ETSI ENI PoC#4

Predictive Fault management of E2E Multi-domain Network Slices

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PoC Status @ ENI#14

ENI PoC project #4: Predictive Fault management of E2E Multi-domain Network Slices (Original Scenario)

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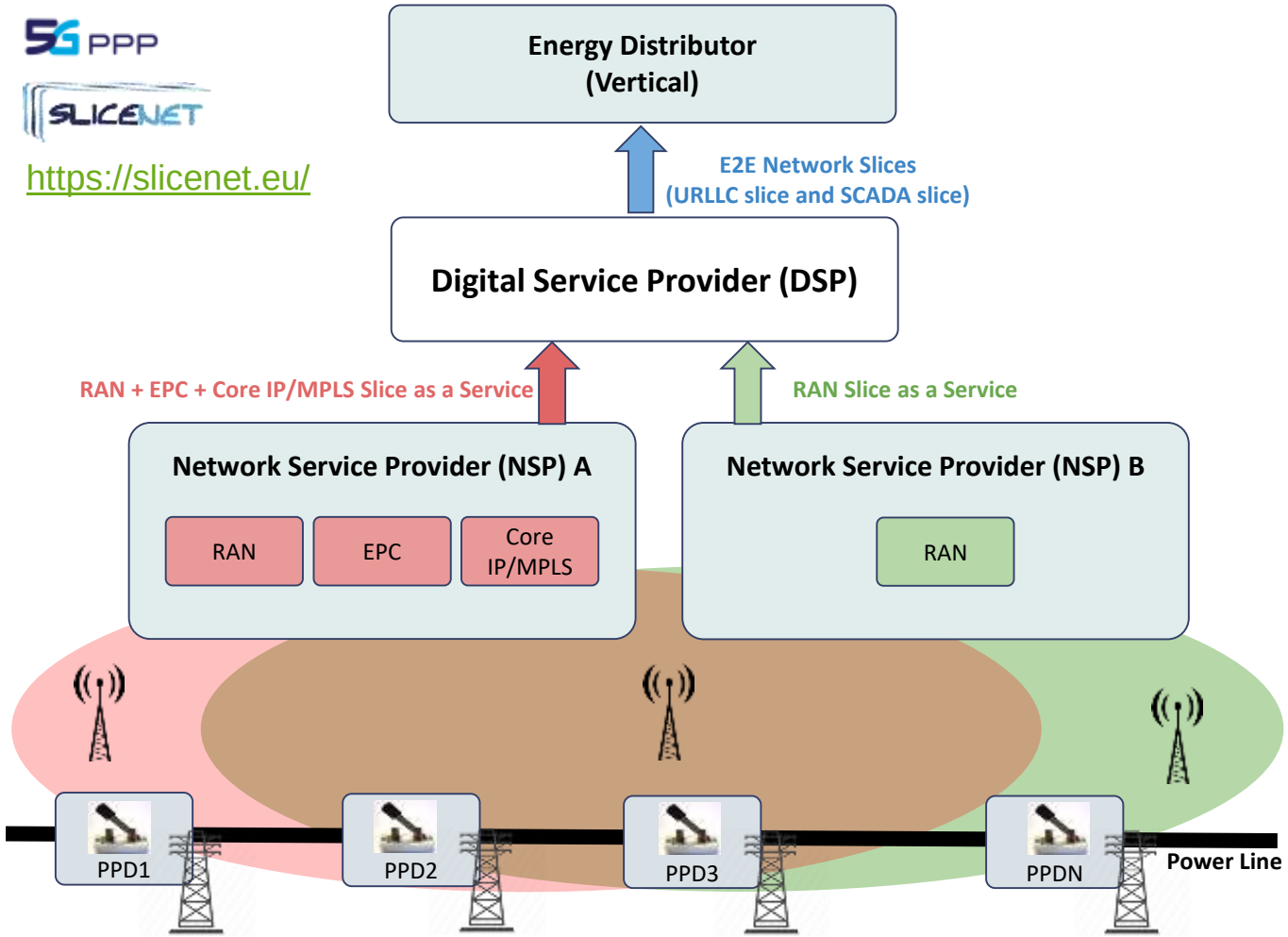

- PoC scenario is a power grid vertical, that uses 5G to provide time sensitive communications for grid protection mechanisms. A Network Slice is provided by a DSP for that effect.

- PoC is focused on the **DSP** functions
  - NSPs provide Sub-slices
  - DSP monitors all Sub-slices behaviour
  - DSP predicts Sub-slice failure
  - DSP decides best failover sub-slice alternative
  - DSP triggers Subslice/NSP switching

PoC Project Goal #1: Network Slice Fault Prediction. Demonstrate the use of AI on performance data to be able to accurately predict failure situations on Network Slices and estimate their impact on an E2E multi-domain slice performance.

PoC Project Goal #2: Policy-based Network Slice Management. Evaluate the use of a policy-based structure for slice composition decisions, as well as the mechanisms for policy definition on that same context.

https://eniwiki.etsi.org/index.php?title=PoC#PoC.234:_Predictive_Fault_management_of_E2E_Multi-domain_Network_Slices

ENI PoC project #4: Predictive Fault management of E2E ~~Multi-domain~~ Network Slices (Present Scenario)

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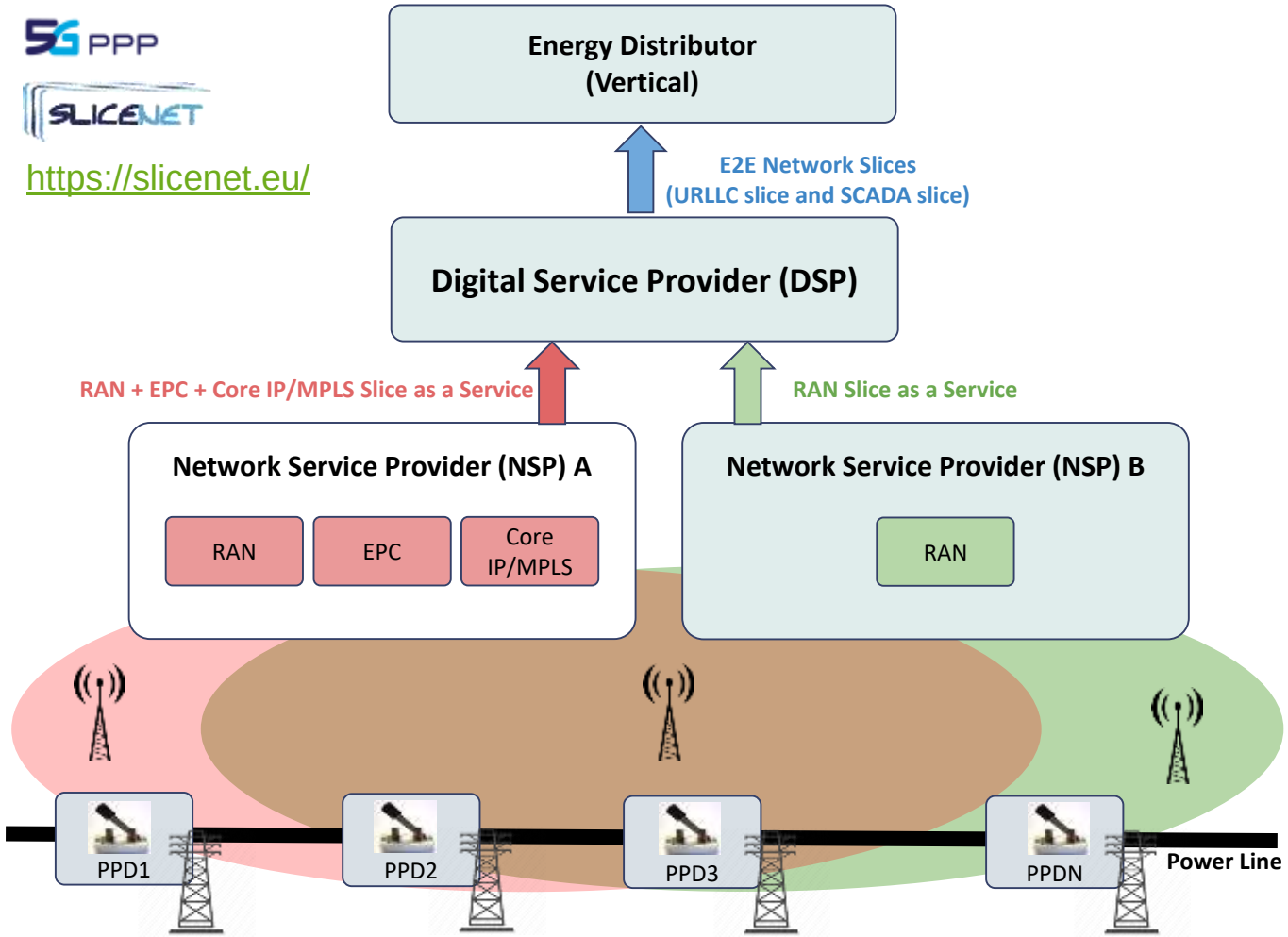

- PoC scenario is a power grid vertical, that uses 5G to provide time sensitive communications for grid protection mechanisms. A Network Slice is provided by a DSP for that effect.

- PoC is focused on the ~~DSP~~ **NSP** functions
  - NSP A provides an E2E slice
  - NSP monitors Sub-slices behaviour
  - NSP predicts Sub-slice failure
  - NSP decides best proactive mitigation strategy
  - NSP enforces the actions necessary to keep the E2E slice operational

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ENI PoC#4 General Status Report

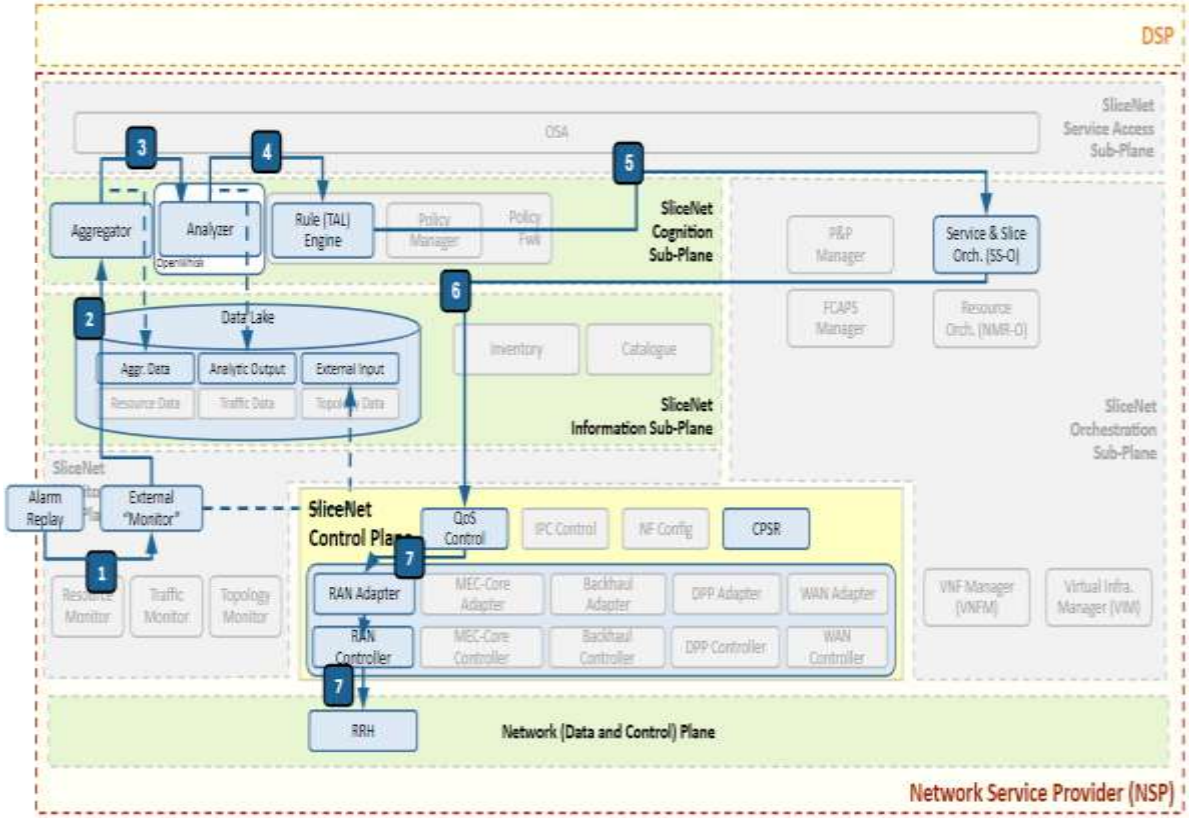
- DSP optimization loop, proposed for this PoC, was abandoned because of lack of resources to be implemented in due time;
- NSP optimization loop (on-slice fault prediction) was delayed but is now closed and ready for demonstration;

ENI PoC#4 Goal Status

Goal	Goal Status
Network Slice Fault Prediction: *Demonstrate the use of AI on performance data to be able to accurately predict failure situations on Network Slices and estimate their impact on an E2E multi-domain slice performance*.	This Goal is **partially attained.** *The use of AI on performance data to be able to accurately predict failure situations on Network Slices* has been fully proven and is already available on the PoC. Nevertheless, major changes in the PoC scenario have restricted the PoC to a single administrative domain, hence the *impact on an E2E multi-domain slice performance* will not be assessed by the PoC, only the impact on E2E slice performance in general.
Policy-based Network Slice Management: *Evaluate the use of a policy-based structure for slice composition decisions, as well as the mechanisms for policy definition on that same context.*	This Goal is **fully attained**. The scenario has changed from the composition of slices (building a E2E Slice from partial slices) provided by different Network Service Providers (NSP) to one where the scope is a single NSP, but still there is a policy-based structure taking decisions about slice composition for the single domain

Use Case for demonstration

1. Real Alarm data is replayed and ingested by the Slicenet System
2. Data is aggregated and persisted
3. The **Analyser,** which is running the Alarms Prediction ML model, runs the model, producing alarmas insights/predictions
4. A **Rule Engine** consumes a prediction event, checks the NSP policies conditions and verifies that the slice available bandwidth is too low. It decides to increase the NS bandwidth to avoid/mitigate the fault
5. The action plan decided by the **Rule Engine** is delivered to the **Service and Slice Orchestrator** for enforcement.
6. the **Service and Slice Orchestrator** interacts with the **QoS Control** subsystem
7. **QoS Control** identifies the appropriate network segment (RAN) adapter to address and interacts with the **RAN Controller**, which translates the generic bandwidth increase information request to RAN specific parameters.
8. Finally, the **RAN Controller** modifies the NS bandwidth by interacting with the OAI **Remote Radio Head (RRH)**



Next steps

- Results Analysis
- Schedule a Demo for ENI
- Final Report

Thank you!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