3GPP TSG-RAN WG2 Meeting #127bis R2-2409213

Hefei, China, Oct 14th – 18rd, 2024

**Agenda item: 9.3**

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

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

**Document for: Approval**

Organizational

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

* [AT127bis][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]  [7.0.2.11] Others (including multi WI issues)  **[8.0] NR19 General**  **Break out**  **@NR151617 UP (Diana)**  **[7.5] XR**  **[7.0.2] Other Rel-18 corrections cont** | Breakout to start after completion of 7.0.2.11  **NR1617 SL (Kyeongin)**  [5.2] NR R16 V2X  [6.6] NR R17 SL  **NR18 SL (Kyeongin)**  [7.15.1] Organizational  [7.15.2] Corrections | Breakout to start after completion of 7.0.2.11  **NRLTE151617 Pos (Nathan)**  [4.3] LTE positioning  [5.3] NR Rel-16 and earlier  [6.4] NR Rel-17  **NR18 Pos**  As far as possible:  [7.2.1] Organizational  [7.2.3] SLPP  [7.2.4] LPP  [7.2.5] RRC |  |
| 11:00 – 13:00 |
| 14:30 – 16:30 | **[7.0.2] Other Rel-18 corrections cont**  **STD related topics**  **[7.24] NR TEI18** | **NR18 SL cont (Kyeongin)** (if needed)  [7.15.2] Corrections  **NR18 Mob (Kyeongin)**  [7.4.1] Organizational  [7.4.2] CP corrections | **NR18 Pos**  Continued from morning session  Any overflow from morning session  [7.2.6] MAC  [7.2.7] Other  [7.2.2] Stage 2  (Overflow to Wednesday evening session if needed) |
| 17:00 – 19:00 | **[7.25] Other Rel-18 corrections (30 mins)**  **NR19 Ambient IoT [2.5] (Diana)**  [8.2.1] Organizational  [8.2.4] AIoT Random Access | **NR18 Mob** (**Kyeongin)**  [7.4.2] CP corrections  [7.4.3] UP corrections | **@17:00-17:20 NR18 MUSIM (Erlin)**  [7.17.1] Stage 2 changes  [7.17.2] RRC CRs  **@17:20-18:00 NR18 MIMO evo (Erlin)**  [7.20.2] MAC and RRC changes  **@18:00-19:00 NR19 MIMO (Erlin)**  [8.12.1] Work plan, LSin  [8.12.2] Initial discussions on R2 impact |
| **Tuesday** | | | | |
| 08:30 – 10:30 | **NR AI/ML Mobility [2] (Diana)**  [8.3.1] Organizations  [8.3.2] RRM prediction | **N19 LP-WUS [1] (Erlin)**  [8.4.1] LSin  [8.4.2] IDLE and INACTIVE procedures/configurations  [8.4.3] RRM relax. / offloading  [8.4.4] Connected state related, only if time allows | **NR1718 SL Relay (Nathan)**  [6.2] Rel-17  [7.9.3] Rel-18 CP  [7.9.4] Rel-18 UP  [7.9.2] Rel-18 Stage 2 |  |
|  |
| 11:00 – 13:00 | **NR19 Mob [2] (Kyeongin)**  [8.6.1] Organizational  [8.6.3] L1 Event MR | **NR19 XR [2] (Dawid):**  - 8.7.1 Organizational: LSin, discussion on reply LSes  - 8.7.3 RRM measurement gaps/restrictions  - 8.7.5 RLC enhancements | **NR18 SONMDT (Mattias)**  All Ais in order  **NR19 SONMDT [0.5] (Mattias)**  [8.10.1]  [8.10.2]  - Subsequent CPAC, CHO with candidate SCGs, LTM  [8.10.5]  - SDT, SCG failure in EN-DC |  |
| 14:30 -16:30 | **NR19 AI/ML PHY [2.5] (Diana)**  [8.1.2.2] LCM for BM (~1.5 hrs)  [8.1.2.3] LCM for Positioning (~.5hrs) | **NR18 NTN NR /IoT(Sergio)**  [6.1.1], [6.1.3] R17 NTN corrections  [7.6.1], [7.6.2] R18 IoT NTN corrections  [7.7.1], [7.7.2] R18 NR NTN corrections | **EUTRA&NR151617 (Mattias)**  Except NR17 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] |  |
|  |
| 17:00– 19:00 | **NR19 Ambient IoT [2] (Diana)**  [8.2.4] Random Access (if needed)  [8.2.2] Functionality Aspects (except segmentation and DOA)  [8.2.5] Topology 2 | **NR19 NR NTN (Sergio) [2]**  [8.8.1] Organizational  [8.8.4] Support of Broadcast service  [8.8.6] LTE to NR NTN mobility  [8.8.2] Downlink coverage enhancements (if time allows) | **@17:00-17:30 EUTRA&NR151617 (Mattias)**  **Continue from above, if needed.**  **@17:30 NR18 MBS/QoE (Dawid)**  [7.14] (QoE) (~15-30 minutes)  [7.11] (MBS) and 7.24.2.2 (MBS related TEI18) |  |
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| 19:00 - | **Social Event** |  |  |  |
| **Wednesday** | | | | |
| 08:30 – 10:30 | **NR19 Mob [2] Kyeongin**  [8.6.2] Inter-CU LTM  [8.6.4] C-LTM | **NR19 XR [2] (Dawid)**  [8.7.6] XR rate control  [8.7.4] LCP enhancements, DSR enhancements | **@9:30 NR19 MIMO (if needed)** |  |
| 11:00 – 13:00 | **NR19 AI/ML Mobility [2] (Diana)**  [8.3.3] Event prediction | **NR19 Network Energy Saving [1] (Kyeongin)**  [8.5.1] Organizational  [8.5.3] OD-SIB1  [8.5.4] Common CH adaptation  [8.5.2] SCell OD-SSB | **NR19 SBFD [0.75] (Erlin)**  [8.11.1] LSin  [8.11.2] RACH related  [8.11.3] Other aspects |  |
| 14:30 -16:30 | **NR19 AI/ML PHY [2.5] (Diana)**  [8.1.2.3] LCM for Positioning (~.5hrs)  [8.1.3] NW data collection | **NR19 IoT NTN [1] Sergio**  [8.9.1] Organizational  [8.9.2] Support of Store and Forward  [8.9.3] Uplink Capacity Enhancements  [9.9.4] Support of PWS | **Offline slot** |  |
|  |
| 17:00– 19:00 | **NR19 AI/ML PHY [2.5] (Diana) CB time if need**  [8.1.5] Model transfer delivery | **NR19 IoT NTN [1] (continued)**  **NR19 NR NTN [2] (Sergio)**  [8.8.2] Downlink coverage enhancements (cont)  [8.8.5] Support of regenerative payload | **NR19 BDS Pos [0.5] (Nathan)**  [8.16]  **NR18 Positioning**  Any overflow from Monday sessions  [7.24.1] TEI18 positioning |  |
| **Thursday** | | | | |
| 08:30 – 10:30 | **CB Diana TBD**  **CB TBD**  Potential AI/ML PHY (depending on Tuesd progress) | **R18 IoT NTN / R19 IoT NTN CB (Sergio)**  TBD | CB Nathan  **NR1718 Positioning and SL relay CB** |  |
| 11:00 – 13:00 | **NR19 Ambient IoT [2.5] (Diana)**  [8.2.5] Topology 2  [8.2.3] Paging | **NR18 NR NTN /NR19 NR NTN CB (Sergio)**  TBD | **CB Mattias**  **CB EUTRA&NR151617 (Mattias)**  **CB SON/MDT** |  |
| 14:30 -16:30 | **CB AIoT (if needed)**  [8.2.3] Paging  **CB** **NR19 AI/ML Mobility**  TBD – RRM prediction possible CB | **CB NR161718 SL** **(Kyeongin)**  **CB NR19 NES (Kyeongin)** | CB Erlin  **14:30-15:00 - CB MUSIM/MIMO**  Details to be added based on Monday session output  **@15:00 CB NR19 LP-WUS (Erlin)**  [8.4.4] Connected state aspects  CB for [8.4.2] and [8.4.3] if needed |  |
| 17:00 – 19:00 | **CB NR18 Diana**  **CBs from NR151617 UP and Rel-18 corrections including TEI and NR Others** | **CB NR18 Mob (Kyeongin)**  **CB NR19 Mob (Kyeongin)** | CB Dawid:  **NR18 MBS/QoE CB**  **NR19 XR CB** |  |
| **Friday** | | | | |
| 08:30 – 10:30 | CB Diana  **CB TBD** | CB Sergio  **NR18 NR/IoT NTN CB (Sergio)**  **[NR19 NR/IoT NTN CB]** | CB Kyeongin |  |
| 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 [AT127bis] offline discussions

NOTE: No offline email discussions will be kicked off before Monday Oct 14th, 09:00 local time

* [AT127bis][301][R19 IoT NTN] Working point for CB-msg3 (NEC)

Scope: Discuss the working point for the CB-msg3 EDT-like mechanism (i.e. which packet loss rate we need to target), e.g. based on the considerations in [R2-2409170](file:///C:\Data\3GPP\RAN2\Docs\R2-2409170.zip), [R2-2408863](file:///C:\Data\3GPP\Extracts\R2-2408863.docx) and [R2-2408547](file:///C:\Data\3GPP\Extracts\R2-2408547.docx)

Intended outcome: Report of the offline discussion

F2F offline time and location: Wednesday 2024-10-16 10:30-11:00 (morning coffee break) in Brk1 room

Deadline for rapporteur's summary (in R2-2409231): Wednesday 2024-10-16 14:00

## 6.1 Common

### 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)

[R2-2408366](file:///C:\Data\3GPP\Extracts\R2-2408366%20Correction%20on%20location%20based%20measurements%20in%20NR%20NTN%20(R17).docx) Correction on location based measurements in NR NTN CATT, Nokia, Nokia Shanghai Bell CR Rel-17 38.300 17.10.0 0909 - F NR\_NTN\_solutions-Core

* Agreed in principle

[R2-2408367](file:///C:\Data\3GPP\Extracts\R2-2408367%20Correction%20on%20location%20based%20measurements%20in%20NR%20NTN%20(R18).docx) Correction on location based measurements in NR NTN CATT, Nokia, Nokia Shanghai Bell CR Rel-18 38.300 18.3.0 0910 - A NR\_NTN\_solutions-Core

* Agreed in principle

### 6.1.3 Control Plane corrections

#### 6.1.3.1 NR RRC

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

[R2-2407970](file:///C:\Data\3GPP\Extracts\R2-2407970%20Further%20discussion%20on%20RAN4%20LS%20R2-2406225%20for%20Rel-17%20NR%20NTN.docx) Further discussion on RAN4 LS [R2-2406225](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_127\Docs\R2-2406225.zip) for Rel-17 NR NTN CATT discussion Rel-17 NR\_NTN\_solutions-Core

Proposal 1: RAN2 discusses how to deal with the RRC configuration dl-DataToUL-ACK-v1700 and associated UE capability k1-RangeExtension-r17 in Rel-17 and Rel-18 Specifications, with down-selection between below two alternatives:

 Alternative 1: Dummify dl-DataToUL-ACK-v1700 and k1-RangeExtension-r17 in Rel-17 and Rel-18 Specifications;

 Alternative 2: Make no change to dl-DataToUL-ACK-v1700 and k1-RangeExtension-r17 (relying on UE implementation to not report this capability k1-RangeExtension-r17 for Rel-17/18 NR NTN).

* ZTE agrees with the observations but thinks there is no need to dummify anything. QC agrees and in case we should go for Alt2 sending an LS to RAN4
* Ericsson thinks Alt 1 would be fine also with no further LS to RAN4.
* CMCC thinks Alt 2 is sufficient.
* CATT thinks that the usual way is to dummify.
* Samsung thinks we could go for Alt 2 and add a sentence in the description saying that this parameter is not used in this release. Inmarsat agrees
* Vivo thinks we don’t need to change anything / put any restriction
* We don’t dummify dl-DataToUL-ACK-v1700 and k1-RangeExtension-r17
* RAN2 understands that a UE will not indicate this capability unless a new TDD band will be defined in a release independent manner in the future

Proposal 2: RAN2 sends LS response to RAN4 based on the conclusion to Proposal 1.

Proposal 3: If RAN2 agrees Alternative 1 in Proposal 1, adopt the TPs in Appendix 3 as the baseline for further CR discussion.

[R2-2408651](file:///C:\Data\3GPP\Extracts\R2-2408651%20Corrections%20on%20measurement%20gap%20configruation.docx) Corrections on measurement gap configruation ZTE Corporation, Sanechips CR Rel-17 38.331 17.10.0 5024 - F NR\_NTN\_solutions-Core, NR\_redcap-Core

* HW supports the CR
* Agreed in principle

[R2-2408652](file:///C:\Data\3GPP\Extracts\R2-2408652%20Corrections%20on%20measurement%20gap%20configruation.docx) Corrections on measurement gap configruation ZTE Corporation, Sanechips CR Rel-18 38.331 18.3.0 5025 - A NR\_NTN\_solutions-Core, NR\_redcap-Core

* Agreed in principle

[R2-2409090](file:///C:\Data\3GPP\Extracts\R2-2409090%20Corrections%20to%20NR%20NTN%20(R17).docx) Corrections to NR NTN (R17) Huawei, HiSilicon, CMCC CR Rel-17 38.331 17.10.0 5075 - F NR\_NTN\_solutions-Core

* QC and Google think the first change is not needed. LG agrees with HW intention and we should specify something in the field description. MTK support the intention and thinks we can fix the working
* Regarding the second change Sequans thinks this is what we already agreed one year ago, without reflecting this in the spec so in case a reference to this should be added to the coverpage
* MTK would like to have more time to check this
* CB Thursday on both changes

[R2-2409091](file:///C:\Data\3GPP\Extracts\R2-2409091%20Corrections%20to%20NR%20NTN%20(R18).docx) Corrections to NR NTN (R18) Huawei, HiSilicon, CMCC CR Rel-18 38.331 18.3.0 5076 - A NR\_NTN\_solutions-Core

Withdrawn

[R2-2408231](file:///C:\Data\3GPP\Extracts\R2-2408231%20Corrections%20to%20NR%20NTN%20(R17).docx) Corrections to NR NTN (R17) Huawei, HiSilicon CR Rel-17 38.331 17.10.0 4987 - F NR\_NTN\_solutions-Core

* Withdrawn

[R2-2408232](file:///C:\Data\3GPP\Extracts\R2-2408232%20Corrections%20to%20NR%20NTN%20(R18).docx) Corrections to NR NTN (R18) Huawei, HiSilicon CR Rel-18 38.331 18.3.0 4988 - A NR\_NTN\_solutions-Core

* Withdrawn

## 7.6 IoT NTN enhancements

(IoT\_NTN\_enh-Core; leading WG: RAN1; REL-18; WID: [RP-223519](http://www.3gpp.org/ftp/tsg_ran/TSG_RAN/TSGR_98\Docs\RP-223519.zip))

Time budget: 0 TU

Tdoc Limitation: 1 tdocs

### 7.6.1 Organizational

LSs, rapporteur inputs.

Editorials/clarifications should not be included in any tdoc but sent to the WI spec rapporteurs, who can submit a rapporteur CR as part of this AI.

Rapporteur inputs do not count towards the tdoc limitation.

Incoming LS

[R2-2407910](file:///C:\Data\3GPP\Extracts\R2-2407910_R1-2407390.docx) LS on Rel-18 RAN1 UE features list for LTE after RAN1#118 (R1-2407390; contact: NTT DOCOMO, AT&T) RAN1 LS in Rel-18 IoT\_NTN\_enh To:RAN2 Cc:RAN4

* Noted

Rapporteurs’ input

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

* ZTE thinks IoT NTN signalling has a different structure so the change might not be the same
* CB Thursday

[R2-2408901](file:///C:\Data\3GPP\Extracts\R2-2408901_36306_CR1894_R18-IoT%20NTN%20UE%20cap.docx) Applicability of optional UE Capabilities without signalling for NB-IoT Qualcomm Inc. CR Rel-18 36.306 18.3.0 1894 - F IoT\_NTN\_enh-Core

* Samsung thinks there might be more capabilities to add
* HW thinks that also some signalled capabilities are missing
* Revised in R2-2409232

R2-2409232 Applicability of optional UE Capabilities for NB-IoT Qualcomm Inc. CR Rel-18 36.306 18.3.0 1894 1 F IoT\_NTN\_enh-Core

* CB Thursday

[R2-2409178](file:///C:\Data\3GPP\Extracts\R2-2409178%20-%2036300_CR1409_(Rel-18)%20-%20IoT%20NTN%20Stage%202%20correction.docx) IoT NTN Stage 2 correction Ericsson (Rapporteur) CR Rel-18 36.300 18.3.0 1409 - F IoT\_NTN\_enh-Core

* ZTE thinks we could remove the last part (“e.g. …”). CATT thinks the last part is the one that defines wen this is needed so it should remain
* Samsung agrees with ZTE
* Vivo is fine to have this to align. HW is also ok with this. Nokia also agrees
* Agreed in principle

### 7.6.2 Corrections

Corrections for all specifications.

RRC

[R2-2407967](file:///C:\Data\3GPP\Extracts\R2-2407967%20Corrections%20on%20location%20based%20mearurements%20and%20need%20code%20for%20IoT%20NTN.docx) Corrections on location based measurements and need code for IoT NTN CATT CR Rel-18 36.331 18.3.1 5052 - F IoT\_NTN\_enh-Core

* Regarding the fisr change, ZTE is fine in principle but the actual change could be different and align to NB-IoT over NTN. Ericsson agrees with ZTE
* First change is agreed in principle but reusing the text for NB-IoT NTN
* ZTE also wonders in the other changes are NBC
* QC is not sure we need the change to the need codes but is ok with the 3rd change
* For the 3rd change ZTE thinks we could add the description of UE behaviour in the field description
* Apple thinks that we should clarify in the coverpage that the change is mandatory if the UE supports the feature
* HW, MTK thinks that changing need codes from OP to OR is needed. HW also thinks that if we have a CR we should fix also the other case (OR to OP).
* The change from Need OP to Need OR is agreed.
* Further check offline the need for the change from Need OR to Need OP
* Revised in R2-2409233

R2-2409233 Corrections on location based measurements and need code for IoT NTN CATT CR Rel-18 36.331 18.3.1 5052 1 F IoT\_NTN\_enh-Core

* CB Thursday

[R2-2408336](file:///C:\Data\3GPP\Extracts\R2-2408336%20SIB33%20related%20RRC%20corrections%20for%20IoT%20NTN.docx) SIB33 related RRC corrections for IoT NT ZTE Corporation, Sanechips CR Rel-18 36.331 18.3.1 5053 - F IoT\_NTN\_enh-Core

* HW an Ericsson think the first change is not needed. Nokia and vivo agree.
* MTK also thinks the existing text is fine.
* First change is not pursued
* HW does not support the second change. QC also thinks we don’t need to change
* CB Thursday for the second change

[R2-2408589](file:///C:\Data\3GPP\Extracts\R2-2408589.docx) Correction on satelliteId in SIB3/SIB5 Apple CR Rel-18 36.331 18.3.1 5059 - F IoT\_NTN\_enh-Core

* MTK thinks leads to unnecessary limitation and we should rather go for the opposite proposal (p4 in R2-2408801) to address this issue. Vivo agrees. Ericsson agrees (prefers the Samsung approach).
* ZTE thinks no clarification is needed
* Apple is ok not to have this change but this implies at least a change in the Stage2 description.
* Not pursued
* Can discuss a Stage 2 change to clarify the behaviour

[R2-2408648](file:///C:\Data\3GPP\Extracts\R2-2408648%20Enabling%20SystemInformationBlockType33%20for%20NB-IoT%20NTN%2036.331.docx) Enabling SystemInformationBlockType33 for NB-IoT NTN Google CR Rel-18 36.331 18.3.1 5060 - F IoT\_NTN\_enh-Core

* Inmarsat supports this change as this is an important use case. QC would also support this but thinks it’s not sufficient
* Novamint agrees it’s an important use case to cover
* ZTE thinks this is new feature, not an actual correction. CATT has the same feeling and wonders if this would be a cat F CR. Samsung thinks that if want to support this we should have a clear agreement that this is supported.
* Ericsson thinks the CR is not needed because already supported. HW agrees. MTK agrees. Google thinks this the CR addresses the opposite case
* CMCC thinks we discussed and excluded this. Xiaomi thinks this was excluded in RAN plenary discussion. Inmarsat doesn’t think this was discussed nor ruled out during a RAN plenary.
* CB Thursday

Misc

[R2-2408801](file:///C:\Data\3GPP\Extracts\R2-2408801%20Various%20corrections%20to%20IoT%20NTN%20Rel-18.docx) Various corrections for IoT NTN Rel-18 Samsung discussion Rel-18 IoT\_NTN\_enh-Core

* Idle mode corrections

Proposal 1: IoT NTN UE shall disregard NTN distance-based measurement when t-Service is triggered, as in NR NTN.

Proposal 2: Agree 36.304 correction text.

* UE capabilities

Proposal 3: Introduce capability for eMTC to indicate that the UE is capable of acquiring and maintaining SIB33 in connected mode.

* RRC corrections

Proposal 4: Clarify in field description of satelliteAssistanceInfoList is associated with SIB31 and SIB33.

Proposal 5: For UEs capable of acquiring SIB33 in connected mode, the UE can acquire the SIB33 in the next T318 opportunity.

Proposal 6: For UEs not capable of acquiring SIB33 in connected mode, dedicated SIB33 is introduced.

Proposal 7: SIB33 may be broadcast on a different narrowband or different NB-IoT carrier than the one configured to the UE.

Proposal 8: Add SystemInformationBlockType33(-NB) to NOTE1 of 5.3.18.

38.306

[R2-2409185](file:///C:\Data\3GPP\Extracts\R2-2409185%20-%2036306_CR1899_(Rel-18)%20-%20IoT%20NTN%20UE%20capabilities%20correction%20for%20GNSS%20and%20HARQ%20enhancements.docx) IoT NTN UE capabilities correction for GNSS and HARQ enhancements Ericsson CR Rel-18 36.306 18.3.0 1899 - F IoT\_NTN\_enh-Core

* Agree the change to align specification text with RAN1 updated feature list to include the conditional support of ntn-Triggered-GNSS-Fix-r18 when ntn-Autonomous-GNSS-Fix-r18 is supported in NGSO
* editorial change is also agreed
* Other changes are not pursued
* Revised in R2-2409234

R2-2409234 IoT NTN UE capabilities correction for GNSS and HARQ enhancements Ericsson CR Rel-18 36.306 18.3.0 1899 1 F IoT\_NTN\_enh-Core

* CB Thursday

[R2-2408830](C:\\Data\\3GPP\\Extracts\\R2-2408830 UE capabilities update for GNSS position fix in IoT NTN.docx" \o "C:\Data\3GPP\Extracts\R2-2408830 UE capabilities update for GNSS position fix in IoT NTN.docx) UE capabilities update for GNSS position fix in IoT NTN Nokia, Nokia Shanghai Bell CR Rel-18 36.306 18.3.0 1893 - F IoT\_NTN\_enh-Core

- QC thinks what we agreed with the previous CR is sufficient and we should not capture this note. MTK thinks the note is unclear on UE behaviour and is not needed

- HW thinks the note will already be reflected in the feature list. Ericsson agrees with HW this is RAN1 understanding and there is no need to repeat this in RAN2

* Not pursued

Stage 2

[R2-2408010](file:///C:\Data\3GPP\Extracts\R2-2408010%20Corrections%20on%20CHO%20and%20measurement.docx) Corrections on CHO and measurement Huawei, HiSilicon CR Rel-18 36.300 18.3.0 1407 - F IoT\_NTN\_enh-Core

[R2-2408011](file:///C:\Data\3GPP\Extracts\R2-2408011_36300_CR1408%20Correction%20on%20UE%20Location%20Information%20Reporting%20in%20IoT-NTN.docx) Correction on UE Location Information Reporting in IoT-NTN vivo, Ericsson CR Rel-18 36.300 18.3.0 1408 - F IoT\_NTN\_enh-Core

Withdrawn

[R2-2408588](file:///C:\Data\3GPP\Extracts\R2-2408588.doc) Discussion on satelliteId Apple discussion Rel-18 IoT\_NTN\_enh-Core

* Withdrawn

## 7.7 NR NTN enhancements

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

Time budget: 0 TU

Tdoc Limitation: 1 tdocs

### 7.7.1 Organizational

LSs, rapporteur inputs.

Editorials/clarifications should not be included in any tdoc but sent to the WI spec rapporteurs, who can submit a rapporteur CR as part of this AI.

Rapporteur inputs do not count towards the tdoc limitation.

Incoming LS

[R2-2407912](file:///C:\Data\3GPP\Extracts\R2-2407912_R1-2407406.docx) LS on FR2-NTN inclusion to specifications (R1-2407406; contact: vivo) RAN1 LS in Rel-18 NR\_NTN\_enh-Core To:RAN2, RAN4

Rapporteurs’ input

[R2-2409186](file:///C:\Data\3GPP\Extracts\R2-2409186%20-%2038331_CR5085_(Rel-18)%20-%20Clarification%20of%20reference%20location%20within%20the%20MO%20for%20NR%20NTN%20Rel-18.docx) Clarification of reference location within the MO for NR NTN Rel-18 Ericsson CR Rel-18 38.331 18.3.0 5085 - F NR\_NTN\_enh-Core

### 7.7.2 Corrections

Corrections for all specifications.

RRC related

* FR2 related

Moved here from 7.7.1

[R2-2408012](file:///C:\Data\3GPP\Extracts\R2-2408012%20Remaining%20Issues%20on%20FR2-NTN%20Support.docx) Remaining Issues on FR2-NTN Support vivo discussion Rel-18 NR\_NTN\_enh-Core

* Enhanced RRM requirements for measurements in IDLE/INACTIVE for FR2-NTN band:

Proposal 1: Introduce a new R18 UE capability without signalling for enhanced RRM requirements for measurements in IDLE and INACTIVE for FR2-NTN.

Proposal 2: RAN2 sends an LS to check with RAN4 on the introduction of the new R18 UE capability.

* Clarification on the terms FR2-1 (band) and FR2-NTN (band):

Observation 1: The term FR2-NTN is added to RAN1 specs in the previous RAN1 meeting.

Observation 2: In TS 38.306 and TS 38.331, only the term FR2-1(bands) or TDD-FR2-1 is specified even if the UE capability also applies to the FR2-NTN (bands) or FDD-FR2 NTN case.

Observation 3: Even though RAN4 updates the note in the spec as per RAN1 LS indicated, there still exists ambiguity in RAN2 spec for the capabilities that are applicable to FDD-FR2 NTN band but use the term TDD-FR2-1 band, considering TDD is not supported for NTN.

Proposal 3: RAN2 agrees to add the terms “FR2-NTN(band)” or “FDD-FR2 NTN” in the descriptions of the related capabilities or RRC parameters for FR2-NTN in TS 38.306 and TS 38.331.

Proposal 4: RAN2 agrees on the TPs in Annex 1 and Annex 2.

[R2-2408654](file:///C:\Data\3GPP\Extracts\R2-2408654%20Miscellaneous%20corrections%20on%20NTN%20in%20FR2%20bands.docx) Miscellaneous corrections on NTN in FR2 bands ZTE Corporation, Sanechips CR Rel-18 38.331 18.3.0 5026 - F NR\_NTN\_enh-Core

[R2-2408944](file:///C:\Data\3GPP\Extracts\R2-2408944%20FR2-related%20Release%2018%20NTN%20Issues.docx) FR2-related Release 18 NTN Issues Nokia discussion Rel-18 NR\_NTN\_enh-Core

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

Proposal 2: RAN2 verifies with RAN4 its assumption regarding the applicability of FR2-1 to FR2-NTN.

Proposal 3: RAN2 considers a general statement expressing FR2-1 requirements and parameters apply to FR2-NTN. Such information should be also available in appropriate RAN4 specification.

Observation 4: The Rel-17 capability for Enhanced RRM requirements for measurements in IDLE and INACTIVE modes applies to FR1 and FDD only.

Proposal 4: Introduce a separate Release 18 capability for Enhanced RRM requirements for measurements in IDLE and INACTIVE modes in FR2-NTN.

* Satellite switch with resync

[R2-2408341](file:///C:\Data\3GPP\Extracts\R2-2408341%20Correction%20to%20satellite%20switch%20with%20resync.docx) Correction to satellite switch with resync Huawei, HiSilicon CR Rel-18 38.331 18.3.0 5000 - F NR\_NTN\_enh-Core

* Revised in [R2-2409204](file:///C:\Data\3GPP\RAN2\Docs\R2-2409204.zip)

[R2-2409204](file:///C:\Data\3GPP\RAN2\Docs\R2-2409204.zip) Correction to satellite switch with resync Huawei, HiSilicon CR Rel-18 38.331 18.3.0 5000 1 F NR\_NTN\_enh-Core

* DL-DataToUL-ACK

[R2-2408943](file:///C:\Data\3GPP\Extracts\R2-2408943%20Correction%20to%20DL-DataToUL-ACK%20for%20NTN.docx) Correction to DL-DataToUL-ACK for NTN Nokia CR Rel-18 38.331 18.3.0 5063 - F NR\_NTN\_enh-Core

* TN to NTN mobility

[R2-2408567](file:///C:\Data\3GPP\Extracts\R2-2408567_Clarification%20on%20TN%20to%20NTN%20mobility_v0.doc) Clarification on TN to NTN mobility Apple, Qualcomm Incorporated discussion Rel-18 NR\_NTN\_enh-Core

<R17 UE features>

Observation 1: All R17 NTN specific mobility/measurement UE features (in Table-1) are only applicable when UE works in NTN mode, i.e. NTN cell is the serving cell or the source cell during mobility.

* CB Thursday to check if we can confirm the RAN2 understands that all R17 NTN specific mobility/measurement UE features (in Table-1 in R2-2408567) are only applicable when UE works in NTN mode, i.e. NTN cell is the serving cell or the source and target cell during mobility.

Proposal 1: Clarify that all R17 NTN specific UE features are only applicable when UE works in NTN mode.

- vivo thinks p1, p2 and p3 are the common understanding, we can further clarify in the meeting notes but not in the spec

- Nokia agrees in principle but we should use a better terminology than “NTN mode”

Proposal 2: Clarify that all R17 NTN specific UE features cannot be applicable for TN to NTN mobility.

<R18 UE features>

Observation 2: In all R18 NTN specific UE features, only the SIB19 reception in TN cell is the applicable when UE is in TN mode.

Proposal 3: Clarify that all R18 NTN specific UE features (except the SIB19 reception in TN cell) are only applicable when UE works in NTN mode.

Proposal 4: For NR NTN, introduce a new R18 optional NR UE capability without signaling to indicate that UE in RRC\_IDLE/RRC\_INACTIVE support SIB19 reception in a TN cell.

Proposal 5: For IoT NTN, introduce a new R18 optional LTE UE capability without signaling to indicate that UE in RRC\_IDLE/RRC\_INACTIVE support SIB33 reception in a TN cell.

* CB Thursday
* Misc

[R2-2409187](file:///C:\Data\3GPP\Extracts\R2-2409187%20-%20Remaining%20open%20issues.docx) Remaining open issues Ericsson discussion Rel-18 NR\_NTN\_enh-Core

Proposal 1 RAN2 to clarify whether a UE can measure a NTN cell while camping or being connected to a TN cell.

*Observation 1 UEs configured with PDD report may (simultaneously) generate and send a PDD report upon satellite switch with resynchronization.*

- Sequans does not necessarily agree with Obs 1 and thinks the maximum PDD is 0.3 ms in the extreme case (of 100km cell size). Sequans thinks we might still need to discuss whether there is a need for the NW to update the SMTC, e.g. due to the feeder link, but still wonders if this is a real issue

- LG also thinks there is no issue, smtc4 provides enough duration to perform neighbour cell measurement after completion of soft satellite switch.

* CB Thursday

Proposal 2 RAN2 to revisit the impact on neighbour cell SMTCs upon satellite switch with resync.

Proposal 3 Upon satellite switch with re-sync, the UE should apply the ssb-TimeOffset to the configured SMTCs for neighbouring satellites before receiving updated SMTCs from the network.

- vivo thinks would lead to autonomous SMTC adjustment at the UE

Stage 2

[R2-2407968](file:///C:\Data\3GPP\Extracts\R2-2407968%20Correction%20on%20coexistence%20between%20CHO%20and%20satellite%20switching%20with%20re-synchronization.docx) Correction on coexistence between CHO and satellite switching with re-synchronization CATT CR Rel-18 38.300 18.3.0 0903 - F NR\_NTN\_enh-Core

[R2-2408013](file:///C:\Data\3GPP\Extracts\R2-2408013_38300_CR0904%20Correction%20on%20RACH-less%20HO%20in%20NR-NTN.docx) Correction on RACH-less HO in NR-NTN vivo, THALES CR Rel-18 38.300 18.3.0 0904 - F NR\_NTN\_enh-Core

[R2-2409027](file:///C:\Data\3GPP\Extracts\R2-2409027.docx) Miscellaneous corrections to NR NTN Samsung CR Rel-18 38.300 18.3.0 0922 - F NR\_NTN\_enh-Core

37.355

[R2-2408414](file:///C:\Data\3GPP\Extracts\R2-2408414%20Correction%20on%20nr-NTN-MeasAndReport.docx) Correction on nr-NTN-MeasAndReport NEC Corporation. CR Rel-18 37.355 18.3.0 0519 - F NR\_NTN\_enh-Core

38.304

[R2-2409056](file:///C:\Data\3GPP\Extracts\R2-2409056%20Correction%20on%20skipping%20TN%20measurements.docx) Correction on skipping TN measurements SHARP Corporation draftCR Rel-18 38.304 18.3.0 F NR\_NTN\_enh-Core

## 8.8 NTN for NR Ph3

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

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

Time budget: 2 TU

Tdoc Limitation: 3 tdocs

### 8.8.1 Organizational

LS, Rapporteur input, including workplan, etc.

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

Rapporteur inputs do not count towards the tdoc limitation.

Incoming LS

[R2-2407919](file:///C:\Data\3GPP\Extracts\R2-2407919_R1-2407538.docx) Reply LS on DL coverage enhancements (R1-2407538; contact: CMCC) RAN1 LS in Rel-19 NR\_NTN\_Ph3-Core To:RAN2

* Noted

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

[R2-2407963](file:///C:\Data\3GPP\Extracts\R2-2407963%20Introduction%20of%20LTE%20TN%20to%20NR%20NTN%20IDLE%20mode%20mobility.docx) Introduction of LTE TN to NR NTN IDLE mode mobility CATT draftCR Rel-19 36.331 18.3.1 B LTE\_TN\_NR\_NTN\_mob [R2-2407617](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_127\Docs\R2-2407617.zip)

* Endorsed

[R2-2408014](file:///C:\Data\3GPP\Extracts\R2-2408014%20Introduction%20of%20LTE%20TN%20to%20NR%20NTN%20Mobility%20UE%20Capability.docx) Introduction of LTE TN to NR NTN Mobility UE Capability vivo draftCR Rel-19 36.306 18.3.0 B LTE\_TN\_NR\_NTN\_mob-Core

* Endorsed

[R2-2408805](file:///C:\Data\3GPP\Extracts\R2-2408805%20Stage%202%20Running%20CR%20for%20E-UTRAN%20to%20NR%20NTN%20idle%20mode%20mobility.docx) Stage 2 Running CR for E-UTRAN to NR NTN mobility Samsung draftCR Rel-19 36.300 18.3.0 LTE\_TN\_NR\_NTN\_mob-Core [R2-2407616](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_127\Docs\R2-2407616.zip)

- Apple thinks the new section 10.2.XX should explicitly refer to E-UTRAN TN to NR NTN.

- Ericsson thinks this is fine but the CR category should be B

* Endorsed as a baseline but can further check the wording, especially of new section 10.2.XX

Rapporteurs’ inputs for NR\_NTN\_Ph3

[R2-2409183](file:///C:\Data\3GPP\Extracts\R2-2409183%20-%2038331_CR5084_(Rel-19)%20-%20Running%20RRC%20CR%20for%20NR%20NTN%20phase%203.docx) Running RRC CR for NR NTN phase 3 Ericsson CR Rel-19 38.331 18.3.0 5084 - B NR\_NTN\_Ph3-Core

* Noted

### 8.8.2 Downlink coverage enhancements

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

Impact with extended SSB periodicity

* Access Control

[R2-2408981](file:///C:\Data\3GPP\Extracts\R2-2408981Discussion%20on%20downlink%20coverage%20enhancement.docx) Discussion on downlink coverage enhancements LG Electronics Inc. discussion Rel-19

* Access Control

Proposal 1 Rel-19 NTN UEs that do not support DL-CE can be barred from accessing a cell operating with DL-CE using the existing NTN bar bit, in the same way as pre-Rel19 NTN UEs.

Proposal 2 A new bar bit with code points {barred, notBarred} should be introduced to control access UEs supporting Rel19 NTN DL-CE.

* SMTC impacts

Proposal 3 SMTC periodicity value range should be extended if SSB periodicity can be greater than 160ms.

Observation1 No decision has been taken on the extension of the SSB periodicity and there is no progress on beam hopping in RAN1.

Observation 2 In case SSB burst timing with beam hopping of neighbor cells are separated each other by a fixed time offset, if SMTC periodicity is set to the as the time offset, the SMTC can accommodate the SSB burst transmissions of those neighbor cells.

Proposal 4 RAN2 does not discuss the impact of beam-hopping on SMTC further until RAN1 provides necessary input on SSB periodicity extension and beam-hopping.

[R2-2408655](file:///C:\Data\3GPP\Extracts\R2-2408655%20Consideration%20on%20DL%20coverage%20enhancements.doc) Consideration on downlink coverage enhancements ZTE Corporation, Sanechips discussion Rel-19 NR\_NTN\_Ph3-Core

* RAN2 impact with extended SSB periodicity

Observation 1: Legacy NTN barred bit can be used to bar UEs not supporting DL CEs which includes pre-19 UEs and Rel-19 UEs. While new bit is needed for UE supporting DL CEs to differentiate whether the cell is barred for NTN access or only barred for UEs not supporting DL CE.

Observation 2: It is too early to conclude if separate or common indications are needed for UE supporting different features combinations defined for DL CE, if there are multiple ones, since RAN2 has not yet concluded on this topic.

Observation 3: When neighboring cells includes both cells with/without DL CE, methods are needed to prevent UEs not supporting DL CE to perform neighboring cells measurement/reselection to cells operating with DL CE.

Observation 4: NW can add cells with DL CE to excluded cell list for neighboring cells which can be done for connected UE with existing signalling.

Observation 5: For UE in idle/inactive, new excluded list dedicated to UEs capable of DL CE is needed in SIB2/4 in order to still allow the UE to reselects to cells with DL CEs.

Proposal 1: Introduce new indication for UE supporting DL CEs to decide whether the cell is barred or not. ffs on the details.

Proposal 2: RAN2 study methods to prevent UEs not supporting DL CE to re-select to cells operating with DL CE.

Proposal 3: Introduce new excluded list dedicated to UEs capable of DL CE in SIB2/4 for UE capable of DL CEs to decide excluded cells for cell reselection.

* Cell /Beam DTX

Observation 6: cell or beam level on-off period similar to DTX is applicable to NTN cells with beam power sharing considering one cell consists of one or multiple satellite beams.

Observation 7: RAN1 reply LS states that the beam status is only for simulation, which means such beam status is not needed to be provided to UE.

Observation 8: DTX caused due to beam power sharing have impacts on all RRC states since there will be no DL transmission at all in the off period, including transmission of common channels, which is different from legacy cell DTX.

Observation 9: RAN2 needs to further study UE behavior during (de)activate time of DTX, for example RACH procedure, RRM measurements or radio link monitoring.

Proposal 4: RAN2 further studies system level impacts, e.g., on RACH/RRM/RLM, assuming both cell and beam level DTX applicable to all RRC states is supported.

* SMTC impacts

[R2-2408970](file:///C:\Data\3GPP\Extracts\R2-2408970_Dowlink%20coverage%20enhancements%20SMTC%20impacts.docx) Downlink coverage enhancement SMTC impacts Sequans Communications discussion Rel-19 NR\_NTN\_Ph3-Core [R2-2407532](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_127\Docs\R2-2407532.zip)

Observation 1: Existing limitation of SMTCs forces to use an aggregated beam pattern

Observation 2: Scattered beam hopping pattern is beneficial to avoid inter-beam interferences

Observation 3: With scattered beam hopping pattern, up to 6 neighbor SMTCs are required

Proposal 1: RAN2 design should not constrain the beam hopping pattern

Proposal 2: Consider extending the NTN SMTC list / defining a new list to signal at least all neighbor SMTCs

Observation 4: The UE should ideally consider only SMTCs corresponding to the closest neighbor cells

Proposal 3: Consider enhancements to allow location-based UE SMTC selection (broadcast of neighbor cells reference location / SSB indexes associated with SMTCs)

Observation 5: In connected, NW may not have UE location information needed to configure SMTCs to UE

Observation 6: R18 location-based CHO without associated measurement avoids SMTCs configuration, but adds complexity and may increase handover interruption time

Proposal 4: Consider location-based UE SMTC selection also in connected

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

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

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

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

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

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

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

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

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

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

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

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

• Increasing the number and duration of SMTC windows;

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

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

[R2-2408337](file:///C:\Data\3GPP\Extracts\R2-2408337%20Discussion%20on%20DL%20coverage%20enhancements.docx) Discussion on DL coverage enhancements Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1: RAN2 waits for RAN1 input before further discussion on cell level and beam level Cell DTX/DRX pattern.

Proposal 2: RAN2 do not increase the number of SMTCs per frequency.

Proposal 3: RAN2 do not consider location-based SMTC selection.

Cell DTX / Beam DTX

[R2-2408097](file:///C:\Data\3GPP\Extracts\R2-2408097%20RAN2%20Impact%20on%20DL%20coverage%20enhancements.docx) RAN2 Impact on DL coverage enhancements CMCC discussion Rel-19 NR\_NTN\_Ph3-Core

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

Proposal 2: As for NES, no impact to idle UE, e.g., RACH, paging, SIBs and SSB transmission, it is proposed to define different UE behavior is different in the non-actvie status when reusing thecurrent periodic cell DTX/DRX pattern (i.e. active and non-active periods) in Rel-18 NES.

Proposal 3: it is propsed to design the DTX/DRX configuration for common control channels (e.g.SSB, CORESET0/SIB1, SIB19), based on RAN1 LS.

[R2-2408160](file:///C:\Data\3GPP\Extracts\R2-2408160%20-%20Discussion%20on%20DL%20coverage%20enhancement%20for%20NTN.doc) Discussion on DL coverage enhancement for NTN OPPO discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1 During NTN cell DTX non-active duration, the cell/beam is in “off” state, i.e., no DL transmission.

Proposal 2 The configuration of cell/beam DTX in NTN cell should be broadcasted via system information at least.

Proposal 3 The existing NTN bar indication can also be used for Rel-19 UEs not supporting DL coverage enhancement.

Proposal 4 Introduce a new bar indication with the value of notBarred for R19 NTN UEs supporting DL coverage enhancement.

Other

[R2-2408920](file:///C:\Data\3GPP\Extracts\R2-2408920%20(R19%20NR%20NTN%20WI%20AI%208.8.2)%20DL%20coverage.docx) Downlink coverage enhancement for NTN InterDigital discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1a: The following options are considered to bar Rel-19 UEs not supporting DL coverage enhancement when the existing NTN bar bit is set:

- Option 1: The UE follows the existing NTN barring bit

- Option 2: Another existing barring bit (e.g., cellbarredNES) is re-purposed for Rel-19 NTN DL coverage enhancements

- Option 3: A new barring bit (e.g., cellbarredDLcov) is introduced for Rel-19 NTN DL coverage enhancements

Proposal 1b: Postpone conclusion on barring behaviour for Rel-19 UEs not supporting DL coverage enhancement until further progress on DL coverage enhancements.

Proposal 2: UE can be notified of changes to beam power sharing/pattern/size.

Proposal 3: Satellite assistance information (e.g., within SIB19) can be used to predict future changes to beam power sharing/pattern/size.

Proposal 4: Clarify whether existing measurement events (e.g., A1, A2) are sufficient to report the impact from change in beam power sharing/pattern/size.

Proposal 5: UE can consider a future change to beam power sharing/pattern/size during mobility.

Proposal 6: UE can consider a future change to beam power sharing/pattern/size during cell (re)selection.

Proposal 7: Clarify whether existing mechanisms (e.g., TAU/RNAU) are sufficient to track/account for RRC\_IDLE/INACTIVE UE(s) during changes in beam power sharing/pattern/size.

[R2-2407960](file:///C:\Data\3GPP\Extracts\R2-2407960%20Discussion%20on%20Downlink%20Coverage%20Enhancements.docx) Discussion on Downlink Coverage Enhancements CATT discussion NR\_NTN\_Ph3-Core

[R2-2407983](file:///C:\Data\3GPP\Extracts\R2-2407983%20Consideration%20on%20downlink%20coverage%20enhancements.docx) Consideration on downlink coverage enhancements NERCDTV discussion

[R2-2408015](file:///C:\Data\3GPP\Extracts\R2-2408015%20Discussion%20on%20Cell%20Bar%20Control%20for%20DL%20Coverage%20Enhancement.docx) Discussion on Cell Bar Control for DL Coverage Enhancement vivo discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408046](file:///C:\Data\3GPP\Extracts\R2-2408046_Discussion%20of%20NR%20NTN%20coverage%20enhancement.doc) Discussion of NR NTN coverage enhancement China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408155](file:///C:\Data\3GPP\Extracts\R2-2408155%20Discussions%20on%20cell%20DTX%20during%20satellite%20dynamic%20power%20sharing.doc) Discussions on cell DTX during satellite dynamic power sharing Fujitsu discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408284](file:///C:\Data\3GPP\Extracts\R2-2408284%20Discussion%20on%20downlink%20coverage%20enhancement.docx) Discussion on downlink coverage enhancement HONOR discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408300](file:///C:\Data\3GPP\Extracts\R2-2408300%20Access%20control%20for%20NTN%20downlink%20coverage%20enhancement.docx) Access control for NTN downlink coverage enhancement Lenovo discussion Rel-19

[R2-2408411](file:///C:\Data\3GPP\Extracts\R2-2408411%20Consideration%20on%20downlink%20coverage%20enhancement.docx) Consideration on downlink coverage enhancement NEC Corporation. discussion Rel-18 NR\_NTN\_Ph3-Core

[R2-2408459](file:///C:\Data\3GPP\Extracts\R2-2408459%20DL%20coverage%20enhancement%20at%20system%20level.docx) DL coverage enhancement at system level Google discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408465](file:///C:\Data\3GPP\Extracts\R2-2408465%20Discussion%20on%20cell%20DTXDRX%20for%20NTN.doc) Discussion on cell DTX/DRX for NTN Xiaomi discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408593](file:///C:\Data\3GPP\Extracts\R2-2408593.doc) DL coverage enhancement in NTN Apple discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408719](file:///C:\Data\3GPP\Extracts\R2-2408719.docx) SMTC impacts due to NTN downlink coverage enhancements Sony discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408739](file:///C:\Data\3GPP\Extracts\R2-2408739%20Discussion%20on%20Downlink%20Coverage%20Enhancements.docx) Discussion on Downlink Coverage Enhancements CSCN discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408894](file:///C:\Data\3GPP\Extracts\R2-2408894%20Cell%20DTX.docx) Discussion on cell DTX Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409004](file:///C:\Data\3GPP\Extracts\R2-2409004-Discussion_for_DL_coverage_enhancement.docx) Discussion on Downlink Coverage Enhancements Sharp discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409025](file:///C:\Data\3GPP\Extracts\R2-2409025.docx) Discussion on Downlink Coverage Enhancement Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409051](file:///C:\Data\3GPP\Extracts\R2-2409051_Discussion%20on%20the%20impact%20of%20SSB%20extension%20for%20NR%20NTN.docx) Discussion on the impact of SSB extension for NR NTN NTPU discussion Rel-19

[R2-2409180](file:///C:\Data\3GPP\Extracts\R2-2409180%20-%20DL%20coverage%20enhancements.docx) DL coverage enhancements Ericsson discussion Rel-19 NR\_NTN\_Ph3-Core

### 8.8.3 Uplink Capacity/Throughput Enhancement

No contributions are expected for this AI at this meeting.

### 8.8.4 Support of Broadcast service

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

Content of service area and signalling format / service continuity

[R2-2408592](file:///C:\Data\3GPP\Extracts\R2-2408592.doc) Intended broadcast service area provision over NTN Apple discussion Rel-19 NR\_NTN\_Ph3-Core

* Broadcast service session and intended service area mapping provision

Proposal 1: Introduce a service area list for MBS broadcast intended service area configuration in SIB20, with each intended service area associated with a ID.

- CATT wonders if we can fit the information in SIB20 and then prefers to go for a MCCH based approach. LG agrees

- HW thinks the size calculation were done assuming the worst case and if needed we could put the actual intended service areas definitions in another SIB and just the service area IDs in SIB20

- Ericsson thinks that an MCCH based solution would be better to avoid a signalling duplication

- Apple has some concerns with introducing yet a new SIB for this.

- LG thinks that a MCCH based solution can also provide MCCH skipping options.

- CATT agrees with LG and thinks that an MCCH based solution is the only solution.

- Xiaomi also supports an MCCH based solution

- Apple thinks that using MCCH for this would have impacts on legacy UEs

* CB Wednesday to check whether we can agree on one of the following alternative Working Assumptions (or even Agreements):

WA A: We introduce 1) a service area list for MBS broadcast intended service area configuration in SIBXX, with each intended service area associated with an ID and 2) a mapping between broadcast service session and intended service area into MCCH (also working on enhancements to allow UE skipping MCCH re-acquisition when UE is not within intended service area of any interested broadcast service)

WA B: We rely on a full MCCH based solution (i.e. the configuration of intended service areas is directly provided in MCCH, with no changes to SIB) (also working on enhancements to allow UE skipping MCCH re-acquisition when UE is not within intended service area of any interested broadcast service)

Proposal 2: Introduce mapping between broadcast service session and intended service area into MCCH. RAN2 to further discuss enhancements to allow UE skipping MCCH re-acquisition when UE is not within intended service area of any interested broadcast service.

* Service continuity

Proposal 3: Intended service area for broadcast session (which is not targeting for service continuity) is only restricted to serving cell.

Proposal 4: Service continuity can be enhanced in two places by considering intended service area.

• In MBSBroadcastConfiguration, the intended service area within each neighbor cell is provided for each MBS broadcast service session.

• In SIB21, the intended service area is provided for each MBS broadcast service session, or for each FSAI (depending on common understanding selected).

[R2-2408016](file:///C:\Data\3GPP\Extracts\R2-2408016%20Further%20Discussion%20on%20MBS%20Broadcast%20Provision%20in%20NTN.docx) Further Discussion on MBS Broadcast Provision in NTN vivo discussion Rel-19 NR\_NTN\_Ph3-Core

* Network signalling:

Proposal 1: MCCH (i.e. MBSBroadcastConfiguration) is used to include intended service area information.

Proposal 2: Service area ID is used for broadcast service and intended service area association.

* UE behavior:

Proposal 3: Frequency prioritization may be performed only when the UE is located within that service area of the broadcast service of its interested broadcast services.

Proposal 4: For an MBS broadcast service intended for a certain area, a R19 UE supporting the feature may initiate the MBS Interest Indication procedure when UE is entering or leaving the intended area.

[R2-2408047](file:///C:\Data\3GPP\Extracts\R2-2408047_Consideration%20of%20service%20area%20in%20NR%20NTN.doc) Consideration of service area in NR NTN China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

Observation 1: SIB20 contains the basic information of MBS service.

Observation 2: SIB21 is mainly for service continuity of MBS and is not mandatory information.

Observation 3: Introducing service area information in MBSBroadcastConfiguration is later than SIB20 and SIB21.

Observation 4: The spec has configuration of circle or polygon area in SIB25 or SIB8.

Proposal 1: Include service area in SIB20 for rapid awareness of MBS service related information.

Proposal 2: RAN2 specifies the description of service area similar with SIB 25 and SIB8.

[R2-2409184](file:///C:\Data\3GPP\Extracts\R2-2409184%20-%20Support%20for%20broadcast%20services%20in%20NR%20NTN.docx) Support for broadcast services in NR NTN Ericsson discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1 The intended service area of an MBS broadcast service is not provided in system information. FFS on other broadcast services (e.g., ETWS).

Proposal 2 MBS Service Announcement is used to indicate the intended service area for MBS broadcast in NTN cells.

- CATT wonders if we can reuse the MBS service announcement as is or if we need to ask SA2 to introduce changes. Ericsson confirms we need to ask SA2 to perform changes.

- LG supports the Ericsson proposal as this would be the cleanest way and think we can send an LS to SA2.

- Apple thinks we cannot exclude enhancements in AS layer if the information that SA2 can provide is at cell level.

- Samsung wonders if this would be consistent with the WI objective

- CMCC wonders if SA2 would have time to work on this in Rel-18

- Nokia wonders if the issue is so severe that we cannot solve it in RAN2 and need to involve other groups

- Lenovo thinks it’s not a good idea to go for a NAS solution, and we would still need to address NAS/AS interaction. Oppo agrees

- Thales thinks a NAS solution would probably work but the WID objective is to work on a AS solution.

- Ericsson wonders if we can work on both approaches

- Samsung can accept to send an LS to ask

- Apple thinks it’s not clear how we could test the UE behaviour if we only rely on a NAS based solution.

Proposal 3 Legacy mechanisms for service continuity in 5G MBS Broadcast should be reused for MBS broadcast with NTN.

Proposal 4 RAN2 focuses on the scenario where the quasi-Earth-fixed cell is replaced due to satellite movement.

Proposal 5 Introduce geographic information in ETWS notification for geo-fencing in NTN cells.

Geo-fencing ETWS notification

[R2-2408946](file:///C:\Data\3GPP\Extracts\R2-2408946%20On%20MBS%20Support%20in%20Rel-19%20NR%20NTN.docx) On MBS Support in Rel-19 NR NTN Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_NTN\_Ph3

Proposal 1: RAN2 to confirm that for ETWS message dissemination through broadcast over NTN (if supported), initially will focus on primary notification message.

Proposal 2: RAN2 to discuss means for geo-fencing broadcast ETWS messages over NTN cells.

Proposal 3: RAN2 to decide what is the impact to the gNB in case of supporting geo-fencing for ETWS.

[R2-2407961](file:///C:\Data\3GPP\Extracts\R2-2407961%20Discussion%20on%20support%20of%20broadcast%20service%20in%20NR%20NTN.docx) Discussion on support of broadcast service in NR NTN CATT discussion NR\_NTN\_Ph3-Core

[R2-2407982](file:///C:\Data\3GPP\Extracts\R2-2407982%20Discussion%20on%20support%20of%20broadcast%20service%20in%20NTN.docx) Discussion on support of broadcast service in NTN NERCDTV discussion

[R2-2408080](file:///C:\Data\3GPP\Extracts\R2-2408080%20Discussion%20on%20MBS%20broadcast%20service%20for%20NR%20NTN.docx) Discussion on MBS broadcast service for NR NTN CMCC discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408138](file:///C:\Data\3GPP\Extracts\R2-2408138%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

[R2-2408156](file:///C:\Data\3GPP\Extracts\R2-2408156%20Discussions%20on%20supporting%20broadcast%20intended%20to%20serve%20partial%20cell.doc) Discussions on supporting broadcast intended to serve partial cell Fujitsu discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408285](file:///C:\Data\3GPP\Extracts\R2-2408285%20Discussion%20on%20the%20support%20of%20broadcast%20service.docx) Discussion on the support of broadcast service HONOR discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408301](file:///C:\Data\3GPP\Extracts\R2-2408301%20Further%20considerations%20for%20broadcast%20service%20area%20indication%20(Revision%20of%20R2-2406871).docx) Further considerations for broadcast service area indication Lenovo discussion Rel-19

[R2-2408338](file:///C:\Data\3GPP\Extracts\R2-2408338%20Discussion%20on%20MBS%20broadcast%20over%20NTN.docx) Discussion on MBS broadcast over NTN Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408464](file:///C:\Data\3GPP\Extracts\R2-2408464.docx) Discussion on Support of MBS Broadcast Service over NTN TCL discussion

[R2-2408488](file:///C:\Data\3GPP\Extracts\R2-2408488%20Discussion%20on%20intended%20service%20area_v2.docx) Discussion on MBS Broadcast service area signaling THALES discussion Rel-19 NR\_NTN\_Ph3-Core [R2-2406606](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_127\Docs\R2-2406606.zip)

[R2-2408602](file:///C:\Data\3GPP\Extracts\R2-2408602_Further%20details%20on%20intended%20service%20area%20for%20MBS%20and%20ETWS.docx) Further details on intended service area for MBS and ETWS NEC discussion

[R2-2408619](file:///C:\Data\3GPP\Extracts\R2-2408619_Discussion%20on%20the%20support%20of%20broadcast%20service.doc) Discussion on the support of broadcast service Xiaomi discussion

[R2-2408656](file:///C:\Data\3GPP\Extracts\R2-2408656%20Consideration%20on%20broadcast%20service%20enhancements.doc) Consideration on broadcast service ehancements ZTE Corporation, Sanechips discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408685](file:///C:\Data\3GPP\Extracts\R2-2408685_NTN_MBS.docx) Discussions on MCCH reacquiring ITRI discussion NR\_NTN\_Ph3-Core

[R2-2408892](file:///C:\Data\3GPP\Extracts\R2-2408892%20MBS%20broadcast%20in%20NTN.docx) Signaling of MBS broadcast service area information Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408958](file:///C:\Data\3GPP\Extracts\R2-2408958%20(R19%20NR%20NTN%20WI%20AI%208.8.4)%20Broadcast.docx) Support for broadcast service in non-terrestrial networks InterDigital, Europe, Ltd. discussion Rel-19

[R2-2408988](file:///C:\Data\3GPP\Extracts\R2-2408988%20NTN%20Discussion%20on%20support%20of%20broadcast%20service%20in%20NTN_final.docx) Discussion on support of broadcast service in NTN LG Electronics France discussion Rel-19 38.331 NR\_NTN\_Ph3-Core [R2-2407418](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_127\Docs\R2-2407418.zip)

[R2-2409002](file:///C:\Data\3GPP\Extracts\R2-2409002-UE%20behaviour%20for%20MBS%20related%20procedures.docx) UE behaviour for MBS related procedures Sharp discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409003](file:///C:\Data\3GPP\Extracts\R2-2409003-Discussion%20on%20MBS%20service%20area%20information.docx) Discussion on MBS service area information Sharp discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409026](file:///C:\Data\3GPP\Extracts\R2-2409026.docx) Discussion on MBS Broadcast Service Intended Area Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409113](file:///C:\Data\3GPP\Extracts\R2-2409113_remaining%20issues%20on%20signaling%20for%20the%20support%20of%20broadcast%20service%20in%20NTN.docx) Remaining issues for the support of broadcast service in NTN ETRI discussion Rel-19 NR\_NTN\_Ph3-Core

### 8.8.5 Support of regenerative payload

Contributions should focus on the needed updates for Stage 2 description and on whether any existing essential features would be affected - and potentially need any modifications - in a regenerative payload architecture.

[R2-2408893](file:///C:\Data\3GPP\Extracts\R2-2408893%20Regenerative%20payload.docx) Discussion on regenerative payload Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

Proposal 1 From RAN2 perspective, the RRC reestablishment and RRC\_INACTIVE state works without any optimization when gNB is on board satellite. RAN2 can revisit the issue if there is any impact foreseen due to RAN3 work on this matter.

Proposal 2 After early contention resolution, i.e., after sending HARQ feedback of the message containing only contention resolution MAC CE, a UE waits UE-gNB RTT to monitor the PDCCH for further downlink message.

Proposal 3 Clarify that satellite switch with resync over regenerative payload architecture is not supported in Rel-19.

[R2-2409179](file:///C:\Data\3GPP\Extracts\R2-2409179%20-%20Regenerative%20payload.docx) Regenerative payload Ericsson discussion Rel-19 NR\_NTN\_Ph3-Core

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

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

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

Proposal 2 Consider the text proposal in section 4.

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

[R2-2407962](file:///C:\Data\3GPP\Extracts\R2-2407962%20Further%20discussion%20on%20regenerative%20payload.docx) Further discussion on regenerative payload CATT discussion NR\_NTN\_Ph3-Core

[R2-2408161](file:///C:\Data\3GPP\Extracts\R2-2408161%20-%20Discussion%20on%20satellite%20switch%20with%20resynch%20for%20regenerative%20payload.doc) Discussion on satellite switch with resynch for regenerative payload OPPO discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408283](file:///C:\Data\3GPP\Extracts\R2-2408283%20Discussion%20on%20regenerative%20payload.docx) Discussion on regenerative payload HONOR discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408302](file:///C:\Data\3GPP\Extracts\R2-2408302%20UE%20location%20verification%20in%20NTN%20regenerative%20architecture%20(Revision%20of%20Revision%20of%20R2-2406872).docx) UE location verification in NTN regenerative architecture Lenovo discussion Rel-19

[R2-2408339](file:///C:\Data\3GPP\Extracts\R2-2408339%20Discussion%20on%20the%20RA-SDT%20in%20Regenerative%20payload.docx) Discussion on regenerative payload Huawei, HiSilicon, Turkcell discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408657](file:///C:\Data\3GPP\Extracts\R2-2408657%20Consideration%20on%20remaining%20NTN%20issues.doc) Consideration on NTN remaining issues ZTE Corporation, Sanechips discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408716](file:///C:\Data\3GPP\Extracts\R2-2408716.docx) Satellite switch with re-sync in regenerative payload Sony discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408806](file:///C:\Data\3GPP\Extracts\R2-2408806%20On%20adaptations%20related%20to%20regenerative%20payload%20for%20NR%20NTN.docx) On adaptations related to regenerative payload for NR NTN Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408947](file:///C:\Data\3GPP\Extracts\R2-2408947%20Remaining%20Issues%20for%20NTN%20over%20Regenerative%20Architecture.docx) Remaining Issues for NTN over Regenerative Architecture Nokia, Nokia Shanghai Bell discussion Rel-19 NR\_NTN\_Ph3

[R2-2408980](file:///C:\Data\3GPP\Extracts\R2-2408980_NTN_Regenerative.docx) Discussion on regenerative payload Fujitsu Limited discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409071](file:///C:\Data\3GPP\Extracts\R2-2409071%20Discussion%20on%20support%20of%20regenerative%20payload.docx) Discussion on support of regenerative payload ETRI discussion Rel-19 NR\_NTN\_Ph3-Core

### 8.8.6 LTE to NR NTN mobility

Contributions should focus on the remaining issues for the support of idle mode mobility between LTE and NR NTN.

Moved here from 8.8.1

[R2-2407964](file:///C:\Data\3GPP\Extracts\R2-2407964%20Open%20issue%20list%20and%20rapporteur's%20input%20for%20LTE_TN_NR_NTN_mob%20WI.docx) Open issue list and rapporteur's input for LTE\_TN\_NR\_NTN\_mob CATT discussion LTE\_TN\_NR\_NTN\_mob

[Issue 1] Signalling design to avoid ephemeris duplication for the same satellite providing both IoT NTN and NR NTN cells

Proposal 1: RAN2 agrees the following signalling design to avoid ephemeris duplication for the same satellite providing both IoT NTN and NR NTN:

* The satelliteId-r19 in an entry of NR NTN assistance info list (i.e. neighSatelliteInfoListNR) can be set equal to a Satellite ID value included in IoT NTN assistance info list (i.e. neighSatelliteInfoList) and thus refers to the ephemeris data of IoT NTN identified by this specific Satellite ID, in which case the ephemeris data (i.e. ephemerisInfo-r19) in that entry of neighSatelliteInfoListNR can be absent.
* Agreed

Proposal 1a: If Proposal 1 is agreeable, RAN2 agrees the TP for Signalling Alt.B in the Appendix.

* Agreed

(Below discussion on satellite ID assignment only after P1/1a concluded)

Proposal 1b: Regarding satellite ID assignment across IoT NTN and NR NTN satellite assistance info lists, RAN2 discusses whether it can be left to NW implementation to handle, or any clarification is needed in the specification (e.g. preventing the same satellite ID being assigned to two different entries in the same list or two entries with different ephemeris across different lists).

* Regarding satellite ID assignment across IoT NTN and NR NTN satellite assistance info lists, RAN2 thinks this can be left to NW implementation to handle.

[Issue 2] Whether to avoid duplication of other information than ephemeris data in the case of same satellite serving both NR NTN and IoT NTN

Proposal 2: RAN2 sticks to the agreement that only duplication of ephemeris data needs to be avoided in the case of same satellite supporting both NR NTN and IoT NTN.

* Agreed

[Other Stage-3 issues]

Proposal 3: RAN2 confirms the understanding that dedicated NR NTN frequency is not configured in the RRCConnectionRelease message, and confirms that this can be left to NW implementation (w/o Spec impact).

- QC is ok with this but thinks it’s fine to clarify this somewhere

- Samsung thinks we should separate the case of providing dedicated frequencies from the redirection case. Xiaomi agrees, redirection could be performed providing assistance information in the release message. LG shares similar view as Samsung but thinks the NW does not need to provide assistance info

- China Telecom thinks satellite information would be needed to support redirection to NR NTN

- QC thinks that either we go for proposal 3 or we need to introduce a UE capability for this.

* Come back in the next meeting

[R2-2408081](file:///C:\Data\3GPP\Extracts\R2-2408081%20Discussion%20on%20left%20issues%20of%20LTE%20to%20NR%20mobility.docx) Discussion on left issues of LTE to NR mobility CMCC discussion Rel-19 LTE\_TN\_NR\_NTN\_mob

Proposal 1: Discuss between current description structure in [2] and put the change above in 10.2.1 cell reselection directly.

Proposal 2: If the latter solution in proposal 1 is agreed, suggest RAN2 to adopt the TP in annex.

Proposal 3: Suggest modified Alt A with a "SEQUENCE" instead of "CHOICE"signaling structure to include the Satellite reference ID and explicit ephemeris data configuration for a same satellite supporting both NR NTN and IoT NTN.

Proposal 4: Confirm that only avoids repeating the ephemeris for a satellite which provides both IoT NTN and NR NTN cells.

[R2-2408048](file:///C:\Data\3GPP\Extracts\R2-2408048_Signaling%20design%20optimization%20for%20satellite%20information.doc) Signaling design optimization for satellite information China Telecom discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408674](file:///C:\Data\3GPP\Extracts\R2-2408674.docx) Remaining Issues on NR Satellite Info Provision in LTE TN cell NEC discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408257](file:///C:\Data\3GPP\Extracts\R2-2408257_SIB33_Multi-Beam_Signalling.docx) SIB33 multi-beam signalling PANASONIC discussion

Proposal 1: Add a beam-related loop – enabling the indication of the characteristics of multiple beams – to SIB33(-NB).

Proposal 2: Adopt the coding proposal outlined with clause 2.2.2 of this document R2-2408257 for an efficient coding of multiple beam characteristics as part of SIB33(-NB) – a fully backwards-compatible extension.

* Noted

## 8.9 IoT NTN Ph3

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

Time budget: 1 TU

Tdoc Limitation: 3 tdocs

### 8.9.1 Organizational

LS, Rapporteur input, including workplan, etc.

Rapporteur inputs do not count towards the tdoc limitation.

Incoming LSs

[R2-2407920](file:///C:\Data\3GPP\Extracts\R2-2407920_R1-2407548.docx) Reply LS to RAN2 on UL synchronization for contention based Msg3 transmission without Msg1/Msg2 (R1- 2407548; contact: ZTE) RAN1 LS in Rel-19 IoT\_NTN\_Ph3-Core To:RAN2, RAN4

[R2-2407931](file:///C:\Data\3GPP\Extracts\R2-2407931_R4-2414114.doc) Reply LS to RAN2 on UL synchronization for contention based Msg3 transmission without Msg1/Msg2 (R4-2414114; contact: ZTE) RAN4 LS in Rel-19 IoT\_NTN\_Ph3-Core To:RAN2 Cc:RAN1

[R2-2407938](file:///C:\Data\3GPP\RAN2\Docs\R2-2407938.zip) LS on reply to LS on FS\_5GSAT\_Ph3\_ARCH conclusions (S3-243533; contact: Nokia) SA3 LS in Rel-19 FS\_5GSAT\_Ph3\_ARCH To:SA2 Cc:SA3-LI, RAN2

Workplan

[R2-2408635](file:///C:\Data\3GPP\Extracts\R2-2408635%20R19%20IOT%20NTN%20WorkPlan.docx) Revised work Plan for Rel-19 IoT NTN MediaTek Inc. Work Plan IoT\_NTN\_Ph3-Core [R2-2402941](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_125bis\Docs\R2-2402941.zip)

Rapporteurs’ inputs

[R2-2409182](file:///C:\Data\3GPP\Extracts\R2-2409182%20-%20Draft%20stage%202%20Introduction%20of%20IoT%20NTN%20phase%203.docx) Introduction of IoT NTN phase 3 Ericsson draftCR Rel-19 36.300 18.3.0 B IoT\_NTN\_Ph3-Core

### 8.9.2 Support of Store & Forward

Contributions should focus on possible impacts to the radio interface.

[R2-2408244](file:///C:\Data\3GPP\Extracts\R2-2408244.docx) Considerations on S&F operation from device perspective Telit Communications S.p.A., Novamint, Sateliot, Thales discussion Rel-19 [R2-2407487](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_127\Docs\R2-2407487.zip)

[R2-2408389](file:///C:\Data\3GPP\Extracts\R2-2408389%20Access%20Control%20for%20Store%20and%20Forward%20Operation.docx) Access Control for Store and Forward Operation CATT, Huawei, HiSilicon, CMCC, vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2407966](file:///C:\Data\3GPP\Extracts\R2-2407966%20Discussion%20on%20RAN2%20impacts%20due%20to%20the%20Satellite%20ID%20List%20from%20MME%20in%20S&F%20operation.DOCX) Discussion on RAN2 impacts due to the satellite ID list from MME in S&F operation CATT discussion IoT\_NTN\_Ph3-Core

[R2-2408017](file:///C:\Data\3GPP\Extracts\R2-2408017%20RAN2%20Aspect%20for%20S&F%20Operation.docx) RAN2 Aspect for S&F Operation vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408049](file:///C:\Data\3GPP\Extracts\R2-2408049_Remaining%20issues%20of%20IoT%20NTN%20Store%20&%20Forward.doc) Remaining issues of IoT NTN Store & Forward China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408064](file:///C:\Data\3GPP\Extracts\R2-2408064%20Support%20of%20Store%20&%20Forward%20for%20IoT-NTN.docx) Discussion on support of Store&Forward Transsion Holdings discussion Rel-19

[R2-2408066](file:///C:\Data\3GPP\Extracts\R2-2408066%20Discussion%20on%20IoT%20NTN%20Store%20and%20Forward.docx) Discussion on IoT NTN Store and Forward CMCC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408108](file:///C:\Data\3GPP\Extracts\R2-2408108%20Further%20consideration%20on%20Store%20and%20Forward.docx) Further consideration on Store and Forward Huawei, HiSilicon, Turkcell, China Southern Power Grid discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408282](file:///C:\Data\3GPP\Extracts\R2-2408282%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

[R2-2408303](file:///C:\Data\3GPP\Extracts\R2-2408303%20Access%20control%20and%20information%20exchange%20for%20Store%20and%20Forward%20operation.docx) Access control and information exchange for Store and Forward operation Lenovo discussion Rel-19

[R2-2408333](file:///C:\Data\3GPP\Extracts\R2-2408333%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

[R2-2408360](file:///C:\Data\3GPP\Extracts\R2-2408360%20Discussion%20on%20information%20for%20Store%20&%20Forward.docx) Discussion on information for Store & Forward ASUSTeK discussion Rel-19 IoT\_NTN\_Ph3-Core [R2-2406526](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_127\Docs\R2-2406526.zip)

[R2-2408460](file:///C:\Data\3GPP\Extracts\R2-2408460%20Access%20control%20and%20the%20S&F%20indication.docx) Access control and the S&F indication Google discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408501](file:///C:\Data\3GPP\Extracts\R2-2408501%20-%20Discussion%20on%20Store%20&%20Forward%20statellite%20operation.doc) Discussion on Store & Forward satellite operation OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408591](file:///C:\Data\3GPP\Extracts\R2-2408591.doc) Support of S&F operation in IoT NTN Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408620](file:///C:\Data\3GPP\Extracts\R2-2408620_Discussion%20on%20the%20support%20of%20store%20and%20forward.doc) Discussion on the support of store and forward Xiaomi discussion

[R2-2408622](file:///C:\Data\3GPP\Extracts\R2-2408622%20RAN2%20impact%20on%20SF%20mode.docx) RAN2 impact on S&F mode MediaTek Inc. discussion IoT\_NTN\_Ph3-Core [R2-2406821](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_127\Docs\R2-2406821.zip)

[R2-2408675](file:///C:\Data\3GPP\Extracts\R2-2408675.docx) Radio Interface Aspect of Store and Forward NEC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408754](file:///C:\Data\3GPP\Extracts\R2-2408754-Store-Forward-RAN-Aspects.docx) On RAN2 Impacts of SF Operation Nokia, Nokia Shanghai Bell discussion

[R2-2408802](file:///C:\Data\3GPP\Extracts\R2-2408802%20Discussion%20on%20Store%20and%20Forward.docx) Discussion on Store and Forward Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408895](file:///C:\Data\3GPP\Extracts\R2-2408895%20store%20and%20forward.docx) Discussion on S&F mode operation Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408905](file:///C:\Data\3GPP\Extracts\R2-2408905%20-%20considerations%20on%20multi%20satellite%20for%20S&F.docx) Considerations on multi-satellite for S&F Satellite operation NOVAMINT, Sateliot discussion

[R2-2408956](file:///C:\Data\3GPP\Extracts\R2-2408956.doc) Considerations on Store & Forward Satellite Operation SHARP Corporation discussion

[R2-2408971](file:///C:\Data\3GPP\Extracts\R2-2408971_Support%20of%20Store%20&%20Forward.docx) Support of Store & Forward Sequans Communications discussion Rel-19 IoT\_NTN\_Ph3-Core [R2-2407537](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_127\Docs\R2-2407537.zip)

[R2-2409064](file:///C:\Data\3GPP\Extracts\R2-2409064_IoT-NTN_S&F.docx) Discussion on Store & Forward operation DENSO CORPORATION discussion IoT\_NTN\_Ph3-Core

[R2-2409189](file:///C:\Data\3GPP\Extracts\R2-2409189%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

### 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).

CB-msg3 EDT-like mechanism

* Collision reduction for CB-msg3
  + Working point

[R2-2409170](file:///C:\Data\3GPP\RAN2\Docs\R2-2409170.zip) Operator views on EDT enhancements and CRDSA Inmarsat, Viasat discussion Rel-19 Late

Observation 1: In satellite communications, an equivalent Transport Block Error Rate (BLER) of 10^-3 (0.1%) is considered the standard target, with 10^-2 (1%) being the minimum. For the purposes of this discussion BLER and Packet Loss Rate (PLR) are equivalent.

Observation 2: Current NB-IoT NTN GEO implementations in the field typically use a 10^-2 BLER (1%) target.

Proposal 1: Consider a Packet Loss Rate target of 1% or less, ideally 0.1% (10^-3 BLER).

Observation 3: “Load” is a relative metric, different from the actual useful information channel capacity.

Observation 4: As also pointed out in [R2-2407555](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_127\Docs\R2-2407555.zip), at high MAC load, all schemes end up in a very high packet loss anyways due to a high collision rate, and other mechanisms have to be used, such as Access Class Barring (ACB) and other access control techniques.

Proposal 2: Consider absolute capacity in terms of delivered information bits/s as the comparison metric, instead of system load.

Proposal 3: A fixed reference time interval shall be taken into account when comparing capacity of DSA/CRDSA with SA/4-step RA and other mechanisms, e.g one RTT or the total time of a complete 4-step EDT transaction (Msg1, Msg2 and Msg4) in ideal condition and 0% PLR.

Observation 5: In satellite deployments, there are many factors that can result in power imbalances between received transmissions, but a relatively close correlation/similarity between replicas from the same UE.

Observation 6: Power imbalances between received transmissions can be used by the base station to aid interference cancellation.

Proposal 4: SIC and replica indexing mechanisms at the Network could be left to implementation, thus RAN1 impact may not be required.

[R2-2408863](file:///C:\Data\3GPP\Extracts\R2-2408863.docx) Discussion on throughput and delay performance of slotted ALOHA and diversity slotted ALOHA DLR, ESA discussion Rel-19

Observation 1: When retransmissions are not considered, DSA can improve throughput substantially with respect to SA for a broad range of packet loss rates of practical relevance. For instance, for a target service PLR of 0.05 (reliability 0.95), a 3-fold throughput increase is achieved with DSA-3 over SA.

Observation 2: DSA leads to significant throughput improvements over SA even when retransmissions are considered, for practical values of service level PLR, and when it is desirable to have a reasonable delay.

Proposal 1: RAN2 to study improved random access protocols for Msg3-EDT transmissions without msg1/ Random Access Response, with focus on low-complexity techniques as DSA and CRDSA.

[R2-2408547](file:///C:\Data\3GPP\Extracts\R2-2408547.docx) Repetitions and Delay Considerations about SA and DSA ESA, Eutelsat Group, Viasat, Inmarsat, Novamint, Echostar, Sateliot, Toyota ITC discussion Rel-19

Observation 1: The DSA solution is improving the Msg3-EDT throughput by about a factor of 4.5 without any impacts on the current receiver implementation at the network, and minimal specification impact overall.

Observation 2: The CRDSA solution is improving the Msg3-EDT throughput by about a factor from 20 to 40, depending on the selected configuration.

Observation 3: The SA PLR working point must be lower than 50%.

Observation 4: The DSA scheme outperforms SA up to PLR = 40%.

Observation 5: For target PLR greater than 10%, the packet delivery time with 99% acceptance rate can exceed several seconds in GEO systems.

Proposal 1: RAN2 to specify the support of Msg#3-EDT replicas (i.e., introduction of DSA solutions).

Proposal 2: RAN2 to specify the indexing strategy of the Msg#3-EDT replicas, when multiple copies are transmitted.

* [AT127bis][301][R19 IoT NTN] Working point for CB-msg3 (NEC)

Scope: Discuss the working point for the CB-msg3 EDT-like mechanism (i.e. which packet loss rate we need to target), e.g. based on the considerations in [R2-2409170](file:///C:\Data\3GPP\RAN2\Docs\R2-2409170.zip), [R2-2408863](file:///C:\Data\3GPP\Extracts\R2-2408863.docx) and [R2-2408547](file:///C:\Data\3GPP\Extracts\R2-2408547.docx)

Intended outcome: Report of the offline discussion

F2F offline time and location: Wednesday 2024-10-16 10:30-11:00 (morning coffee break) in Brk1 room

Deadline for rapporteur's summary (in R2-2409231): Wednesday 2024-10-16 14:00

R2-2409231 Report of [AT127bis][301][R19 IoT NTN] Working point for CB-msg3 NEC discussion Rel-19 IoT\_NTN\_Ph3-Core

* + Use of OCC vs (or together) replicas (DSA/CRDSA)

[R2-2408413](file:///C:\Data\3GPP\Extracts\R2-2408413.docx) Consideration on UL capacity enhancement for IoT-NTN NEC Corporation. discussion Rel-18 IoT\_NTN\_Ph3-Core

Observation 10: The packet loss rate of SA with OCC increases linearly as the overload factor rises from 0% to 200%. This rate is lower than that of SA without OCC in all overload factor ranges and less than half of SA without OCC's packet loss rate when the overload factor exceeds 100%.

Observation 11: SA with OCC demonstrates superior throughput compared to SA without OCC across all overload factor ranges. The throughput is twice as high when the overload factor is at 90% and five times higher when the overload factor reaches 200%.

Proposal 4: RAN2 should consider implementing OCC to further improve the CB-msg3 capacity, especially if SA/CRDSA CB-msg3 repetition is supported.

Observation 13: CA demonstrates packet loss rates of lower than 50%, when the overload factor is lower than 90%. For DSA, SA, and CRDSA, the corresponding overload factors are 70%, 80%, and 115%.

Observation 14: In a large overload factor region (80%-200%), CA maintains a robust throughput of around 60 kbps and achieves higher throughput than SA and DSA in almost all overloading regions. CRDSA reaches peak throughput when the overload factor is under 90% but experiences throughput loss with an overload factor larger than 125%.

Proposal 5: RAN2 should further discuss the use of CA as the CB-msg3 mechanism, especially if SA/CRDSA CB-msg3 repetition is not supported.

Proposal 6: Ask RAN1 whether the discussion on NPUSCH capacity enhancement with OCC applies to CB-msg3 without msg1/2.

Proposal 7: Ask RAN1 whether channel estimation will pose a challenge for implementing interference cancellation for CRDSA CB-msg.

Proposal 8: Ask RAN1, for IoT-NTN CB-msg3, whether the repetition of SA/DSA/CRDSA will result in downlink desynchronization or violate other physical layer constraints.

Proposal 9: Ask RAN1, whether the 10% BLER for SA/DSA/CRDSA without repetition and 1% BLER for CA and SA/DSA/CRDSA with repetition are suitable for the system-level evaluation of CB-msg3 throughput and packet loss ratio. If not, please recommend the proper value from link-level.

[R2-2408018](file:///C:\Data\3GPP\Extracts\R2-2408018%20Discussion%20on%20CB-Msg3%20EDT%20Enhancement.docx) Discussion on CB-Msg3 EDT Enhancement vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

Observation 1: OCC provides the best peak performance gain in both UL throughput and packet loss rate.

Observation 2: DSA and CRDSA provide performance gain in both UL throughput and packet loss rate only when the channel load is light (e.g. G <= 0.3), at the cost of more UE power consumption.

Observation 3: The performance gain in both UL throughput and packet loss rate between OCC and CRDSA with ideal SIC is quite near (i.e. within 1.5%) when the channel load is light or medium (e.g. G <= 0.6).

Observation 4: The performance of DSA and CRDSA is worse than SA in both UL throughput and packet loss rate when the channel load is high (e.g. G >= 1).

Observation 5: Compared with SA, DSA leads to more than 10% of maximum UL throughput degradation while the performance gain in both UL throughput and packet loss rate is less than 10% when the channel load is light.

Observation 6: Enanbling retransmission after backoff time has negligible impacts on UL throughput while significantly improving packet loss rate performance in any channel load case.

Observation 7: Adopting DSA and CRDSA for contention-based Msg3 transmission requires specific RAN1/RAN2 spec modification.

Proposal 1: RAN2 firstly asks RAN1 whether the OCC solution for NPUSCH on which they are working can be applied to contention-based Msg3 PUSCH or not.

Proposal 2: Support re-attempt after backoff time (like PRACH) for contention-based Msg3 PUSCH.

[R2-2408334](file:///C:\Data\3GPP\Extracts\R2-2408334%20Comparison%20of%20solutions%20for%20UL%20capacity%20enhancements%20in%20IoT%20NTN.docx) Comparison of solutions for UL capacity enhancements in IoT NTN ZTE Corporation, Sanechips discussion Rel-19 IoT\_NTN\_Ph3-Core

* + Possible concerns with (CR)DSA

[R2-2408109](file:///C:\Data\3GPP\Extracts\R2-2408109%20Discussion%20on%20the%20mechanisms%20for%20UL%20capacity%20enhancement%20based%20on%20simulation%20results.docx) Discussion on the mechanisms for UL capacity enhancement based on simulation results Huawei, HiSilicon, CTCC, CATT, Nokia, Nokia Shanghai Bell, Apple, Turkcell, China Southern Power Grid discussion Rel-19 IoT\_NTN\_Ph3-Core

Observation 1: DSA/CRDSA requires that the system load is medium or low to avoid decoding failure, but if system load is medium or low, the UL capacity enhancement is not so necessary.

Observation 2: In typical cases, the throughput gains of both DSA and CRDSA are marginal compared with SA. The capacity of DSA and CRDSA can be even worse than SA, when the system load becomes higher than a certain level.

Observation 3: DSA and CRDSA will lead to unnecessary power and resource consumption, which is critical to IoT device.

Observation 4: Supporting of CRDSA leads to higher complexity for NTN system and brings challenges for both the algorithm implementations and storage on satellites.

Proposal 1a: RAN2 concludes to not support CRDSA in this release.

Proposal 1b: RAN2 discusses whether to support DSA, by taking into account its performance in the high-load scenarios.

* All other aspects

[R2-2409181](file:///C:\Data\3GPP\Extracts\R2-2409181%20-%20UL%20capacity%20enhancements%20for%20IoT%20NTN.docx) UL capacity enhancements for IoT NTN Ericsson discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1 The baseline for uplink capacity enhancements is EDT.

Proposal 2 The Rel-19 uplink capacity enhancement is referred to as preamble-less EDT or RACH-less EDT.

Proposal 3 Diversity Slotted Aloha is considered beneficial and will be supported

Proposal 4 RAN2 will not further consider CRDSA.

* Resource allocation

Proposal 5 System Information is used to provide preamble-less EDT cell specific PUSCH resources for Msg3 transmission. FFS on signalling details.

Proposal 6 Preamble-less EDT cell specific PUSCH resources for Msg3 transmission are provided per CE level.

Proposal 7 Preamble-less EDT cell specific PUSCH resources are associated with number of repetitions, RSRP selection threshold and largest TBS for Msg3 transmission.

* TA handling

Observation 8 The UE will verify uplink synchronization before sending Msg3.

Observation 9 The UE may not receive any Timing Advance Command before sending Msg3.

Proposal 8 Preamble-less EDT does not require a running TAT for Msg3 transmission.

* Collision detection / backoff / fallback procedure

Proposal 9 After a failure in Msg3 transmission, the UE may attempt another transmission after waiting for a random back-off and increasing the transmission power.

Proposal 10 After a number of failed Msg 3 transmission attempts, the UE falls back to 4-step random access EDT. FFS on the maximum number of transmission attempts.

* RNTI calculation

Proposal 11 The RNTI used to schedule Msg4 transmission is derived based on the PUSCH time-frequency resource(s) used for contention based Msg3 EDT transmission.

* Efficient delivery of msg4

Proposal 12 Introduce multiplexing of several UE Contention Resolution Identities in Msg4.

Proposal 13 For DSA and CRDSA, RAN2 shall first discuss whether it is feasible to integrate them with repetition.

[R2-2408082](file:///C:\Data\3GPP\Extracts\R2-2408082%20Further%20discussion%20on%20uplink%20capacity%20enhancement%20for%20IoT-NTN.docx) Further discussion on uplink capacity enhancement for IoT-NTN CMCC discussion Rel-19 IoT\_NTN\_Ph3-Core

Observation 1: Based on the feedback from RAN1/4, the pre-compensated TA could satisfy the required timing accuracy for Msg3 transmission without Msg1/Msg2.

Proposal 1: RAN2 could confirm to continue work on a CB-Msg3 EDT-like mechanism.

* Contention-based Msg3 transmission:

Observation 2: There are two types of trigger conditions for existing MO-EDT, that is request the establishment or resumption of the RRC Connection for Mobile Originated data by upper layers and whether the the uplink data size is less than or equal to a TB size indicated in the system information.

Proposal 2: For the trigger of contention-based Msg3 transmission in IoT-NTN, it is at least to support the establishment or resumption of the RRC Connection requested by the upper layers.

Proposal 3: For the Msg3 content in contention-based Msg3 transmission for EDT in IoT-NTN, the Msg3 content in current MO-EDT could be the baseline.

Proposal 4: For resource allocation, one or more contention-based PUR pool(s) could be configured via broadcast manner.

Proposal 5: A similar contention resolution scheme in CBRA procedure (i.e. whether Msg4 carrying a UE Contention Resolution Identity matches the 48 first bits of the CCCH SDU transmitted in Msg3) could be considered as the baseline to resolve the collision issue of EDT based on CBS PUR.

Proposal 6: If combination EDT and contention-based PUR is supported, the above procedure could be the baseline.

Proposal 7: It is proposed to introduce a maximum number of EDT transmissions based on shared PUR resource to avoid the more serious delay caused by too many attempts.

Proposal 8: If UE attempts up to the maximum number of EDT transmissions, a fall back mechanism could be considered, i.e., to perform legacy RACH procedure to obtain UL resource.

Proposal 9: Suggest RAN2 to discuss combination OCC and CB-Msg3 for NB-IoT for UL capacity improvement.

* Diversity Slotted ALOHA (DSA) and Contention Resolution Diversity Slotted Aloha (CRDSA):

Observation 3: CRDSA provides a better throughput performance of the CRDSA compared to DSA.

Proposal 10: It is proposed that deprioritize the discussion of CRDSA in R19 considering the limited TUs or if majority prefer to discuss, an LS to RAN1 to make more evaluation about CRDSA or similar schemes is needed.

[R2-2408590](file:///C:\Data\3GPP\Extracts\R2-2408590.doc) Uplink capacity enhancement in IoT NTN Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

* Issue 1: Contention based Msg3 resource configuration

Proposal 1: Contention based Msg3 resource set comprises of a group of periodic Msg3 resource.

Proposal 2: Aim to support multiple sets of contention based Msg3 resources with different repetition level, size, periodicity, etc.

Proposal 3: RAN2 to decide whether contention based shared Msg3 resource provision is via RRCConnectionRelease or SIB.

- If Option 1 (via RRCConnectionRelease message) is selected, RAN2 to discuss if the configured Msg3 resources are still valid in a new serving cell.

* Issue 2: Msg3 transmission, contention resolution, and Msg4 addressing

Observation 1: If UE dedicated Msg3-RNTI and DMRS are configured, eNB can differentiate the UE by Msg3-RNTI and DMRS embedded in Msg3, thus there is no need to further enhance Msg4 addressing and contention resolution.

Observation 2: If Msg4 reception windows for two different Msg3 resources with the same Msg3-RNTI are overlapped, extra indication of its associated Msg3 resource is needed in Msg4.

Observation 3: By introducing shorter contention resolution timer (than Msg4 reception window), separate contention resolution from Msg4 can facilitate Msg3 retransmission from the UE whose initial Msg3 transmission fails.

Proposal 4: Aim to guarantee that the Msg4 reception windows for two different Msg3 resources with the same Msg3-RNTI are not overlapped.

Proposal 5: Msg3-RNTI calculation is based on Msg3 resource time domain info (e.g., subframe, SFN, H-SFN) and frequency domain location (e.g., frequency domain resource index, carrier index, etc).

Proposal 6: Contention resolution is done by echoing back UE Contention Resolution Identity.

Proposal 7: RAN2 to discuss whether contention resolution procedure is independent from legacy Msg4 transmission or along with Msg4 transmission.

* Issue 3: UL timing for PUSCH transmission via contention based Msg3 resource

Observation 4: PUSCH transmission from NB-IoT with 3.75kHz SCS and eMTC UE mode A can meet the timing error.

Proposal 8a: For NB-IoT with 3.75kHz SCS and eMTC UE mode A, confirm that TA validation for PUSCH transmission is not needed.

Proposal 8b: RAN2 to discuss whether to introduce TA validation for NB-IoT UE with 15kHz SCS and eMTC mode B UE.

* Issue 4: Power control for PUSCH transmission via contention based Msg3 resource

Proposal 9: Discuss whether to ask RAN1 on power control handling for contention based Msg3 transmission.

* Issue 5: Fallback

Proposal 10: Support fallback mechanism when EDT PUSCH transmission on contention based Msg3 fails. UE can fallback to RACH based EDT procedure upon:

- Msg4 response window time expiry

- eNB indication on fallback

- Condition for using contention based Msg3 resource not met

[R2-2408803](file:///C:\Data\3GPP\Extracts\R2-2408803%20Procedures%20for%20uplink%20capacity%20enhancements%20for%20IoT%20NTN.docx) Procedures for uplink capacity enhancements for IoT NTN Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

* *Scenario of RACH-less EDT*

Proposal 1: RACH-less EDT-like procedures and any Msg4 enhancement are only introduced for NTN.

Proposal 2: Any Msg4 enhancement is introduced in combination with RACH-less EDT, and not considered as a standalone enhancement deployed without RACH-less EDT.

* *Discussion on LS reply*

Proposal 3: RAN2 confirms that transmitting Msg3 without Msg1 is possible if the UE transmission timing error limit is satisfied.

Proposal 4: RAN2 to discuss how to ensure timing error limit:

- UE ensures GNSS position fix is valid,

- UE ensures recently acquired ephemeris, through a shorter uplink sync validity duration timer for RACH-less EDT.

* *RACH-less EDT procedure*

Proposal 5: Contention-based RACH-less EDT-like procedure is not dedicatedly pre-configured, but uses broadcasted common resources.

Proposal 6: Introduce possibility to configure repetitions for RACH-less EDT-like transmissions.

Proposal 7: If RACH-less Msg3 fails, it should be possible to fallback to random access with RACH.

Proposal 8: RAN2 to discuss whether RACH-less Msg3 fallback should be UE initiated, or network signals to UE to fallback, or both.

* DSA and CRDSA

Proposal 9: RAN2 introduces DSA for RACH-less EDT, by introducing RACH-less EDT Msg3 to be transmitted in multiple random subframes in a pre-configured set of subframes.

Proposal 10: RAN2 confirms that RAN2 impacts of CRDSA compared to DSA is to signal the subframes the frame was replicated in.

Proposal 11: Send LS to RAN1/RAN4 on the identified impacts of CRDSA and on the identified impacts:

- Successive Interference cancellation.

- Multi-subframe sample storing, i.e not being able to process subframe until full frame transmitted.

- Collision detection.

Efficient delivery of msg4

[R2-2409190](file:///C:\Data\3GPP\Extracts\R2-2409190%20(R19%20IoT-NTN%20AI%208.9.3)%20-%20EDT%20enhancements.docx) EDT/PUR enhancements InterDigital, Inc. discussion Rel-19 IoT\_NTN\_Ph3-Core

* Efficient delivery (reduced overhead) of msg4 / RRCEarlyDataComplete

Proposal 9: Efficient delivery (reduced overhead) of msg4 / RRCEarlyDataComplete only applies to the C-plane solution.

Observation 3: It is already possible with the existing PUR feature to terminate the EDT procedure without using RRCEarlyDataComplete, by using Layer 1 ACK or Timing advance MAC CE, if eNB is aware that there is no pending downlink data or signalling.

Proposal 10: RAN2 to discuss how eNB knows that there is no pending downlink data from the application layer.

Observation 4 : It is already possible with the existing PUR feature for UE to indicate in PURConfigurationRequest whether it expects a downlink response by RRCEarlyDataComplete.

Proposal 11: Confirm that the existing PUR feature may not be optimal in an NTN deployment as there is currently no mechanism for the eNB to determine whether UE expects a downlink application layer response unless the UE moves to RRC\_CONNECTED in every cell to perform dedicated PUR configuration.

Proposal 12: RAN2 to consider whether the following enhancements are beneficial:

1) Introducing network signalling so that PUR configuration request information to be transferred across cells.

2) Indication by the UE in RRCEarlyDataRequest an “rrc-ACK” parameter (whether UE expects a downlink application layer response)

3) Enabling EDT termination without any downlink ACK

4) Using a “common” ACK for multiple transmissions or UEs

[R2-2408896](file:///C:\Data\3GPP\Extracts\R2-2408896%20EDT%20enh.docx) Discussion on EDT enhancements Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

* Efficient delivery (reduced overhead) of msg4 / RRCEarlyDataComplete

Proposal 9 For the second objective, a PUR-like L1 ACK concept, as a response to the EDT transmission, can be considered.

Proposal 10 For the second objective, multicast Msg4 (multi-user Msg4 multiplexing) or multi-user Msg4 scheduled by a single DCI (as in multi-TB Msg4 scheduling) can be studied as a solution.

[R2-2407965](file:///C:\Data\3GPP\Extracts\R2-2407965%20Further%20consideration%20on%20UL%20capacity%20enhancements.docx) Further consideration on UL capacity enhancements CATT discussion IoT\_NTN\_Ph3-Core

[R2-2408050](file:///C:\Data\3GPP\Extracts\R2-2408050_Support%20Contention-based%20Msg3-EDT%20in%20IoT%20NTN.doc) Support Contention-based Msg3-EDT in IoT NTN China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408065](file:///C:\Data\3GPP\Extracts\R2-2408065%20Uplink%20Capacity%20enhancement%20for%20IoT-NTN.docx) Discussion on uplink capacity enhancement Transsion Holdings discussion Rel-19

[R2-2408163](file:///C:\Data\3GPP\Extracts\R2-2408163.doc) Uplink Capacity Enhancement for EDT transaction Spreadtrum Communications discussion Rel-19

[R2-2408304](file:///C:\Data\3GPP\Extracts\R2-2408304%20EDT%20for%20uplink%20capacity%20enhancement%20in%20NTN%20(Revision%20of%20R2-2406875).docx) EDT for uplink capacity enhancement in NTN Lenovo discussion Rel-19

[R2-2408466](file:///C:\Data\3GPP\Extracts\R2-2408466%20Discussion%20on%20uplink%20capacity%20enhancements%20for%20IOT%20NTN.doc) Discussion on uplink capacity enhancements for IOT NTN Xiaomi discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408502](file:///C:\Data\3GPP\Extracts\R2-2408502%20-%20Discussion%20on%20enhanced%20EDT%20for%20IoT%20NTN.doc) Discussion on enhanced EDT for IoT NTN OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408623](file:///C:\Data\3GPP\Extracts\R2-2408623%20Discussion%20on%20enhanced%20EDT.docx) Discussion on enhanced EDT MediaTek Inc. discussion IoT\_NTN\_Ph3-Core [R2-2406869](http://www.3gpp.org/ftp/tsg_ran/WG2_RL2/TSGR2_127\Docs\R2-2406869.zip)

[R2-2408831](file:///C:\Data\3GPP\Extracts\R2-2408831%20Discussion%20on%20UL%20capacity%20enhancement%20for%20IoT%20NTN.docx) Discussion on UL capacity enhancement for IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-19 IoT\_NTN\_Ph3-Core

Withdrawn

R2-2408545 Repetitions and Delay Considerations about SA and DSA ESA, Eutelsat Group, Viasat, Inmarsat, Novamint, Echostar, Sateliot, Toyota ITC discussion Rel-19

1. Withdrawn

### 8.9.4 Support of PWS

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

[R2-2408019](file:///C:\Data\3GPP\Extracts\R2-2408019%20Discussion%20on%20the%20Support%20of%20PWS%20in%20IoT-NTN.docx) Discussion on the Support of PWS in IoT-NTN vivo, Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408051](file:///C:\Data\3GPP\Extracts\R2-2408051_Support%20PWS%20in%20IoT%20NTN.doc) Support PWS in IoT NTN China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408083](file:///C:\Data\3GPP\Extracts\R2-2408083%20Discussion%20on%20broadcast%20of%20PWS%20messages%20for%20NB-IoT.docx) Discussion on broadcast of PWS messages for NB-IoT CMCC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408110](file:///C:\Data\3GPP\Extracts\R2-2408110%20Support%20of%20PWS%20for%20NB-IoT.docx) Support of PWS for NB-IoT Huawei, HiSilicon, Turkcell, China Southern Power Grid discussion Rel-19 IoT\_NTN\_Ph3-Core

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

[R2-2408335](file:///C:\Data\3GPP\Extracts\R2-2408335%20PWS%20support%20for%20NB-IoT%20over%20NTN.docx) PWS support for NB-IoT over NTN ZTE Corporation, Sanechips discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408412](file:///C:\Data\3GPP\Extracts\R2-2408412%20Consideration%20on%20PWS%20broadcast%20for%20NB-IoT.docx) Consideration on PWS broadcast for NB-IoT NEC Corporation. discussion Rel-18 IoT\_NTN\_Ph3-Core

[R2-2408621](file:///C:\Data\3GPP\Extracts\R2-2408621_Discussion%20one%20the%20support%20of%20broadcast%20of%20PWS%20for%20NB-IoT.doc) Discussion one the support of broadcast of PWS for NB-IoT Xiaomi discussion

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

[R2-2408804](file:///C:\Data\3GPP\Extracts\R2-2408804%20Impact%20of%20PWS%20broadcasting%20for%20NB-IoT.docx) Impact of PWS signalling for NB-IoT Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408826](file:///C:\Data\3GPP\Extracts\R2-2408826%20-%20Discussion%20on%20Emergency%20Broadcast%20for%20NB-IoT.docx) Discussion on Emergency Broadcast for NB-IoT Inmarsat, Viasat discussion Rel-19

[R2-2408832](file:///C:\Data\3GPP\Extracts\R2-2408832%20Support%20of%20PWS%20for%20NB-IoT%20NTN.docx) Support of PWS for NB-IoT NTN Nokia, Nokia Shanghai Bell discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408897](file:///C:\Data\3GPP\Extracts\R2-2408897%20PWS%20NB-IoT.docx) Discussion on PWS in NB-IoT NTN Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408998](file:///C:\Data\3GPP\Extracts\R2-2408998.doc) Discussion on broadcast of PWS message for NB-IoT KT Corp. discussion

[R2-2409191](file:///C:\Data\3GPP\Extracts\R2-2409191%20(R19%20IoT-NTN%20AI%208.9.4)%20-%20Support%20of%20PWS.docx) Support of PWS Interdigital, Inc. discussion Rel-19 IoT\_NTN\_Ph3-Core

# Summary

Agreed CRs

NR-NTN

IoT-NTN

Approved LSs out

[Post127bis] Email discussions

Short

Long