**3GPP TSG-RAN WG3 Meeting #112-e *R3-212795***

**eLocation, eLocation, 17-28 May 2021**

**Title:** (TP for BL CR TS 38.300) NTN FeederSwitch

**Source:** Thales,Huawei

**Agenda item:** 20.2.4

**Document Type:** Approval

# 1. Introduction

This document contains a TP resulting from the initial round discussion on the CB: # 80\_NTN\_FeederSwitch (1st round) in R3-212794

# 3. Discussion

Based on the SoD associated to RAN3#114-e’s CB: # 80\_NTN\_FeederSwitch (1st round) in R3-212699, a number of proposals have been revised by moderator.

They are provided as TP to the stg2 BL CR 38.300 for both the normative and informative part.

As part of the follow-up discussion on CB#80, it is proposed to directly discuss a tentative TP- for the stg2 BL CR 38.300.

Proposal 1: Discuss tentative TP on Feederswitch aspects for stg2 BL CR 38.300 (which last endorsed version can be found in R3-211497)

# 4. Conclusion

We propose the following:

Proposal 1: Discuss tentative TP on Feederswitch aspects for stg2 BL CR 38.300 (which last endorsed version can be found in R3-211497)

The TP for the BL CR is reflected in Annex A

# 5. Reference

1. R3-211497 BL CR update
2. R3-212699 CB: # 80\_NTN\_FeederSwitch

# Annex A – TP for BL CR TS 38.300 NTN

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## 16.x Non-Terrestrial Networks

[RAN2 - TP]

### 16.x.4 Switch over

[RAN2 - TP]

#### 16.x.4.1 Definitions

A feeder link switch over is the procedure where the feeder link is changed from a source NTN Gateway to a target NTN Gateway for a specific NTN payload. The feeder link switch over is a Transport Network Layer procedure.

Both hard and soft feeder link switch overs are applicable to NTN.

Editor’s note: The previous statement on feeder link switch over is merely capturing a RAN3 agreement. Terminology, definitions, etc. to follow pending to RAN2.

Editor’s note: RAN2 text for intra-gNB feeder/service link switch is FFS.

#### 16.x.4.2 Assumptions

A feeder link switch over may result in transferring the established connection for the affected UEs between two gNBs.

For soft feeder link switch over, an NTN payload is able to connect to more than one NTN Gateway during a given period i.e. a temporary overlap can be ensured during the transition between the feeder links.

For hard feeder link switch over, an NTN payload only connect to one NTN Gateway at any given time i.e. a radio link interruption may occur during the transition between the feeder links.

Editor’s Note: Some clarification on example of the temporary overlap and the interruption time may be provided later

Editor’s note: RAN2 text for intra-gNB feeder/service link switch is FFS.

#### 16.x.4.3 Operations [FFS]

#### 16.x.4.4 Procedures [FFS]

### 16.x.5 Signalling [FFS]

The Cell Identity which is indicated by the gNB to the Core Network as part of the User Location Information (as defined in TS 38.413 [26]) corresponds to a fixed geographical area, irrespective of the orbit of the NTN payload. The mapping between Cell Identities and geographical areas is configured in the RAN and Core Network.

Editor’s note: It is FFS how the gNB derives the information required to derive the Cell Identity provided to the CN.

### 16.x.6 AMF (Re-)Selection by NG-RAN

If the NG-RAN node serves more than one country, the NG-RAN node may be configured to ensure that the UE is using an AMF that serves the country in which the UE is located. When so configured:

- If at AMF Selection the NG-RAN node detects that the UE is in a different country to that served by the AMF, the NG-RAN node implements the NAS Node Selection Function behavior specified in TS 38.410 [16];

- For RRC Connected, if the NG-RAN node detects that the UE is in a different country to that served by the AMF, the NG-RAN should perform an NG handover to change to an appropriate AMF.

Editor’s note: Text may need to be revised depending on RAN2/SA2/RAN3 progress.

### 16.x.7 O&M Requirements

The following NTN related parameters shall be provided by O&M to the gNB providing non-terrestrial NR access:

- Ephemeris information describing the orbital trajectory information or coordinates for the NTN vehicles. This information is provided on a regular basis or upon demand to the gNB.

Editor’s note: Ephemeris format (e.g. Position Velocity and Time state vectors or Orbital parameters) and usage details (e.g. Uplink synchronisation, Random access procedure, mobility management) are FFS.

Editor’s note: FFS if the location of the NTN-Gateways associated to the gNB needs to be provided to the gNB

- additional information to enable gNB operation for feeder/service link switch overs.

NOTE: The NTN related parameters provided by O&M to the gNB may depend on the type of supported service links, e.g. earth fixed beams, quasi earth fixed beams, earth moving beams, etc.

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# Annex B Example implementation of Non-Terrestrial Networks (informative)

The following figure illustrates an example implementation of an Non-Terrestrial Network within an NG-RAN infrastructure for transparent NTN payload:



Figure B-1: NTN based NG-RAN

The gNB depicted in Figure B-1 may be subdivided into non-NTN infrastructure gNB functions and the NTN Service Link provisioning System. The NTN infrastructure may be thought of being subdivided into the NTN Service Link provisioning System and the NTN Control function. The NTN Service Link provisioning System may consist of one or more NTN payloads and NTN Gateways.

The NTN payload is embarked on a spaceborne (or airborne) vehicle, providing a structure, power, commanding, telemetry, attitude control for the satellite (resp. HAPS) and possibly an appropriate thermal environment, radiation shielding.

The NTN Service Link provisioning System maps the NR-Uu radio protocol over radio resources of the NTN infrastructure (e.g. beams, channels, Tx power).

The NTN control function controls the spaceborne (or airborne) vehicles as well as the radio resources of the NTN infrastructure (NTN payload(s) & NTN Gateway(s)). It provides control data, e.g. Ephemeris, to the non-NTN infrastructure gNB functions of the gNB.

Provision of NTN control data to the gNB is out of 3GPP scope.

Editor’s Note: Whether the provision of the NTN control date is out of scope of 3GPP or rely on 3GPP O&M is FFS.

NOTE: The transport of NR-Uu protocol between the NTN Service Link provisioning system and the non-NTN infrastructure gNB functions is out of 3GPP scope.

Editor’s Note: The list of NTN related parameters provided below needs further discussion.

At least the following NTN related parameters are expected to be provided by O&M to the gNB for its operation

- a) Earth fixed beams: for each beam provided by a given satellite,

- the Cell identifier (NG and Uu) mapped to the beam,

- the Cell’s reference location (e.g. cell’s center and range)

- b) quasi Earth fixed beams: for each beam provided by a given satellite:

- the Cell identifier (NG and Uu) and time window mapped to a beam,

- the Cell’s/beam’s reference location (e.g. cell’s center and range)

- the time window of the successive switch overs (feeder link, satellite),

- the identifier and time window of all serving satellites and NTN-Gateways,

- c) Earth moving beams: for each beam provided by a given satellite,

- the Uu Cell identifier mapped to a beam and mapping information to fixed geographical areas reported on NG, including information about the beams direction and motion of the beam’s foot print on Earth

- its elevation with respect to the NTN-payload,

- schedule of successive serving NTN-Gateways/gNBs,

- schedule of successive switch overs (feeder link, NTN-payload).

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