MsgB

Proposal 18 The CB MsgB has a 4 bit HARQ ACK resource allocation, reusing the existing HARQ ACK/NACK allocation signalling in the DCI, per UE that is replied to.

Proposal 19 In the HARQ-ACK resources for CB MsgB, the value ‘15’ indicate HARQ feedback disabled.

* Number of UEs that can be answered in one CB MsgB

Proposal 20 The number of CB MsgA replies in one CB MsgB can be left to eNB implementation.

* CB MsgB window and the RNTIs for MsgA and MsgB

Proposal 21 There is one RNTI for CB MsgA and CB MsgB transmissions.

Proposal 22 The UE shall use the cell specific Koffset for the CB EDT feature, regardless of if it has a UE specific Koffset or not.

Proposal 23 The scheduling of CB MsgB uses NPDCCH format 1.

Proposal 24 The CD EDT configuration has an NPDCCH repetition number per CE level for the CB MsgB window.

Proposal 25 The CD EDT configuration has an NPDCCH occasion periodicity per CE level for CB MsgB window.

Proposal 26 The CD EDT configuration has a CB MsgB window size per CE level.

Proposal 27 The UEs shall monitor NPDCCH occasions inside the CB MsgB window unless it has successfully decoded a CB MsgB containing a matching Contention Resolution Identity.

* Design of CB MsgB

Proposal 28 Introduce multiplexing of several UE Contention Resolution Identities in CB MsgB using NR MSGB as baseline.

Proposal 29 Introduce a Backoff Indicator in CB MsgB.

Proposal 30 The CB MsgB contention resolution uses legacy UE Contention Resolution Identity MAC Control Element for the contention resolution.

* Multi carrier DSA

Proposal 31 The CB EDT configuration indicates which carrier is used for the CB EDT.

Proposal 32 RAN2 to discuss whether one carrier per CE level can be configured, or if all CE levels are supported on the same carrier.

* Contention control

Proposal 33 If no successful contention resolution was received in the CB MsgB window after a CB MsgA replica was transmitted, the UE shall draw a random number from a back off (indicated in a CB MsgB, if received, or from back off indicator in system information) ad wait the number of DSA windows and in the DSA window after the wait, do the CB MsgA replica selection and transmission.

* Collision detection and backoff

Proposal 34 After a failure in CB MsgA transmission (no matching UE ID received in the CB MsgB), the UE may attempt another transmission after waiting for a random back-off and increasing the transmission power. FFS parameters and details of the mechanism.

Proposal 35 After a number of failed CB MsgA transmission attempts, the UE falls back to 4-step random access EDT. FFS on the maximum number of transmission attempts.

* OCC

Proposal 37 OCCs are not used for the CB EDT functionality.

* eMTC considerations

Proposal 38 An eMTC UE may stop transmitting CB MsgA replicas or CB MsgA repetitions of a replica if the UE receive a CB MsgB with a matching contention resolution identity.

[R2-2500981](file:///C:\Data\3GPP\Extracts\R2-2500981.docx) Discussion on EDT Enhancements for IOT NTN Skylo Technologies discussion Rel-19

* Multiplexing of CB-Msg4

Proposal 1: Enable the new CB-MSG4 to carry NPDSCH messages targeting multiple UEs simultaneously.

Proposal 2: Multiplex multiple UE Contention Resolution Identities in CB-Msg4.

Proposal 3: The multiplexed CB-Msg4 should have provision to send only DCI (L1 ACK/NACK) for UEs for whom there is no DL data transmission.

* Contention Resolution Used for CB-Msg4

Proposal 4: Reduce the size of UE identifiers for the new multiplexed CB-Msg4.

Proposal 5: Use a hash map to reduce the size of Contention Resolution identity (S-TMSI) used in CB-Msg4.

* Structure of Multiplexed CB-Msg4

Proposal 6: Contention Resolution Identity (CRIs) of the UEs which have NAS payload should be placed first in the Group CRI. And CRIs of the UEs which don’t have NAS payload should be placed at the end.

Proposal 7: RRC messages of UEs which have NAS payload should be placed first in the sequence of RRC messages.

Proposal 8: One common RRC message should be placed at the end of the RRC message sequence for the UEs which don’t have NAS payload.

* Connected Mode EDT

Proposal 9: CB-EDT mechanism should be extended to RRC connected mode.

Proposal 10: Regular EDT should also be extended to RRC connected mode.

* Multicast MSG4 for CP-EDT

Proposal 11: Multicast CB-MSG4 should be extended to connected mode EDT.

Proposal 12: Multicast CB-MSG4 mechanism should be extended to regular EDT for RRCEarlyDataComplete.

[R2-2501265](file:///C:\Data\3GPP\Extracts\R2-2501265.docx) Implicit pointer for locating CB-Msg3 DSA replicas DLR, ESA, Toyota ITC, Inmarsat, Viasat, Thales, Aalyria Technologies, Echostar, Eutelsat Group Sateliot, Novamint discussion

Proposal 1: RAN2 to specify a procedure to be followed by UEs to randomize placement of their replicas, enabling the use of an implicit pointer to infer the positions of the DSA replicas sent by a UE over the available set of EDT occasions.

[R2-2500072](file:///C:\Data\3GPP\Extracts\R2-2500072_UL%20capacity%20IoT%20NTN.doc) Discussion on uplink capacity enhancements for IoT NTN Xiaomi discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500083](file:///C:\Data\3GPP\Extracts\R2-2500083%20Discussion%20on%20CB-Msg3%20Mechanism.docx) Discussion on CB-Msg3 Mechanism vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500096](file:///C:\Data\3GPP\Extracts\R2-2500096.docx) Further discussion on CB-Msg3 Mechanism NTU discussion Rel-19

[R2-2500138](file:///C:\Data\3GPP\Extracts\R2-2500138.docx) Further considerations on Locating of Replicas for DSA NTPU discussion

[R2-2500162](file:///C:\Data\3GPP\Extracts\R2-2500162.doc) Remaining issues on CB-Msg3 transmission Spreadtrum, UNISOC discussion Rel-19

[R2-2500200](file:///C:\Data\3GPP\Extracts\R2-2500200%20%20Further%20consideration%20on%20UL%20capacity%20enhancement.docx) Further consideration on UL capacity enhancement Huawei, HiSilicon, Turkcell discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500310](file:///C:\Data\3GPP\Extracts\R2-2500310-%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

[R2-2500528](file:///C:\Data\3GPP\Extracts\R2-2500528%20Further%20consideration%20on%20UL%20capacity%20enhancements.docx) Further consideration on UL capacity enhancements CATT discussion

[R2-2500534](file:///C:\Data\3GPP\Extracts\R2-2500534%20EDT%20enh.docx) CB-Msg3 and Msg4 enhancements Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500548](file:///C:\Data\3GPP\Extracts\R2-2500548%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

[R2-2500579](file:///C:\Data\3GPP\Extracts\R2-2500579_Consideration%20of%20CB%20Msg3-EDT%20in%20IoT%20NTN.doc) Consideration of CB Msg3-EDT in IoT NTN China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500585](file:///C:\Data\3GPP\Extracts\R2-2500585_Contention%20based%20MSG3.doc) Uplink capacity enhancement in IoT NTN Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500619](file:///C:\Data\3GPP\Extracts\R2-2500619%20EDT%20for%20uplink%20capacity%20enhancement%20in%20NTN%20(Revision%20of%20R2-2410271).docx) EDT for uplink capacity enhancement in NTN Lenovo discussion Rel-19

[R2-2500659](file:///C:\Data\3GPP\Extracts\R2-2500659%20Discussion%20on%20UL%20capacity%20enhancement.docx) Discussion on UL capacity enhancement HONOR discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500664](file:///C:\Data\3GPP\Extracts\R2-2500664%20Discussion%20on%20UL%20Capacity%20Enhancement%20for%20IoT-NTN.docx) Discussion on UL Capacity Enhancement for IoT-NTN NEC Corporation discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500763](file:///C:\Data\3GPP\Extracts\R2-2500763%20Discussion%20on%20Uplink%20Capacity%20enhancement%20for%20IoT-NTN.docx) Discussion on uplink capacity enhancement Transsion Holdings discussion Rel-19

[R2-2500848](file:///C:\Data\3GPP\Extracts\R2-2500848-IoT-NTN%20uplink%20capacity%20enhancement.docx) IoT-NTN uplink capacity enhancement Nordic Semiconductor ASA discussion

[R2-2500877](file:///C:\Data\3GPP\Extracts\R2-2500877%20(R19%20IoT-NTN%20AI%208.9.3)%20-%20EDT%20enhancements.docx) EDT/PUR enhancements. Interdigital, Inc. discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2501034](file:///C:\Data\3GPP\Extracts\R2-2501034%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

[R2-2501164](file:///C:\Data\3GPP\Extracts\R2-2501164%20Discussion%20on%20CB-Msg3.docx) Discussion on CB-Msg3 procedure MediaTek Inc. discussion IoT\_NTN\_Ph3-Core [R2-2410641](file:///C:\Data\3GPP\archive\RAN2\RAN2%23128\Tdocs\R2-2410641.zip)

[R2-2501274](file:///C:\Data\3GPP\Extracts\R2-2501274%20Further%20issues%20on%20contention-based%20Msg3.docx) Further issues on contention-based Msg3 Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

### 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.

[R2-2501308](file:///C:\Data\3GPP\Extracts\R2-2501308%20-%20Enhancements%20to%20support%20PWS%20in%20NB-IoT%20NTN.docx) Enhancements to support PWS in NB-IoT NTN Ericsson discussion Rel-19 IoT\_NTN\_Ph3-Core

* Enhancements to eDRX

Proposal 1 Investigate methods to improve the reception of PWS messages for NB- NTN UEs in challenging scenarios (e.g., eDRX).

Proposal 2 Allow a UE to indicate its interest in PWS services to the network.

* SIB1-NB acquisition

Proposal 3 RAN2 studies ways for allowing an NB-IoT UE to skip SIB1-NB acquisition to speed up the delivery of the ETWS primary notification.

* Support of geofencing in ETWS

Proposal 4 Introduce geographic information in ETWS notifications for geo-fencing in NTN cells.

Proposal 5 Introduce the Warning Area Coordinates IE for ETWS to describe an emergency area in system information.

Proposal 6 Introduce the Warning Area Coordinates IE to existing ETWS SIBs, i.e., SIB10/11 (LTE) and SIB6/7 (NR).

Proposal 7 For complex emergency area descriptions, RAN2 should consider introducing a new SIB with pre-configured emergency areas.

* PWS reception during initial access

Proposal 8 RAN2 to discuss the feasibility of enabling the reception of PWS during initial access.

[R2-2500535](file:///C:\Data\3GPP\Extracts\R2-2500535%20PWS%20NB-IoT.docx) Discussion on PWS in NB-IoT NTN Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

* PWS support

Proposal 1 Introduce a new indication in SIB that a NB-IoT cell supports PWS feature.

Proposal 2 Introduce a new UE capability signaling to indicate whether the NB-IoT UEs support PWS feature in RRC\_IDLE.

* Geofencing for ETWS

Proposal 3 Same geocoordinates format (warningAreaCoordinatesSegment-r15) of SIB12 is added in SIB10 and SIB11 for NB-IoT.

* PWS message size

Proposal 4 Same as in NR and LTE, the maximum number of segments for SIB11/12 is 64 for NB-IoT. Discuss whether primary ETWS notification in SIB10 needs segmentation.

Proposal 5 Send LS to CT1 and RAN3 informing the maximum warning message size that can be broadcast via SIB.

[R2-2500464](file:///C:\Data\3GPP\Extracts\R2-2500464%20Discussion%20on%20the%20support%20for%20PWS%20in%20NB-IoT.docx) Discussion on the support for PWS in NB-IoT Google discussion Rel-19 IoT\_NTN\_Ph3-Core

* PWS message segmentation

Observation 1 If NB-IoT uses the same segmentation limit as LTE, PWS messages exceeding 43,520 bits cannot be transmitted via an NB-IoT network.

Proposal 1 RAN2 to discuss whether to increase the maximum number of segments for PWS messages beyond 64, for example, to 192. This is to enable NB-IoT to support PWS messages of comparable size to LTE.

* Handling of PWS segments after switching to a new cell

Observation 2 An LTE UE switching to a new cell would discard any previously buffered PWS segments, if it has not fully received a segmented PWS message in the original cell.

Proposal 2 Under certain circumstances (e.g., operating in NTN mode), the NB-IoT UE may resume the reception of a segmented PWS message after switching to a new cell.

* Inclusion of the PWS area information in Paging

Observation 3 The likelihood of paging an irrelevant UE in an NTN cell for a PWS alert is very high.

Proposal 3 PWS area information in coarse level can be signaled together with a PWS indication in Paging-NB. The UE not within the area determined by the PWS area information can skip acquiring the system information relevant to the PWS.

* PWS reception in RRC\_CONNECTED

Proposal 4 Support transmission of PWS messages via dedicated signaling for NB-IoT UEs operating in the RRC\_CONNECTED state.

Proposal 5 Utilize the DLInformationTransfer-NB message to transmit PWS messages to NB-IoT UEs operating in the RRC\_CONNECTED state.

[R2-2501322](file:///C:\Data\3GPP\Extracts\R2-2501322-%20Remaining%20issues%20on%20support%20of%20PWS%20for%20NB-IoT%20NTN.docx) On PWS support for NB-IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-19 IoT\_NTN\_Ph3-Core [R2-2500797](file:///C:\Data\3GPP\Extracts\R2-2500797-%20Remaining%20issues%20on%20support%20of%20PWS%20for%20NB-IoT%20NTN.docx)

* PWS reception in moving cell scenario

Observation 4: In legacy, the PWS message segmentation feature is only supported for the intra-cell scenario.

Observation 5: In NTN, all the segments of PWS message may not be delivered to UE successfully within a single cell in moving cell scenario.

Proposal 3: RAN2 to discuss how to support continued reception of PWS segmentation of message in moving cell scenario.

* PWS Support in SF mode

Observation 6: PWS delivery when cell operates in S&F mode may have impacts on meeting delay requirements of PWS services.

Observation 7: RAN2 assumes no additional impacts in supporting PWS functionality in S&F operation.

Proposal 4: Support for PWS in SF operation is decided at SA2. RAN2 to decide whether to send LS on this or wait for SA2 decision.

* WUS Efficiency Impacts for PWS Transmission

Observation 7: WUS configuration helps to minimize downlink monitoring related energy consumption for UE configured with shorter eDRX cycle.

Observation 8: When WUS is configured in NB-IoT cell, the PWS transmission may false wake-up all the UE outside the PWS service area resulting in reducing the overall efficiency of WUS benefits.

Proposal 5: RAN2 to investigate the false wake-up issue for PWS transmission for WUS configuration in NB-IoT-NTN.

[R2-2500073](file:///C:\Data\3GPP\Extracts\R2-2500073_PWS%20for%20NB-IoT.doc) PWS support for NB-IoT over NTN Xiaomi discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500084](file:///C:\Data\3GPP\Extracts\R2-2500084%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

[R2-2500311](file:///C:\Data\3GPP\Extracts\R2-2500311%20-%20Discussion%20on%20PWS%20for%20NB-IoT.docx) Discussion on PWS for NB-IoT OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500342](file:///C:\Data\3GPP\Extracts\R2-2500342%20PWS%20for%20NB-IoT.docx) Remaining issues on PWS support for NB-IoT Huawei, HiSilicon, Turkcell discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500368](file:///C:\Data\3GPP\Extracts\R2-2500368%20Further%20consideration%20on%20PWS%20support%20in%20IoT%20NTN.docx) Further consideration on PWS support in IoT NTN ZTE Corporation, Sanechips discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500522](file:///C:\Data\3GPP\Extracts\R2-2500522%20Remaining%20issues%20on%20support%20of%20PWS%20for%20NB-IoT%20NTN%20UE.docx) Remaining issues on support of PWS for NB-IoT NTN UE CATT discussion

[R2-2500580](file:///C:\Data\3GPP\Extracts\R2-2500580_Remaining%20issues%20for%20PWS%20in%20IoT%20NTN.doc) Remaining issues for PWS in IoT NTN China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500620](file:///C:\Data\3GPP\Extracts\R2-2500620%20PWS%20broadcast%20support%20for%20NB-IoT%20in%20NTN%20(Revision%20of%20R2-2410272).docx) PWS broadcast support for NB-IoT in NTN Lenovo discussion Rel-19

[R2-2500641](file:///C:\Data\3GPP\Extracts\R2-2500641%20Considering%20on%20PWS%20Support%20in%20NB-IoT.docx) Considering on PWS Support in NB-IoT NEC Corporation discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2500797](file:///C:\Data\3GPP\Extracts\R2-2500797-%20Remaining%20issues%20on%20support%20of%20PWS%20for%20NB-IoT%20NTN.docx) On PWS support for NB-IoT NTN Nokia , Nokia Shanghai Bells discussion

* Revised in [R2-2501322](file:///C:\Data\3GPP\Extracts\R2-2501322-%20Remaining%20issues%20on%20support%20of%20PWS%20for%20NB-IoT%20NTN.docx)

[R2-2500952](file:///C:\Data\3GPP\Extracts\R2-2500952.doc) Discussion on remaining issues for support of PWS message KT Corp. discussion

[R2-2501035](file:///C:\Data\3GPP\Extracts\R2-2501035%20Support%20of%20PWS%20messages%20for%20NB-IoT.docx) Support of PWS messages for NB-IoT CMCC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2501161](file:///C:\Data\3GPP\Extracts\R2-2501161%20Discussion%20on%20supporting%20PWS%20for%20NB-IoT.docx) Discussion on supporting PWS for NB-IoT MediaTek Inc. discussion IoT\_NTN\_Ph3-Core [R2-2410643](file:///C:\Data\3GPP\archive\RAN2\RAN2%23128\Tdocs\R2-2410643.zip)

[R2-2501275](file:///C:\Data\3GPP\Extracts\R2-2501275%20Impact%20of%20introducing%20PWS%20broadcasting%20for%20NB-IoT.docx) Impact of introducing PWS broadcasting for NB-IoT Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

## 8.17 IoT-NTN TDD mode

(IoT\_NTN\_TDD; leading WG: RAN1; REL-19; WID RP-243293)

Time budget: 0.5 TU

Tdoc Limitation: 1 tdoc

Workplan

[R2-250l175](file:///C:\Data\3GPP\Extracts\R2-2500175%20IOT_NTN_TDD%20WP.docx) Work plan for WID: introduction of IoT-NTN TDD mode Iridium Satellite LLC Work Plan Rel-19 IoT\_NTN\_TDD

[R2-2500390](file:///C:\Data\3GPP\Extracts\R2-2500390.docx) Discussion on IoT-NTN TDD mode Iridium Satellite LLC discussion Rel-19 IoT\_NTN\_TDD

* Overall description

Proposal 1: A description of IoT-NTN TDD mode shall be added in 36.300 [§5] as follows:

Downlink and uplink transmissions are organized into radio frames with 10 ms duration. Three radio frame structures are supported:

- Type 1, applicable to FDD and IoT-NTN TDD;

- Type 2, applicable to TDD;

…

Proposal 2: Anchor carrier definitions in 36.300 §3 needs updating:

Anchor carrier: in NB-IoT, a carrier where the UE assumes that NPSS/NSSS/NPBCH/SIB-NB for FDD and IoT-NTN TDD or NPSS/NSSS/NPBCH for TDD are transmitted.

Proposal 3: In 36.300 §23.21 should be updated to reflect that NTN is applicable to both FDD and IoT-NTN TDD system:

In this release of the specification, NTN is only applicable to FDD and IoT-NTN TDD system.

* SI scheduling

Proposal 4: When operating in IoT-NTN TDD mode, there is no need to update the SIB-1 scheduling mechanism in the existing specifications, except for disabling transmissions during downlink inactive time.

Proposal 5: In IoT-NTN TDD mode, if start of the SI window falls within the downlink inactive time, it shall be postponed to the next downlink active time.

Proposal 6: In IoT-NTN TDD mode, subframes from a single repetition of the SI transmission shall be allowed to be postponed to the next downlink active time opportunity.

Proposal 7: In IoT-NTN TDD mode, SI transmissions shall be truncated if, due to the proposed postponement, they overlap with the transmission of the next SI repetition within the SI window.

Proposal 8: In IoT-NTN TDD mode, SI transmission shall be truncated if, due to the proposed SI transmission postponement, it overflows the configured SI window length.

Proposal 9: In IoT-NTN TDD mode, by making modifications to the SI scheduling mechanism, all SI messages can be delivered to the UE. This can be achieved by updating 36.331 §5.2.3a as follows:

…

* Paging

Proposal 10: In IoT-NTN TDD mode, when calculated paging opportunity of a UE falls in downlink inactive time, it shall get postponed to the next downlink active time.

* Kmac extension

Proposal 11: Increase Kmac, effectively either by increasing defined value from 9 to 10 bits, or by defining another optional parameter “Kmac\_extension”, and the two together would allow for larger delay.

[R2-2500773](file:///C:\Data\3GPP\Extracts\R2-2500773%20Consideration%20on%20IoT-NTN%20TDD%20mode.docx) Consideration on IoT-NTN TDD mode ZTE Corporation, Sanechips discussion Rel-19 IoT\_NTN\_TDD

* RAN2 issues

Proposal 1a: Below issues can be discussed in RAN2:

* How to handle the offset between the 90ms TDD pattern and the 10240ms SFN period.
* Paging adaption, e.g., how to determine the PF and PO in IoT NTN TDD system.
* UL SPS transmission mechanism when it overlaps with non-U NB-IoT subframes.
* Higher layer timers related issue.

Proposal 1b: Below issues can wait for more progress in RAN1:

* Enhancements on NPSS/NSSS/NPBCH and/or SIB1-NB reception
* RACH adaptions caused due to ROs overlapped with non-U NB-IoT subframes (e.g., RA-RNTI calculation)
* H-SFN

Proposal 2: RAN2 confirms that idle mode eDRX is supported in IoT-NTN TDD network.

Proposal 3: RAN2 send an LS to RAN1 to indicate that idle mode eDRX will be supported in IoT-NTN TDD network. And option 1-1 and 2-2 will impact H-SFN level synchronization of idle mode eDRX mechanism specified in SA2 and CT1’ specification, where the feasibility shall be evaluated by SA2 and CT1 first.

Proposal 4: For handling of offset between the 90ms TDD pattern and the 10240ms SFN period, RAN2 study potential RAN2 impact of option 1-2 or option 2-1 of observation 6, taking UE power saving and resource efficiency into account.

* Paging occasion

Proposal 5: Define new DRX cycle(T) (e.g. 36 radio frames, 72 radio frames, 144 radio frames, 288 radio frames, or 1024 radio frames) and restrict that the PO occasions only locates in NB-IoT DL subframes to solve the Paging occasion determination issue in IoT-NTN TDD system.

* UL SPS

Proposal 6: UL SPS transmission is dropped when the UL SPS overlaps with non-U NB-IoT subframes.

* Higher layer timers

Proposal 7: RAN 2 confirms that the existing value range of timers with unit of pp are enough for IoT NTN TDD.

Proposal 8a: RAN2 send LS to consult RAN1 on whether coverage enhancement(e.g. transmission with repetitions) is needed in IoT-NTN TDD system. If needed, what’s the value range of supported repetitions.

Proposal 8b: RAN2 postpone the discussion on extending the value range of timers with unit of ms or seconds until receiving RAN1’s response on whether to support coverage enhancement(e.g. transmission with repetitions) or not.

[R2-2500587](file:///C:\Data\3GPP\Extracts\R2-2500587_TDD%20IoT%20NTN.doc) Discussion on supporting IoT NTN TDD mode Apple discussion Rel-19 IoT\_NTN\_TDD

Proposal: RAN2 to study aspects such as PF determination, SI message scheduling, UL gap, starting point of PUR response window in this WI.

[R2-2500206](file:///C:\Data\3GPP\Extracts\R2-2500206%20Discussion%20on%20RAN2%20impacts%20of%20IoT-NTN%20TDD.docx) Discussion on RAN2 impacts of IoT-NTN TDD Huawei, HiSilicon discussion Rel-19 IoT\_NTN\_TDD

* Impact on Access Control

Observation 1: Pre-R19 UEs cannot access the network in 1616-1626.5 MHz MSS allocated band so there is no need to enhance the Access Control mechanism for legacy UEs.

Proposal 1: The IE cellBarred in the SIB1-NB message can be reused to control whether a UE supporting NB-IoT NTN TDD mode is allowed to access an NB-IoT TDD NTN cell.

* Impact on Random Access

Proposal 2: The legacy design of RAR window and the CR timer can be reused in NB-IoT NTN TDD system with appropriate values configured.

* Impact on Paging

Proposal 3: Discussion on paging can be wait for RAN1’s conclusion on the offset between the 90ms TDD structure and the 10240ms H-SFN.

* UE Behavior during the Guard Period

Proposal 4: UE behavior during the guard period should follow the behavior observed during discontinuous coverage.

[R2-2500936](file:///C:\Data\3GPP\Extracts\R2-2500936%20Discussion%20on%20IoT%20TDD_v1.docx) Discussion of adaptions to support IoT-NTN TDD THALES discussion Rel-19 IoT\_NTN\_TDD-Core

<Description in Stage 2>

Proposal 1 Update the stage 2 specification to support and describe the NB-IoT NTN TDD mode. The text proposal in Annex can be considered as a baseline.

<Definition of the TDD pattern>

Observation 1 Compared to the FDD, 8.9% of the DL subframes are usable in the proposed IoT-NTN TDD pattern. Therefore, adaptations are needed to ensure the transmission of the essential signaling and other messages occur on usable DL subframes.

Proposal 2 The IoT-NTN TDD pattern parameters and possible adaptation of existing parameters are provided by RAN1

Proposal 3 Wait for RAN1 conclusions on the possible misalignment issue between H-SFN and IoT-NTN TDD pattern with N=9 cycle periodicities

Observation 2 In the proposed way forward in RAN to support downlink subframes within D=8, the subframe number location of the NPSS, NSSS, NPBCH (MIB-NB) and NPDSCH (SIB1) remains unchanged compared to the FDD system

Proposal 4 Wait for RAN1 on which downlink subframe option is selected and how to signal it

<MIB-NB>

Observation 4 7.125 of the 64 blocks of a given MIB-NB are expected to be transmitted according to the TDD pattern with N=9

Proposal 5 The MasterInformationBlock-NB can be decoded by the UE with the proposed IoT-NTN TDD pattern without modifications of the schedule periodicity of 640 ms

<SIB1-NB>

Observation 5 The SIB1-NB can be decoded by the UE for some SIB1-NB TBS values at least when configured number of repetitions is 16 with unchanged schedule periodicity of 2560 ms

Proposal 6 The SIB1-NB can be decoded by the UE with the proposed TDD pattern without modification of the fixed scheduling periodicity of 2560 ms at least when 16 repetitions are configured with a maximum TBS size to be determined by RAN1

<Others SIBs>

Proposal 7 There are SI-Window configurations that ensure transmission of the SI-Message

Proposal 8 RAN2 wait for RAN1 to discuss necessary enhancements, if needed, on SI-Window transmission configurations to permit the UE to decode SIBs-NB

Observation 6 The TDD pattern of D=8 implies at most 6 usable subframes for SI-message transmission within a transmission period. For TBS > 120 bits, SI-message is transmitted over 8 SFs. Therefore, a SI-message transmission may need to be transmitted over 2 downlink transmissions.

Proposal 9 According to RAN1 conclusion on others SIBs evaluation, RAN2 to discuss the postponing of the SI-message subframe to the next usable downlink subframe, including outside of the SI-Window

<NPDCCH>

Observation 7 No available configurations can align all the NPDCCH transmissions with the IoT-NTN TDD pattern

Proposal 10 Wait RAN1 to conclude on the NPDCCH handling w.r.t. the IoT TDD pattern

Proposal 11 If postponement is decided for NPDCCH, RAN2 to clarify in the specification that postponement is to be done to a next usable downlink subframes excluding subframes used for the transmission of SI messages

<Paging>

Proposal 12 In all DL subframes configuration options discussed in RAN1, the Paging Occasion(s) subframes within a Paging Frame are transmitted, i.e. SF#0, #4, #5, #9. No adaptation of the PO subframes is needed

Observation 8 There exists a set of configurations that allow transmission of paging but no configuration can align IoT-NTN TDD pattern N=9 and paging cycle

Proposal 13 Upon RAN1 decision, if NPDCCH is postponed to a next usable D subframe, RAN2 to discuss how to clarify the UE behaviour on the postponement of a Paging Frame (so the Paging Occasion(s)) in the 3GPP TS 36.304

<Random Access>

Proposal 14 Wait for RAN1 inputs for any necessary enhancements on the NPRACH scheduling mechanism

Observation 9 The RAR window and the MAC contention resolution timer can be configured to up to 10 NPDCCH cycles and 64 respectively. According to the NPDCCH cycles configuration is it sufficient to ensure multiple DL subframe transmissions w.r.t. the IoT-NTN TDD pattern

Proposal 15 The RAR window and the MAC contention resolution timer configurations are sufficiently large to cope with limited DL transmission opportunities w.r.t the IoT NTN TDD pattern. Can be rediscussed to increase these timers according to RAN1 conclusions on NPRACH/NPDCCH evaluations

<k-mac extension>

Proposal 16 Increase k-Mac of 1 bit to allow more flexibility on the scheduling. FFS if we define a new k-Mac\_ext or if we extend the current k-Mac value broadcasted in SIB31/SIB31-NB

[R2-2500085](file:///C:\Data\3GPP\Extracts\R2-2500085%20Discussion%20on%20RAN2%20Imapcts%20of%20IoT-NTN%20TDD%20Mode.docx) Discussion on RAN2 Imapcts of IoT-NTN TDD Mode vivo discussion Rel-19 IoT\_NTN\_TDD-Core

[R2-2500312](file:///C:\Data\3GPP\Extracts\R2-2500312%20-%20Discussion%20on%20IoT%20NTN%20TDD%20mode.docx) Discussion on IoT NTN TDD mode OPPO discussion Rel-19 IoT\_NTN\_TDD

[R2-2500527](file:///C:\Data\3GPP\Extracts\R2-2500527%20Discussion%20on%20support%20of%20IoT%20NTN%20TDD.docx) Discussion on support of IoT NTN TDD CATT discussion

[R2-2500536](file:///C:\Data\3GPP\Extracts\R2-2500536%20NB-IoT%20TDD.docx) Discussion on new NB-IoT NTN TDD mode Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_TDD

[R2-2500549](file:///C:\Data\3GPP\Extracts\R2-2500549%20Discussion%20on%20support%20of%20TDD%20mode%20for%20IoT-NTN.docx) Discussion on support of TDD mode for IoT-NTN Nokia, Nokia Shanghai Bell discussion Rel-19 IoT\_NTN\_TDD

[R2-2500621](file:///C:\Data\3GPP\Extracts\R2-2500621%20Discussion%20on%20TDD%20support%20in%20IoT%20NTN.docx) Discussion on TDD support in IoT NTN Lenovo discussion Rel-19

[R2-2500923](file:///C:\Data\3GPP\Extracts\R2-2500923.docx) Signaling aspects of IoT-NTN TDD mode TOYOTA Info Technology Center discussion Rel-19 IoT\_NTN\_TDD-Core

[R2-2501036](file:///C:\Data\3GPP\Extracts\R2-2501036%20Support%20of%20IoT-NTN%20TDD%20mode.docx) Support of IoT-NTN TDD mode CMCC discussion Rel-19 IoT\_NTN\_TDD

[R2-2501277](file:///C:\Data\3GPP\Extracts\R2-2501277%20On%20RAN2%20aspects%20of%20IoT%20NTN%20TDD.docx) Initial aspects on IoT NTN TDD Samsung discussion Rel-19 IoT\_NTN\_TDD

## 8.18 TEI19

Time budget: 1 TU

Tdoc Limitation: 1 tdoc for new proposals and 1 tdoc for old proposals.

1 additional tdoc for primary co-sourcing company on top of the limit is allowed for co-sourced contribution with 4 or more companies.

Companies are encouraged to submit co-sourced contributions, which will have priority for discussion in RAN2#129.

[R2-2500086](file:///C:\Data\3GPP\Extracts\R2-2500086%20On%20LTE%20TN%20to%20NB-IoT%20NTN%20Mobility%20Handling.docx) On LTE TN to NB-IoT NTN Mobility Handling vivo discussion Rel-19 TEI19

[R2-2501276](file:///C:\Data\3GPP\Extracts\R2-2501276%20Re-direction%20to%20an%20NTN%20frequency.docx) Re-direction to an NTN frequency Samsung discussion Rel-19 TEI19

## 8.19 NR Others

Tdoc limit: 1

Contributions addressing LS from RAN4 R4-2420410 and any RAN4 LSs not related to any of the AIs above.

[R2-2500034](file:///C:\Data\3GPP\Extracts\R2-2500034_R4-2419902.docx) LS on Ku band numerology (R4-2419902; contact: Rumney Telecom) RAN4 LS in Rel-19 NR\_NTN\_Ku\_bands-Core To:RAN1, RAN2 Cc:RAN

[R2-2500979](file:///C:\Data\3GPP\Extracts\R2-2500979%20Reply%20LS%20to%20RAN4%20on%20Ku%20band%20numerology.docx) Reply LS on Ku band numerology Eutelsat Group LS out Rel-19 NR\_NTN\_Ku\_bands-Core

[R2-2500087](file:///C:\Data\3GPP\Extracts\R2-2500087%20Discussion%20on%20RAN4%20LS%20on%20Ku%20Band%20Numerology.docx) Discussion on RAN4 LS on Ku Band Numerology vivo discussion Rel-19 NR\_NTN\_Ku\_bands-Core

[R2-2500694](file:///C:\Data\3GPP\Extracts\R2-2500694%20Discussion%20on%20Ku%20band%20numerology.docx) Discussion on Ku band numerology Huawei, HiSilicon discussion Rel-19 NR\_NTN\_Ku\_bands-Core

[R2-2500937](file:///C:\Data\3GPP\Extracts\R2-2500937%20Draft%20reply%20on%20Ku%20band%20numerology.docx) Draft Reply LS on Ku band numerology THALES LS out Rel-19 NR\_NTN\_Ku\_bands-Core To:RAN4 Cc:RAN1, RAN

To:RAN4 Cc:RAN, RAN1

# Summary

Agreed CRs

R17 IoT NTN (LTE\_NBIOT\_eMTC\_NTN)

R17 NR NTN (NR\_NTN\_solutions-Core)

R18 IoT NTN (IoT\_NTN\_enh-Core)

R18 NR NTN (NR\_NTN\_enh-Core)

Approved LSs out

[Post129] Email discussions

Short

Long