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 sessionAny 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[8.8.6] LTE to NR NTN mobility[8.8.4] Support of Broadcast service | **@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 | **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)**[8.8.4] Support of Broadcast service (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)**[7.6.1], [7.6.2] Issues marked CB Thursday[8.9.4] Support of PWS | 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)**[7.7.1], [7.7.2] All corrections[8.8.2] Downlink coverage enhancements  | **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 (9:00 – 10:00)****R18 IoT NTN / R19 IoT NTN CB (9:00 – 9:30)**[6.1.3] CR marked CB Friday[7.6.2] CRs marked CB Friday[8.9.3] R2-2409239 (Draft LS to RAN1) and other issue marked CB Friday[8.9.4] R2-2409237 (Draft LS to SA1, SA2, RAN3, CT1)**R18 NR NTN CB (9:30 – 10:00)**[7.7.2] CRs marked CB Friday | CB Kyeongin |  |
| 11:00 – 13:00 | CB Diana@11-12 R19 Ambient IoTOther CBsReports from breakout sessionsEoM |  |  |
| 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%3A%5CData%5C3GPP%5CRAN2%5CDocs%5CR2-2409170.zip), [R2-2408863](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408863.docx) and [R2-2408547](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408547.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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408366%20Correction%20on%20location%20based%20measurements%20in%20NR%20NTN%20%28R17%29.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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408367%20Correction%20on%20location%20based%20measurements%20in%20NR%20NTN%20%28R18%29.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%3A%5CData%5C3GPP%5CExtracts%5CR2-2407970%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%5CDocs%5CR2-2406225.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
* We don’t need to reply to RAN4 on this

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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408651%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408652%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2409090%20Corrections%20to%20NR%20NTN%20%28R17%29.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 supports 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 cover page
* MTK would like to have more time to check this
* HW thinks we can leave the first issue open or leave some room for implementation
* Revised in R2-2409238 to consider at least the second change

[R2-2409238](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409238.zip) Corrections to NR NTN (R17) Huawei, HiSilicon, CMCC, Sequans Communications CR Rel-17 38.331 17.10.0 5075 1 F NR\_NTN\_solutions-Core

* Agreed in principle

[R2-2409091](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409091%20Corrections%20to%20NR%20NTN%20%28R18%29.docx) Corrections to NR NTN (R18) Huawei, HiSilicon, CMCC CR Rel-18 38.331 18.3.0 5076 - A NR\_NTN\_solutions-Core

* Revised in R2-2409240

[R2-2409240](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409240.zip) Corrections to NR NTN (R18) Huawei, HiSilicon, CMCC, Sequans Communications CR Rel-18 38.331 18.3.0 5076 1 A NR\_NTN\_solutions-Core

* Agreed in principle

Withdrawn

[R2-2408231](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408231%20Corrections%20to%20NR%20NTN%20%28R17%29.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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408232%20Corrections%20to%20NR%20NTN%20%28R18%29.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%5CDocs%5CRP-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%3A%5CData%5C3GPP%5CExtracts%5CR2-2407910_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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408342%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
* After further discussion ZTE is fine with the change, i.e. to make this applicable to IoT NTN based on the decision for NR NTN
* Agreed in principle

[R2-2408901](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408901_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](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409232.zip) 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

* Agreed in principle

[R2-2409178](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409178%20-%2036300_CR1409_%28Rel-18%29%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2407967%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 first 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
* 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 cover page 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 (Need OR to Need 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](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409233.zip) 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

* CATT indicates that it was not possible to reuse the NB-IoT text. Also some new text was added to describe the behaviour for the change from Need OR to Need OP
* Agreed in principle

[R2-2408336](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408336%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
* Come back in the next meeting on the second change

[R2-2408589](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408589.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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408648%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.
* 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.
* ZTE still wonders if this would be an incomplete solution
* Google think this is needed for initial search
* Samsung agrees there is a use case and supports the CR
* Ericsson thinks this would be an optimization: a UE should be able to perform cell search on a IoT-NTN cell from scratch
* MTK thinks that from ASN.1 point of view this is already supported and so we could clarify this in the description.
* Come back in the next meeting

Misc

[R2-2408801](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408801%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.

* Agreed

Proposal 2: Agree 36.304 correction text.

* Agreed (to be reflected in a 36.304 CR in R2-2409235)
* UE capabilities

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

- vivo supports this proposal

- ZTE thinks the NW can still configure the UE since the UE can use the stored information about SIB33 acquired in idle. Nokia shares the view

- MTK has not strong view but could be fine to support this

* 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.

- Ericsson thinks SIB33 is optional and does not agree with the proposal

- Nokia also does not think this is needed. Nokia thinks the UE can read SIB33 before entering connected mode

- vivo thinks we can discuss the capability paper first

- Huawei support this change

- QC sees some merit for this and would like to check more

- ZTE supports the proposal

* Come back in the next meeting

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

[R2-2409235](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409235.zip) Corrections on distance-based measurements during T-Service for IoT NTN Samsung CR Rel-18 36.304 18.2.0 0876 - F IoT\_NTN\_enh-Core

* Agreed in principle

38.306

[R2-2409185](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409185%20-%2036306_CR1899_%28Rel-18%29%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](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409234.zip) 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

* Agreed in principle

R2-2408830 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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408010%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

* Second change is agreed with the addition of “For a UE in connected mode in a NTN cell…” at the beginning of the sentence
* Revised in R2-2409236

[R2-2409236](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409236.zip) Corrections on measurement Huawei, HiSilicon CR Rel-18 36.300 18.3.0 1407 1 F IoT\_NTN\_enh-Core

* Remove the reference to the 5G architecture in the coversheet

[R2-2409241](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409241.zip) Corrections on measurement Huawei, HiSilicon CR Rel-18 36.300 18.3.0 1407 2 F IoT\_NTN\_enh-Core

* Agreed in principle

[R2-2408011](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408011_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

- Nokia wonders if this has any impacts on CT1.

- vivo and Novamint think this has no impacts to CT1.

- QC wonders if this is applicable also for eMTC

* Update the coversheet to refer to CT1 spec
* Come back with an update in the next meeting

Withdrawn

[R2-2408588](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408588.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%3A%5CData%5C3GPP%5CExtracts%5CR2-2407912_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%3A%5CData%5C3GPP%5CExtracts%5CR2-2409186%20-%2038331_CR5085_%28Rel-18%29%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

* Not handled at this meeting. Can come back in the next meeting
* Postponed

### 7.7.2 Corrections

Corrections for all specifications.

RRC related

* FR2 related

Moved here from 7.7.1

[R2-2408012](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408012%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.

- QC is ok with p1 but no need to send the LS. ZTE and Nokia agree. Vivo is fine

* Agreed

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.

- QC agrees in principle we need a CR but thinks we need to check some mandatory parts on FR2-1 band

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

[R2-2408654](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408654%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

- apart from the fist change (where vivo’s version looks better) HW supports the CR. ZTE is also fine. Vivo also supports HW view.

- Ericsson prefers to have a general statement and not refer to FR2-1 everywhere. Nokia agrees we could follow such approach

- ZTE is not sure a general statement would clarify all the cases

* We take this CR as a basis, apart from the fist change where we consider the proposal in R2-2408012
* Come back in the next meeting (a single CR from ZTE and vivo is expected in the next meeting)

[R2-2408944](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408944%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408341%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%3A%5CData%5C3GPP%5CRAN2%5CDocs%5CR2-2409204.zip)

[R2-2409204](file:///C%3A%5CData%5C3GPP%5CRAN2%5CDocs%5CR2-2409204.zip) Correction to satellite switch with resync Huawei, HiSilicon CR Rel-18 38.331 18.3.0 5000 1 F NR\_NTN\_enh-Core

- ZTE wonders if these clarifications are more applicable to Stage 2. Nokia agrees

- Ericsson does not think this is needed.

- LG supports the second change

* Not pursued
* DL-DataToUL-ACK

[R2-2408943](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408943%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

* Not pursued
* TN to NTN mobility

[R2-2408567](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408567_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 understanding 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”

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

- Nokia thinks this is now covered by the RAN2 understanding above

- Samsung wonders if we need to take into account also NTN to TN mobility. HW thinks would have other problems

- HW supports p2

- Ericsson wonders if using this formulation would imply that TN to NTN mobility is not supported

* Can continue the discussion on a proper formulation for RAN2 understanding in the next meeting, if needed

<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.

* RAN2 understands that all R18 NTN specific mobility/measurement UE features (except the SIB19 reception in TN cell) 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 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.

- Nokia thinks we previously decided not to have an explicit capability for this

- Samsung supports both p4 and p5

- CATT is not sure this is needed, as SIB19 is an essential feature for NTN and if we have this proposal then we need to clarify when SIB19 reception is indeed and essential feature. Ericsson agrees.

- QC thinks it’s better to clarify and then supports this

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.

* Misc

[R2-2409187](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409187%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.

- vivo thinks this is more related to RRM requirements so in case we need to check with RAN4.

- QC thinks the UE most likely cannot perform NTN measurements in this case (in this case the UE does not have GNSS measurement). Apple and LG agree

* RAN2 understands that for now there are no RAN4 requirements regarding measurements on a NTN cell while the UE is camping or being connected to a TN cell and then it’s up to UE implementation whether to perform such measurements or not. RAN2 will not further work on enhancements for TN to NTN mobility in Rel-18.

*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.

* Can come back in the next meeting

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%3A%5CData%5C3GPP%5CExtracts%5CR2-2407968%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

- Nokia agrees on the need for a change but thinks we can fix the wording

* Consider bringing a revision for the next meeting

[R2-2408013](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408013_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

- Ericsson thinks we shouldn’t add features in maintenance, also this would have RAN3 impacts, e.g. for beam selection

- After checking with RAN3 colleagues Nokia thinks that there would be no impact to RAN3

- Samsung thinks this is capturing existing agreements but prefers a different wording. QC agrees

- Inmarsat and Thales think that there is no impact in RAN3 and RACH-less HO can be supported in the inter-gNB case by NW implementation

* Come back in the next meeting

[R2-2409027](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409027.docx) Miscellaneous corrections to NR NTN Samsung CR Rel-18 38.300 18.3.0 0922 - F NR\_NTN\_enh-Core

- LG supports the second and third change

* Second and third change are agreed
* Revised in R2-2409244

[R2-2409244](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409244.zip) Miscellaneous corrections to NR NTN Samsung CR Rel-18 38.300 18.3.0 0922 1 F NR\_NTN\_enh-Core

* Agreed in principle

37.355

[R2-2408414](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408414%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

- CATT thinks this is not needed. Xiaomi agrees

* Not pursued

38.304

[R2-2409056](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409056%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

- LG supports this

- vivo and ZTE don’t think this is needed. Nokia agrees

* Not pursued

## 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%5CDocs%5CRP-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%3A%5CData%5C3GPP%5CExtracts%5CR2-2407919_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%3A%5CData%5C3GPP%5CExtracts%5CR2-2407963%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%5CDocs%5CR2-2407617.zip)

* Endorsed

[R2-2408014](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408014%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408805%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%5CDocs%5CR2-2407616.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%3A%5CData%5C3GPP%5CExtracts%5CR2-2409183%20-%2038331_CR5084_%28Rel-19%29%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408981Discussion%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.

- Apple thinks there are different solutions in RAN1 and in this case we should only consider the SSB extension case

- Ericsson thinks it’s still not sure we need to bar R19 UEs not supporting DL-CE. Google and Thales agree.

- CMCC is not sure this would work

- Ericsson thinks that if a UE cannot read MIB then we don’t even need to bar them.

- Fujitsu agrees with p1

* If it turns out that there is a need to bar UEs not supporting DL-CE, Rel-19 UEs not supporting 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 (this is an extension of the previous agreement to include also Rel-19 UE not supporting DL-CE)

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

- ZTE agrees with the principle to be able to bar Rel-19 UEs supporting DL-CE but thinks it’s too early to decide on the details

- Fujitsu thinks that for now we can say that Rel-19 UEs supporting DL-CE can neglect the legacy NTN bar bit

* If it turns out that there is a need to bar UEs not supporting DL-CE, then we need to introduce a barring mechanism to control access of UEs supporting Rel19 NTN DL-CE. FFS on the details. (This also implies that UEs supporting Rel19 NTN DL-CE will not consider the existing NTN barring bit)
* 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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408655%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.

- LG wonders whether such scenario exists

- Fujitsu thinks that nothing more than a barring indication is needed

- Xiaomi thinks this could a legacy issue, not related to this specific scenario

- CMCC thinks this scenario could exist and the barring approach does not work for the reselection case

- IDC supports p2 and we should avoid SIB reading in this case

- China Telecom thinks we don’t need to mandate to down-prioritize cells not operating in DL-CE

* (also depending on the details of the RAN1 solution) we can further consider methods to allow UEs not supporting DL CE to down-prioritize or prevent re-selection 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.

Agreements:

1. If it turns out that there is a need to bar UEs not supporting DL-CE, Rel-19 UEs not supporting 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 (this is an extension of the previous agreement to include also Rel-19 UE not supporting DL-CE)

2. If it turns out that there is a need to bar UEs not supporting DL-CE, then we need to introduce a barring mechanism to control access of UEs supporting Rel19 NTN DL-CE. FFS on the details. (This also implies that UEs supporting Rel19 NTN DL-CE will not consider the existing NTN barring bit)

3. (also depending on the details of the RAN1 solution) we can further consider methods to allow UEs not supporting DL CE to down-prioritize or prevent re-selection to cells operating with DL CE.

* SMTC impacts

[R2-2408970](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408970_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%5CDocs%5CR2-2407532.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

- LG thinks it’s early to decide on this before RAN1 decision.

- Nokia supports p2

- Ericsson wonders whether we should bring this proposal in RAN1 or RAN4

- Sequans thinks this is in RAN2 scope

- Google wonders if there is really a need to extend

- Xiaomi thinks the SMTC could be grouped together. Nokia thinks this would not always work

- QC wonders if this is really needed since the RAN1 solution is not clear yet

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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408699%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408337%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408097%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408160%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408920%20%28R19%20NR%20NTN%20WI%20AI%208.8.2%29%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2407960%20Discussion%20on%20Downlink%20Coverage%20Enhancements.docx) Discussion on Downlink Coverage Enhancements CATT discussion NR\_NTN\_Ph3-Core

[R2-2407983](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407983%20Consideration%20on%20downlink%20coverage%20enhancements.docx) Consideration on downlink coverage enhancements NERCDTV discussion

[R2-2408015](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408015%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408046_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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408155%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408284%20Discussion%20on%20downlink%20coverage%20enhancement.docx) Discussion on downlink coverage enhancement HONOR discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408300](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408300%20Access%20control%20for%20NTN%20downlink%20coverage%20enhancement.docx) Access control for NTN downlink coverage enhancement Lenovo discussion Rel-19

[R2-2408411](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408411%20Consideration%20on%20downlink%20coverage%20enhancement.docx) Consideration on downlink coverage enhancement NEC Corporation. discussion Rel-18 NR\_NTN\_Ph3-Core

[R2-2408459](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408459%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408465%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408593.doc) DL coverage enhancement in NTN Apple discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408719](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408719.docx) SMTC impacts due to NTN downlink coverage enhancements Sony discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408739](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408739%20Discussion%20on%20Downlink%20Coverage%20Enhancements.docx) Discussion on Downlink Coverage Enhancements CSCN discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408894](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408894%20Cell%20DTX.docx) Discussion on cell DTX Qualcomm Incorporated discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409004](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409004-Discussion_for_DL_coverage_enhancement.docx) Discussion on Downlink Coverage Enhancements Sharp discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409025](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409025.docx) Discussion on Downlink Coverage Enhancement Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409051](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409051_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%3A%5CData%5C3GPP%5CExtracts%5CR2-2409180%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408592.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)

- Ericsson thinks the final solution for geo-fencing for ETWS can be similar to the one for CMAS and then not influence the solution for MBS

* For each MBS service we include one or more intended service area IDs into MCCH. FFS whether the list of the intended service areas (and related IDs) is also included in MCCH or if it is provided in a new or existing SIB. We will consider possible enhancements (including enhancements left up to UE implementation) to allow UE skipping MCCH re-acquisition when UE is not within intended service area of any interested broadcast service.

- CMCC wonders if we need to clarify that possible enhancements should not have impacts on RAN1

- Apple thinks it’s too early to decide on this.

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).

- Ericsson thinks we should focus on the scenario where the quasi-Earth-fixed cell is replaced due to satellite movement

- ZTE thinks we currently support both and then supports p4

- QC also thinks both scenarios should be supported.

- HW thinks this covers the case of UE movement. For the satellite movement there would be no difference wrt previous releases. HW is ok to reflect the second part of p4

- Ericsson disagrees with the proposal as there is no need for service continuity for this. Apple thinks this is needed for cell reselection.

- CATT wonders whether we really need to provide the service area for service continuity, in a per neighbour cell way.

- Ericsson thinks we need to clarify the UE behavior when receiving this information

* Come back in the next meeting

[R2-2408016](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408016%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.

- QC thinks this is up to UE and there is nothing to reflect in the spec. Xiaomi agrees

- HW thinks that when entering the area this makes sense, but wonder about the case when the UE leaves the area.

- Apple thinks the UE could initiate the MII procedure in any case and then it’s up to NW implementation how to behave. LG agrees with Apple. Oppo also agrees. CMCC thinks in this case the NW has no idea of the UE location in this case.

* Come back in the next meeting

[R2-2408047](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408047_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%3A%5CData%5C3GPP%5CExtracts%5CR2-2409184%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 thinks 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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408946%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.

Agreements:

1. For each MBS service we include one or more intended service area IDs into MCCH. FFS whether the list of the intended service areas (and related IDs) is also included in MCCH or if it is provided in a new or existing SIB. We will consider possible enhancements (including enhancements left up to UE implementation) to allow UE skipping MCCH re-acquisition when UE is not within intended service area of any interested broadcast service.

[R2-2407961](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407961%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2407982%20Discussion%20on%20support%20of%20broadcast%20service%20in%20NTN.docx) Discussion on support of broadcast service in NTN NERCDTV discussion

[R2-2408080](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408080%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408138%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408156%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408285%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408301%20Further%20considerations%20for%20broadcast%20service%20area%20indication%20%28Revision%20of%20R2-2406871%29.docx) Further considerations for broadcast service area indication Lenovo discussion Rel-19

[R2-2408338](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408338%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408464.docx) Discussion on Support of MBS Broadcast Service over NTN TCL discussion

[R2-2408488](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408488%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%5CDocs%5CR2-2406606.zip)

[R2-2408602](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408602_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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408619_Discussion%20on%20the%20support%20of%20broadcast%20service.doc) Discussion on the support of broadcast service Xiaomi discussion

[R2-2408656](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408656%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408685_NTN_MBS.docx) Discussions on MCCH reacquiring ITRI discussion NR\_NTN\_Ph3-Core

[R2-2408892](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408892%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408958%20%28R19%20NR%20NTN%20WI%20AI%208.8.4%29%20Broadcast.docx) Support for broadcast service in non-terrestrial networks InterDigital, Europe, Ltd. discussion Rel-19

[R2-2408988](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408988%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%5CDocs%5CR2-2407418.zip)

[R2-2409002](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409002-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%3A%5CData%5C3GPP%5CExtracts%5CR2-2409003-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%3A%5CData%5C3GPP%5CExtracts%5CR2-2409026.docx) Discussion on MBS Broadcast Service Intended Area Samsung discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409113](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409113_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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408893%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.

- Fujitsu supports p1

- Ericsson thinks we already agreed something similar in the past

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.

- HW thinks that in practice for the NW it is difficult to optimize the behaviour for this case and power saving is probably not the main problem in this case

- Ericsson also thinks this is not needed

- ZTE thinks this depends on NW implementation and there seems to be no interest from network vendors to optimize the behaviour for this

* We don’t further consider this possible optimization.

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

[R2-2409179](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409179%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2407962%20Further%20discussion%20on%20regenerative%20payload.docx) Further discussion on regenerative payload CATT discussion NR\_NTN\_Ph3-Core

[R2-2408161](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408161%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408283%20Discussion%20on%20regenerative%20payload.docx) Discussion on regenerative payload HONOR discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408302](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408302%20UE%20location%20verification%20in%20NTN%20regenerative%20architecture%20%28Revision%20of%20Revision%20of%20R2-2406872%29.docx) UE location verification in NTN regenerative architecture Lenovo discussion Rel-19

[R2-2408339](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408339%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408657%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408716.docx) Satellite switch with re-sync in regenerative payload Sony discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408806](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408806%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408947%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408980_NTN_Regenerative.docx) Discussion on regenerative payload Fujitsu Limited discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2409071](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409071%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2407964%20Open%20issue%20list%20and%20rapporteur%27s%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408081%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408048_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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408674.docx) Remaining Issues on NR Satellite Info Provision in LTE TN cell NEC discussion Rel-19 NR\_NTN\_Ph3-Core

[R2-2408257](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408257_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

Agreements:

1. The following signalling design is agreed, 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.

2. 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.

3. 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.

## 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%3A%5CData%5C3GPP%5CExtracts%5CR2-2407920_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

* Noted

[R2-2407931](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407931_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

* Noted

[R2-2407938](file:///C%3A%5CData%5C3GPP%5CRAN2%5CDocs%5CR2-2407938.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

* Noted

Workplan

[R2-2408635](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408635%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%5CDocs%5CR2-2402941.zip)

* Noted

Rapporteurs’ inputs

[R2-2409182](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409182%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

* Noted

### 8.9.2 Support of Store & Forward

Contributions should focus on possible impacts to the radio interface.

[R2-2408244](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408244.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%5CDocs%5CR2-2407487.zip)

* S&F Indication

Observation 1: UE should receive an indication via system information broadcast whether S&F satellite operation is currently activated in an NTN cell or not (as per RAN2 and SA2 agreements). This indication is referred to as S&F Activated indication in this paper.

Proposal 1: If a S&F Activated indication is not provided in a NTN cell (i.e. either no S&F satellite operation indication is provided via system broadcast or the S&F satellite operation mode is explicitly indicated as not activated), the UE should assume that the NTN cell is operating in real-time mode (i.e. default/normal mode).

- Nokia wonders if this has an impact on cell reselection. Lenovo thinks there could be a problem depending on whether there will be a barring bit

- QC supports p1

- ZTE and MTK also support p1

* The dynamic indication that “the cell is operating in S&F mode” is called “S&F operation” indication (we can come back on the exact name when putting this in the spec, if needed)
* RAN2 assumes that if an indication that “the cell is operating in S&F mode” is not provided in a NTN cell, the UE should assume that the NTN cell is operating in real-time mode (i.e. default/normal/”not-S&F” mode). RAN2 assumes there should be no distinction between the case that the UE is served by a NTN cell that do not support S&F capability and the case that the UE is served by a NTN cell that does support S&F capability but indication that “the cell is operating in S&F mode” is not provided.

Proposal 2: From a UE behavior standpoint, there should be no distinction between the case that the UE is served by a NTN cell that do not support S&F capability and the case that the UE is served by a NTN cell that does support S&F capability but S&F Activated indication is not provided.

Proposal 3: Providing a S&F Capability indication, conceived as a static indication of whether the S&F capability is supported or not by a specific satellite/NTN-cell, in addition to the S&F Activated indication, is not needed.

- Ericsson supports all the first 3 proposals

- Samsung supports p3

* An S&F explicit capability indication by the serving cell, conceived as a static indication of whether the S&F capability is supported or not by a specific satellite/NTN-cell, in addition to the indication that “the cell is operating in S&F mode”, is not needed
* Cell barring

Proposal 4: A Rel-19 UE (regardless whether supporting S&F or not) shall consider an NTN cell as barred if cellBarred-NTN is activated and no indication about support of S&F operation mode is given (i.e. the S&F Activated indication is not broadcast).

- Samsung thinks the “S&F operation” indication should be a “cell barred S&F” indication. Telit wonders what this would mean for MT traffic

- Ericsson supports the proposal and is not sure about the comment from Samsung

* If the “S&F operation” indication is not broadcast, a Rel-19 UE (regardless whether supporting S&F or not) shall follow the legacy barring procedure

Proposal 5: In the case that the NTN cell is barred (cellBarred-NTN bit activated), a Rel-19 S&F-capable UE could still treat the NTN cell as not barred only for S&F satellite operation if S&F Activated indication is provided.

- CATT disagrees

* When present, the “S&F operation” indication has two possible settings:

**‘1’: the cell is operating in S&F mode for all UEs (Rel-19 UEs supporting S&F are allowed to access the cell)**

**‘0’: the cell is operating in S&F mode for UEs in Connected mode (which are not required to monitor the “S&F indication”), but idle Rel-19 UEs supporting S&F are barred (Rel-19 UEs not supporting S&F will follow legacy barring procedure).**

Proposal 6: The presence or absence of the S&F indication element shall be interpreted as access regulation/barring for Rel.-19 S&F operation. Hence a S&F separate barring may not be needed in addition.

* Additional indications/information for S&F Satellite operation

Proposal 7: For S&F Satellite operation expected maximum delivery time should be indicated to the UE. FFS if an indication of the expected maximum delivery time can be provided via system information or signaling via NAS suffices.

Proposal 8: It is up to the network to provide an indication on operation mode switching times.

Proposal 9: If network operation switching times are provided, UE behavior is up to UE implementation and application needs.

Proposal 10: RAN2 to further discuss expected behavior for ongoing sessions during mode transition.

Proposal 11: In the case that the satellite data storage is full (i.e. the satellite cannot accept more MO data from UEs) but the satellite can still perform control plane procedures (e.g.; Attach, TAU) and MT traffic delivery, an indication can be provided for UEs to refrain from sending MO traffic. FFS is the indication on maximum delivery time can be used also for this purpose.

* Information element details

Proposal 12: Indication of S&F operational status can be an optional IE broadcast in SIB31 and include the following information:

(Optional IE in SIB31) S&F\_Operational\_Status:

* S&F Activated Flag: TRUE: S&F Activated, FALSE: S&F Deactivated, which is equivalent to RT/Default mode)
* (Optional) S&F Switching Time: When activated flag=FALSE, indicates the time instant at which S&F mode will be activated. When activation flag=TRUE, signals the time instant at which the S&F mode will be deactivated.
* (Optional) S&F Maximum Delivery Time:
* (Optional) S&F MO Data Barred Flag: TRUE: MO data is barred, not allowed, FALSE or IE not present: MO is allowed.

[R2-2408389](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408389%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

* S&F Indication

Observation 1: There seems no additional benefit for the UE to know the NW's S&F capability, when the satellite indicates that it is operating in normal IoT NTN mode. This makes it not necessary to introduce another static indication on whether NW supports S&F feature, in addition to the indication already agreed on the current NW operation mode.

Proposal 1: No additional static indication of whether the NW supports S&F feature is needed.

Proposal 2: For the agreed S&F indication on NW operation mode: when the indication is present, it means the serving satellite is operating in S&F mode; otherwise, it means the serving satellite is operating in normal IoT NTN mode. How the NW sets presence/absence of this indication in terms of feeder link availability is up to NW implementation.

* Cell barring

Proposal 3: When the agreed S&F indication (e.g. sf-CellBarred) is present, it further functions as the S&F specific barring bit and indicates to the Rel-19 S&F capable UEs whether the cell operating in S&F mode is barred or not (i.e. with the two values of "barred" and "notBarred").

- QC thinks this is not needed, a single “S&F operation” bit is sufficient. Google agrees (supports the proposal from Thales and others)

- CATT supports p3. MTK agrees

- CATT thinks the use case is when the NW does not have enough resources. CMCC agrees

- Xiaomi thinks a single bit indication is enough

- China Telecom also thinks there is a need to bar S&F UE while still indicating that the cell is supporting S&F operation

- Sequans also supports to have an explicit barring indication for S&F barring indication, also to be able in the future to discriminate between R19 and R20 UEs

Proposal 4: If the agreed S&F indication (e.g. sf-CellBarred) is present, the UE capable of S&F operation determines whether the cell operating in S&F mode is barred or not depending on the value of sf-CellBarred, and ignores existing cellBarred/cellBarred-NTN. Otherwise, the UE capable of S&F operation determines whether the cell is barred depending on the existing cellBarred-NTN.

[R2-2408591](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408591.doc) Support of S&F operation in IoT NTN Apple discussion Rel-19 IoT\_NTN\_Ph3-Core

* Cell barring

Observation 1: RAN2 assumption is legacy UE may or may not be barred from S&F mode satellite.

Proposal 1: Introduce a Rel-19 cellBarred bit with {barred, notBarred} in SIB1 to bar/unbar Rel-19 NTN UE supporting S&F mode.

- Rel-17/Rel-18 NTN UE(s) and Rel-19 NTN UE(s) not supporting S&F mode do not check the new Rel-19 cellBarred bit.

- Rel-19 NTN UE(s) supporting S&F mode only apply Rel-19 cellBarred bit and do not apply legacy cellBarred bits (cellBarred, cellBarred-NTN).

* S&F Indication

Proposal 2: S&F indication comprises of starting time point and duration of network S&F mode.

* UE behaviour

Proposal 3: For RRC connected UE, UE does not automatically go to idle state due to network switching into S&F mode. Network configuration can make sure that, only DRB(s) with tolerant latency are maintained when satellite switches to S&F mode.

Proposal 4: RRC idle UE determines when to monitor paging messages based on current and past feeder link status.

- If camping satellite had once recovered feeder link, UE monitors paging message and perform data reception.

- If camping satellite had never recovered feeder link, UE may skip monitoring paging message.

Agreements:

1. The dynamic indication that “the cell is operating in S&F mode” is called “S&F operation” indication (we can come back on the exact name when putting this in the spec, if needed)

2. RAN2 assumes that if an indication that “the cell is operating in S&F mode” is not provided in a NTN cell, the UE should assume that the NTN cell is operating in real-time mode (i.e. default/normal/”not-S&F” mode). RAN2 assumes there should be no distinction between the case that the UE is served by a NTN cell that do not support S&F capability and the case that the UE is served by a NTN cell that does support S&F capability but indication that “the cell is operating in S&F mode” is not provided.

3. An S&F explicit capability indication by the serving cell, conceived as a static indication of whether the S&F capability is supported or not by a specific satellite/NTN-cell, in addition to the indication that “the cell is operating in S&F mode”, is not needed

4. If the “S&F operation” indication is not broadcast, a Rel-19 UE (regardless whether supporting S&F or not) shall follow the legacy barring procedure

5. When present, the “S&F operation” indication has two possible settings:

 ‘1’: the cell is operating in S&F mode for all UEs (Rel-19 UEs supporting S&F are allowed to access the cell)

 ‘0’: the cell is operating in S&F mode for UEs in Connected mode (which are not required to monitor the “S&F indication”), but idle Rel-19 UEs supporting S&F are barred (Rel-19 UEs not supporting S&F will follow legacy barring procedure).

[R2-2407966](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2407966%20Discussion%20on%20RAN2%20impacts%20due%20to%20the%20Satellite%20ID%20List%20from%20MME%20in%20S%26F%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408017%20RAN2%20Aspect%20for%20S%26F%20Operation.docx) RAN2 Aspect for S&F Operation vivo discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408049](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408049_Remaining%20issues%20of%20IoT%20NTN%20Store%20%26%20Forward.doc) Remaining issues of IoT NTN Store & Forward China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408064](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408064%20Support%20of%20Store%20%26%20Forward%20for%20IoT-NTN.docx) Discussion on support of Store&Forward Transsion Holdings discussion Rel-19

[R2-2408066](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408066%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408108%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408282%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408303%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408333%20Further%20consideration%20on%20S%26F%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408360%20Discussion%20on%20information%20for%20Store%20%26%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%5CDocs%5CR2-2406526.zip)

[R2-2408460](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408460%20Access%20control%20and%20the%20S%26F%20indication.docx) Access control and the S&F indication Google discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408501](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408501%20-%20Discussion%20on%20Store%20%26%20Forward%20statellite%20operation.doc) Discussion on Store & Forward satellite operation OPPO discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408620](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408620_Discussion%20on%20the%20support%20of%20store%20and%20forward.doc) Discussion on the support of store and forward Xiaomi discussion

[R2-2408622](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408622%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%5CDocs%5CR2-2406821.zip)

[R2-2408675](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408675.docx) Radio Interface Aspect of Store and Forward NEC discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408754](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408754-Store-Forward-RAN-Aspects.docx) On RAN2 Impacts of SF Operation Nokia, Nokia Shanghai Bell discussion

[R2-2408802](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408802%20Discussion%20on%20Store%20and%20Forward.docx) Discussion on Store and Forward Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408895](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408895%20store%20and%20forward.docx) Discussion on S&F mode operation Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408905](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408905%20-%20considerations%20on%20multi%20satellite%20for%20S%26F.docx) Considerations on multi-satellite for S&F Satellite operation NOVAMINT, Sateliot discussion

[R2-2408956](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408956.doc) Considerations on Store & Forward Satellite Operation SHARP Corporation discussion

[R2-2408971](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408971_Support%20of%20Store%20%26%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%5CDocs%5CR2-2407537.zip)

[R2-2409064](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409064_IoT-NTN_S%26F.docx) Discussion on Store & Forward operation DENSO CORPORATION discussion IoT\_NTN\_Ph3-Core

[R2-2409189](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409189%20%28R19%20IoT-NTN%20AI%208.9.2%29%20-%20Support%20of%20S%2BF.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%3A%5CData%5C3GPP%5CRAN2%5CDocs%5CR2-2409170.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%5CDocs%5CR2-2407555.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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408863.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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408547.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.

- HW thinks we should first of all rule out CRDSA as the shown performance is ideal and in any case this would add complexity to the NW. ZTE agrees. Nokia also agrees (open to DSA but not to CRDSA). Ericsson also agrees.

- QC thinks that then we can at least focus on DSA

- MTK thinks we should take clear a decision that in case we only support DSA, also considering this is the only case we can consider in RAN2

- vivo thinks we can focus on DSA (p1) but we might still need to ask some questions to RAN1 on details of the replicas

- IDC wonders what the extra specification impact is to support CRDSA if we already support DSA. Inmarsat agrees with IDC and wonders about the actual specification impact.

- CATT thinks we should just support DSA

- ZTE thinks that CRDSA would likely have impacts to other specs.

* RAN2 will introduce support for DSA (i.e. the possibility to transmit more than one replica of CB-msg3, if configured by the NW). RAN2 does not intend to work on CRDSA in Rel-19.

* [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%3A%5CData%5C3GPP%5CRAN2%5CDocs%5CR2-2409170.zip), [R2-2408863](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408863.docx) and [R2-2408547](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408547.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](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409231.zip) Report of [AT127bis][301][R19 IoT NTN] Working point for CB-msg3 NEC discussion Rel-19 IoT\_NTN\_Ph3-Core

Based on the divergent views, we might try to focus the discussion on a working point where the PLR is lower than 10%.

* In evaluation of possible methods to improve UL capacity for CB-msg3 ETD-like transmission we focus on a working point where the PLR is lower than 10% (this does not mean that we are mandating any network to work at any working point)
	+ Use of OCC vs (or together) replicas (DSA/CRDSA)

[R2-2408413](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408413.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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408018%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.

- Xiaomi supports asking this to RAN1. MTK and Nokia agree on asking RAN1. ZTE thinks we should explicitly ask RAN1 to take also CB-msg3 case as part of their discussion on OCC. Apple also supports p1. Google also supports.

- Inmarsat and Huawei think that RAN1 is anyway discussing this. Ericsson, QC and IDC also agree

- Samsung thinks we can continue working on this assuming that OCC can be supported in this case and ask later if needed.

- ESA indicates that RAN1 has agreed that only OCC2 will be supported

* RAN2 will continue their work on CB-msg3 assuming that OCC2 might also apply to CB-msg3 transmission (“CB-NPUSCH”) (final decision whether this is feasible is up to RAN1). FFS whether an LS to indicate this to RAN1 is needed.
* Tentatively draft a LS to RAN1 in R2-2409239

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

[R2-2409239](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409239.zip) Draft LS on OCC for CB-msg3 NPUSCH (vivo) LSout To: RAN1 Rel-19 IoT\_NTN\_Ph3-Core

* Remove Draft and put RAN2 as source
* Revised in R2-2409242

[R2-2409242](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409242.zip) LS on OCC for CB-msg3 NPUSCH vivo LSout To: RAN1 Rel-19 IoT\_NTN\_Ph3-Core

* Approved

[R2-2408334](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408334%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408109%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2409181%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.

- - Nokia thinks there should be reference to the fact this is using shared resources

- QC is fine with preamble-less EDT

* We use the term CB-msg3 EDT for now

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.

* At least system Information is used to provide CB-msg3 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.

- IDC supports this but wonders if we have CE level specific configuration for DSA

* CB-msg3 EDT cell specific PUSCH resources for Msg3 transmission are provided per CE level (FFS whether we have a CE level specific configuration for DSA)

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

- Xiaomi agrees but wonders if RAN1 should discuss this

- Huawei thinks that RSRP is not needed

- vivo thinks we should also consider RSRP. Nokia agrees, and this is also related to the previous agreement

* RAN2 assumes that CB-msg3 EDT cell specific PUSCH resources are associated with number of repetitions, RSRP selection threshold to determine the CE level and largest TBS for Msg3 transmission, but this has to be confirmed by RAN1. FFS if there is an RSRP threshold that determines whether CB-msg3 EDT cannot be used (the UE will have to use 4-step RA)
* 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.

- Nokia thinks there are some cases where the discussion is still open

* At least in the cases confirmed by RAN1/RAN4, a running TAT is not needed to initiate a CB-msg3 EDT 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.

- IDC thinks we could use similar rules as for PRACH

* Come back to this in the next meeting

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.

* Come back to this in the next meeting
* 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.

- QC thinks we should refer to the resource associated to the PUSCH occasion

* The RNTI used at least to schedule Msg4 transmission is derived based on the resource associated to the PUSCH occasion used for contention based Msg3 EDT transmission (FFS on the details. FFS how this is impacted by DSA)
* 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.

Agreements:

1. RAN2 will introduce support for DSA (i.e. the possibility to transmit more than one replica of CB-msg3, if configured by the NW). RAN2 does not intend to work on CRDSA in Rel-19.

2. RAN2 will continue their work on CB-msg3 assuming that OCC2 might also apply to CB-msg3 transmission (“CB-NPUSCH”) (final decision whether this is feasible is up to RAN1). FFS whether an LS to indicate this to RAN1 is needed.

3. At least system Information is used to provide CB-msg3 EDT cell-specific PUSCH resources for Msg3 transmission. FFS on signalling details.

4. CB-msg3 EDT cell specific PUSCH resources for Msg3 transmission are provided per CE level (FFS whether we have a CE level specific configuration for DSA)

5. RAN2 assumes that CB-msg3 EDT cell specific PUSCH resources are associated with number of repetitions, RSRP selection threshold to determine the CE level and largest TBS for Msg3 transmission, but this has to be confirmed by RAN1. FFS if there is an RSRP threshold that determines whether CB-msg3 EDT cannot be used (the UE will have to use 4-step RA)

6. At least in the cases confirmed by RAN1/RAN4, a running TAT is not needed to initiate a CB-msg3 EDT transmission

7. The RNTI used at least to schedule Msg4 transmission is derived based on the resource associated to the PUSCH occasion used for contention based Msg3 EDT transmission (FFS on the details. FFS how this is impacted by DSA)

8. CB-msg3 EDT procedures and any Msg4 enhancement are only introduced for IoT NTN.

[R2-2408082](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408082%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408590.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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408803%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.

* CB-msg3 EDT procedures and any Msg4 enhancement are only introduced for IoT 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.

* Come back to this after further work on CB-msg3 EDT and Msg4 enhancements
* *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%3A%5CData%5C3GPP%5CExtracts%5CR2-2409190%20%28R19%20IoT-NTN%20AI%208.9.3%29%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408896%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2407965%20Further%20consideration%20on%20UL%20capacity%20enhancements.docx) Further consideration on UL capacity enhancements CATT discussion IoT\_NTN\_Ph3-Core

[R2-2408050](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408050_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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408065%20Uplink%20Capacity%20enhancement%20for%20IoT-NTN.docx) Discussion on uplink capacity enhancement Transsion Holdings discussion Rel-19

[R2-2408163](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408163.doc) Uplink Capacity Enhancement for EDT transaction Spreadtrum Communications discussion Rel-19

[R2-2408304](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408304%20EDT%20for%20uplink%20capacity%20enhancement%20in%20NTN%20%28Revision%20of%20R2-2406875%29.docx) EDT for uplink capacity enhancement in NTN Lenovo discussion Rel-19

[R2-2408466](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408466%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408502%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408623%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%5CDocs%5CR2-2406869.zip)

[R2-2408831](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408831%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

* 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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408019%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

* New SIBs to provide the PWS message:

Proposal 1: For NB-IoT PWS, introduce the following new SIBs, reusing the same content within the corresponding LTE SIBs:

SystemInformationBlockType10-NB for primary ETWS notification;

SystemInformationBlockType11-NB for secondary ETWS notification;

SystemInformationBlockType12-NB for CMAS notification.

- QC thinks this is the only way but we might not need to import all the fields, as there are some useless fields we can avoid in the NB-IoT version, e.g. for SIB10

* For NB-IoT NTN PWS, introduce the following new SIBs, taking the content within the corresponding LTE SIBs as a baseline (but also checking whether we can have some optimization/ skip some unnecessary fields):

SystemInformationBlockType10-NB for primary ETWS notification;

SystemInformationBlockType11-NB for secondary ETWS notification;

SystemInformationBlockType12-NB for CMAS notification.

- PWS message notification:

Observation 1: Due to power-saving considerations, the system information change notification for BL UEs/UEs in CE/NB-IoT UEs or the PWS notification for PWS capable BL UEs/UEs in CE is either indicated via the paging message or the direct indication information.

Proposal 2: Add the following PWS indication:

etws-Indication in the Paging-NB and the direct indication information for NB-IoT;

cmas-Indication in the Paging-NB and the direct indication information for NB-IoT.

- Samsung thinks we don’t need this in Paging-NB. QC agrees

- vivo thinks we should introduce this in Paging-NB as well

- MTK agrees with the proposal. Nokia also supports this, we should keep legacy behaviour

- Samsung would like to think about this more

* Add the following PWS indication in direct indication information for NB-IoT:

etws-Indication;

cmas-Indication.

* Come back in the next meeting on whether this is also added in Paging-NB
* UE behaviours upon receiving PWS notification:

Observation 2: Upon receiving the PWS notification, legacy PWS-capable UE shall acquire the corresponding PWS message immediately.

Proposal 3: Upon receiving the PWS notification from NB-IoT cell, the PWS-capable NB-IoT UE acquires the corresponding PWS message immediately.

- IDC wonders what does immediate mean? Without waiting for the modification period?

- QC wonders if the UE would have to read SIB1

- CMCC thinks this would be the same as the LTE behaviour.

* Upon receiving the PWS notification from NB-IoT cell, the PWS-capable NB-IoT UE acquires the corresponding PWS message immediately (can come back to clarify further what immediately means)
* UE capability on PWS:

Proposal 4: Add the support of PWS capabilities for NB-IoT in TS 36.306.

* Other spec impacts on supporting PWS:

Proposal 5: The restrictions on usage of PWS for NB-IoT should be removed from TS 36.331.

Proposal 6: Descriptions of the newly introduced SIBs for PWS for NB-IoT should be added in the TS 36.300.

Proposal 7: RAN2 to take the TPs in Annex as the baseline for the support of PWS in NB-IoT.

[R2-2409191](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409191%20%28R19%20IoT-NTN%20AI%208.9.4%29%20-%20Support%20of%20PWS.docx) Support of PWS Interdigital, Inc. discussion Rel-19 IoT\_NTN\_Ph3-Core

Proposal 1: Clarify whether the scope of the WID applies to ETWS, CMAS, or both.

- Novamint confirms the intention is to support all PWS

* RAN2 confirms the understanding that this WID objective covers all PWS services, including ETWS and CMAS

Observation: PWS was not specified for NB-IoT in Rel-13 due to complexity, incompatible service and device requirements, and lack of use-case.

Proposal 2: Clarify that for NB-IoT the ETWS, CMAS, PWS requirement may not be met when the UE is in eDRX.

* Clarify in the spec (and at least in 36.300) that for NB-IoT the ETWS, CMAS, PWS requirement may not be met in some scenarios, e.g. when the UE is in eDRX (can come back to further clarify the specific cases)

Proposal 3: Send an LS to SA1, SA2, RAN3 to inform them that PWS is being specified for NB-IoT and to update their specifications, if needed.

- QC thinks that at some point we need to do this

- Telit thinks that due to S&F the network itself might not be aware of incoming PWS so there might be more reasons to update the description

- Novamint thinks it’s ok to inform them that we are working on this

- Ericsson thinks we can wait a bit more until we know the impacts a bit better. MTK agrees

* Send an LS to SA1, SA2, RAN3, CT1 to inform them that PWS is being specified for NB-IoT, that RAN2 is identifying whether this might impact the requirements and inviting other WGs to see whether any alignment is needed
* Draft an LS to SA1, SA2, RAN3, CT1 in R2-2409237

Proposal 4: Procedures related to system information acquisition and paging need to be updated to be applicable to NB-IoT.

Proposal 5: SIB10-NB, SIB11-NB need to be added to NB-IoT to support ETWS.

Proposal 6: SIB12-NB needs to be added to NB-IoT to support CMAS.

Proposal 7: Paging-NB needs to be updated to add support for ETWS and CMAS notifications.

Proposal 8: FFS whether MAC configuration need to be updated to indicate if UE shall monitor for ETWS/CMAS notification on control channels associated with the shared data channel in RRC\_CONNECTED. RAN1 to be informed if so.

- QC thinks this would not be possible for NB-IoT UEs, the requirement cannot be met by UEs in Connected mode

- Samsung thinks we can still consider some sort of indication for the UE in connected mode

[R2-2409237](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409237.zip) Draft LS on PWS support for NB-IoT NTN in NTN (Interdigital) LSout To: SA1, SA2, RAN3, CT1 Rel-19 IoT\_NTN\_Ph3-Core

- Inmarsat thinks the group that should really be involved is SA3

- Telit wonders if we should also highlight that the S&F feature might also impact this

* Remove Draft, put RAN2 as source, add SA3 in CC
* Revised in R2-2409243

[R2-2409243](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409243.zip) LS on PWS support for NB-IoT NTN in NTN Interdigital LSout To: SA1, SA2, RAN3, CT1, Cc: SA3 Rel-19 IoT\_NTN\_Ph3-Core

* Approved

[R2-2408305](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408305%20PWS%20broadcast%20support%20for%20NB-IoT%20in%20NTN.docx) PWS broadcast support for NB-IoT in NTN Lenovo discussion Rel-19

Observation 1: At least for ETWS, the broadcast service area needs to be indicated to NB-IoT UE in NTN.

Observation 2: The warningAreaCoordinatesSegment for CMAS can represent circles and polygons with number restrictions and smaller granularity and value range than radius.

Observation 3: The PWS broadcast service area indication can be associated to the paging indication or PWS contents in PWS SIBs to facilitate area-based delivery to NB-IoT UEs.

Proposal 1: At least for ETWS broadcast service area indication, RAN2 can wait for NR NTN progress or discuss whether warningAreaCoordinatesSegment for CMAS can be reused.

Proposal 2: For CMAS broadcast service area indication, RAN2 can discuss whether warningAreaCoordinatesSegment is sufficient for NTN deployment or NR NTN solution may also be needed.

Proposal 3: RAN2 to discuss the association between PWS broadcast service area and paging indication or PWS contents in PWS SIBs.

[R2-2408335](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408335%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

Proposal 3a: RAN2 discuss whether to support ETWS/CMAS acquisition in connected mode for NB-IoT.

- ZTE thinks we could continue to discuss this

- IDC agrees we need to discuss more but PWS is not best effort service so we should really consider to support this in connected mode

* Continue the discussion in the next meeting(s) on whether and how to support PWS for NB-IoT NTN UEs in Connected mode

Proposal 3b: If RAN2 agrees to support ETWS/CMAS acquisition in connected mode for NB-IoT, RAN2 check with RAN1 whether it’s feasible for NB-IoT UE in connected mode to monitor NPDCCH CSS to receive etws-indication and/or cmas-indication.

[R2-2408826](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408826%20-%20Discussion%20on%20Emergency%20Broadcast%20for%20NB-IoT.docx) Discussion on Emergency Broadcast for NB-IoT Inmarsat, Viasat discussion Rel-19

Observation 2: The NB-IoT maximum SIB/SI size is 680 bit. Segmentation may need to be considered.

Observation 3: Whilst the PWS delivery time requirement could be relaxed for NB-IoT NTN, as per the following note in TS 22.268, RAN2 should still strive to achieve efficient and fast delivery, as close as possible to the original requirement:

Note: A bandwidth reduced low complexity UE or a UE supporting eDRX may not support all requirements for PWS, including ETWS, CMAS, EU-Alert and KPAS

Proposal 2: Consider the NB-IoT SI/SIB maximum size, as well as impact of time to deliver the full PWS content in NB-IoT NTN, and consider at least the following possible solutions:

- Message segmentation in multiple SIBs

- Indications to the network to allow restricting the PWS message payload size

- PWS message compaction.

Proposal 3: Study support of reception of PWS during eDRX and, if possible, PSM, via group wake-up signal.

Proposal 4: Introduce mechanisms to restrict the affected area and/or group of users for the PWS message.

Proposal 5: Send an LS to SA3 to consider security aspects of PWS and potentially mandating securing of PWS.

- QC wonders why this would be an issue only for NB-IoT

* Can further check this in future meetings and decide whether any LS to SA3 is needed for this

[R2-2408110](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408110%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

Proposal 1a: Introduce SystemInformationBlockType10-NB for ETWS primary notification, SystemInformationBlockType11-NB for ETWS secondary notification, and SystemInformationBlockType12-NB for CMAS notification.

Proposal 1b: The newly introduced NB-IoT system information can also be sent in TN.

- QC thinks that if this comes for free we should do it, but we should not consider specific changes to support this. vivo agrees

* The support for PWS introduced for NB-IoT NTN can also be made applicable for NB-IoT in TN, if this does not require additional NB-IoT TN specific changes.

Proposal 2: Remove the restrictions throughout the specification that prevent supporting PWS for NB-IoT.

Proposal 3: Whether to support the indication of intended service area for ETWS in IoT NTN should waits for the conclusion in NR NTN.

Agreements:

1. RAN2 confirms the understanding that this WID objective covers all PWS services, including ETWS and CMAS

2. The support for PWS introduced for NB-IoT NTN can also be made applicable for NB-IoT in TN, if this does not require additional NB-IoT TN specific changes.

3. For NB-IoT NTN PWS, introduce the following new SIBs, taking the content within the corresponding LTE SIBs as a baseline (but also checking whether we can have some optimization/ skip some unnecessary fields):

 - SystemInformationBlockType10-NB for primary ETWS notification;

 - SystemInformationBlockType11-NB for secondary ETWS notification;

 - SystemInformationBlockType12-NB for CMAS notification.

4. Add the following PWS indication in direct indication information for NB-IoT (Come back in the next meeting on whether this is also added in Paging-NB):

 - etws-Indication;

 - cmas-Indication.

5. Upon receiving the PWS notification from NB-IoT cell, the PWS-capable NB-IoT UE acquires the corresponding PWS message immediately (can come back to clarify further what immediately means)

6. Clarify in the spec (and at least in 36.300) that for NB-IoT the ETWS, CMAS, PWS requirement may not be met in some scenarios, e.g. when the UE is in eDRX (can come back to further clarify the specific cases)

[R2-2408051](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408051_Support%20PWS%20in%20IoT%20NTN.doc) Support PWS in IoT NTN China Telecom discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408083](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408083%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

[R2-2408412](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408412%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408621_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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408624%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408804%20Impact%20of%20PWS%20broadcasting%20for%20NB-IoT.docx) Impact of PWS signalling for NB-IoT Samsung discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408832](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408832%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%3A%5CData%5C3GPP%5CExtracts%5CR2-2408897%20PWS%20NB-IoT.docx) Discussion on PWS in NB-IoT NTN Qualcomm Incorporated discussion Rel-19 IoT\_NTN\_Ph3-Core

[R2-2408998](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408998.doc) Discussion on broadcast of PWS message for NB-IoT KT Corp. discussion

# Summary

In principle agreed CRs

* NR\_NTN\_solutions-Core:

38.300

[R2-2408366](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408366%20Correction%20on%20location%20based%20measurements%20in%20NR%20NTN%20%28R17%29.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

[R2-2408367](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408367%20Correction%20on%20location%20based%20measurements%20in%20NR%20NTN%20%28R18%29.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

38.331

[R2-2408651](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408651%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

[R2-2408652](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408652%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

[R2-2409238](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409238.zip) Corrections to NR NTN (R17) Huawei, HiSilicon, CMCC, Sequans Communications CR Rel-17 38.331 17.10.0 5075 1 F NR\_NTN\_solutions-Core

[R2-2409240](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409240.zip) Corrections to NR NTN (R18) Huawei, HiSilicon, CMCC, Sequans Communications CR Rel-18 38.331 18.3.0 5076 1 A NR\_NTN\_solutions-Core

* IoT\_NTN\_enh-Core

36.300

[R2-2409178](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2409178%20-%2036300_CR1409_%28Rel-18%29%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

[R2-2409241](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409241.zip) Corrections on measurement Huawei, HiSilicon CR Rel-18 36.300 18.3.0 1407 2 F IoT\_NTN\_enh-Core

36.331

[R2-2408342](file:///C%3A%5CData%5C3GPP%5CExtracts%5CR2-2408342%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

[R2-2409233](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409233.zip) 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

36.306

[R2-2409232](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409232.zip) 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

[R2-2409234](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409234.zip) 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

36.304

[R2-2409235](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409235.zip) Corrections on distance-based measurements during T-Service for IoT NTN Samsung CR Rel-18 36.304 18.2.0 0876 - F IoT\_NTN\_enh-Core

* NR\_NTN\_enh-Core

38.300

[R2-2409244](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409244.zip) Miscellaneous corrections to NR NTN Samsung CR Rel-18 38.300 18.3.0 0922 1 F NR\_NTN\_enh-Core

Approved LSs out

[R2-2409242](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409242.zip) LS on OCC for CB-msg3 NPUSCH vivo LSout To: RAN1 Rel-19 IoT\_NTN\_Ph3-Core

[R2-2409243](file:///C%3A%5CData%5C3GPP%5CRAN2%5CInbox%5CR2-2409243.zip) LS on PWS support for NB-IoT NTN in NTN Interdigital LSout To: SA1, SA2, RAN3, CT1, Cc: SA3 Rel-19 IoT\_NTN\_Ph3-Core

[Post127bis] Email discussions

Short

Long