Smarter technology for all

3GPP TSG RAN Meeting #101
Bangalore, India, September 11-15, 2023

RP-232133

Agenda Item:	8A.2.9
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Further Study on AI for RAN in Rel-19

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Motivations

- Rel18 AI for NG-RAN:
  - focused on three use cases, i.e., load balancing, network energy saving, and mobility optimization;
  - NOT support multi-vendor operability w.r.t. model training/transfer deployment;
  - NOT support AI/ML capability at gNB DU;
  - NOT support collaboration with CN.

- A separate Rel19 SI can be helpful to address:
  - New use cases such as AI assisted QoE and AI assisted slicing;
  - Multi-vendor operability w.r.t model training/transfer/deployment, especially using distributed learning method;
  - AI/ML capability at gNB DU;
  - Collaboration with CN.

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Rel19 Further Study on AI for RAN SI- Overview

- Some studies can be carried out in Rel 19 for Distributed AI for NG-RAN:
  - **Objective 1:** Study new use cases for NG-RAN (e.g., AI/ML for slicing, AI/ML for QoE, and other potential use cases) taking the outcome of Rel18 WI as baseline.

  - **Objective 2:** Study network functionality and interface procedures in NG-RAN split architecture to support
    - AI/ML training/inference at gNB-DU;
    - gNB-CU and gNB-DU collaboration for AI/ML training/inference:
      - AI/ML training at gNB-CU and inference at gNB-DU;
      - Distributed/Federated ML among gNB-CU and gNB-DU.

  - **Objective 3:** Study network functionality and interface procedures between different NGRAN nodes to support
    - Distributed/Federated ML among NG-RAN nodes.

  - **Objective 4:** Study integration and collaboration with 5GC to reach global optimization:
    - Input/feedback from 5GC for model training/inference;
    - Distributed/Federated ML among NWDAF and NGRAN.

  Note: The following aspects can be studied when applicable in Objective 2, 3, 4:
  - AI/ML model transfer and feedback
  - Large size training data set transfer

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Rel19 Further Study on AI for RAN SI (1)

- **Objective 1:** AI for RAN new use cases
  - **AI assisted QoE**
    - In legacy, RvQoE measurement can be utilized by gNB (DU) to optimize radio resource allocation and scheduling.
    - In legacy, QoE configuration is the pre-condition for RvQoE configuration
    - It would be beneficial to support
      - RvQoE prediction
      - RvQoE configuration decoupled from QoE configuration (Note: it can be handled by QoE related WI, if any)
  - **AI assisted Slicing**
    - In Rel18 AI for RAN, the per slice resource status prediction was not supported
    - It would be beneficial to support slice resource status prediction (e.g., Slice Available Capacity prediction) and exchange over Xn interface
  - The outcome of Rel18 WI should be taken as the baseline.

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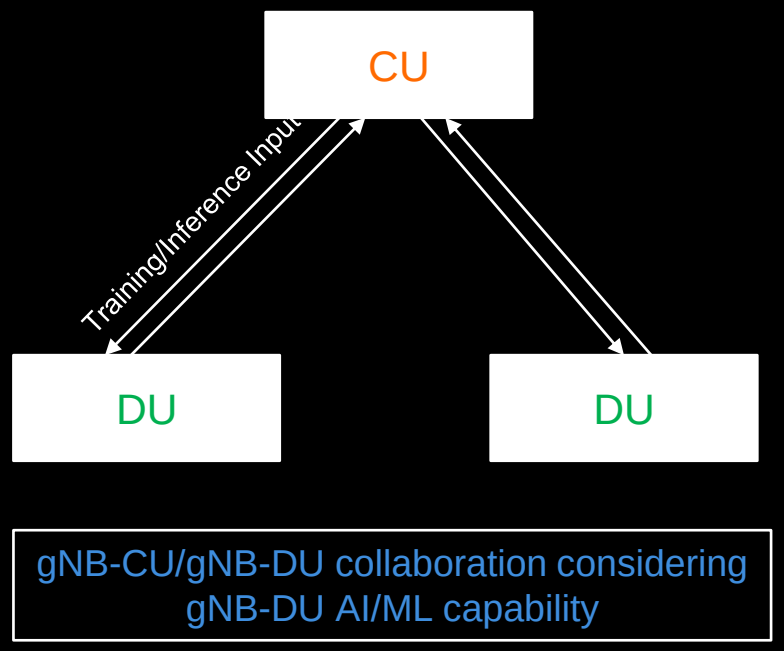
Rel19 Further Study on AI for RAN SI (2)

- **Objective 2:** Study network functionality and interface procedures in NG-RAN split architecture to support:
  - AI/ML training/inference at gNB-DU;
  - gNB-CU and gNB-DU collaboration for AI/ML training/inference:
    - AI/ML training at gNB-CU and inference at gNB-DU;
    - Distributed/Federated ML among gNB-CU and gNB-DU.



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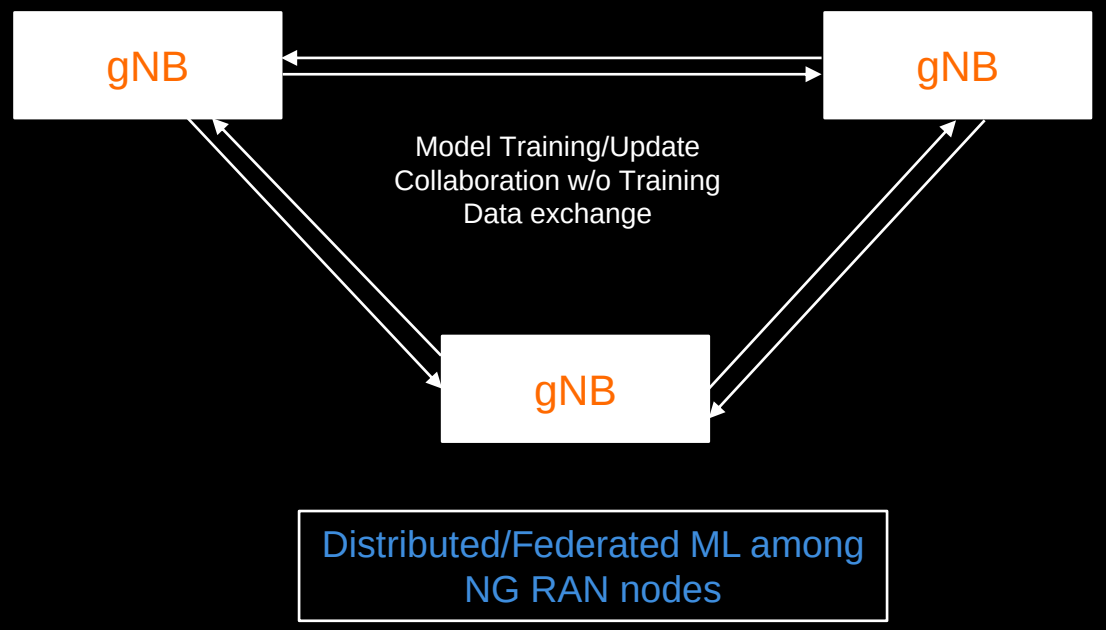
Rel19 Further Study on AI for RAN SI (3)

- **Objective 3:** Study network functionality and interface procedures between different NGRAN nodes to support:
  - Distributed/Federated ML among NGRAN nodes.



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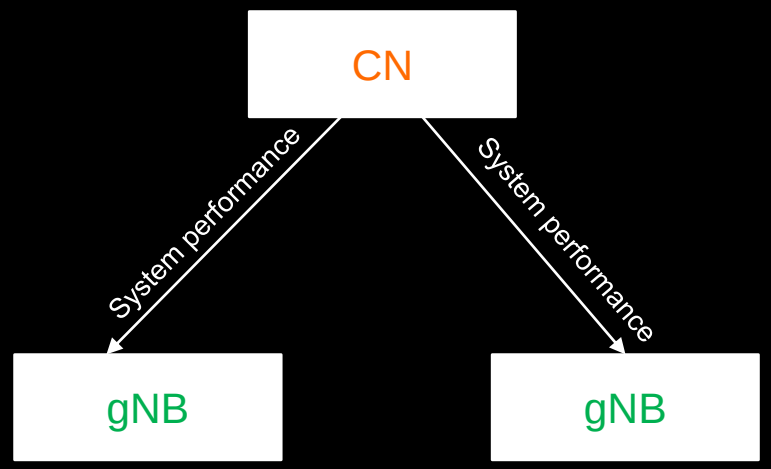
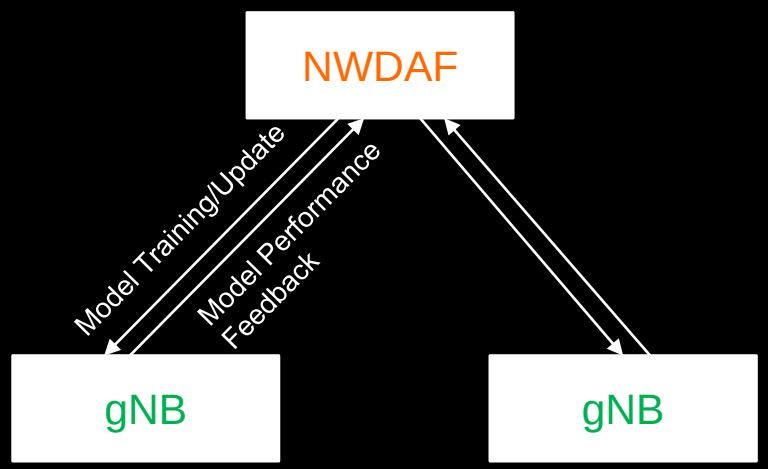
Rel19 Further Study on AI for RAN SI (4)

- **Objective 4:** Study integration and collaboration with 5GC to reach global optimization:
  - Input/feedback from 5GC for model training/inference;
  - Distributed/Federated ML among NWDAF and NGRAN.



Feedback from CN to NG RAN



Distributed/Federated ML among NWDAF and NG RAN

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thanks.

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