

# 3GPP TSG RAN MEETING #103

## MAASTRICHT, NETHERLANDS, MARCH 18-21, 2024

RP-240255

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Source: Rohde & Schwarz  
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On proposals led by RAN4 in Rel-19

**ROHDE & SCHWARZ**

Make ideas real



# AGENDA

- ▶ Channel model for MIMO requirements
- ▶ Dynamic OTA testing for FR2
- ▶ Combined FR1 + FR2 Testability
- ▶ NTN NGSO Testing
- ▶ Performance requirements for RTK/PPP and posSIB for NR

# CHANNEL MODEL FOR MIMO REQUIREMENTS

## ► Motivation

- CDL models provide spatial component compared to currently used TDL channel models
- CDL models have not been implemented so far for UE conducted performance testing
  - thus how to specify these models needs to be studied by RAN4 before introducing them to the specification
- Need for RAN4 Study which includes at least the following parameters
  - Scenario: FR1 conducted
  - Simplification of cluster to be modeled (e.g. by power threshold)
  - Number of carriers for CA, bandwidth, CSI-RS ports, MIMO layers, UE antennas
  - Doppler frequency
  - Other influences not precluded
- Study needs to consider the feasibility in the conformance test system & complexity for TE implementation
- Use channel models from TR 38.901 as a starting point

## ► Proposal

- RAN4 to study a simplified Channel Model based on CDL model for inclusion into the performance specifications

# DYNAMIC OTA TESTING FOR FR2

## ► Motivation

- This topic has been raised several times in the past to include advanced beam management test cases (RRM and Demod) under a dynamic environment
  - i.e. multiple beams from different directions on a continuously changing environment.
- In order to accommodate those advanced test cases within Rel-19, the focus shall be enhancement of existing test methodologies.
  - i.e. those defined for “RRM 2AoA Rel.15” which are the basis for the more recent “Multi-Rx FR2 / FS\_NR\_FR2\_OTA\_enh”.
- Existing OTA test methodologies present several options to accommodate such kind of testing. These should be available before considering further evolution towards a dynamic testing
  - The work for NR\_MIMO\_OTA\_enh Rel.18 has not been completed yet, despite that it has been running for 2 releases.
  - The study for FS\_NR\_FR2\_OTA\_enh Rel. 18 was just declared completed in February, and there is still work to define the corresponding RRM and Demod requirements.

## ► Proposals

- RAN4 shall focus on the enhancement of existing methodologies (i.e. RRM 2AoA Rel.15 and Multi-Rx FR2) to accommodate test cases for Dynamic OTA for FR2.
- RAN4 shall not include Dynamic OTA for FR2 in Rel.19

# COMBINED FR1+FR2 TESTABILITY

## ► Motivation

- There is no consolidated method to test both frequency ranges (FR1 and FR2) at the same time:
  - FR1 conformance testing is defined only conducted. (LTE for EN-DC modes)
  - FR2 conformance testing is fully radiated (i.e. OTA) with FR1 connection when required (CA, EN-DC, NR-DC) only provided as a stable link (i.e. functional error-free connection).
- It is required to expand the existing FR2 OTA methodologies and define metrics/methods to enable FR1 testing on FR1+FR2 connectivity scenario
- Either of the following options can be considered :
  1. RSRP-based link calibration for FR1. This option is the less invasive, but it will enable test cases only based on relative power levels for FR1. FR2 is not impacted in this case.
  2. Conducted FR1 + OTA FR2. This option may enable test cases based on both relative and absolute power levels for FR1, but it is more invasive, impacting FR2 radiated performance (i.e. Spherical Coverage, Beam Peak Search) and thus limiting the possible set of FR2 test cases.

## ► Proposals

- RAN4 shall study the enhancement of existing FR2 OTA methodologies to enable FR1+FR2 testing
- RAN4 shall study the FR1+FR2 Testing by means of RSRP-based link calibration for FR1

# NTN NGSO TESTING

## Channel model following realistic orbit

- SIB19 represents a realistic orbit
  - UE can interpolate satellite position
- TE must implement orbit propagator (e.g. simple Kepler)
- Test margins may be adapted based on maximum doppler rate

## Advantages :

- SIB19 is synchronized to the doppler/delay profiles
- UE test mode not required
- Test coverage is closest to real conditions
- Pre-defined orbits & UE location can be standardized

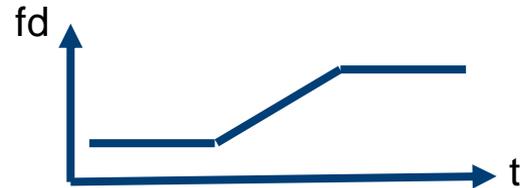


## Channel model following synthetic doppler/delay profile

- SIB19 is not following doppler/delay profile

## Disadvantages :

- Requires UE test mode
  - disable satellite trajectory prediction
  - reduced test coverage, e.g. bug in Orbit prediction might stay unnoticed
- Requires a deep technical discussion to define a representative synthetic channel model



# NTN NGSO TESTING

## Proposal

- ▶ RAN Plenary shall include to R19 WI „NTN\_enh\_2“ a performance part on NGSO Testing
- ▶ NGSO Testing shall include Channel model following the ephemeris seen by UE

# PERFORMANCE REQUIREMENTS FOR RTK/PPP AND POS\_SIB FOR NR

## ► Motivation

- RTK and PPP support as well as posSIB were introduced in Rel. 15 for LTE and enabled in Rel.16 for NR
  - (In NR\_pos\_enh2 and LCS\_LTE\_acc\_enh )
- Nevertheless, the respective performance requirements were not specified.
  - Without a performance evaluation, the advantage of RTK/PPP vs. regular A-GNSS is not standardized and cannot be proven.
- An extension of the legacy performance requirement to cover the RTK/PPP higher accuracy is necessary
  - Enable network operators implementing RTK/PPP and posSIB services for High Accuracy GNSS applications, a baseline performance, that can be relied on in all equipped UEs.
- The expected RAN4 standardization effort ( including potential simulation ) is low

## ► Proposal

- RAN Plenary shall introduce a TEI Rel.19 to add Performance requirements for RTK/PPP and posSIB for NR

# SUMMARY : PROPOSALS FOR RAN4 IN REL-19

1. RAN4 to study a simplified Channel Model based on CDL model for inclusion into the performance specifications
2. RAN4 shall focus on the enhancement of existing methodologies (i.e. RRM 2AoA Rel.15 and Multi-Rx FR2) to accommodate test cases for Dynamic OTA for FR2.
3. RAN4 shall not include Dynamic OTA for FR2 in Rel.19
4. RAN4 shall study the enhancement of existing FR2 OTA methodologies to enable FR1+FR2 testing
5. RAN4 shall study the FR1+FR2 Testing by means of RSRP-based link calibration for FR1
6. RAN Plenary shall include to R19 WI „NTN\_enh\_2“ a performance part on NGSO Testing
7. NGSO Testing shall include Channel model following the ephemeris seen by UE
8. RAN Plenary shall introduce a TEI Rel.19 to add Performance requirements for RTK/PPP and posSIB for NR