3GPP TSG-RAN WG3 Meeting #127bis R3-25xxxx
Wuhan, China, 7 – 11 April, 2025

Agenda Item: 14.3

Source: Xiaomi (moderator)

Title: Summary of Offline Discussion on NRNTN

Document for: Approval

# Introduction

The following CB is discussed in this document:

Will update according to the chair notes.

# For the Chairman’s Notes

Propose the following:

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# Discussion

## Feeder link switch aspects

1. **Stage 2 on TNL management**

***The current mechanisms including, e.g. multiple TNLA association, are sufficient for TNL management during feeder link switch***

R3-251772 and R3-252010 proposed to add descriptions on TNL management during feeder link switch for regenerative NTN payload.

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| [R3-251772](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251772.zip) | TP for TS 38.300 on NR NTN Regenerative Payload Feeder Link Switch Over (Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, Xiaomi, CATT) |
| [R3-252010](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252010.zip) | (TP for TS 38.300) Support of regenerative payload - various topics (Huawei) |

TP in R3-251772 (QC)

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| 16.14.4.3 ProceduresFor Transparent Payload, the NTN Control function (see Annex B.4) determines the point in time when the feeder link switch over between two gNBs is performed. The transfer of the affected UE(s)' context between the two gNBs at feeder link switch over is performed by means of either NG based or Xn based handover, and it depends on the gNBs' implementation and configuration information provided to the gNBs by the NTN Control function.In Regenerative NTN payload, the NTN Control function (see Annex B.4) determines the point in time when the feeder link switch over is performed. The change from old NTN GW to new NTN GW is supported by existing mechanism, e.g., multiple TNLA association, NG based or Xn Based handover.  |

TP in R3-252010 (HW)

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| 16.14.4.3 ProceduresThe NTN Control function (see Annex B.4) determines the point in time when the feeder link switch is performed. The transfer of the affected UE(s)' context at feeder link switch over is performed by means of either NG based or Xn based handover or TNL function, and it depends on the gNBs' implementation and configuration information provided to the gNBs by the NTN Control function. |

**Proposal 1, agree the TP R3-25xxx in revision of R3-251772 or R3-252010 to capture the description of the TNL management during feeder link switch.**

1. **TNL address updates due to feeder link switch over**

According to the papers in [R3-251714](file:///C%3A%5CUsers%5CLisi%20Li%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251714.zip), R3-251873, R3-252010 and [R3-251730](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251730.zip), the gNB's TNL address changes after a feeder link switch over, the gNB must notify the 5GC (AMF/UPF) of the new address to ensure AMF/UPF can use it for downlink (DL) NG-C/NG-U transmissions. The TNL updates can be performed via UE associated messages (existing signaling) [[R3-251714](file:///C%3A%5CUsers%5CLisi%20Li%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251714.zip), R3-251873, R3-252010] or non-UE associated message (new signaling, similar to F1AP IAB UP Configuration Update procedure discussed in mobile IAB) to avoid signalling storms [[R3-251730](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251730.zip)]. However, (Huawei) in R3-252010 says that for the hard FLSO, the TNL can be kept, the change of the gateway working as a TNL router, and should not influence the TNL address on the satellite gNB.

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| [R3-251714](file:///C%3A%5CUsers%5CLisi%20Li%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251714.zip) | (TP to NTN BL CRs) Support of Regenerative payload (CATT) |
| [R3-251730](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251730.zip) | (TP to BL CR for TS 38.413) Discussion on the support of Regenerative payload (Nokia, Nokia Shanghai Bell) |
| [R3-251873](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251873.zip) | (TP for TS 38.300) Support of regenerative payload (China Telecom) |
| [R3-252010](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252010.zip) | (TP for TS 38.300) Support of regenerative payload - various topics (Huawei) |

**Proposal 2, in case of feeder link switch over, the TNL addresses of the gNB may be changed.**

**Proposal 2bis, in case the TNL addresses are changed due to feeder link switch over, the updated TNL addresses are notified to 5GC via:**

**Option 1, existing PDU session related message.**

**Option 2, new non-UE associated message.**

If option 1 is agreed, do we need a stage 2 to reflect the agreements? If yes, the TP in R3-251714(CATT) can be as used as baseline?

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| 16.14.4.3 ProceduresThe NTN Control function (see Annex B.4) determines the point in time when the feeder link switch over between two gNBs is performed. The transfer of the affected UE(s)' context between the two gNBs at feeder link switch over is performed by means of either NG based or Xn based handover, and it depends on the gNBs' implementation and configuration information provided to the gNBs by the NTN Control function.In case of feederlink switch, on board gNB may provide the updated DL GTP-U tunnels for the served UEs to AMF via Path Switch Request or PDU Session Resource Modify Indication message. |

1. **NG Connection interruption due to hard feeder link switch over**

According to the discussion in R3-251784, for hard FLSO, there would be a break in NG connection between 5GC and gNB. The gNB and 5GC needs to stop transmission over NG (NG-C and NG-U) at time T and restart at time T1 after hard FLSO, it’s proposed to introduce an indication to notify 5GC suspend or resume the connection in R3-251784 and R3-251731, while R3-251686(NEC) thinks that this can be done by OAM configuration.

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| [R3-251784](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251784.zip) | (TP for TS 38.300) Discussion on Hard FLSO and RRC Inactive state in NR NTN Regenerative Payload (Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, Xiaomi, China Telecom) |
| [R3-251731](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251731.zip) | (TP to BL CR for TS 38.413) Enhancement to support hard FLSO (Nokia, Nokia Shanghai Bell, Qualcomm, Xiaomi, China Telecom) |
| [R3-251686](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251686.zip) | (TP for TS 38.300) Discussion on regenerative payload enhancement for NR NTN (NEC) |
| [R3-251873](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251873.zip) | (TP for TS 38.300) Support of regenerative payload (China Telecom) |
| [R3-252010](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252010.zip) | (TP for TS 38.300) Support of regenerative payload - various topics (Huawei) |

**Proposal 3, in case of hard feeder link switch over, the 5GC suspends or resumes the DL signalling/data transmission(s) to the gNB based on:**

**Option 1, the new indicator in RAN configuration update**

**Option 2, the OAM configuration**

The following are related TPs:

Stage 3 text in R3-251731(Nokia) for option 1

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| If the *Downlink NG Transmission Control* IE is included in the RAN CONFIGURATION UPDATE message, the AMF shall, if supported, suspend or resume the downlink NG transmission accordingly.**9.2.6.4 RAN CONFIGURATION UPDATE**This message is sent by the NG-RAN node to transfer updated application layer information for an NG-C interface instance.Direction: NG-RAN node ® AMF

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| --- | --- | --- | --- | --- | --- | --- |
| IE/Group Name | Presence | Range | IE type and reference | Semantics description | Criticality | Assigned Criticality |
| Message Type | M |  | 9.3.1.1 |  | YES | reject |
| RAN Node Name | O |  | PrintableString(SIZE(1..150, …)) |  | YES | ignore |
| Downlink NG Transmission Control | O |  | ENUMERATED(suspend, resume,…) | Indicates the CN to suspend or resume the downlink NG Transmission | YES | ignore |

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Stage 2 text in R3-251784 (QC) for option 1

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| 16.14.4.3 ProceduresThe NTN Control function (see Annex B.4) determines the point in time when the feeder link switch over between two gNBs is performed. The transfer of the affected UE(s)' context between the two gNBs at feeder link switch over is performed by means of either NG based or Xn based handover, and it depends on the gNBs' implementation and configuration information provided to the gNBs by the NTN Control function.For Regenerative payload, an indication to suspend and resume data and signaling procedures over NG interface is sent to AMF from gNB in the NGAP Configuration Update message when the Hard Feeder Link switch occurs. |

Stage 2 text in R3-251686 (NEC) for option 2

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| 16.14.4.3 ProceduresThe NTN Control function (see Annex B.4) determines the point in time when the feeder link switch over between two gNBs is performed. The transfer of the affected UE(s)' context between the two gNBs at feeder link switch over is performed by means of either NG based or Xn based handover, and it depends on the gNBs' implementation and configuration information provided to the gNBs by the NTN Control function.The hard feeder link switchover may cause an NG interface interruption between the NGSO regenerative payload and 5GC. The OAM provides the time window or schedule of the feeder link switchover; then, the regenerative payload should suspend the NG interface pointed by the switchover time window or schedule.  |

## NG removal

In RAN3 #127, IoT NTN has agreed to introduced S1 Removal to support Regenerative Payload as NR NTN, and BLCR to TS 36.410 added the S1 Removal description in S1 management functions.

BL CR to TS 36.410 in R3-250674 (TP to TS36.410) Introduce S1 Removal to support Regenerative Payload in IoT NTN

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| **5.8 S1 interface management function**The error indication function is used by the eNB (respectively the MME) to indicate to the MME (respectively the eNB) that a logical error has occurred.The reset function is used to initialize the peer entity after node setup and after a failure event occurred. This procedure can be used by both the eNB and MME.The S1 setup (respectively the eNB and MME configuration update) function allows to exchange (respectively update) application level data needed for the eNB and MME to interoperate correctly on the S1 interface. The S1 removal function is used by eNB to initialize the removal S1 interfaces (with all application level configuration data) between MME.  |

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| [R3-252180](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252180.zip) | (TPs to BL CR 38.410) Introduce NG Removal Function (CMCC, Samsung, ZTE, CATT) | other |

TP in R3-252180 (CMCC):

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| **5.8 NG Interface Management function** The NG-interface management functions provide:- means to ensure a defined start of NG-interface operation (reset);- means to handle different versions of application part implementations and protocol errors (error indication).- means to remove the interface instance between gNB and AMF in a controlled manner (removal). |

**Proposal 4, agree the TP R3-25xxx in revision of R3-252180 to capture NG removal as interface management function.**

## NG suspend/resume

We’ve been discussed this topic for a long time, it’s foreseen that we’ll repeat the discussion without progress in the future.

**Proposal 5, how to deal with this topic?**

**Option 1, no NG suspend/resume in R19 (to stop repeating discussion in the next meetings)**

**Option 2, keep the NG suspend/resume as an open issue.**

# Conclusion, Recommendations [if needed]

# References

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| [R3-251528](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251528.zip) | Reply LS to LS on reply to LS on OAM requirements to support regenerative payload (SA5(Huawei)) | LS in |
| [R3-251714](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251714.zip) | (TP to NTN BL CRs) Support of Regenerative payload (CATT) | other |
| [R3-251766](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251766.zip) | Support of Inactive UE mobility in NTN (Xiaomi, Qualcomm Incorporated, Nokia, Nokia Shanghai Bell) | discussion |
| [R3-251772](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251772.zip) | TP for TS 38.300 on NR NTN Regenerative Payload Feeder Link Switch Over (Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, Xiaomi, CATT) | other |
| [R3-251784](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251784.zip) | (TP for TS 38.300) Discussion on Hard FLSO and RRC Inactive state in NR NTN Regenerative Payload (Qualcomm Incorporated, Nokia, Nokia Shanghai Bell, Xiaomi, China Telecom) | other |
| [R3-251903](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251903.zip) | Making the Case for Location-Based CHO in Rel-19 (Ericsson, Thales, ESA, Inmarsat, Viasat, Jio Platforms Limited, Intelsat) | discussion |
| [R3-252180](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252180.zip) | (TPs to BL CR 38.410) Introduce NG Removal Function (CMCC, Samsung, ZTE, CATT) | other |
| [R3-251594](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251594.zip) |  Further Discussion on Support of NTN Regenerative Architecture (TCL) | discussion |
| [R3-251686](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251686.zip) | (TP for TS 38.300) Discussion on regenerative payload enhancement for NR NTN (NEC) | discussion |
| [R3-251730](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251730.zip) | (TP to BL CR for TS 38.413) Discussion on the support of Regenerative payload (Nokia, Nokia Shanghai Bell) | other |
| [R3-251731](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251731.zip) | (TP to BL CR for TS 38.413) Enhancement to support hard FLSO (Nokia, Nokia Shanghai Bell, Qualcomm, Xiaomi, China Telecom) | other |
| [R3-251744](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251744.zip) | Discussions on INACTIVE support from moving satellite gNBs (LG Electronics Inc.) | discussion |
| [R3-251745](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251745.zip) | (TP for NR\_NTN\_Ph3 TS 38.300 BL CR) OAM for NG management (LG Electronics Inc.) | other |
| [R3-251767](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251767.zip) | (TP for TS 38.300) Support of regenerative payload (Xiaomi) | other |
| [R3-251812](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251812.zip) | Further discussion on support of regenerative payload for NR NTN (Samsung) | discussion |
| [R3-251873](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251873.zip) | (TP for TS 38.300) Support of regenerative payload (China Telecom) | other |
| [R3-251891](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251891.zip) | (TP to BL CR for 38.413) Further discussion on support of regenerative payload (ZTE Corporation) | other |
| [R3-251902](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251902.zip) | Considerations on NG Interface Management over the Feeder Link (Ericsson, Thales, Huawei, Jio Platforms Limited, Intelsat, ESA) | discussion |
| [R3-251904](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251904.zip) | Location-Based CHO in Rel-19 - XnAP Impacts (Ericsson, Thales, ESA, Inmarsat, Viasat, Jio Platforms Limited, Intelsat) | other |
| [R3-251905](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-251905.zip) | Inactive UEs and NR NTN (Ericsson, Jio Platforms Limited, T-Mobile, BT, Thales, Telia Company, China Unicom, KT Corp.) | discussion |
| [R3-252009](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252009.zip) | (TP for TS 38.300) Support of regenerative payload-UE INACTIVE (Huawei) | discussion |
| [R3-252010](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252010.zip) | (TP for TS 38.300) Support of regenerative payload - various topics (Huawei) | discussion |
| [R3-252073](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252073.zip) | Tracking Area Handling for Regenerative Satellite Access (Ericsson LM) | discussion |
| [R3-252074](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252074.zip) | Study for RRC-INACTIVE UEs in NR NTN (Jio Platforms) | discussion |
| [R3-252099](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252099.zip) | Discussion on Support of Inactive UE in NTN (ETRI) | discussion |
| [R3-252179](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252179.zip) | Discussion on Support of regenerative payload for NR NTN (CMCC) | discussion |
| [R3-252211](file:///D%3A%5C%E4%BC%9A%E8%AE%AE%E7%A1%AC%E7%9B%98%5CTSGR3_127-bis%5CDocs%5CR3-252211.zip) | Discussion on support of regenerative payload for NR NTN (CSCN) | discussion |