**3GPP TSG RAN WG4 Meeting #97-e draft R4-2017661**

**Electronic meeting, November 2th – November 13th, 2020 *rev R4-2014381***

**Title: NR\_NTN\_solutions work plan**

**Source: Thales**

**Type: Work Plan**

**For: Endorsement**

**Agenda Item: 12.8.1 - General and work plan [NR\_NTN\_solutions]**

**Release: Rel-17**

# Introduction

At the RAN#86 meeting, upon successful completion of the “Study Item on NR support non-terrestrial network” [1], the corresponding work item was approved [2].

In this contribution, we provide for informative an updated work plan on the Rel-17 NR-NTN work item.

# WID Objective

The work item aims to specify the enhancements identified for NR NTN (non-terrestrial networks) especially LEO and GEO with implicit compatibility to support HAPS (high altitude platform station) and ATG (air-to-ground) scenarios according to the following principles:

* FDD is assumed for core specification work for NR-NTN.
  + NOTE: This does not imply that TDD cannot be used for relevant scenarios, e.g. HAPS, ATG.
* Earth fixed Tracking area is assumed with Earth fixed and moving cells.
* UEs with GNSS capabilities are assumed.
* Transparent payload is assumed

The detailed objectives are to specify enhancing features to Rel-15 & Rel-16’s NR radio interface & NG-RAN as follows:

## RAN4

### Objective of core part [2]

Study the framework for how NTN core requirements are defined.

Specify the following requirements [RAN4] (Note 1)

* + UE RRM core requirements
* Study and identify which bands may be potentially relevant to NTN including:
  + Analysis of regulations in the spectrum considered
  + Adjacent channel co-existence
* Considering the potential bands to be used as example for the WID:
* Specify needed generic RF core requirements for the network and the UE such that adjacent channel co-existence scenarios are met and performance of other RF parameters (RX performance, TX signal quality etc.) are subject to acceptable minimum requirements
* Investigate and specify UE timing & frequency pre-compensation accuracy requirements as needed [RAN4].

*Note 1: It is assumed that this work item will be frequency agnostic and therefore we can consider that NTN can operate in FR1 or FR2 ranges. Defining NR bands for NTN should be included as part of dedicated Rel-17 RAN4 led work items including an analysis of regulations in spectrum considered, which bands 3GPP should specify, as well as potential co-existence between NR terrestrial and satellite*

### Objective of Performance part [2]

Specify necessary UE and network performance requirements for the specified enhancements [RAN4].

Specify RRM test and network conformance tests [RAN4].

# Work Plan

## WG RAN4 RF

In this section RAN4 RF work plan for NR support non-terrestrial network WI is proposed:

**2-13 November 2020, RAN4#97-e, e-meeting**

* Work plan endorsed.
* Initial presentation of reference use cases and architecture to be considered.
* Initial discussion on RF core requirements for NTN.
* Initial discussion on the exemplary band(s) relevant for NTN and their regulatory constraints.

**25 January-5 February 2021, RAN4#98-e, e-meeting**

* Agree on use cases & scenarios
* Target Agreement on the exemplary band.
* Further discuss and align on NTN architecture and NTN components description
* Initial discussion on coexistence study scenarios to be considered and related simulations assumptions.

**12-20 April 2021, RAN4#98-bis-e, e-meeting**

* Further discuss coexistence study scenarios to be considered and related simulations assumptions.

**19 – 27 May 2021, RAN4#99, e-meeting**

* Agree on coexistence study scenarios to be considered and related simulations assumptions.
* Early discussion on the calibration of simulations for coexistence study scenarios.
* Start discussion on demodulation performance.

**23-27 August 2021, RAN4#100, Toulouse**

* Calibration of simulations for coexistence study scenarios and Initial discussion on simulation results for coexistence study scenarios.
* Further discussion on the RF core requirements (UE and “BS” requirements) for NTN
* Further discuss on exemplary band(s) specific requirements
* Continue discussion on demodulation performance, align on needed requirements and simulation assumptions.

**October 2021, RAN4#100-bis, TBD**

* Further discussion on simulation results for coexistence study scenarios.
* Further discussion on the RF core requirements (UE and “BS” requirements) for NTN
* Further discuss on exemplary band(s) specific requirements
* Continue discussion on demodulation performance and early simulation results, finalize the list of needed requirements and simulation assumptions.
* Start discussion on RF conformance testing.

**November 2021, RAN4#101, TBD**

* Align on simulation results for coexistence study scenarios.
* Further discuss on the RF core requirements (UE and “BS” requirements) for NTN
* Further discuss on exemplary band(s) specific requirements
* Continue discussion on demodulation performance and align on simulation results.
* Further discuss RF conformance testing.
* Start drafting of CRs.

**February 2022, RAN4#102, TBD**

* Further discussion on the RF core requirements (UE and “BS” requirements) for NTN
* Further discussion on exemplary band(s) specific requirements
* Align on demodulation requirements.
* Further discuss RF conformance testing.
* Further drafting of CRs

**April 2022, RAN4#103, TBD**

* Agree on the RF core requirements (UE and “BS” requirements) for NTN
* Agree on exemplary band(s) specific requirements
* Finalize demodulation requirements.
* Finalize RF conformance testing.
* Endorse CRs

## WG RAN4 RRM

In this section RAN4 RRM work plan for NR support non-terrestrial network WI is proposed:

**2-13 November 2020, RAN4#97-e, e-meeting**

* Work plan presented for information.
* Presentation of reference use cases and scenarios to be considered.
* Initial discussion on RRM core requirements for NTN.

**25 January-5 February 2021, RAN4#98-e, e-meeting**

* Agree on use cases and scenarios
* Further discussion on the RRM core requirements for NTN
* Further discuss necessary simulations based on progress and agreements

**12-20 April 2021, RAN4#98-bis-e, e-meeting**

* Further discussion on the RRM core requirements for NTN
* Discuss if there is any specific requirement associated to the exemplary bands agreed by RF group as well as the necessary simulations if needed.

**19 – 27 May 2021, RAN4#99, e-meeting**

* Further discussion on the RRM core requirements for NTN
* Further discuss if there is any specific requirement associated to the exemplary bands agreed by RF group as well as the necessary simulations if needed

**23-27 August 2021, RAN4#100, Toulouse**

* Further discussion on the RRM core requirements for NTN
* Further discuss if there is any specific requirement associated to the exemplary bands agreed by RF group as well as the necessary simulations if needed
* Start drafting CRs provided there is sufficient progress

**October 2021, RAN4#100-bis, TBD**

* Further discussion on the RRM core requirements for NTN
* Further discuss if there is any specific requirement associated to the exemplary bands agreed by RF group and simulation results if needed
* Further drafting of CRs based on the progress

**November 2021, RAN4#101, TBD**

* Further discussion on the RRM core requirements for NTN
* Further discuss on specific requirements associated to the selected exemplary bands and simulations results
* Further drafting of CRs

**February 2022, RAN4#102, TBD**

* Agree on the RRM core requirements for NTN
* Agree if there is any specific requirement associated to the selected exemplary bands and simulations results
* Agree CRs

**April 2022, RAN4#103, TBD**

* Discuss and decide RRM test cases and related parameters
* Discuss and specify measurement accuracy

**May 2022, RAN4#104, TBD**

* provide draft CRs to TS 38.133 for the RRM performance part

**August 2022, RAN4#105, TBD**

* approve the CRs for TS 38.133 for the RRM performance part

# References

1. TR 38.821 “Study on solutions for NR to support non-terrestrial networks”
2. RP-201256, “Solutions for NR to support non-terrestrial networks (NTN)”, Thales, RAN#88-e, june 2020.

***END***