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ONAP: A1 Policy enforcement with Non-RT RIC

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Project goals

- Enhance ONAP alignment with O-RAN standards
- Porting ORAN Non-RT RIC to ONAP (joint effort)
- Analysis, Design, Architecture of O-RAN Non-RT RIC Integration IF’s and ONAP Components
- Realization of Sample ML-based Handover use case
- Validate assumptions and define limitations

Agenda

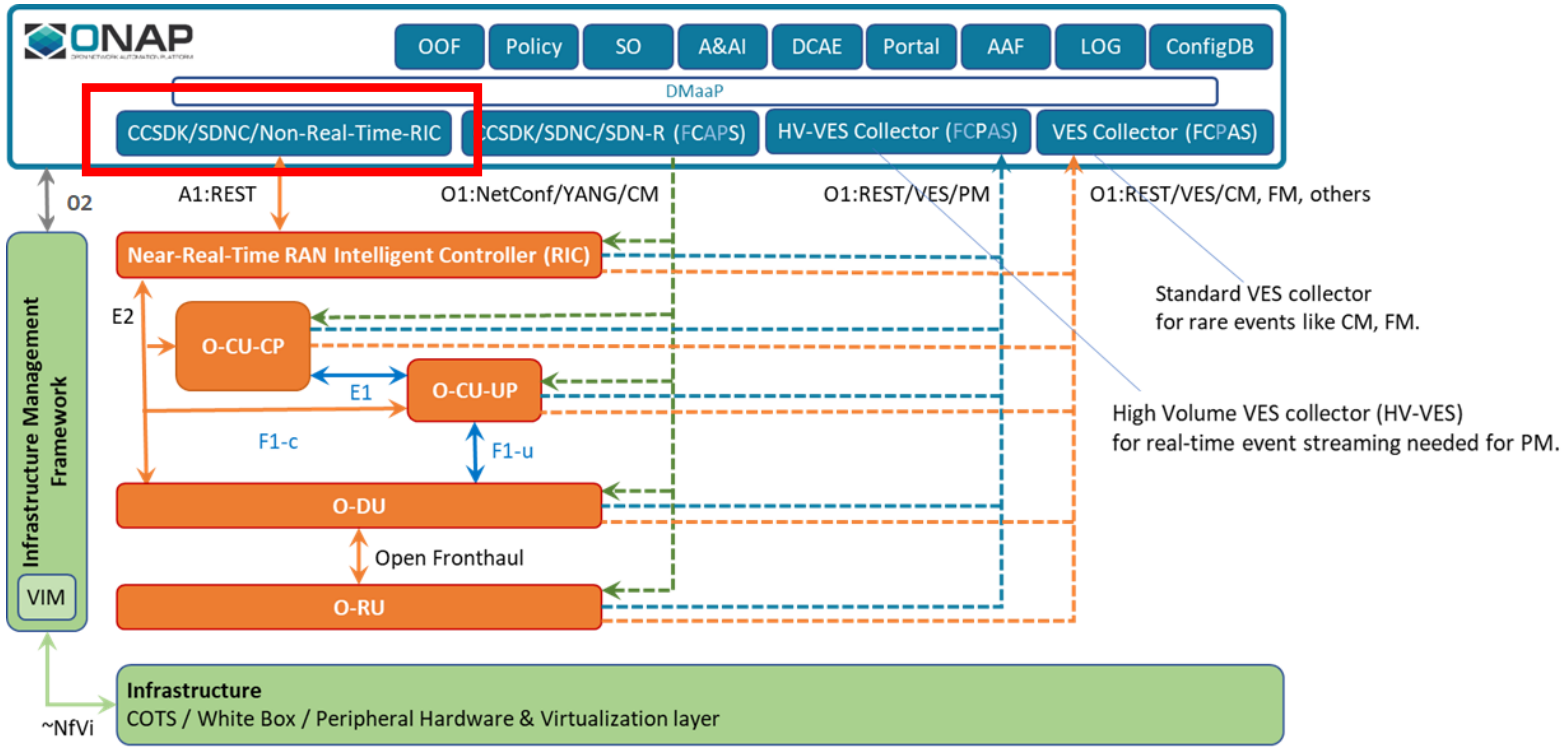
1. What is Non-Real Time Radio Intelligent Controller (Non-RT RIC)
2. Non-RT RIC in ONAP: design and architecture
   - A1 Policy Management
   - R-APPs
3. Demo: UE handover
   - Sample R-APPs
   - O-RAN Simulator for UE Handover
4. Reflections
   - Achievements
   - Missing parts of architecture

What is Non-RT RIC

- A new component in ONAP
- A part of O-RAN Architecture
- Added to ONAP in Guilin

- For non-real-time control of RAN infrastructure
  - Optimization
  - Performance monitoring and evaluation
  - Provisioning of policies
  - Training and provisioning of AI/ML models

- Control Loops > 1s



Source: O-RAN Alliance

Non-RT RIC: R-APPs & A1 Policy Management

Community definition:

Non-RT RIC Applications (R-APPs) – Modular applications that leverage the functionality exposed by the non-RT RIC Framework to provide added value services relative to RAN operation.

Current plans of O-RAN community:

Evaluate existing & planned candidates for R-APP platform, R-APP modelling, R-APP LCM & coordination in ONAP

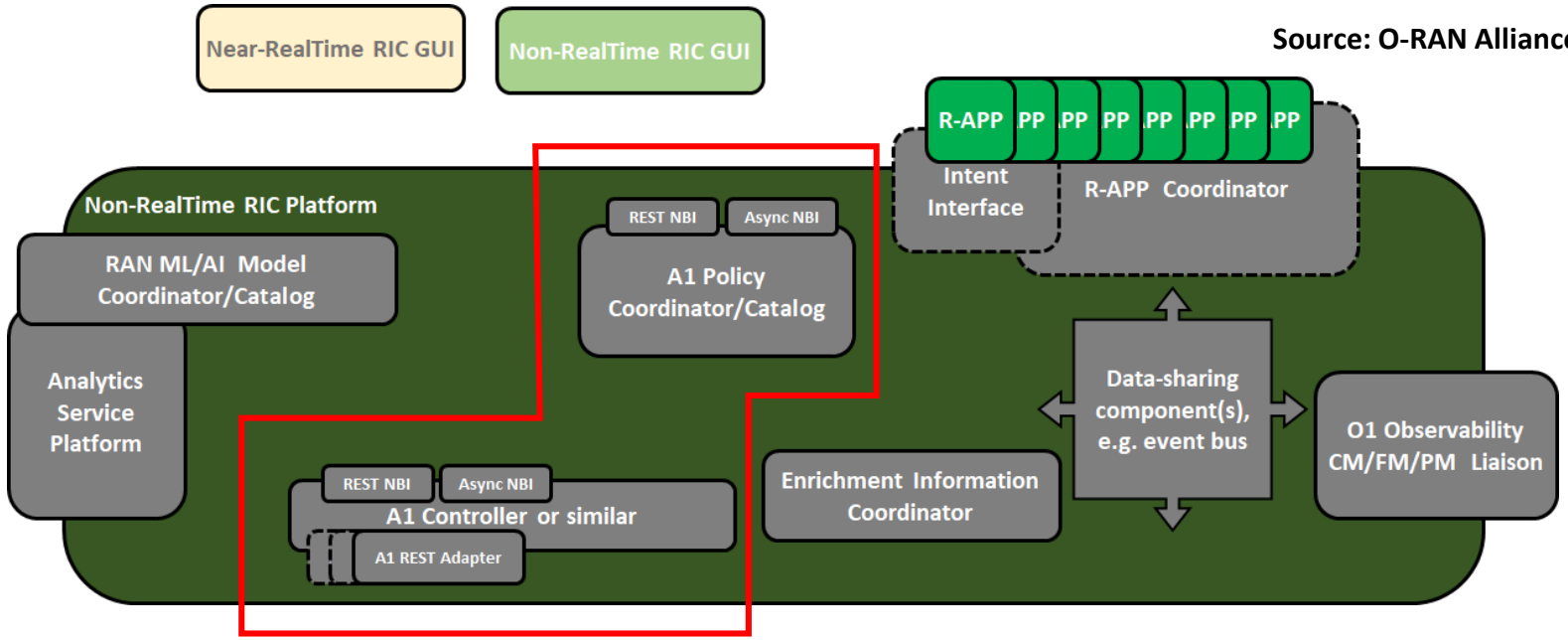
R-APPs to support (examples):

- Handover management for V2X
- QoE optimization

by **generation of AI/ML models**

- Traffic Steering
- Massive MIMO optimization

by **requesting configuration changes**



Source: O-RAN Alliance

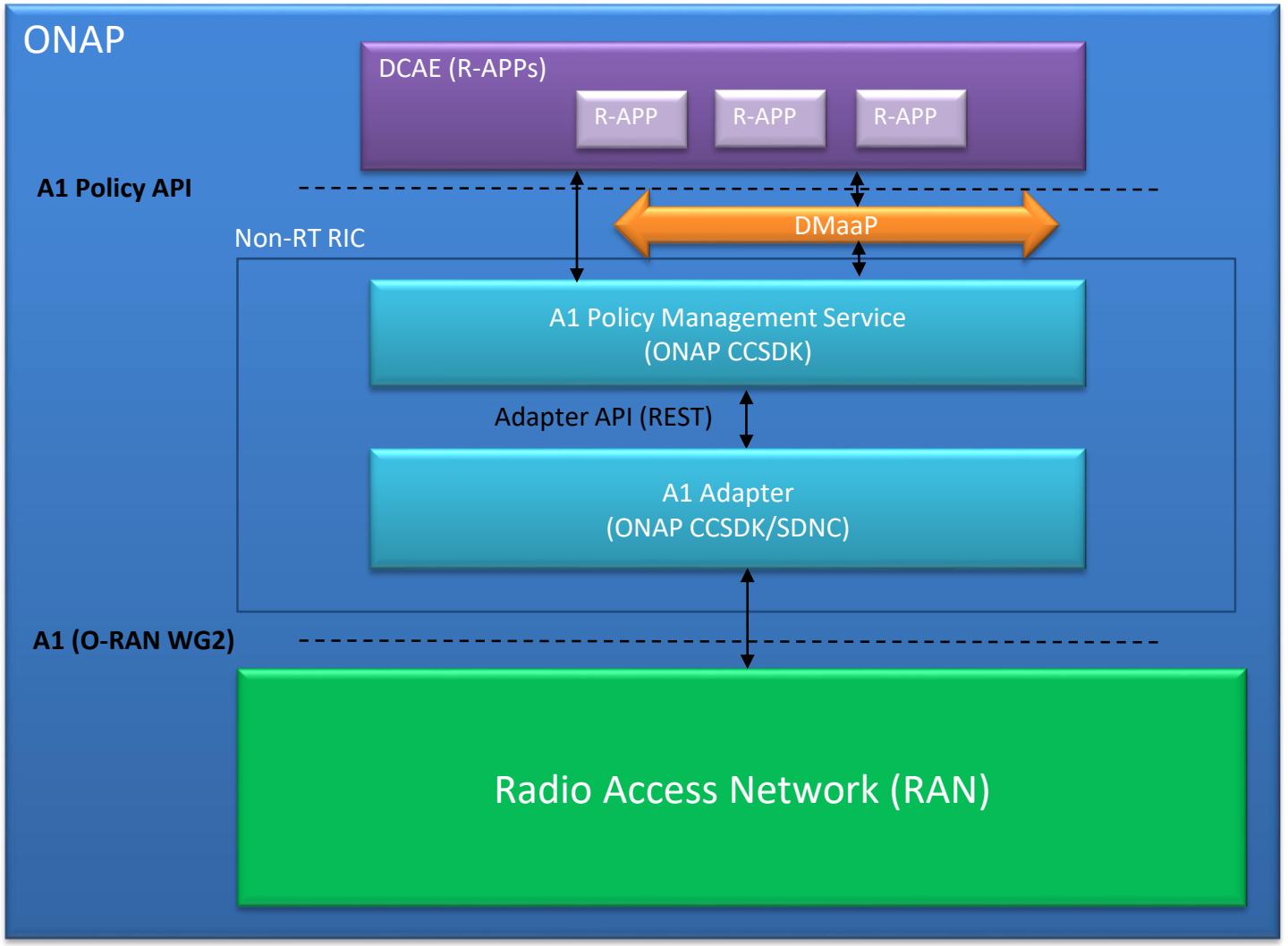
Non-RT RIC as a part of ONAP platform

In ONAP “G” release, only A1 Policy Management function is supported

Components focus:

- A1 Policy Management Service: CCSDK micro service (community design)
- A1 Adapter: SDNC plugin (community design)
- **R-APPs: DCAE micro services (proposed option)**

A1 policy: Declarative *Set of rules* to guide the near-RT RIC function, and hence the RAN, towards better fulfilment of the RAN *operational or business goals*.



R-APPs as DCAE applications

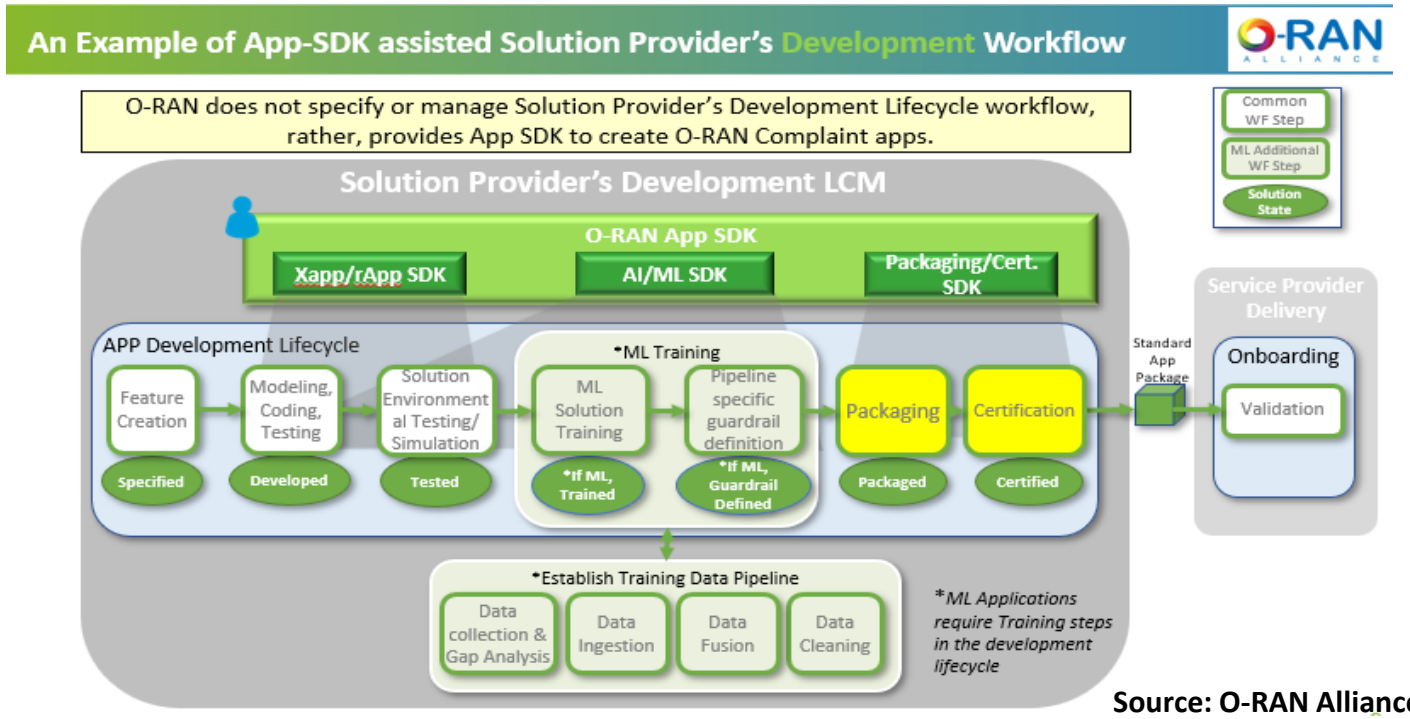
- Option 1: R-APPs managed my O-RAN SMO
- Option 2: xNF based deployment – analyzed by ONAP community
- **Option 3: R-APP services deployed on ONAP DCAE**

Pros:

- R-APPs have access to ONAP services
  - DMaaP
  - AAI
  - All other services
- LCM with Cloudify framework
  - Containerized and Cloud Native
  - TOSCA-based packaging
  - Deployment and Management
  - Stable framework
- Support for ML/Analytics (Acumos)

Cons:

- Specific for ONAP, depends on DCAE

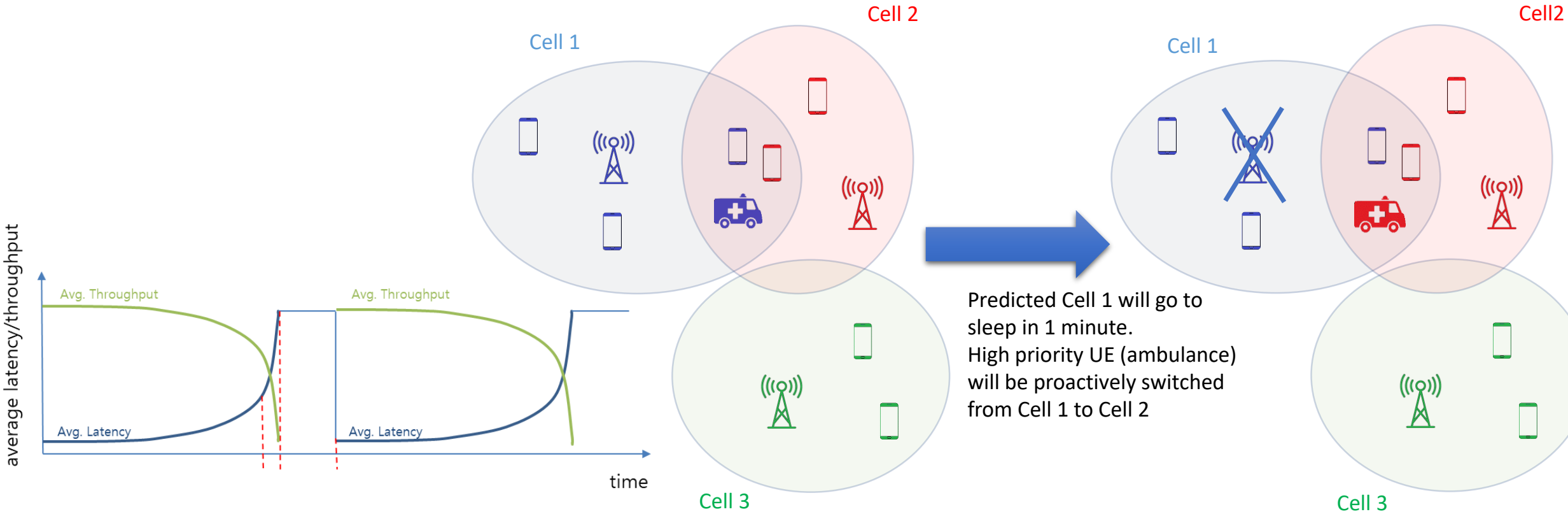


Source: O-RAN Alliance

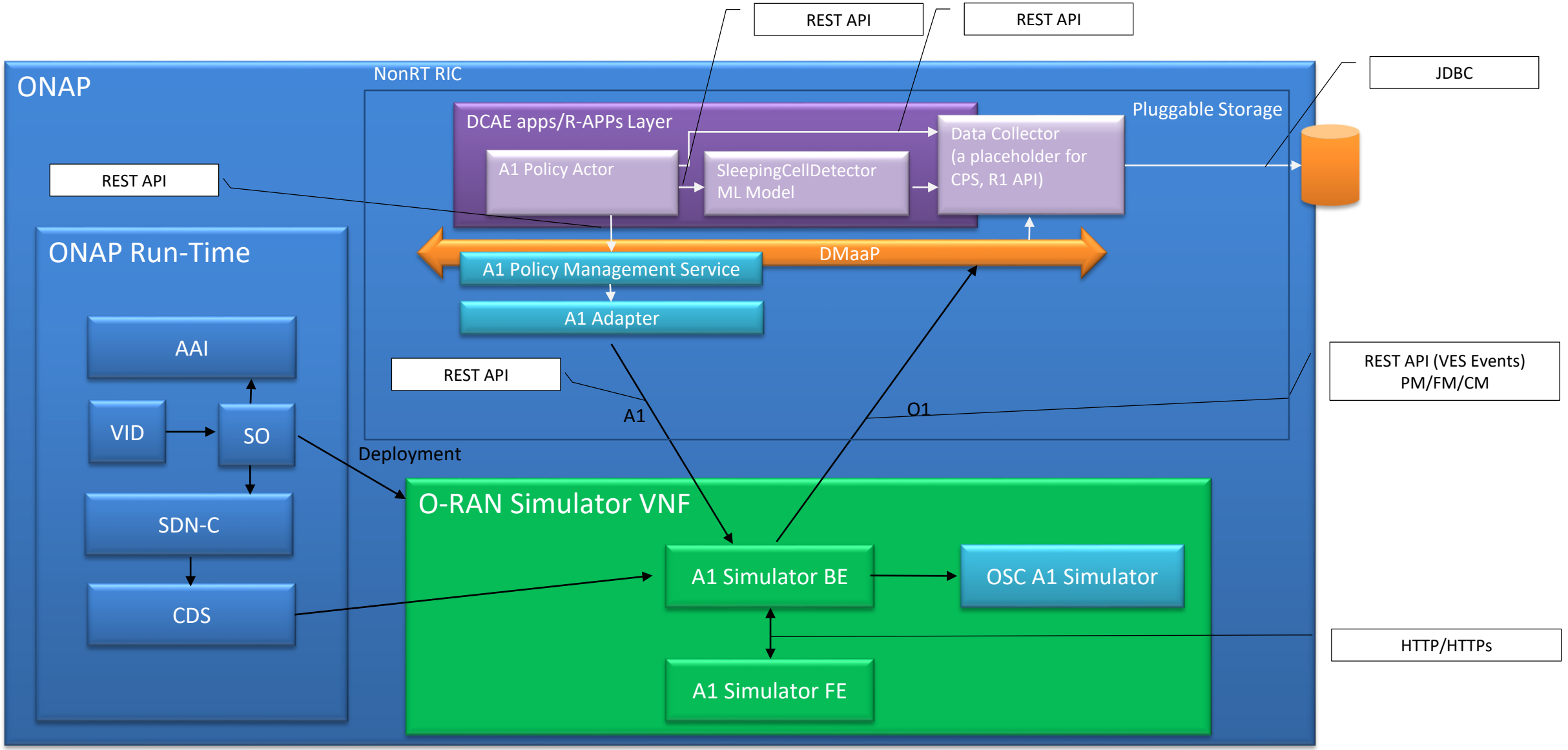
Demo scenario: UEs Handover

Goal: show how ONAP platform features can be used to implement a control loop based on Non-RT RIC

Example: Handover scenario



Demo scenario: components



Demo scenario

Scenario:

1. DCAE R-APPs deployed in ONAP (to monitor and optimize behavior of RAN)
   - Show DCAE R-APPs in dashboard
2. RAN Simulator deployed as VNF in ONAP
   - Show O-RAN Simulator in VID
3. Start RAN Simulator
4. Simulate a sleeping cell in RAN
5. Show UEs handover triggered by a sleeping cell detection

Demo

Reflections: What was achieved

We demonstrated that:

- ONAP is a good candidate to be a default SMO for O-RAN
- R-APPs can be deployed as DCAE micro services. That is one of options
- Non-RT RIC is working in ONAP after porting from O-RAN Software Community
- A1 Policy Enforcement loops can be implemented within ONAP using Non-RT RIC, DCAE and DMaaP

Reflections: What is missing

Feature	ONAP	O-RAN
No final specification of R-APPs. How that specification will fit ONAP?	✖	✖
O-RAN as an ONAP Network Service. • With CNFs and VNFs?	✖	✖
Missing topology service (missing CPS, R1)	✖	
Missing PM data service (to collect and provide PM metrics, R1)	✖	
Hardcoded Near-RT RIC registration – missing more dynamic run-time mechanism like dedicated REST API	✖	
Missing A1 Feedback mechanism on A1 Policy execution	✖	
Missing ML-related features: • A1 Enrichment API • No mechanism for learning ML models	✖	✖

Thank You