3GPP TSG-RAN WG3 Meeting #127bis R3-252348  
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:

**Whether to support NG suspend/Resume?**

**When the on-board gNB performs feeder link switchover to the new NTN Gateway, gNB could notifies the AMF about the new DL NG-U TNL Information through Path Switch Request or PDU Session Resource Modify Indication message?**

**CB: # NRNTN**

**- Discuss the open issues above**

**- Provide the TPs if agreeable**

(moderator - Xiaomi)

Summary of offline disc [R3-252348](file:///C:\Users\Lisi%20Li\AppData\Local\Temp\BNZ.67f7286c13cedc42\Inbox\R3-252348.zip)

# For the Chairman’s Notes

Stage 2 TNL management

**Proposal 1, agree the TP R3-252405(Huawei) to capture TNL management during feeder link switch.**

Stage 2 on TNL address updates due to feeder link switch

**Proposal 2, in case of the TNL addresses are changed due to feeder link switch over, existing procedures may be used.**

**Proposal 2bis, agree the TP R3-252419 (CATT) to add a note for TNL addresses update due to feeder link switch over.**

NG Connection interruption due to hard feeder link switch over

**Proposal 3, agree the stage-2/3 TPs with EN to support hard feeder link switch over**

**- Stage 2 TP in** **R3-252408 (QC)**

**- Stage 3 TP in R3-252409 (Nokia)**

**Proposal 3bis, Further check the functionality: in case of hard feeder link switch over, the 5GC suspends or resumes the DL signalling/data transmission(s) to the gNB based on the new indicator in RAN configuration update, FFS on the relationship with respect to NG suspend/resume (if any).**

Stage 2 on NG removal

**Proposal 4, agree the TP R3-252416(CATT) to capture NG removal as interface management function.**

NG suspend/resume

**Proposal 5, no new NGAP suspend/resume procedures in R19.**

# 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:\会议硬盘\TSGR3_127-bis\Docs\R3-251772.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:\会议硬盘\TSGR3_127-bis\Docs\R3-252010.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 Procedures  For 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 Procedures  The 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 handover or TNL functionality, and it depends on the gNBs' implementation and configuration information provided to the gNBs by the NTN Control function. |

**Moderator summary:**

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

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| 16.14.4.3 Procedures  The 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 handover or TNL functionality, and it depends on the gNBs' implementation and configuration information provided to the gNBs by the NTN Control function. |

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

According to the papers in [R3-251714](file:///C:\Users\Lisi%20Li\会议硬盘\TSGR3_127-bis\Docs\R3-251714.zip), R3-251873, R3-252010 and [R3-251730](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251730.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:\Users\Lisi%20Li\会议硬盘\TSGR3_127-bis\Docs\R3-251714.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:\会议硬盘\TSGR3_127-bis\Docs\R3-251730.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:\Users\Lisi%20Li\会议硬盘\TSGR3_127-bis\Docs\R3-251714.zip) | (TP to NTN BL CRs) Support of Regenerative payload (CATT) |
| [R3-251730](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251730.zip) | (TP to BL CR for TS 38.413) Discussion on the support of Regenerative payload (Nokia, Nokia Shanghai Bell) |
| [R3-251873](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251873.zip) | (TP for TS 38.300) Support of regenerative payload (China Telecom) |
| [R3-252010](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-252010.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 of the TNL addresses change due to feeder link switch over, the updated TNL addresses are notified to 5GC via:**

**Option 1, existing procedures.**

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

Add a note for proposal 2bis and fix the wording.

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 Procedures  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.  Note: In case of TNL address change due to feeder link switch, existing procedures (e.g., Path Switch, PDU Session Resource Modification Indication) may be used. |

**Moderator summary:**

**Proposal 2, in case of the TNL addresses are changed due to feeder link switch over, existing procedures may be used.**

**Proposal 2bis, agree the TP R3-25xxx in revision of R3-251714(CATT) to add a note for proposal 2.**

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| 16.14.4.3 Procedures  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.  Note: In case of TNL address change due to feeder link switch, existing procedures (e.g., Path Switch, PDU Session Resource Modification Indication) may be used. |

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:\会议硬盘\TSGR3_127-bis\Docs\R3-251784.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:\会议硬盘\TSGR3_127-bis\Docs\R3-251731.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:\会议硬盘\TSGR3_127-bis\Docs\R3-251686.zip) | (TP for TS 38.300) Discussion on regenerative payload enhancement for NR NTN (NEC) |
| [R3-251873](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251873.zip) | (TP for TS 38.300) Support of regenerative payload (China Telecom) |
| [R3-252010](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-252010.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:**

**the new indicator in RAN configuration update**

**~~Option 2, the OAM configuration~~**

**FFS 1, Further check proposed functionality, FFS 2, relationship with respect to NG suspend/resume (if any)**

**no new NGAP suspend/resume procedures in R19**

**work on the TPs with editor notes.**

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   |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | 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 | |

Editor’s Note: FFS whether this IE is needed.

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

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| 16.14.4.3 Procedures  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.  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. |

Editor’s Note: FFS whether this text is needed.

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

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| 16.14.4.3 Procedures  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.  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. |

**Moderator summary:**

Companies want to further check the enhancement on hard feeder link switch over but are OK to capture the stage 2 and stage 3 TP with either notes.

**Proposal 3, Further check the functionality: in case of hard feeder link switch over, the 5GC suspends or resumes the DL signalling/data transmission(s) to the gNB based on the new indicator in RAN configuration update, FFS on the relationship with respect to NG suspend/resume (if any)**

**Proposal 3bis, agree the revisions of the following TPs with editor notes.**

**- Stage 2 in** **R3-251784 (QC)** Editor’s Note: FFS whether this text is needed.

**- Stage 3 in R3-251731(Nokia)** Editor’s Note: FFS whether this IE is needed.

## 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:\会议硬盘\TSGR3_127-bis\Docs\R3-252180.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). |

**Moderator summary:**

**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.**

**Moderator summary:**

This discussion is related to NG connection interruption due to hard feeder link switch, according to the discussion, companies agree the following

**Proposal 5, no new NGAP suspend/resume procedures in R19.**

# Conclusion, Recommendations [if needed]

# References

|  |  |  |
| --- | --- | --- |
| [R3-251528](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251528.zip) | Reply LS to LS on reply to LS on OAM requirements to support regenerative payload (SA5(Huawei)) | LS in |
| [R3-251714](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251714.zip) | (TP to NTN BL CRs) Support of Regenerative payload (CATT) | other |
| [R3-251766](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251766.zip) | Support of Inactive UE mobility in NTN (Xiaomi, Qualcomm Incorporated, Nokia, Nokia Shanghai Bell) | discussion |
| [R3-251772](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251772.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:\会议硬盘\TSGR3_127-bis\Docs\R3-251784.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:\会议硬盘\TSGR3_127-bis\Docs\R3-251903.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:\\会议硬盘\\TSGR3_127-bis\\Docs\\R3-252180.zip) | (TPs to BL CR 38.410) Introduce NG Removal Function (CMCC, Samsung, ZTE, CATT) | other |
| [R3-251594](file:///D:\\会议硬盘\\TSGR3_127-bis\\Docs\\R3-251594.zip) | Further Discussion on Support of NTN Regenerative Architecture (TCL) | discussion |
| [R3-251686](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251686.zip) | (TP for TS 38.300) Discussion on regenerative payload enhancement for NR NTN (NEC) | discussion |
| [R3-251730](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251730.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:\会议硬盘\TSGR3_127-bis\Docs\R3-251731.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:\会议硬盘\TSGR3_127-bis\Docs\R3-251744.zip) | Discussions on INACTIVE support from moving satellite gNBs (LG Electronics Inc.) | discussion |
| [R3-251745](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251745.zip) | (TP for NR\_NTN\_Ph3 TS 38.300 BL CR) OAM for NG management (LG Electronics Inc.) | other |
| [R3-251767](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251767.zip) | (TP for TS 38.300) Support of regenerative payload (Xiaomi) | other |
| [R3-251812](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251812.zip) | Further discussion on support of regenerative payload for NR NTN (Samsung) | discussion |
| [R3-251873](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251873.zip) | (TP for TS 38.300) Support of regenerative payload (China Telecom) | other |
| [R3-251891](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251891.zip) | (TP to BL CR for 38.413) Further discussion on support of regenerative payload (ZTE Corporation) | other |
| [R3-251902](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251902.zip) | Considerations on NG Interface Management over the Feeder Link (Ericsson, Thales, Huawei, Jio Platforms Limited, Intelsat, ESA) | discussion |
| [R3-251904](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251904.zip) | Location-Based CHO in Rel-19 - XnAP Impacts (Ericsson, Thales, ESA, Inmarsat, Viasat, Jio Platforms Limited, Intelsat) | other |
| [R3-251905](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-251905.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:\会议硬盘\TSGR3_127-bis\Docs\R3-252009.zip) | (TP for TS 38.300) Support of regenerative payload-UE INACTIVE (Huawei) | discussion |
| [R3-252010](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-252010.zip) | (TP for TS 38.300) Support of regenerative payload - various topics (Huawei) | discussion |
| [R3-252073](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-252073.zip) | Tracking Area Handling for Regenerative Satellite Access (Ericsson LM) | discussion |
| [R3-252074](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-252074.zip) | Study for RRC-INACTIVE UEs in NR NTN (Jio Platforms) | discussion |
| [R3-252099](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-252099.zip) | Discussion on Support of Inactive UE in NTN (ETRI) | discussion |
| [R3-252179](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-252179.zip) | Discussion on Support of regenerative payload for NR NTN (CMCC) | discussion |
| [R3-252211](file:///D:\会议硬盘\TSGR3_127-bis\Docs\R3-252211.zip) | Discussion on support of regenerative payload for NR NTN (CSCN) | discussion |