



LFN NETWORKING

LFN Developer & Testing Forum



OLF NETWORKING

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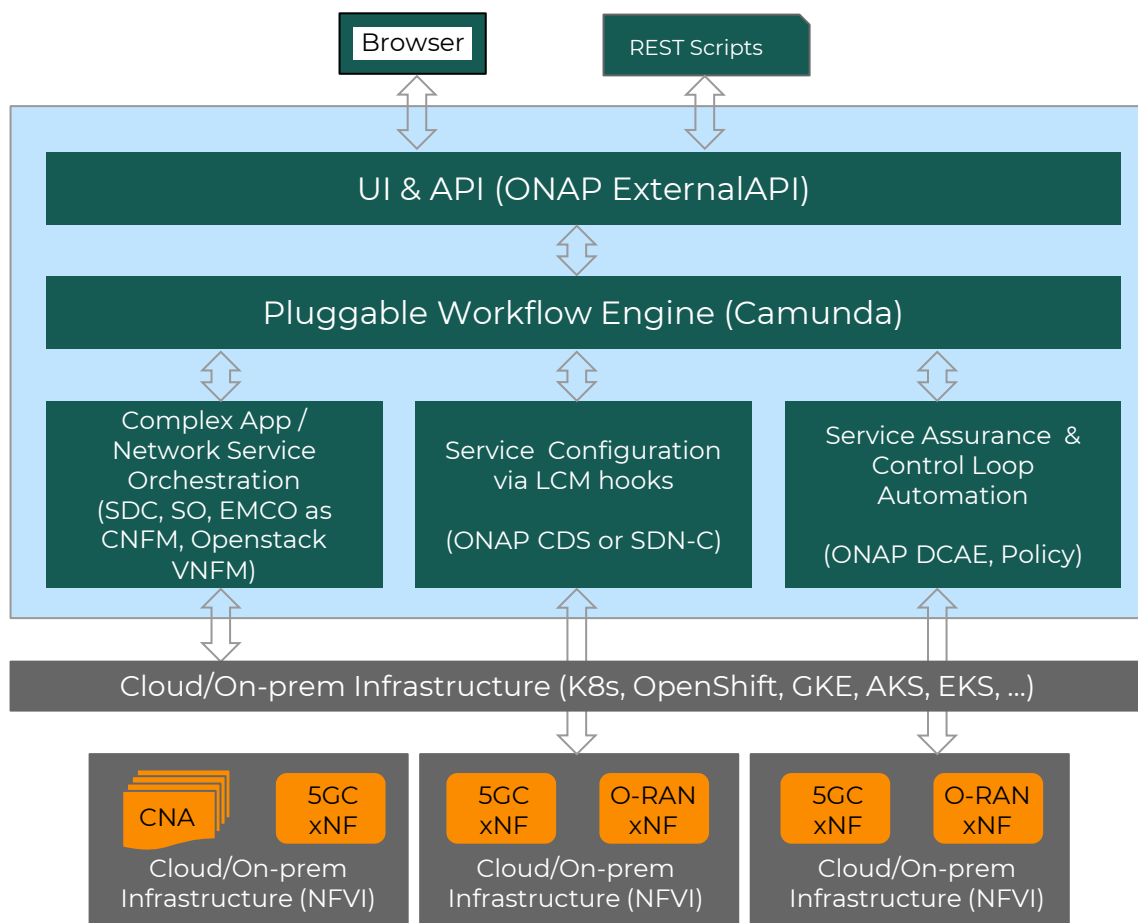
EMCO & ONAP Alignment

Architecture, Role, Use Cases and more

Session Objectives

- Share EMCO/ONAP Architecture Alignment
- Integration Phasing Approach
- Sample Edge/5-6G Use Cases

Alignment Proposal inspired by SDOs

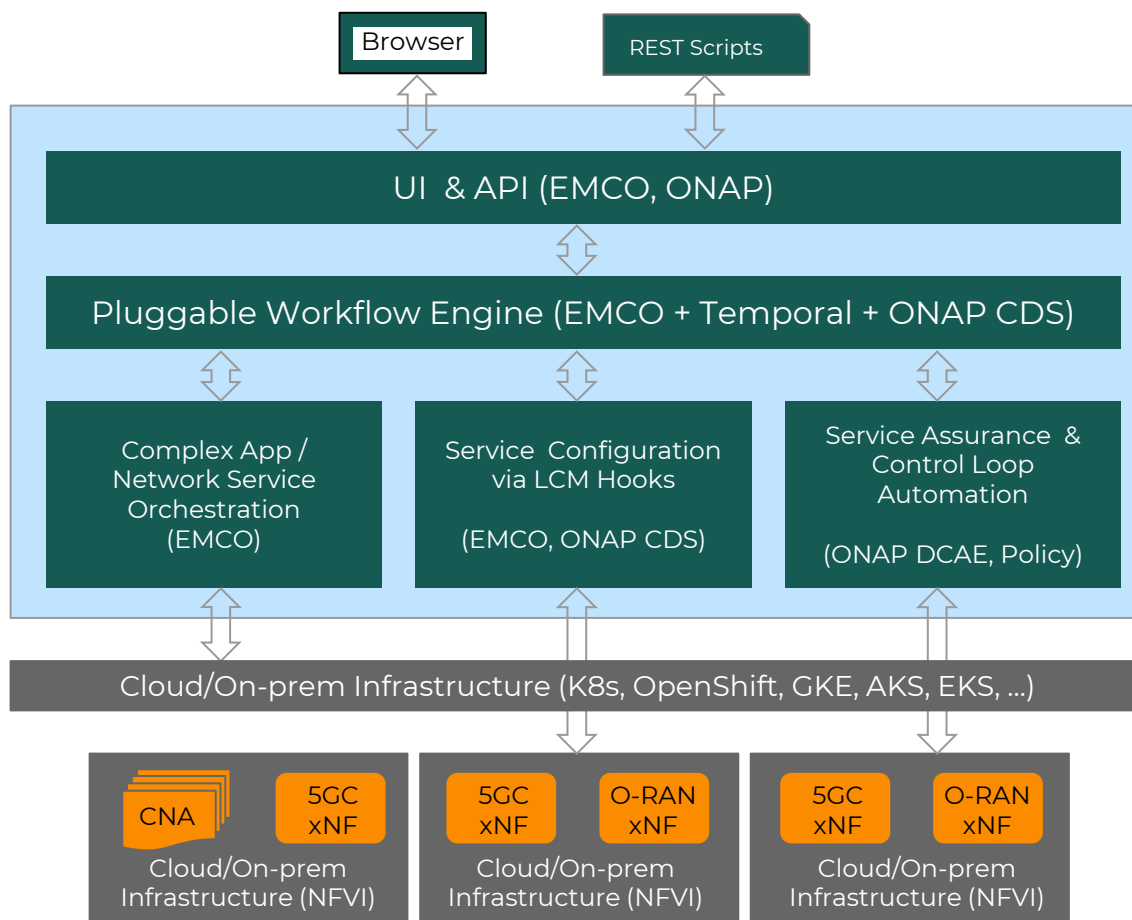


- SDC, SO (E2E Orchestrator), EMCO for Network Service Orchestration
- ONAP CDS or SDN-C (O-RAN) for configuration management/lifecycle management
- ONAP DCAE, Policy for FM/PM and control loop automation
- Pluggable workflow engine Camunda
- GUI and APIs to interact with the various components
- Centralised Inventory to support PNF/CNF/VNF

Show case VNFs/OS and PNFs

Second Alignment Proposal

ETSI/TOSCA Model Free



- EMCO for orchestration & Service Configuration
- ONAP DCAE, Policy for FM/PM and control loop automation
- Pluggable workflow engine e.g., Temporal or Camunda
- GUI and APIs to interact with the various components

When does one use this variation?

- When cloud native packaging (Helm) is good enough.
- Where central inventory of all types of NFs is not required.
- When one requires lightweight central orchestration
- When one requires intent based placement & placement constraints
- When one requires automation of service mesh for application connectivity
- When one requires centralized CA certificate management.
- When one requires customization based on destination cluster types.
- When one requires GitOps way of synchronizing resources

Bring the Best of Both Worlds



Smart Edge Management

Capabilities to support

- Workload Cluster registration management
- Cloud native temporal workflow support
- Multi tenancy support
- Logical Cloud management across multiple K8s clusters for tenants
- Complex Application / Network Service Onboarding
- Placement intents and Placement constraints (HPA, **Latency Aware using 5GFF, Affinity/Anti Affinity**)
- Edge specific customization
- Automation of Service Mesh and Network Middle boxes with LCM of Application/Services.
- Automation of SFC and exposing multiple networks to workloads
- Resource Synchronizer manages instantiation of resources to clusters via fluxv2/AWS, Azure ARC, Google Anthos
- ExternalDNS automation (avoid hardcoding of Ips) for CNFs across clusters to talk to each other.
- MetalLB BGP automation of IP addresses of MEC applications on a specific slice.

Capabilities to support 5G Super Blueprint

- Multi Cluster Logical Clouds – One for each cluster.
- Automation of logical cloud configuration based on the slice parameters
- Automation of resources quotas based on slice parameters
- Bring up and monitoring of 5G CNFs across multiple logical clouds across multiple physical clusters
- Proven with free5GC across clusters for multiple slices.
- **ISTIO automation across 5GC CNFs for security and load balancing (3GPP SCP Support)**
- **K8s native Subscriber configuration (WIP)**
- **Dynamic Slice Orchestration beyond 3GPP slice creation (K8s layers, MEC Edges) – WIP**
- **Dynamic Slice orchestration across multiple operators (WIP)**

Network Automation Management O-RAN Non-Real-Time RIC (SMO)



Capabilities to support Network Automation, RAN Virtualization, Enterprise Business

- Unified framework where we can build integration of public/vendor Orchestrators and Controllers
- Policy Driven Model and Control Loop Mechanisms
- Joint Lifecycle Management of VNFs/PNFs and CNFs including Helm Enrichment, K8s, TOSCA and more
- Monitoring, FCAPS Collection and Analytics
- Model-Driven Design and Onboarding
- Centralized Active Inventory
- Configuration Persistence Service & Synchronization
- Support ETSI NFV standards, TM Forum APIs, etc.
- Pick & Choose Deployment
- Production Readiness (Daily Stability/Integration Tests, Security Focus, Scalability and Resiliency, etc.)

Network Systems Capabilities to support 5G Super Blueprint

- Establish Secure Slice, including:
 - Network Secure
 - On-Board Slice Package as part of Network Design
 - Initialize Resource Assignment
 - Notify Resource to be considered for Network Slice
- Lifecycle Management, including:
 - Network Slice KPI Monitoring
 - Network Secure Slice
 - Service Orchestration and Controller of Lifecycle
 - Visualization of Network, Network Slicing
 - Control Loop
- Policies and Rules to manage isolation and entities
- Enablers for AI/ML/DL



Role Alignment



Smart Edge Management

Network Automation Management
O-RAN Non-Real-Time RIC (SMO)



- Two variations until all EMCO features are exposed in TOSCA/ETSI Modeling.
- In 1st variation, EMCO to acts CNFM (Cloud Native Function Manager) and ONAP to acts as centralized E2E Orchestrator
- EMCO Enabler for Day2 operations to configure containerized applications with ONAP CDS/SO (like ONAP K8S Plug-ins)
- EMCO enables fine-grained tuning of K8s workloads i.e. Magma
- EMCO/ONAP collaborating on Network Slicing Capabilities that goes beyond 3GPP defined slicing.
- EMCO/ONAP collaborating on development multi provider dynamic orchestration.
- EMCO/ONAP collaborating on Service Assurance and closed loop that works with both variations.
- ONAP provides centralized Active Inventory for Network Resources to support VNFs/PNFs and CNFs



- What questions do we still need to answer from discussion on previous slides?
- <List questions to work on answers for>

Integration Phasing Approach

- Phase 1: EMCO/ONAP (SO/SDC)
- Phase 2: EMCO/ONAP (SO/SDC/CDS/AAI/SDNC)
- Phase 3: EMCO/ONAP based on ASD Model
- Phase 4: EMCO/ONAP – Service Assurance

Sample Edge/5-6G Use Cases

#1 Segment Emergency Services (Security, Latency)

<OPS 5G Use Case including SABRES>

#2 Segment Broadcasting & Steaming (Bandwidth)

Visualize a movie trailer uploaded in the Private Cloud vs a movie trailer uploaded in the Private Edge, measured the movie trailer experience

#3 Segment Gaming (Bandwidth)

Play a video game uploaded in the Private Cloud vs a video game uploaded in the Private Edge, measured the game play experience

#4 Segment Supply Chain (Latency, QoS)

Update Stock Inventory and cache data to the Edge, measured customer's experience and supply chain accuracy