3GPP TSG RAN Meeting #101
Bangalore, India, September 11-15, 2023
Agenda Item: 8A.2.9

RP-232538

Views on AI/ML for NG-RAN

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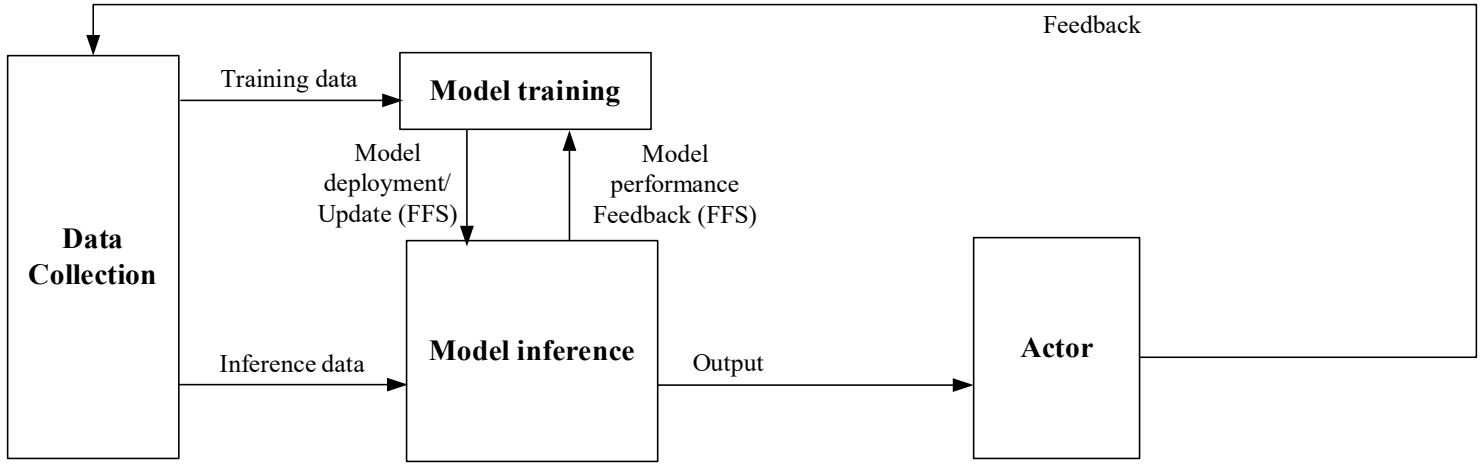
Background and Motivation

Study Item in Rel. 17, Work Item in Rel. 18

- TR 37.817, "Study on enhancement for data collection for NR and EN-DC" studied general high-level principles, AI/ML functional framework and the potential use cases, and the identified potential solutions for these use cases
- New procedures over Xn which can be used for exchanging AI/ML related information on-demand, e.g., predicted information
- UE KPIs and measurements (e.g., UL/DL throughput, packet delay, packet loss) which can be exchanged for model training and feedback
- Potential data collection enhancements and signaling support within existing NG-RAN interfaces and architecture
- Detailed AI/ML algorithms and models for use cases are out of RAN3 scope

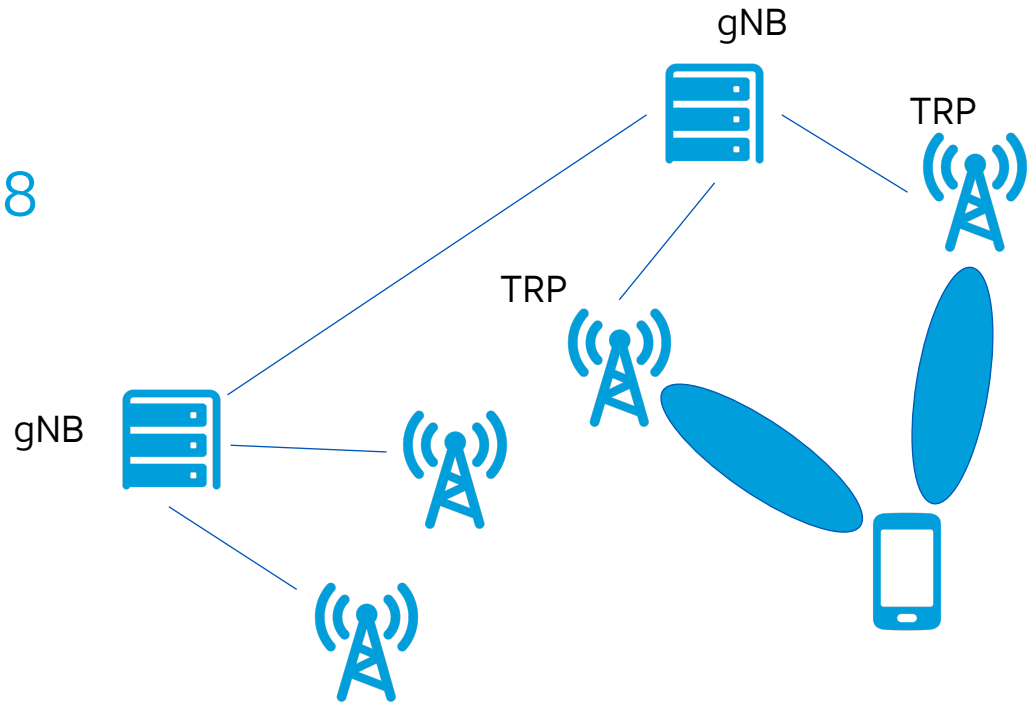


Rel-19 Scope

AI/ML algorithms embedded in the RAN to enable (near) real-time decisions with distributed data

Interface enhancements to support training and LCM with fallback in multi-vendor deployments + OAM

SI-phase for new use cases going beyond Rel-18



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Use Case Overview

Load Balancing

- Optimization of handover parameters and automation of handover actions to distribute/transfer part of the traffic or offload users to provide high quality user experience, while simultaneously improving the system capacity while also minimizing human intervention
- **Rel-19 Objectives: Extend resource predictions to CA/DC scenarios, exchange of joint DL/UL coverage + capacity metrics**

Mobility Optimization

- Unsuccessful handovers result in packet dropping or extra delay during mobility events, which is especially problematic for high-reliability and low-latency applications. Conventional optimization techniques underperform due to dynamic radio environments.
- **Rel-19 Objectives: Support for LTM with beam-level prediction granularity, and CHO threshold prediction**

Dynamic cell-shaping with multi-cell/OAM coordination

- Efficient and autonomous network DL/UL parameter optimization, including antenna tilt, horizontal/vertical HPBW, and Tx power, etc.
- **Rel-19 Objectives: Exchange of predicted antenna parameter configurations, exchange of joint DL/UL coverage + capacity metrics, efficient coordination between gNBs/TRPs, performance monitoring and fallback procedures**

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User Clustering and Data Collection Enhancements

Rel-19 enhancements for Continuous MDT-based data collection

- Mechanisms for efficient selection of users/user profiles based on network policies
- More flexible data type/format configurations to support specific AI/ML implementations

New Objective: User-clustering based data collection and RRM

- Per-user optimization has significant overhead and lacks scalability
- Real time learning of user clusters enables scalable training and performance monitoring
  - Mapping users to clusters based on context and RAN configuration (geo location, speed, QoS etc.)
  - Scalable complexity with performance comparable to user-based optimization
  - Incorporates non-real time and real-time learning in the RAN/OAM
  - Increases efficiency and reduces data collection overhead for model training

Applicable to a wide range of use cases:

- Handover decisions
- Traffic steering/Load balancing
- Cell shaping/Resource Allocation
- QoS enforcement for Slicing

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