3GPP TSG-RAN Meeting # 102
Edinburgh, Scotland, December 11-15, 2023

RP-233281
Agenda Item 9.1.4.4

MediaTek Views on RAN4 Rel-19: Cross session

MediaTek Inc.

Outline

- A summary of all MTK’s Rel-19 proposals
- Detail proposals to cross-session area

A summary of all MediaTek Rel-19 RAN4 proposals

Area	Proposed objectives
RF & OTA (RP-233279)	Study on UE antenna correlation for FR1 multiple antennas (SI)
	MPR Reduction for RedCap (via relaxed emission requirements)
	3Tx for 2 bands with UL Tx switching between 1T2T and 2T1T

Area	Proposed objectives
RRM (RP-233280)	HO interruption minimization
	Relaxed RLM/BFD measurement for Redcap
	TS38.133 Spec clean-up (Kp calculation; MG integration)
	[MG] Pre-configured NCSG
	[MG] NCSG enh for SCell
Demod (RP-233280)	App layer throughput enh: OLLA and 4-layer
	CQI report for R-ML SU-MIMO receiver

Area	Proposed objectives
Cross-session (RP-233281)	Enhanced NTN testing for NGSO
	NTN RedCap UE Support
	NR NTN 3MHz channel bandwidth
	IoT NTN HPUE support
	In-band/guard-band co-existence of NB-IoT w/ NR

OLLA: Outer-Loop Link Adaptation

Enhanced NTN testing for NGSO

- Motivations
  - RAN4 RRM and demod requirements for NR NTN (NR_NTN_solutions) was introduced in Rel-17, and for IoT NTN (LTE_NBIOT_eMTC_NTN_req) the requirements have just been completed early in Rel-18.
  - Two different types of satellites were considered, e.g., Geostationary orbit (GSO) and Non-geostationary orbit (NGSO)
    - In the current RRM and Demod test cases, the DL arrival timing and Doppler frequency offsets of the modelled channel were agreed to be fixed.
    - Under an NGSO field scenario, a large/continual variation in DL arrival timing and Doppler frequency will likely be observed at the UE. As these characteristics are not well represented by the current RAN4 modelling, it may lead to unpredictable UE performance in the field for an NGSO deployment.
  - To fix this, a new WI is needed to introduce a new channel model which reflect correctly the ephemeris seen by UE.

- Objectives
  - Phase I (study phase)
    - Collect inputs of satellite trajectory and UE locations
    - Derive the following time-varying channel parameters as well as the testability based on above inputs
      - Arrival timing
      - Doppler
      - [Sampling rate]
  - Phase II (work phase)
    - Define the SIB19 message and introduce new channel models based on phase I study outcome
    - Define corresponding performance requirements

NR NTN Evolution

- Motivations
  - There is a **growing interest in NTN**, and a **wide range of vendors** are providing support for terminal, chipset, and infrastructure development. This has led to the initiation of normative activities in 3GPP, including **further Rel-18 work** for IoT NTN and NR NTN to define enhancements for various use case requirements.
  - In addition, the introduction of **RedCap UE** in Rel-17 aims to reduce UE complexity and cater to use cases such as industrial wireless sensors and video surveillance.
    - There is an increasing interest and demand to extend the benefits of RedCap UE for NTN systems.
  - Furthermore, there is a recognized need to support **less than 5MHz in NR NTN** for licensees operating regionally and nationally in the **USA, Europe, SE Asia, and Africa**.
    - By leveraging the work item for NR support for dedicated spectrum less than 5MHz for FR1, there is an opportunity to **improve uplink and downlink coverage in NTN** by considering NTN characteristics such as large propagation delay and satellite movement

- Objectives
  - Specify support for the UE complexity reduction (RedCap) features for NTN networks

    NOTE :
    - Re-use existing RedCap UE requirements as much as possible
    - Coexistence with non-RedCap NTN UEs is to be ensured.
    - Focuses on SA mode and single connectivity with operation in a single band at a time.
  - Specify necessary RAN4 requirements to support deploying NR in spectrum allocations from approximately 3 MHz up to below 5 MHz for NTN networks

    Notes:
    - Re-use outcome of Rel-18 dedicated spectrum less than 5MHz for FR1 UE requirements [NR_FR1_lessthan_5MHz_BW] as much as possible

IoT NTN Evolution

- Motivation
  - High Power UE
    - With the **increasing demand for IoT** devices and applications, there is a growing need for high power UE for **IoT NTN**.
    - Highpower UE can provide **better signal strength and UL coverage**, which are essential for IoT devices that operate in **challenging environments**.
    - High power UE for IoT NTN can drive innovation in the IoT industry, and also create new business opportunities by enabling **new use cases and applications**.
  - In-band/guard-band NB-IoT with NR NTN
    - Utilizing existing spectrum for NB-IoT deployments.
    - This allows for **efficient use of resources, enables seamless coexistence with other services, and reduces the need for additional spectrum allocation**.
    - By leveraging in-band/guardband NB-IoT with NR NTN, operators can **maximize the coverage and capacity** of their existing networks, and also provide a cost-effective solution for IoT connectivity.
    - The combination of inband/guard-band NB-IoT with NR NTN offers **enhanced performance and reliability** for IoT applications, and ensures a seamless and robust connectivity experience for IoT devices, hence opens up new opportunities for **innovative IoT use cases and applications**.
- Objectives
  - Specify HPUE support for IoT NTN
  - Specify In-band/guard-band co-existence of NB-IoT w/ NR NTN

Thank you!