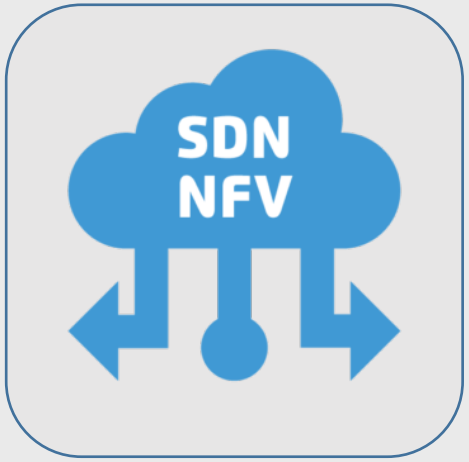
Transforming Network Infrastructure towards 5G

ULAK Solutions & Portfolio

ULAK BASE STATION (LTE/5G)

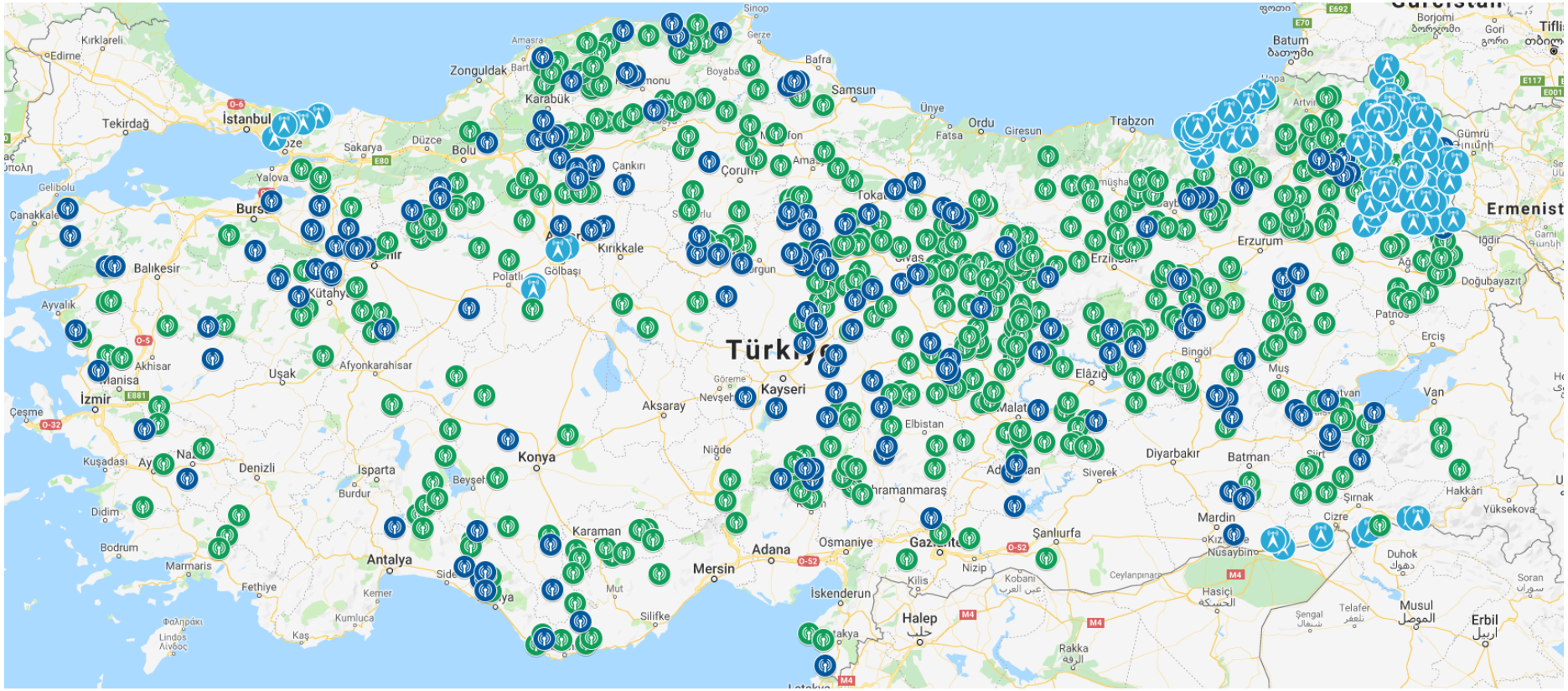


MILAT SDN/NFV Based NW Tech.

LTE/5G Core Network

R&D for 5G & Beyond

E2E, SECURE, SMART, MANEGABLE, NETWORK INFRASTRUCTURES



ULAK LTE-A Base Stations Deployed since May 2018.

(1500+ Delivered / 1000+ On Air)

Serving 3 operators in Turkey, both governmental & commercial systems

Open Networking Foundation

Open Network Operating System

Milat MAYA Potential Application Areas

SOFTWARE DEFİNED WIDE AREA NETWORK (SD-WAN)

LOCAL AREA NETWORK (SD-LAN)

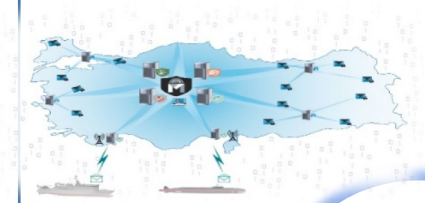
SECURITY (SD-Security)

DATA CENTER (SD-DC)

CRITICAL INFRASTRUCTURE (SD-Critical)

- Public Safety Network

- Government Network
- National Data Center



- Military Infrastructure Modernization
- Tactical Communication Infrastructure

Public Safety & Emergency Call

Government Network & National Data Centers

Military

Regulatory Body / Telecom Operators

Mission Critical Systems Infrastructure

Projects:
- 4.5G Transitions
- 5G Transformations

- Smart City Safety Management System
- Natural Gas Pipeline Safety & Security

Robust and Reliable Communication Infrastructure with ULAK MAYA

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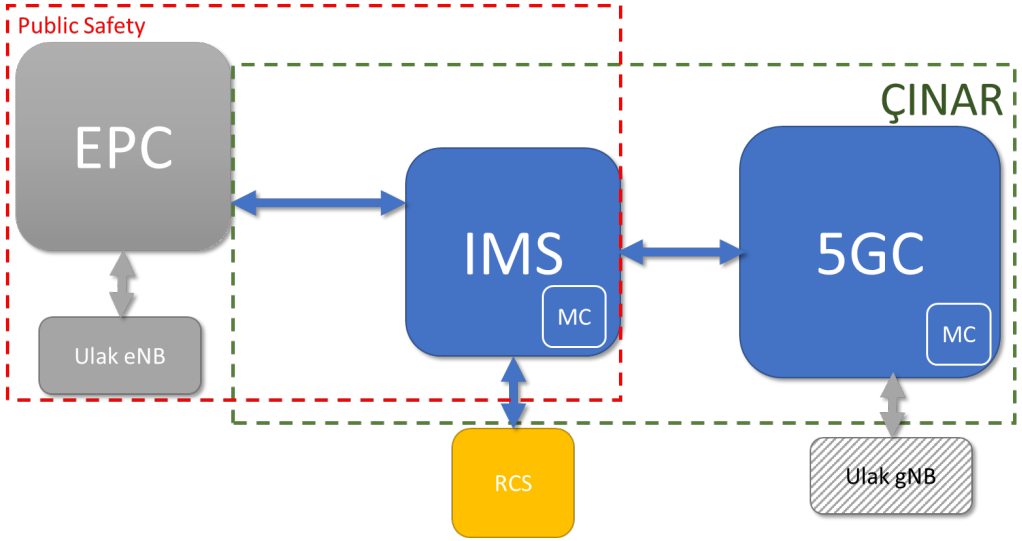
ULAK 4.5G/5G Core Network Solution



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=> Public Safety & Emergency Call

=> Mobil Operators Network Infrastructure

=> Armed Forces Mobil Network Infrastructure

Development & Integration on going

Transforming the Network Infrastructure…

Our jurney with Open Networking started in early 2015

with ARGELA (Supported by Defence Industry Agency)

…with a heavy mission to transform networks ;

more agile ,

more secure ,

more efficient

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What we looked for ..

- Scalability
- High Performance
- Resiliency
- Open Standarts
- Next-Generation Networks support
- 5G Enabler Platform

We decided to continue this journey with ONOS

What we did ..

- Developed in house **ONOS based MILAT SDN / NFV Framework** in two years with the effort more than 100 man-year.
- Contributed many features to ONOS and OpenFlow (*Especially on Openflow 1.5 Support, ONOS OVSDB Feature Enhancements and Performance Healings on Topology Discovery Process)*
- We productized MILAT as:
  - **MAYA SD-WAN** and
  - **MAYA SD-DC** solutions in the last two years.
- We are now developing **5G Core Network (CINAR)** based on **MAYA SDN IP Core**

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How we use ..

- We locate ONOS as the brain of network control plain.
- We develop all our product's features, as an application, over ONOS controller
- Modular architecture of ONOS was very helpful for us during development phase
- By the help of comprehensible code format, we can easily contribute extra features and improvements on ONOS code base.

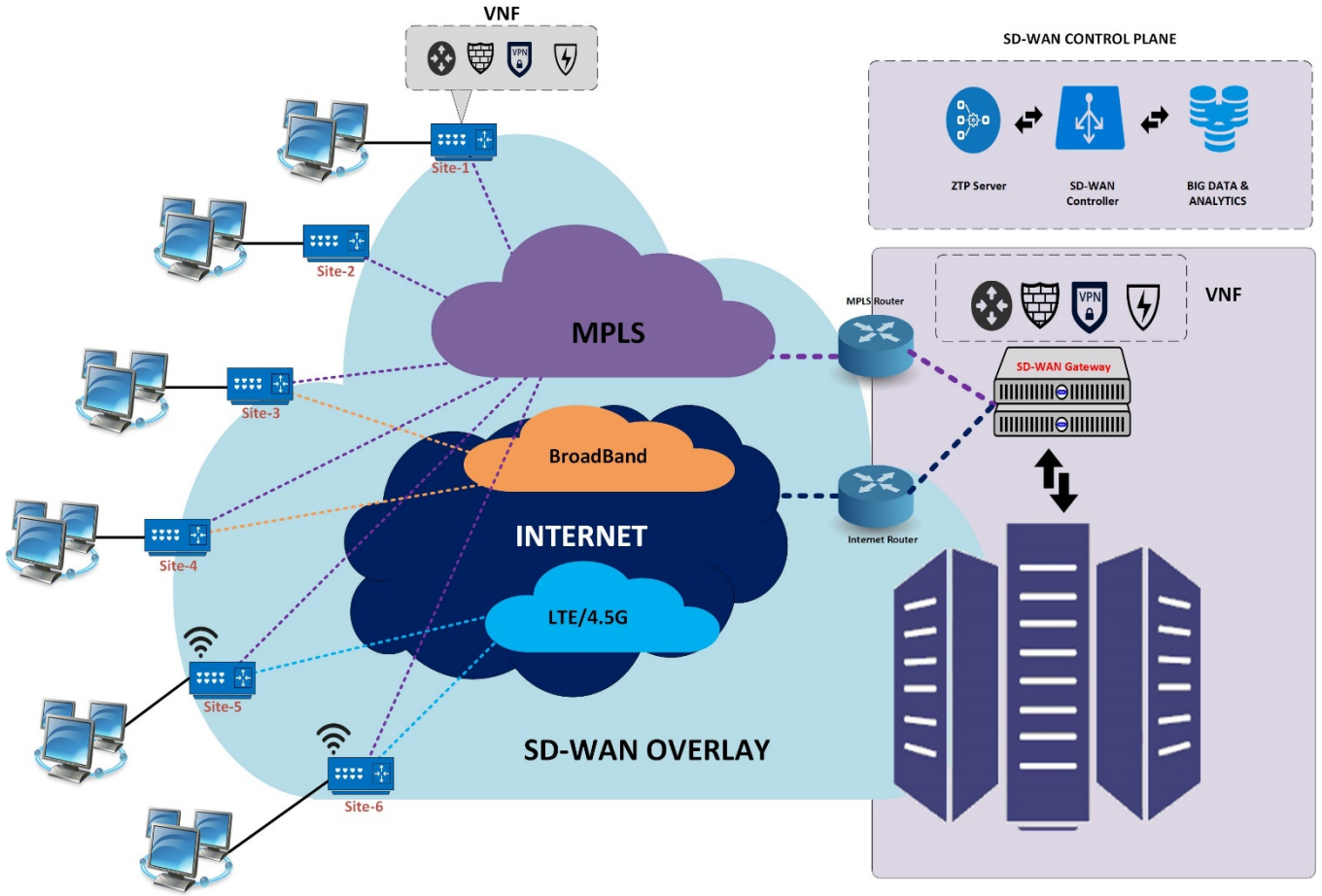
Where we use ..

- Maya SD-WAN – Integrated with CPEs :
  Milat Manages and Controls Flows, Network Functions and OVS Bridges on Edge Devices

- Maya SD-DC – Integrated with OpenStack as NFVI and OpenBaton as Orchestrator :
  Milat controls networking stack by ONOS VTN Application and manages network functions by integrated OpenBaton

- Maya SD-CORE – Integrated with OFDPA Supported Switches :
  Milat configures Leaf and Spine switches for multipathing and redundancy features by enhanced version of ONOS Segment Routing App

MAYA SD-WAN



- Deployed to customers including:
  - Military,
  - Gov. Organizations,
  - Municipalities institutions,
  - Private Organizations,

  in TURKEY.
- SDN/NFV Based Secure and Agile WAN
- Control and DataPlane separation with OpenFlow
- Cost efficient and high performence Networks

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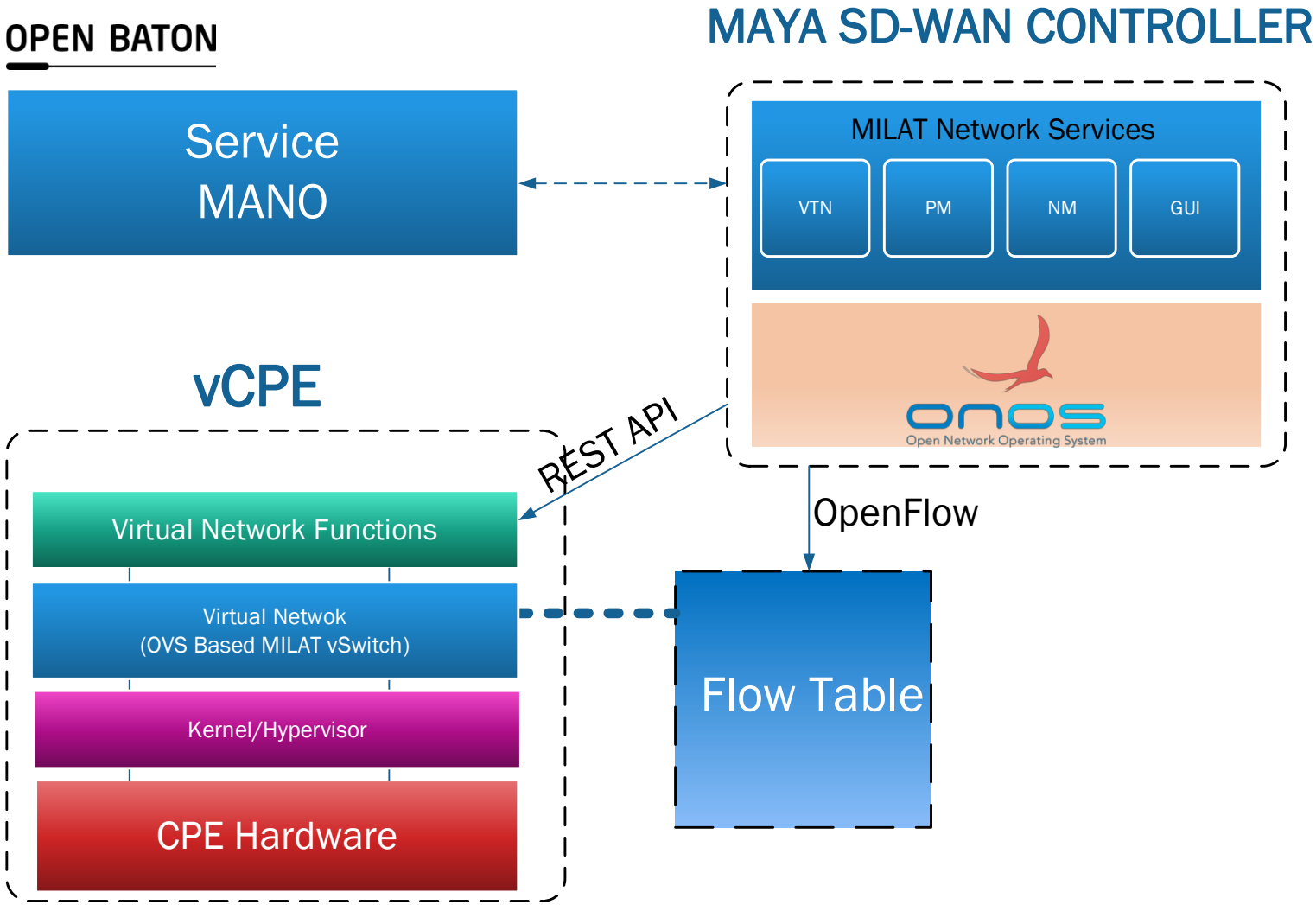
MAYA SD-WAN TOP LEVEL ARCHITECTURE & ONOS INTERFACES



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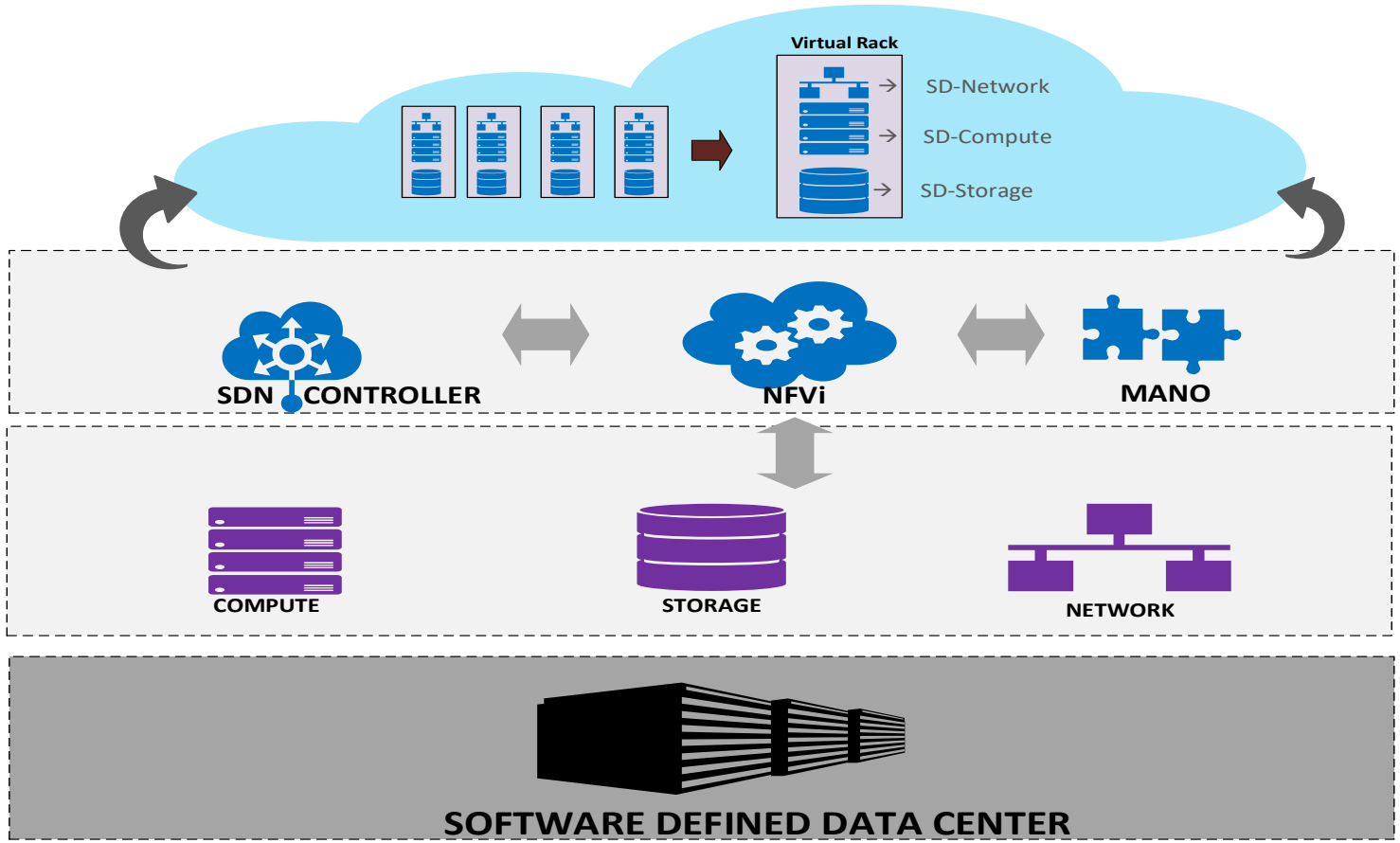
MAYA SD-DC



- Underlay and Overlay Network Control with MILAT SDN Controller
- Network Virtualization and Multitenancy with Openstack Integration
- Open Architecture with WhiteBox Switches and COTS Hardware
- High Performance and Cost Efficient Service Oriented Architecture

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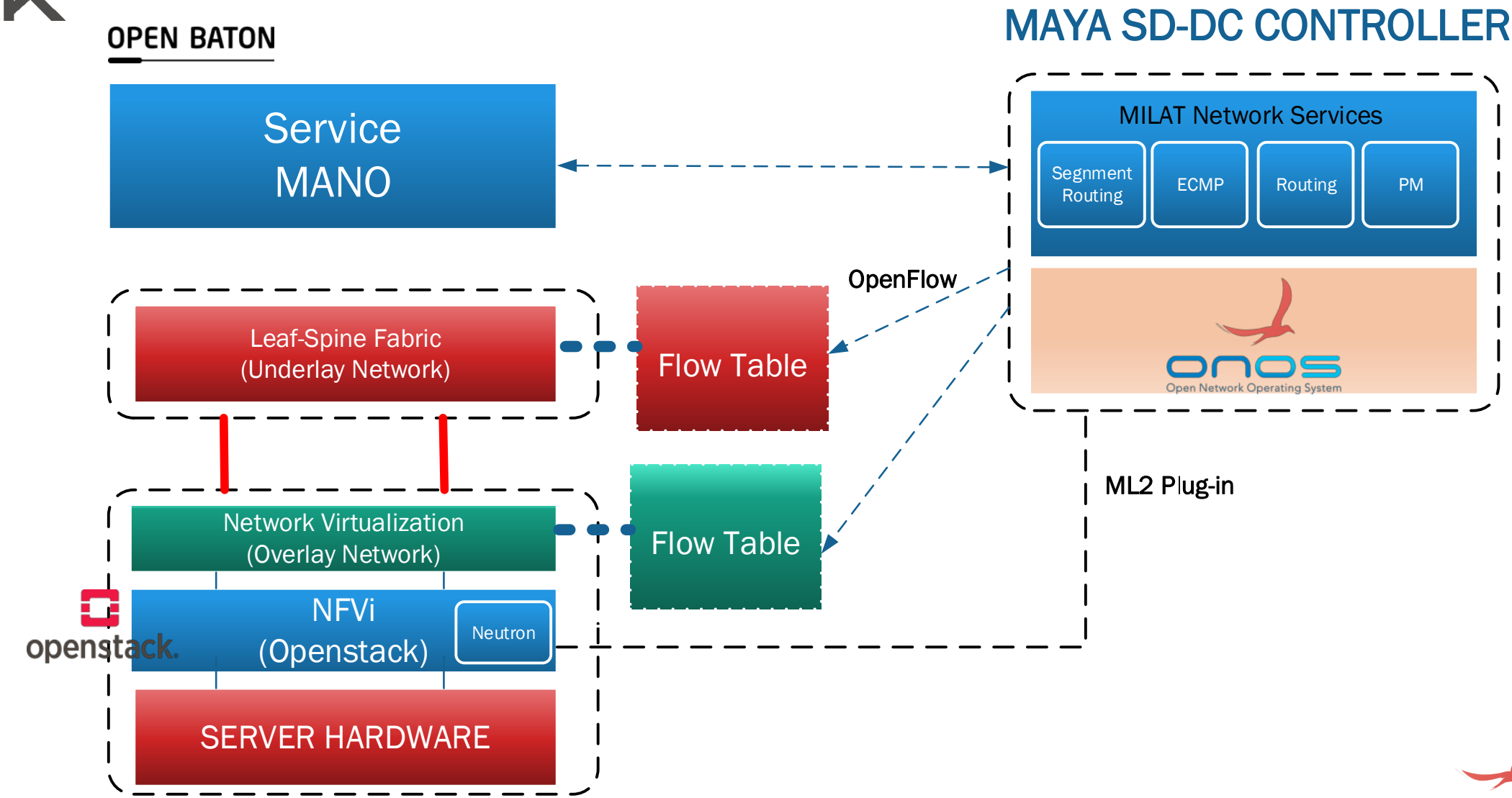
MAYA SD-DC TOP LEVEL ARCHITECTURE & ONOS INTERFACES



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ONOS Key Benefits for MAYA SD-WAN
- Control Plane and Data Plane Separation with ONOS **Southbound Interface (**SBI) via OpenFlow
- Network Programming with ONOS **Northbound Interface (NBI) via RESTFULL API**
- Network Virtualization Management via OVSDB

ONOS and TRELLIS Key Benefits for MAYA SD-DC
- Control Plane and Data Plane Separation with ONOS **Southbound Interface (**SBI) via OpenFlow
- TRELLIS ECMP routing for multi-pathing and segment routing path control for selected traffic
- TRELLIS distributed virtual routing to all tenant traffic in the overlay
- TRELLIS Integrates both underlay and overlay configuration and control
- TRELLIS Eliminates complex control protocols in the fabric nodes (no need to BGP implementation)
- Reduce Cost and Maximise DC Network Performance with White Box Leaf-Spine Fabric Architecture

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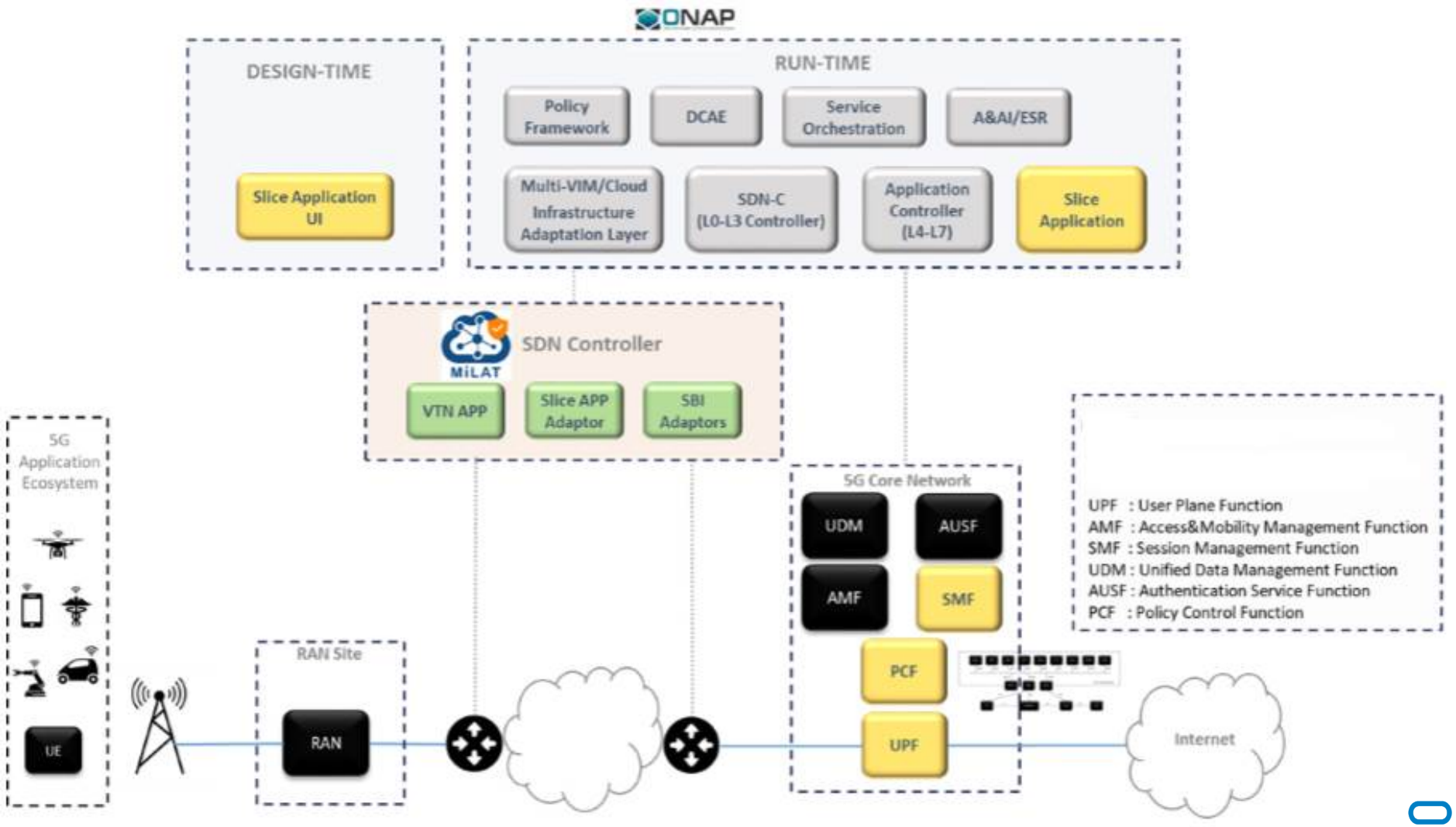
ULAK 5G CORE NW (CINAR) TOP LEVEL ARCHITECTURE & ONOS INTERFACES



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What we achived..

- High Performence Networks
- Cost Efficiency
- More Agility
- Open Architecture
- Trust on MAYA, an ONOS Based system

5G Architecture, functionality and flexibility already fielded at the edge
Getting Ready for 5G gNR integration.

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THANK YOU !

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