

SDO and Open Source Partnership



Alla Goldner

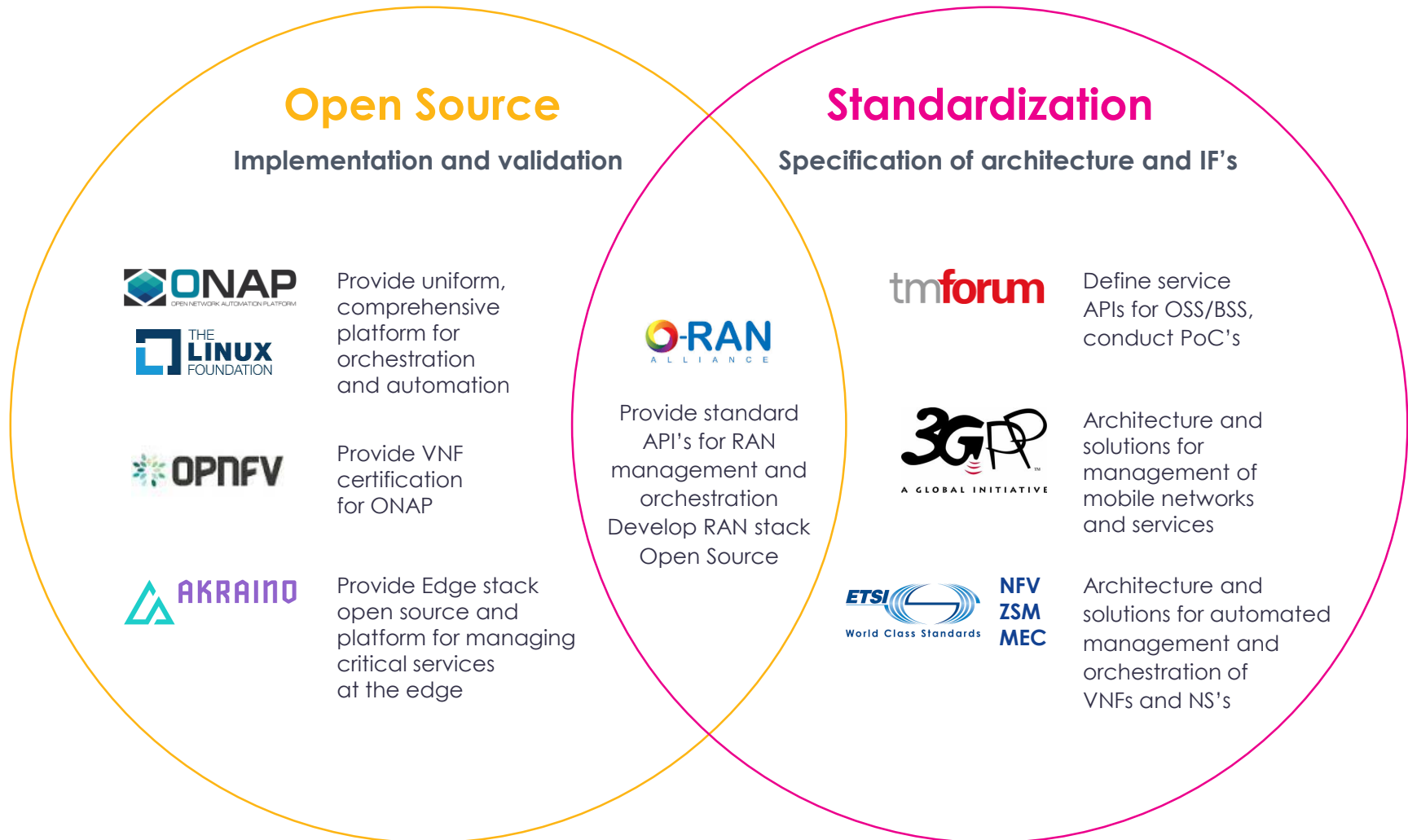
Director of Technology, Strategy and Standardization

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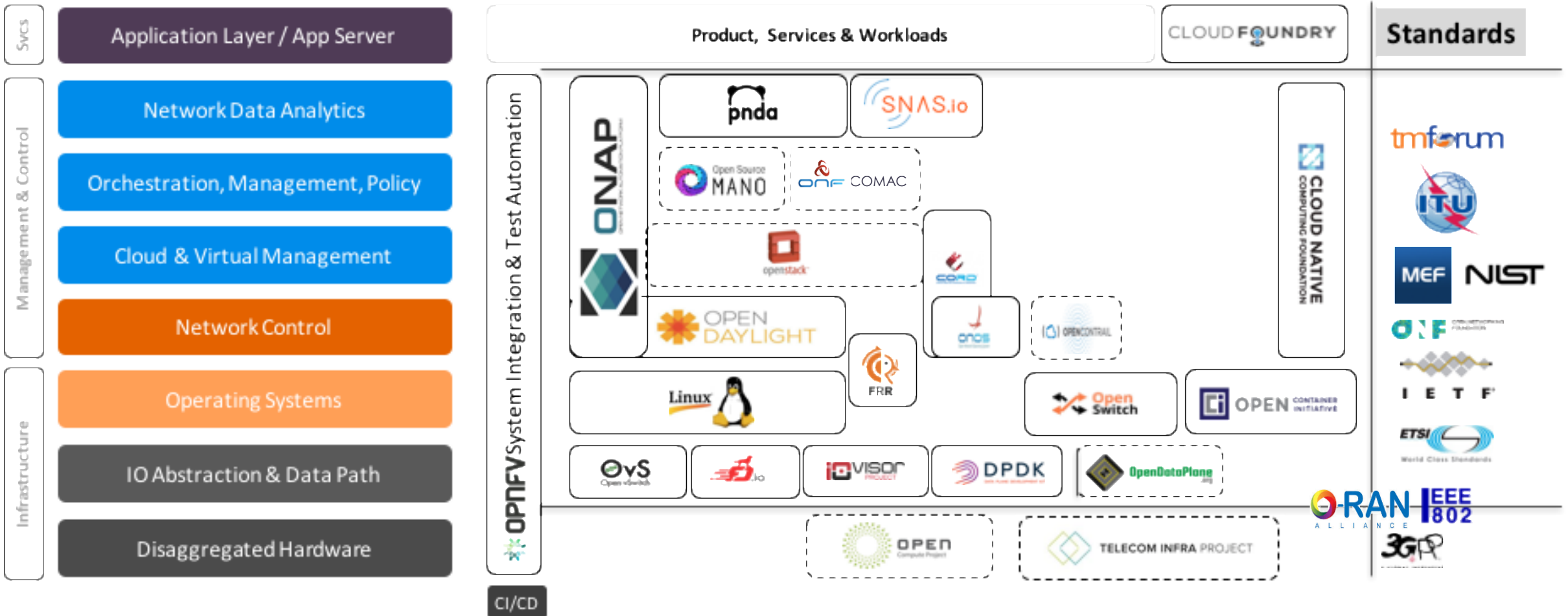


Standardization and OS Inter-working

Open source implements the standards to ensure interoperability between implementations



Open Networking – Open Source & Standards MAP




Automation of Network + Infrastructure + Cloud + Apps + IOT

Linux Foundation Hosted

Outside Linux Foundation




Standards Usage Outline - ONAP

Open Source	SDO Partner	Standards	Affected Components
	ETSI NFV	VNF and NS descriptors: IFA011/IFA014 SOL001; VNF/PNF packaging and onboarding: SOL004; NS packaging and onboarding SOL007	SDC, SO, VF-C
		3-rd party VNFM interface: SOL003 3-rd party NFV-O and OSS interface: SOL005	SO: VNF-M adapter SO: NFVO adapter, External API
		VNF control, events, KPI's etc.: SOL002	EMS adapter
	OASIS TOSCA	ONAP Internal model: TOSCA/YAML Spec v1.2	SDC, AAI, DCAE
	TMForum	Service Order, Catalogue and Inventory: TMF API's: 641, 633, 638	External API to BSS (NB), SO, AAI, DCAE
	ETSI ZSM	Leveraging ETSI ZSM multi-domain architecture	SO, SO adapters
	3GPP	Network Slicing Mngmt & Info Model: 3GPP SA2 and SA5	SDC, DCAE, APPC, AAI
		3GPP 5G Configuration SA5	SDC, APPC
		3GPP FM/PM SA5	SDC, DCAE
	ETSI OSM Interworking	Based on YANG to TOSCA translation and ETSI NFV- SOL005	NF-SDK, SDC

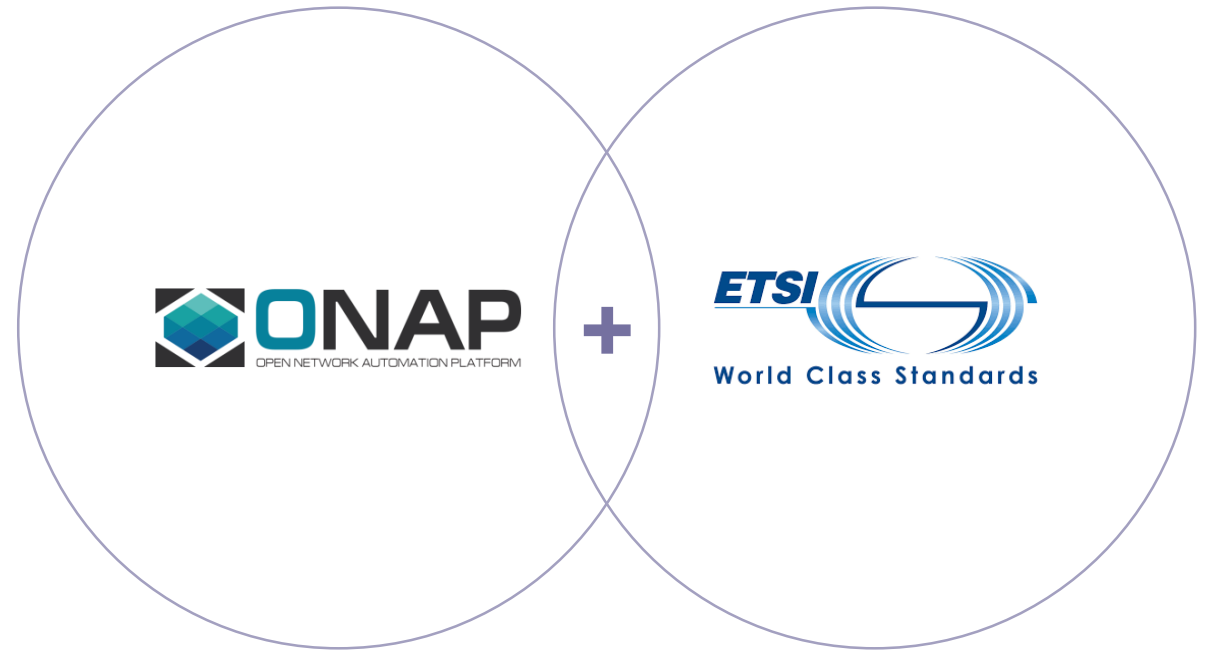
Standards Usage Outline - ORAN

Open Source	SDO Partner	Standards	Affected Components
	3GPP	Same as for ONAP support of 5G and Network Slicing	O-RAN O1 Interface
	ETSI ZSM	O-RAN OAM architecture	O-RAN O1* interface
	ETSI NFV	O-RAN Service management and Orchestration Spec	O-RAN O1* interface
	ONAP Inter-working	O-RAN Service management and Orchestration Spec	A1 interface, Non-RT RIC, near-RT RIC

Standards Usage Outline - AKRAINO

Open Source	SDO Partner	Standards	Affected Components
	ETSI MEC	ETSI MEC Open API's to be used by Akraino	Micro-MEC Akraino architecture
	ONAP	Akraino Edge orchestrated by ONAP	
	O-RAN	Radio Edge Cloud (REC) placing RAN NF's on the edge	O-RAN architecture also considering

ONAP – ETSI NFV Interworking

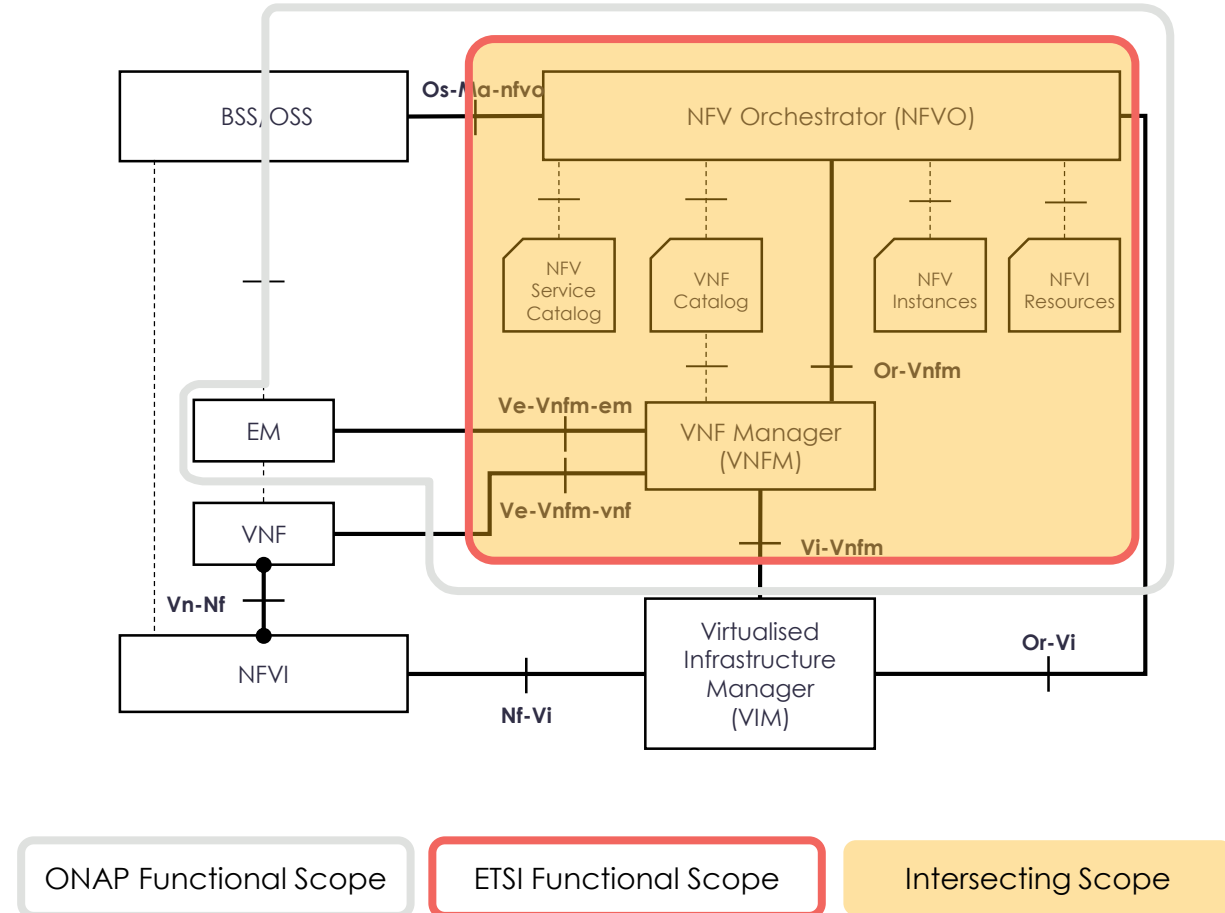


Scope of ETSI Relative to Scope of ONAP

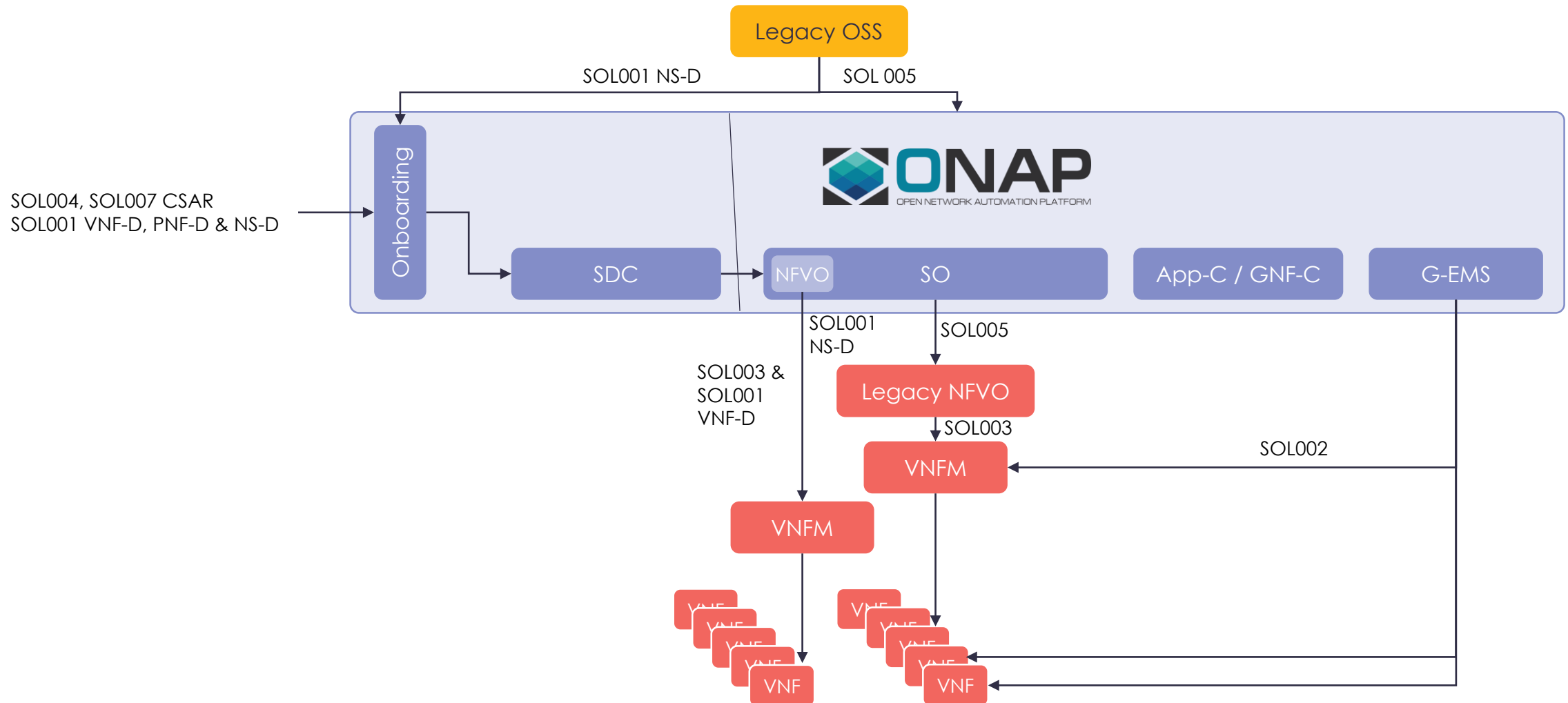
ONAP and ETSI have differing scopes, with ETSI scope being a subset of ONAP scope

ONAP scope includes OSS/EM features:

- PNF Orchestration/Provisioning (though SOL004 onboarding for PNF is part of ETSI)
- Services/Apps configuration
- Services/Apps FCAPS



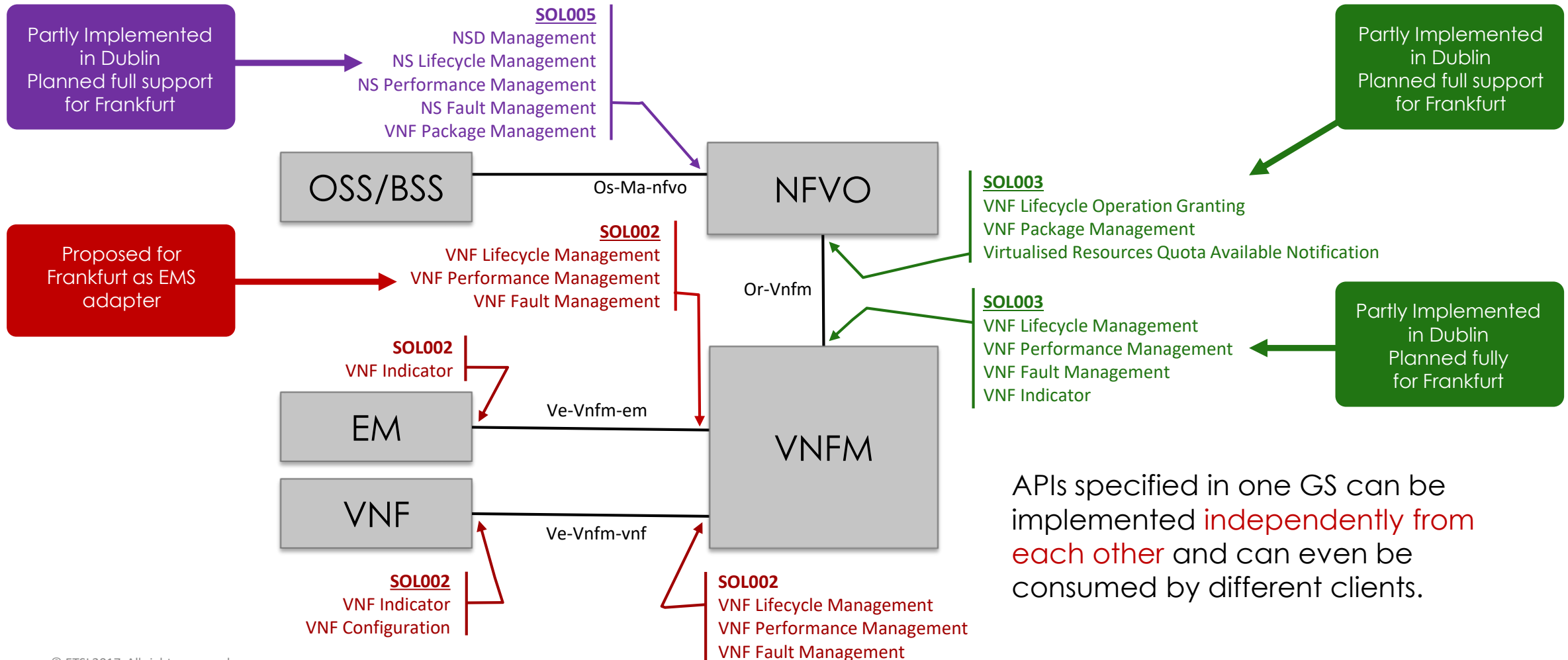
ONAP with external NFVO, VNFM and OSS



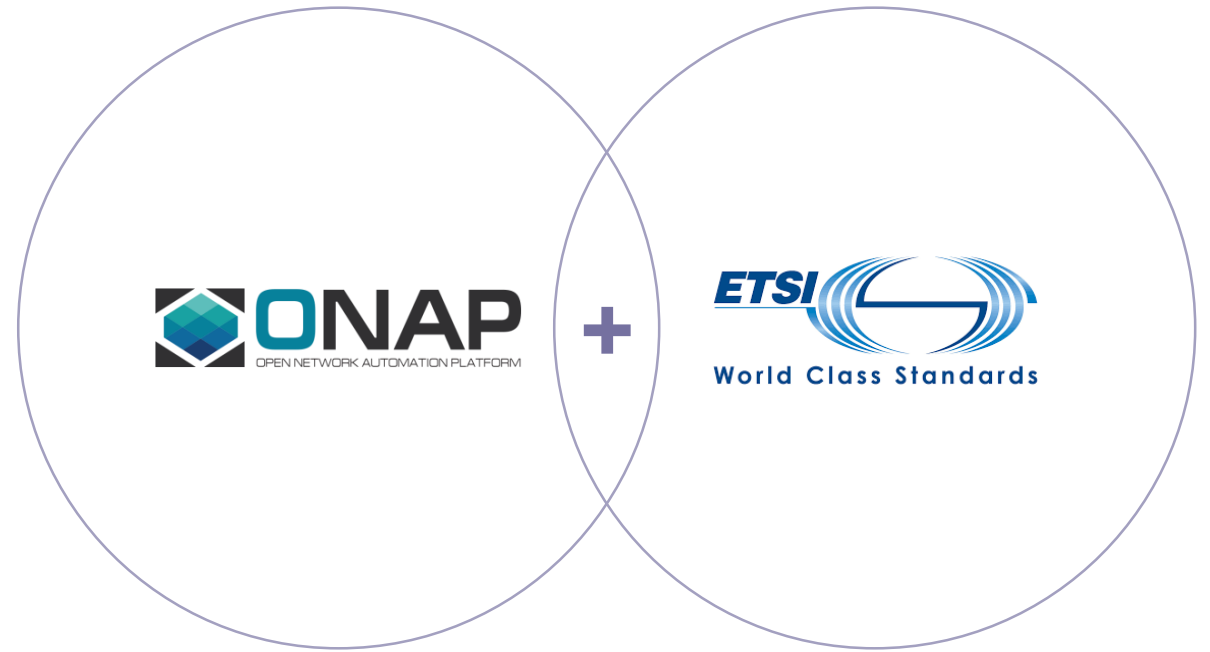
RESTful APIs in the ETSI NFV MANO architecture



An NFV-SOL GS contains specifications for **multiple APIs**, each of which realizes one of the **interfaces** produced on the **reference point** covered by this GS.

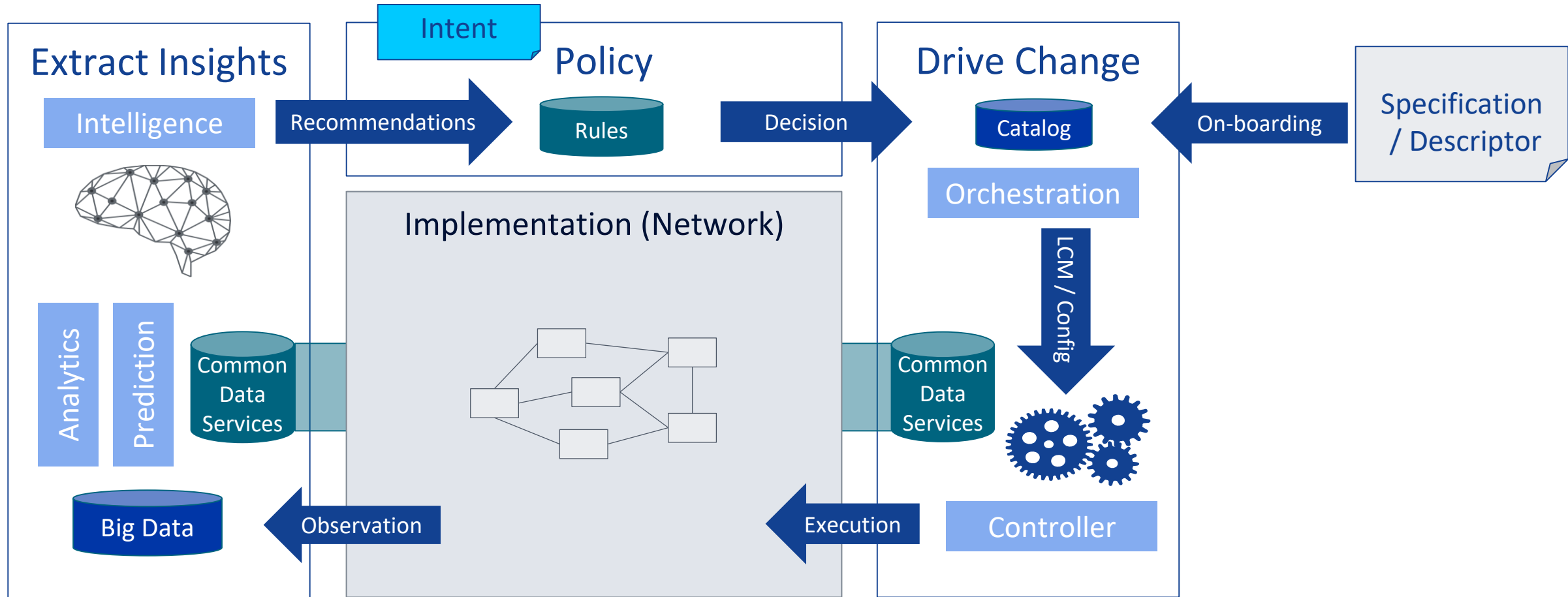


ONAP – ETSI ZSM Interworking



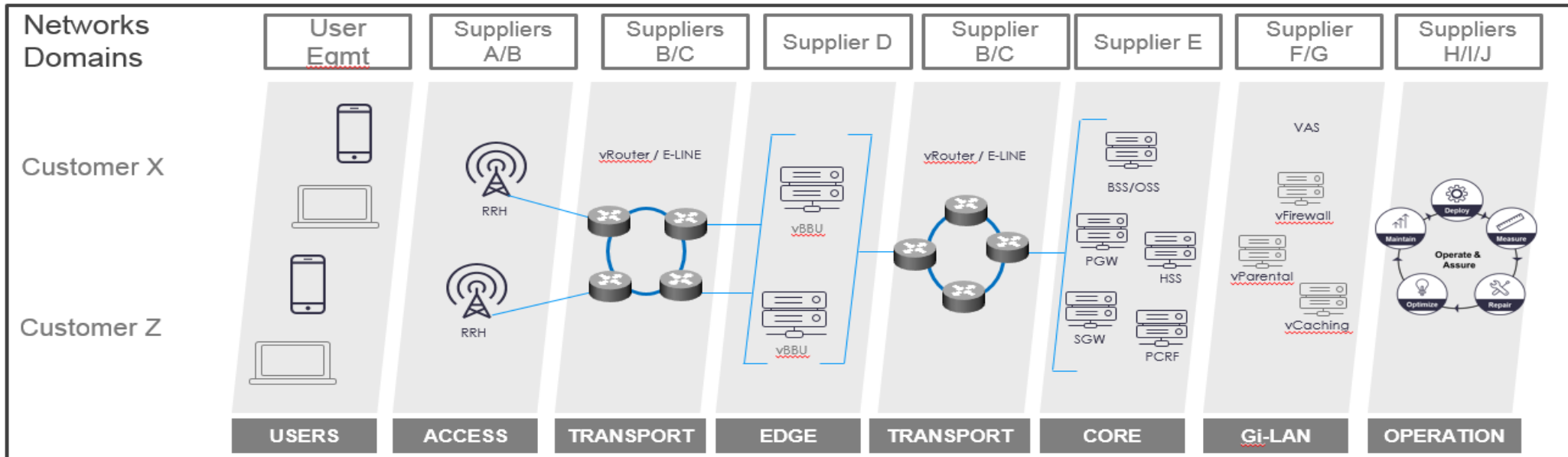
ZSM 002 Architecture feature

- Enabling Automation Based on Closed Loops



OODA – Observe, Orient, Decide, Act - Closed Control Loop

ZSM – Domain Exposure for Network Slicing

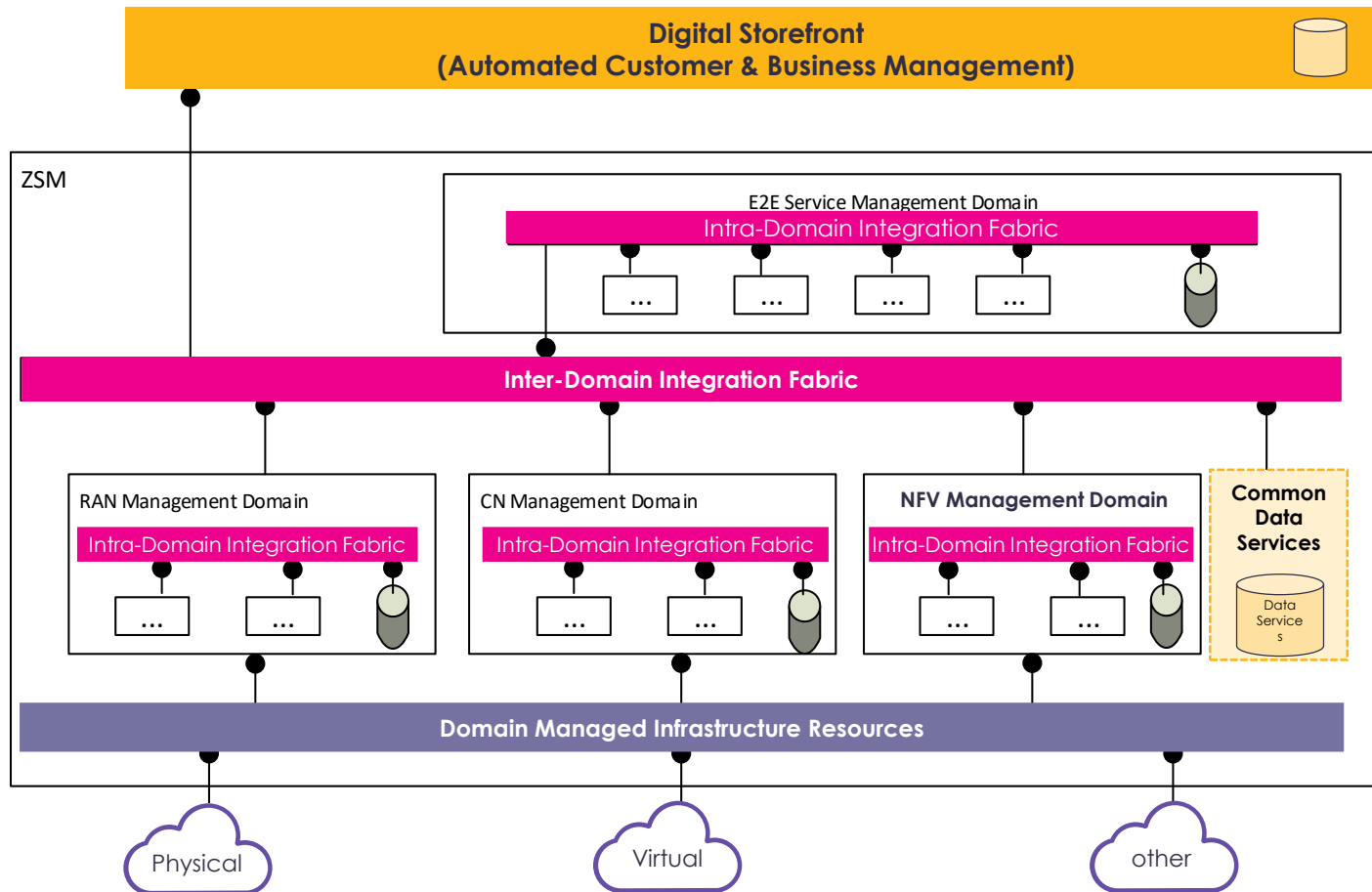


Each domain expose capabilities via unified interfaces: Config & Activation, Service Catalogue, inventory

- Alignment from suppliers of all domains
- Monitoring of services originating from different domains (NFVI, IP / SDN network, Front haul, Radio).
- Closed-loop assurance.
- Managing the lifecycle of the services/capabilities exposed per domain providing an interface that hides internal details

ONAP to Support ETSI ZSM

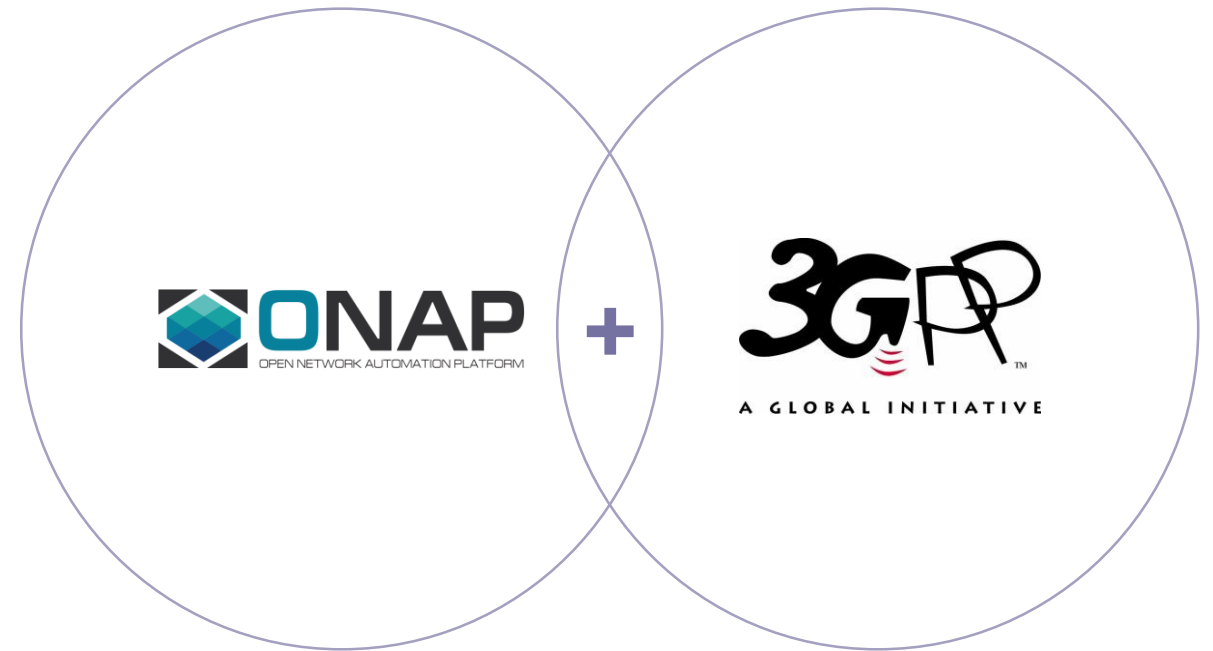
- Multi-domain Network Slice Orchestration



- Cross-domains E2E Network slicing management
- Management domains for E2E Service: RAN, Core and transport are provided by different providers.
- Direct interworking between domains is also assumed

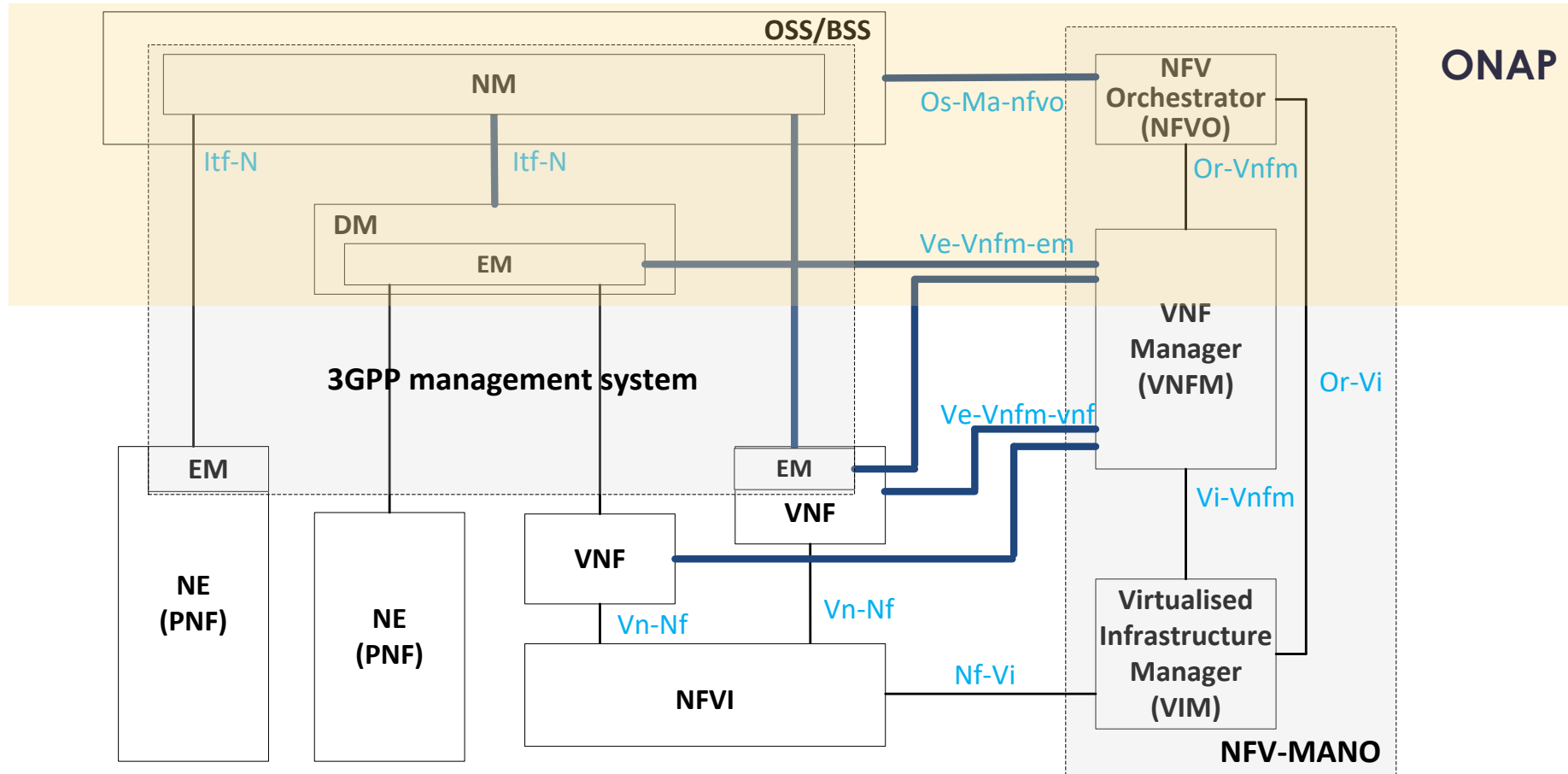


ONAP - 3GPP Interworking



Aspects of NFV related to Mobile Networks

The mobile network management architecture mapping relationship between 3GPP and NFV-MANO architectural framework (TS 28.500)



How 3GPP Leverages ONAP DCAE Collectors



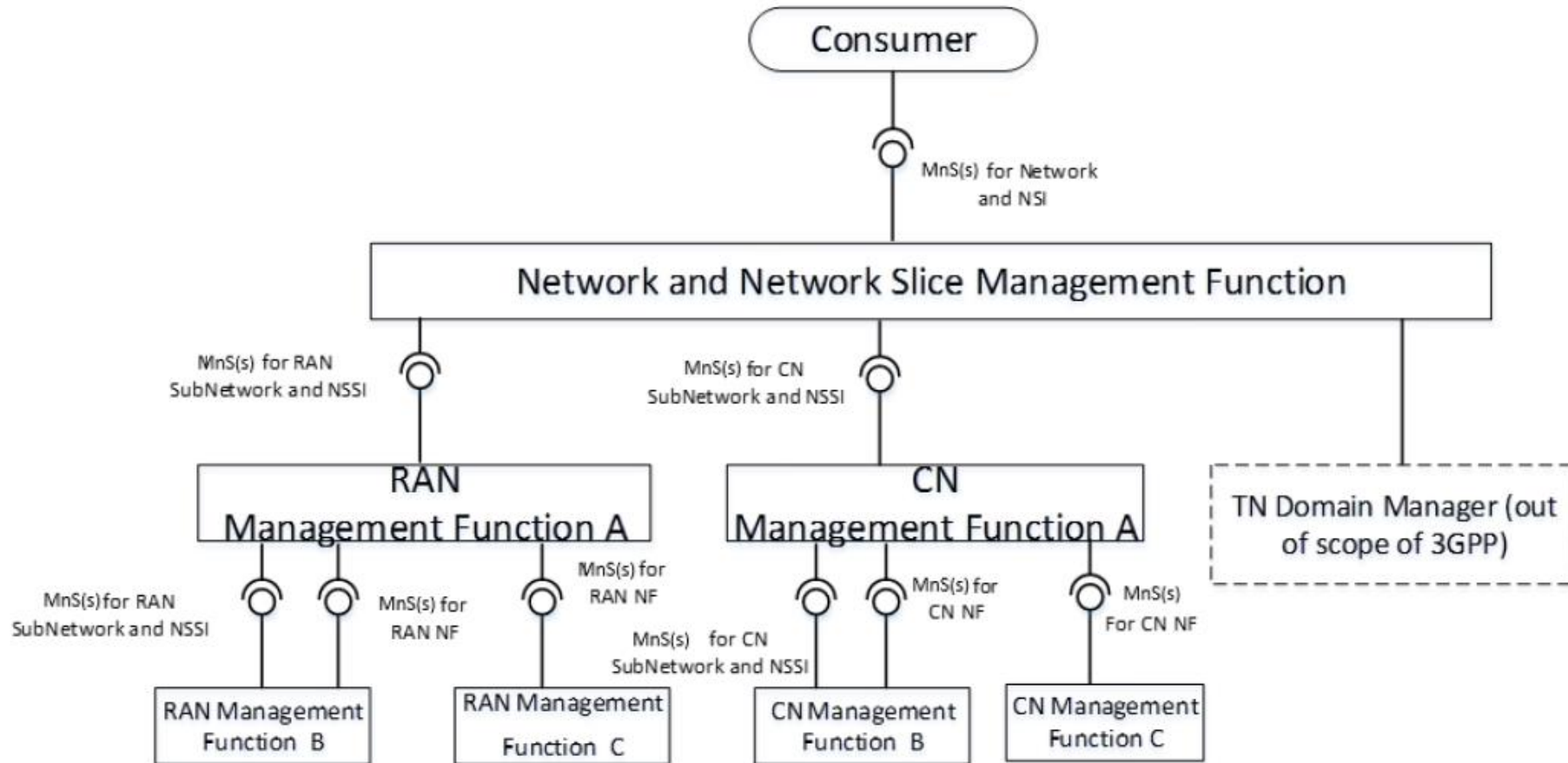
3GPP Performance Assurance services	Candidate consumers in ONAP	Candidate 3GPP Rel-16 solution sets
Performance data file reporting services	VES JSON Collector (for FileReady notification)	Protocol: REST Payload: JSON
	Data File Collector (for PM file upload)	Protocol: FTP File content: XML
Performance data streaming services	VES JSON Collector for low-medium volume PM	Protocol: REST Payload: JSON
	HV Collector for real-time (less than 1 minute) high volume PM (TCP, GPB)	Protocol: TCP Payload: ASN.1 Binary (TBC)

3GPP Fault Supervision services	Candidate consumers in ONAP R3	Candidate 3GPP Rel-16 solution sets
Fault supervision data report services	VES JSON Collector for alarm notifications under normal conditions	Protocol: REST Payload: JSON
	HV Collector for alarm notifications under alarm flooding conditions	Protocol: TCP Payload: ASN.1 Binary (TBC)



3GPP Management Framework

Example of deployment scenario for management of a mobile network including network slicing



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Key 5G Management Specifications



5G Management

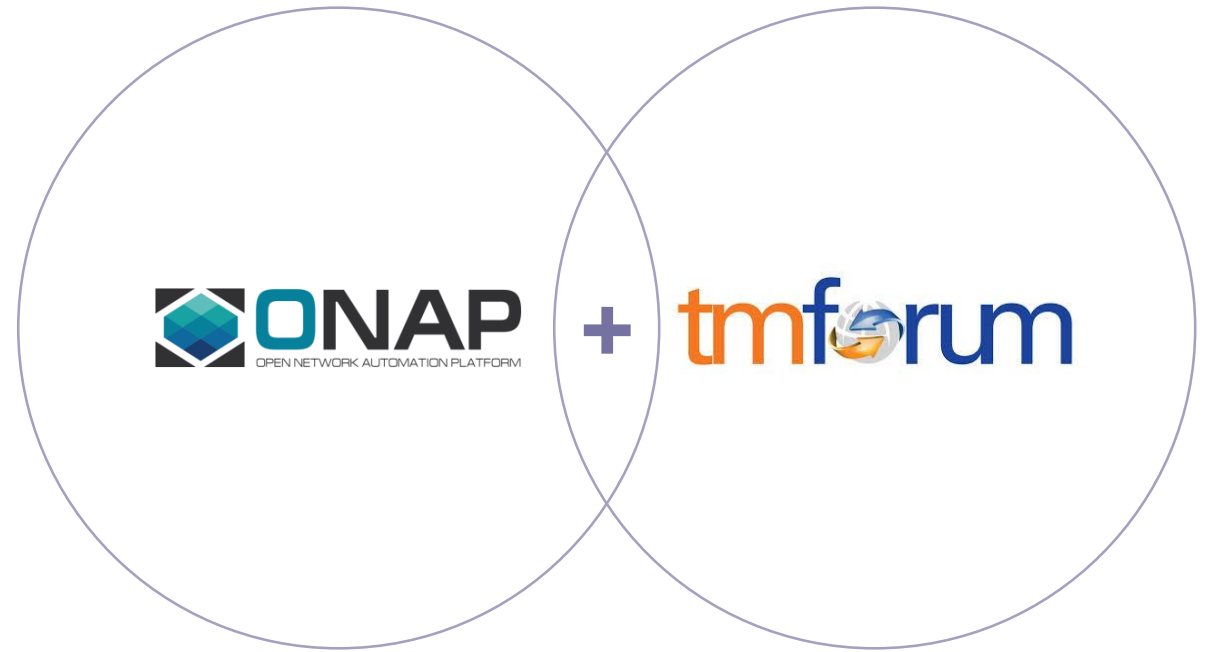
- Concepts, use cases, requirements architecture: 3GPP TS 28.530, 28.533
- Provisioning: TS 28.531
- Generic management services (incl. Prov, FM,PM): TS 28.532
- Network resource Model (NRM): TS 28.540, 28.541 (incl. Network Slicing)
- PM/KPI's and assurance: TS 28.550/552/554



Network Slicing

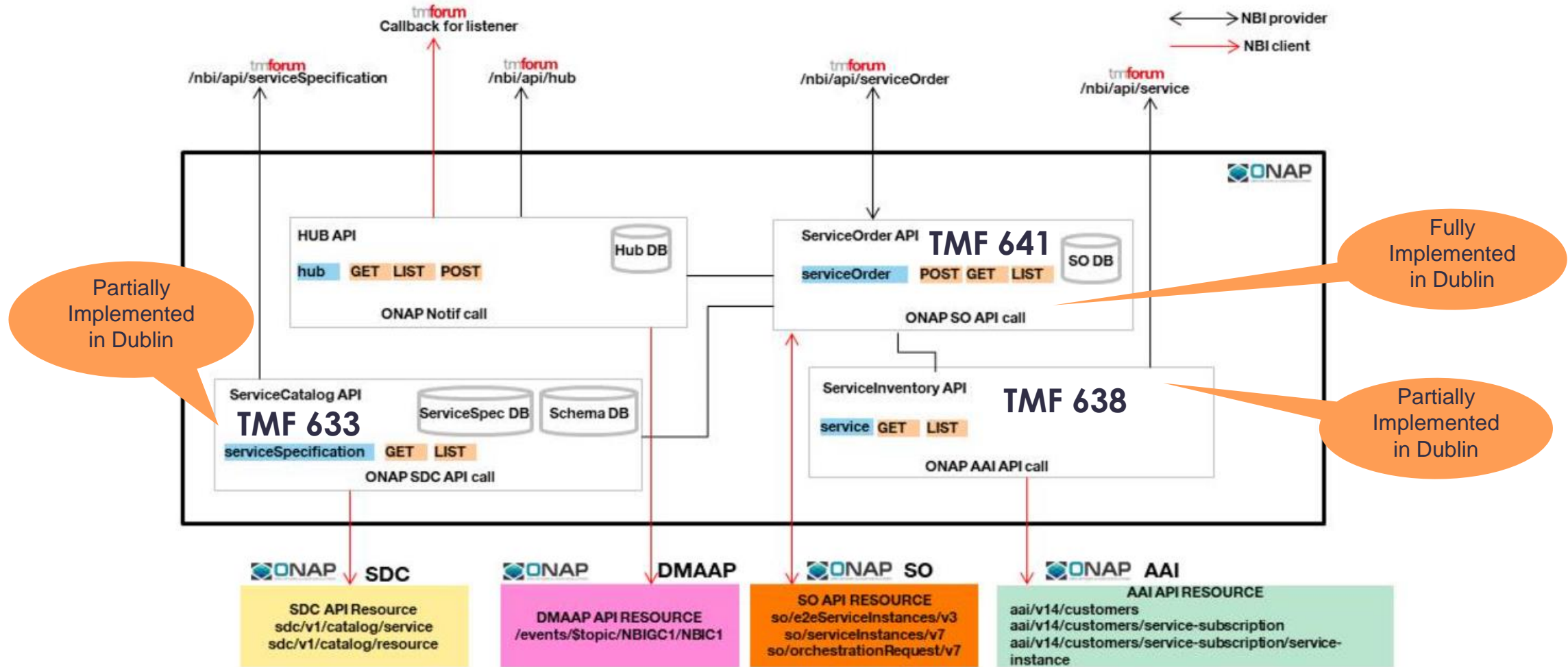
- Service requirements for next generation new services and markets TS 22.261
- Feasibility Study on Business Role Models for Network Slicing TR 22.830
- Definition, concepts and terms are defined by SA2 in 3GPP TS 23.501, 23.502
- Study on management and orchestration of network slicing in 3GPP TR 28.801

TMF Open API's ONAP – BSS Interworking

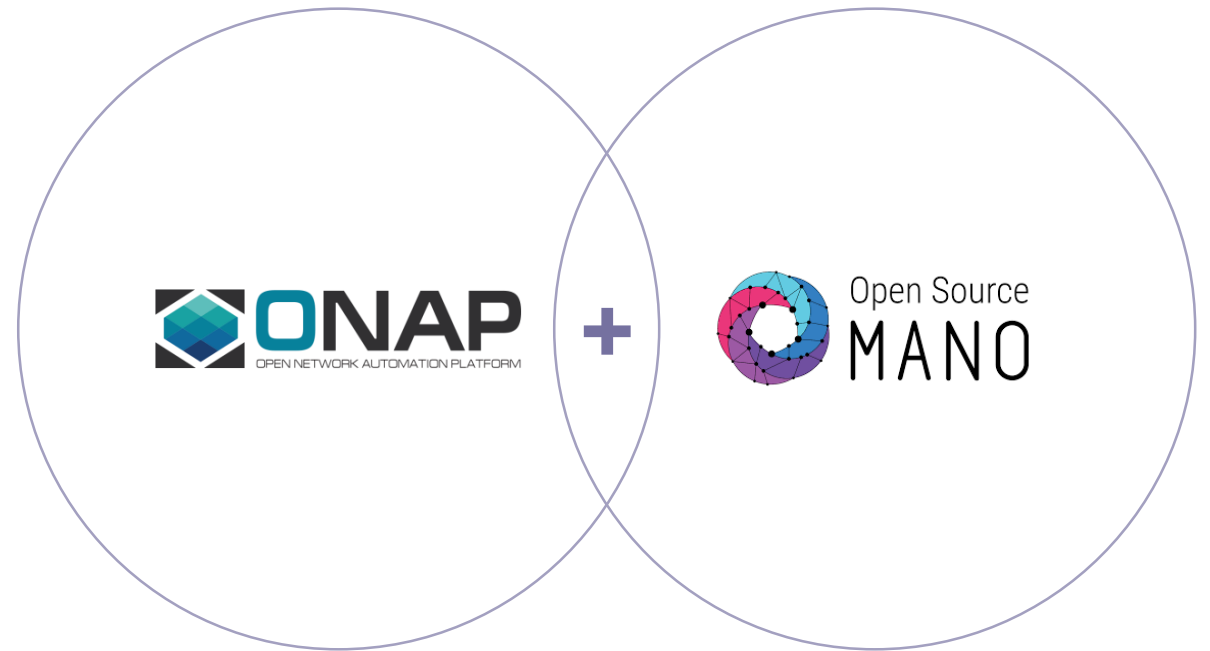


ONAP North Bound Interface with BSS

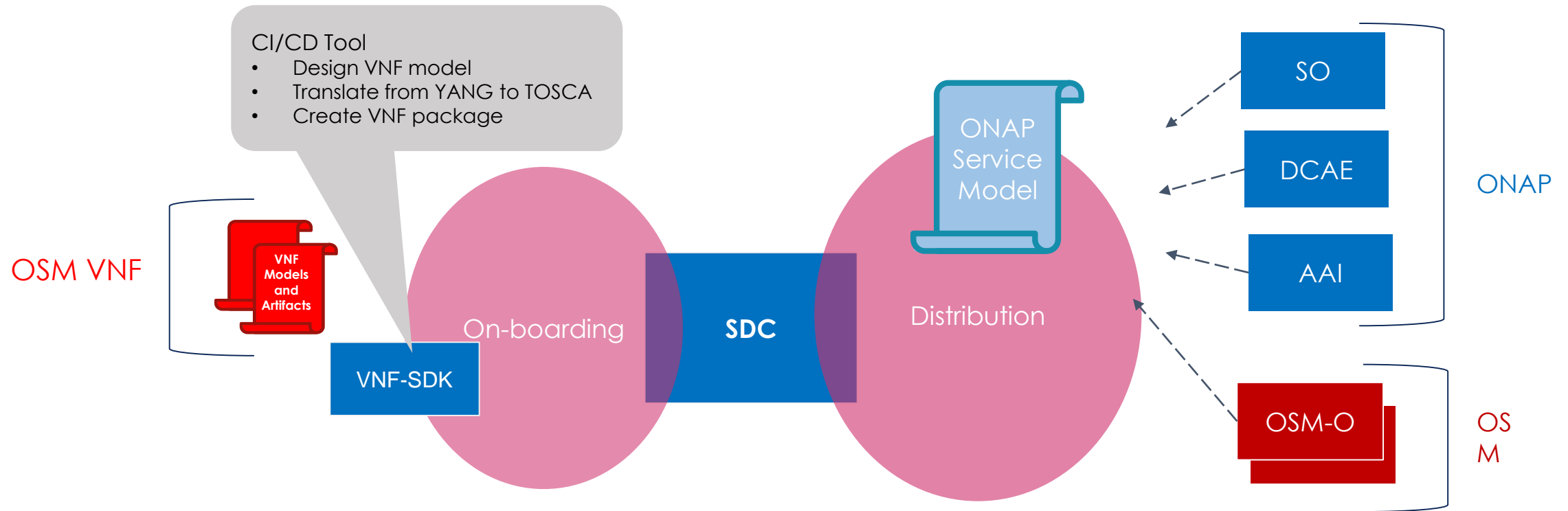
- Based on TMF Open API's



OSM Interworking



Interworking Scenario

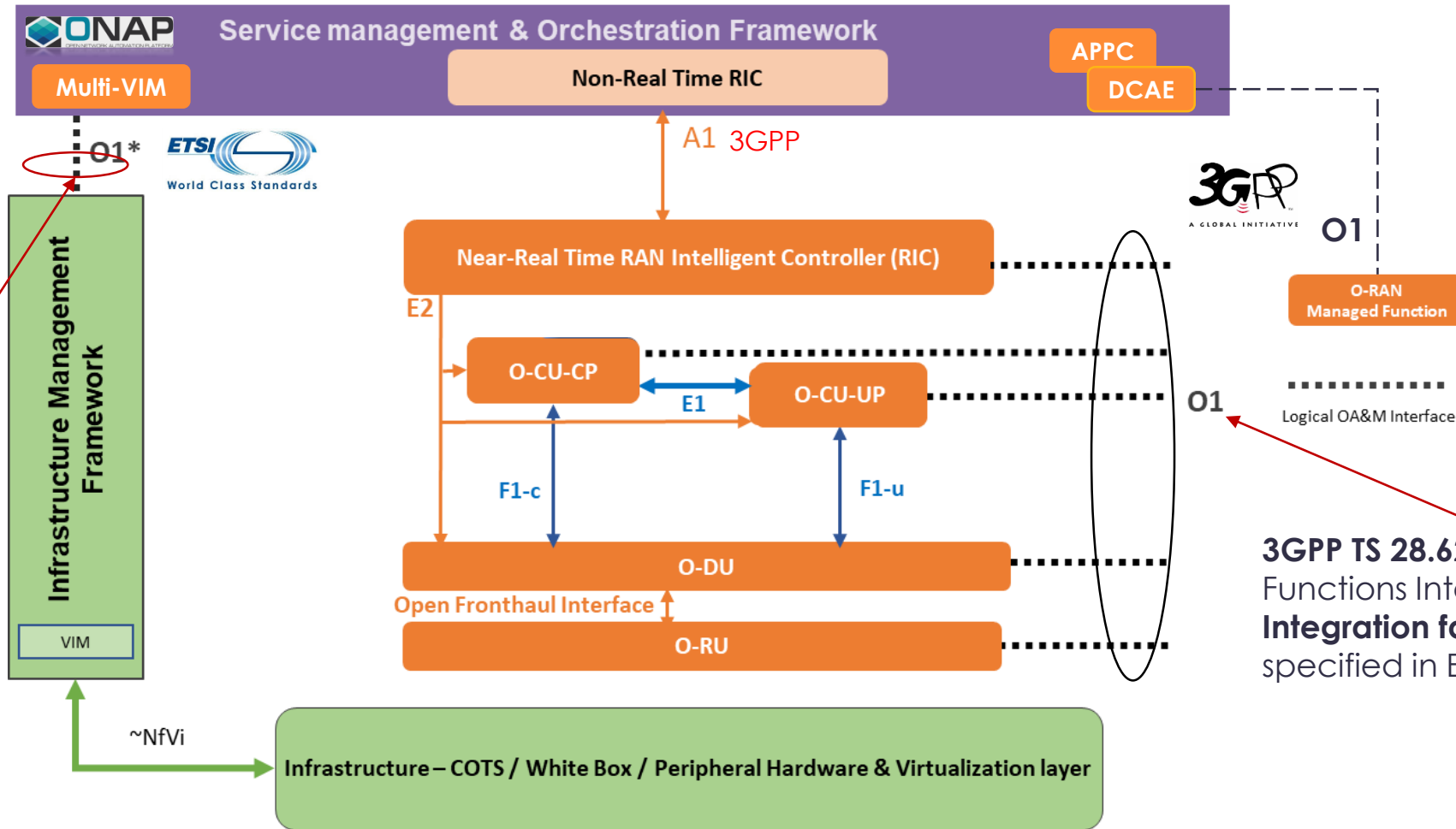


- ✓ VNF-SDK creates the OSM VNF package
- ✓ SDC onboard and enrich OSM VNF models to design ONAP Service Model
- ✓ ONAP SDC distributes applicable models and other artifacts to
 - ONAP components
 - OSM components
- ✓ OSM-O to support ONAP service model for enrichment

O-RAN Interworking 3GPP and ETSI NFV



O-RAN High Level Architecture



O1* - Resources management interface based on ETSI NFV Or-Vi and Vi-Vnfm

3GPP TS 28.622 Managed Functions Integration **Integration fabric** as specified in ETSI ZSM



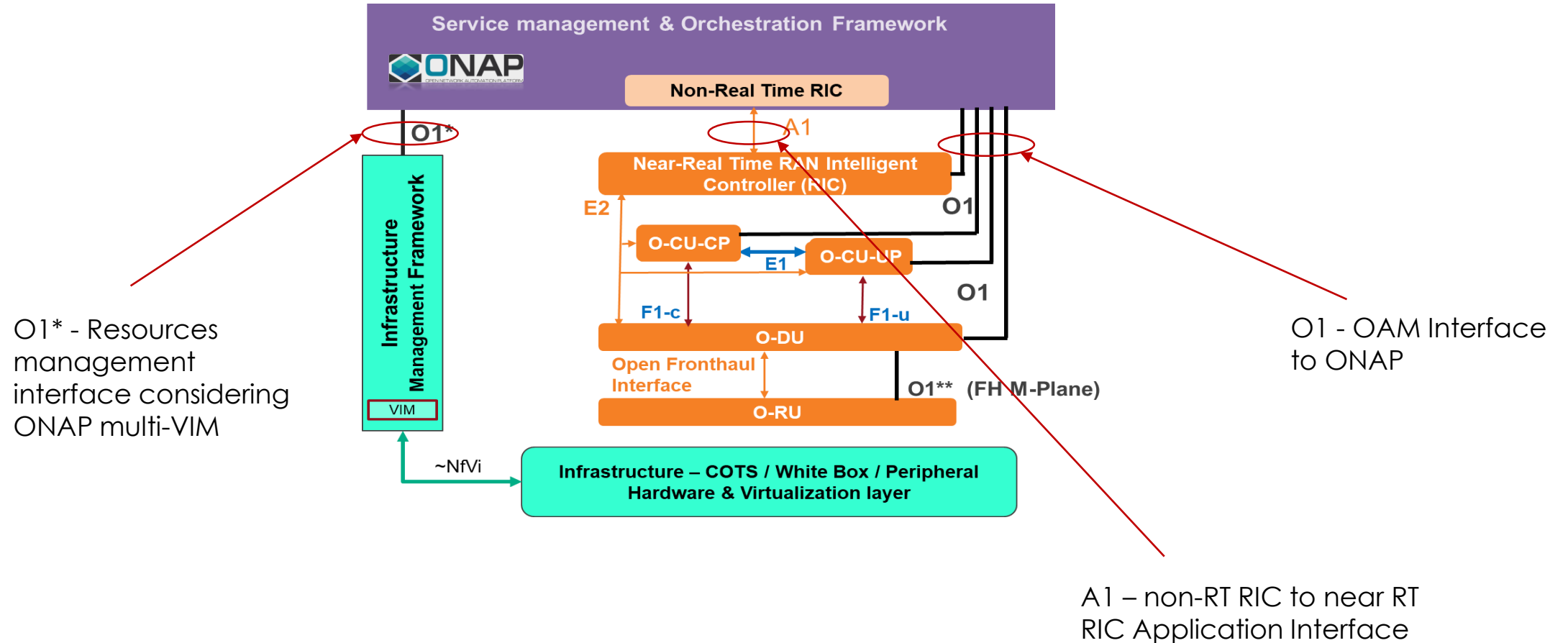
5G O1 Reference point

- ✓ All 5G Management related standards are in scope
- ✓ 3GPP TS 28.622
 - Managed Function (MF) represent a network function either realized by software running on dedicated hardware (PNF) or realized by software running on NFVI (VNF)
 - Managed Element (ME) logically contains MF's and communicates with a manager (directly or indirectly) over one or more management interfaces for the purpose of being monitored and/or controlled

O-RAN Interworking ONAP

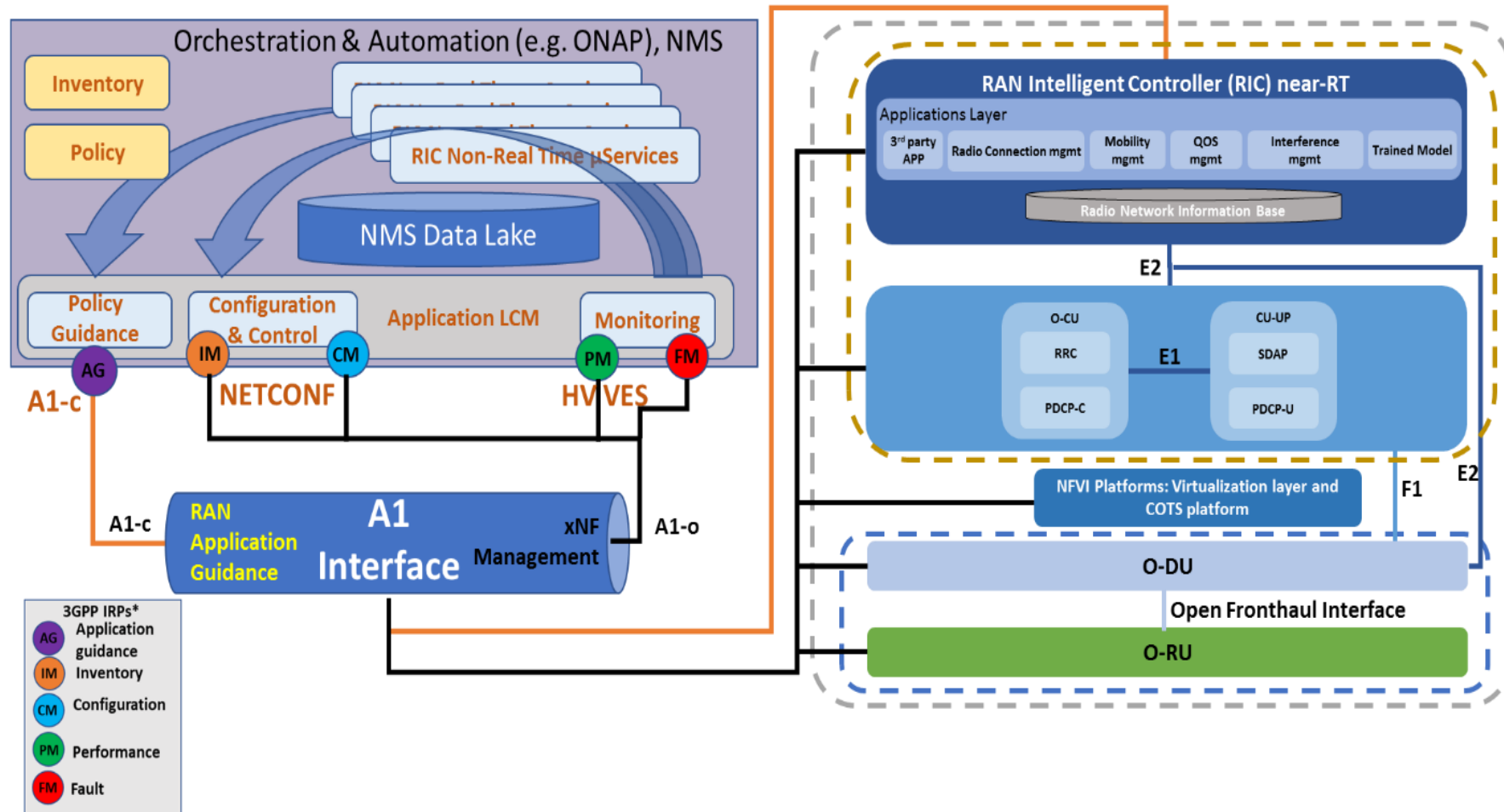


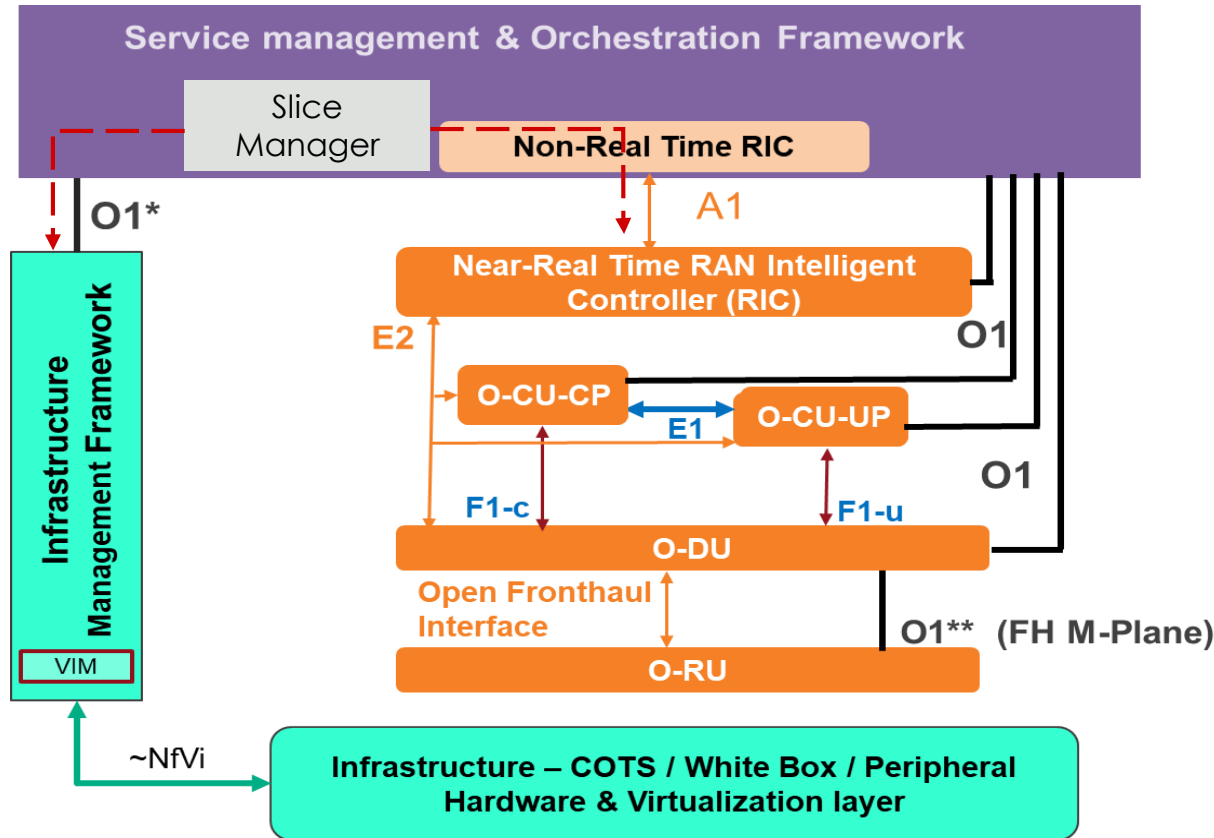
O-RAN Management and Orchestration



A1 Interface:

- Interworking Non-Real Time with Near-RT RIC





Network Slices Life-Cycle Management

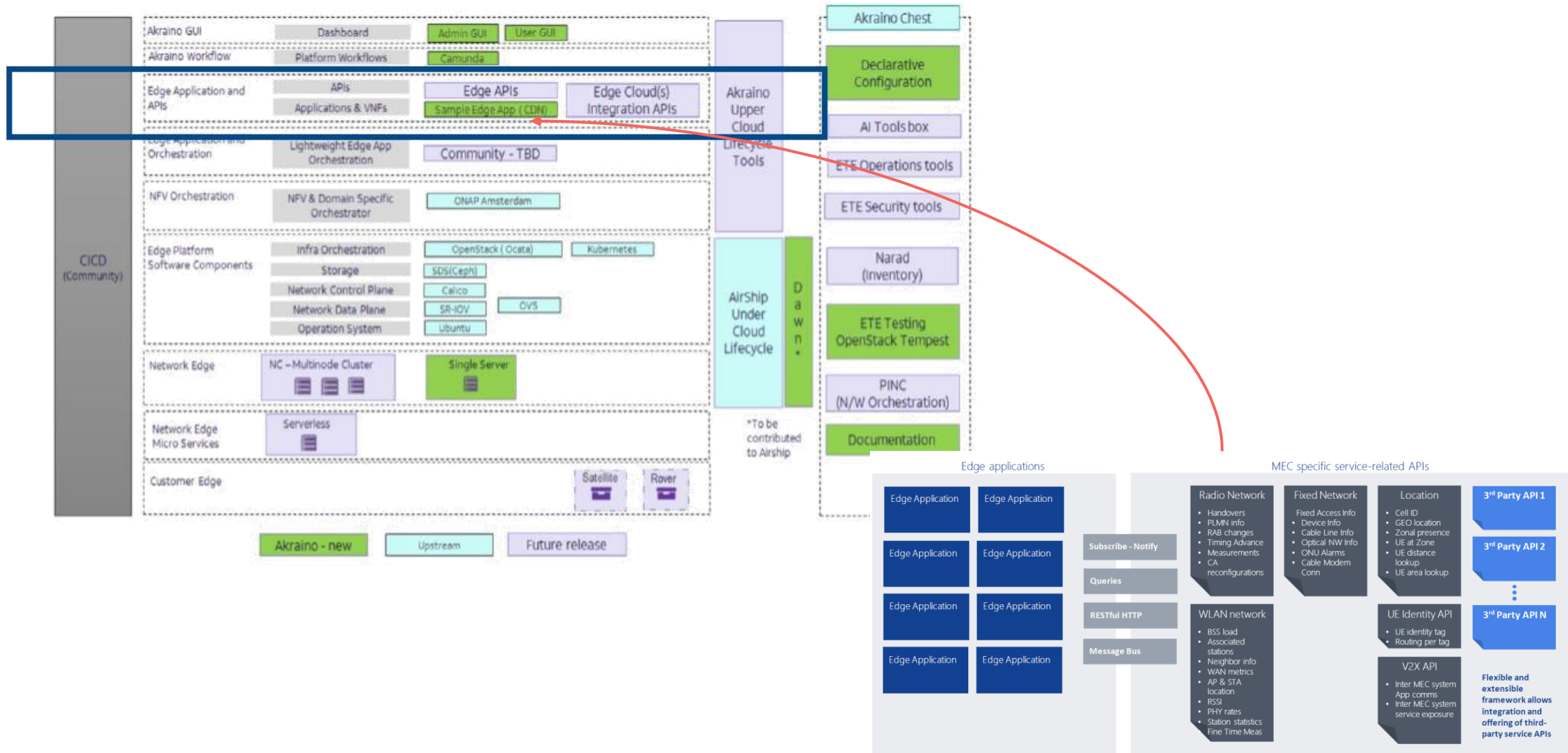
- Allocate and free unused resources e.g. for other slices use – Prioritization and semi-dedication
- Support common pool of resources for best effort not exceeding max threshold
- Down-Link/Up-Link separation
- Allocation, segmentation and prioritization to be configurable per carrier
- Pre-requisite for Slice as a Service
- **Network Slicing Use Cases for Non-RT RIC**

Akraino Interworking

ETSI MEC



Akraino Edge API's Leverage MEC Open API's



Conclusion



Networking Standards and Open Source collaboration



Common ground for supporting the requirements of open standard based Networks



Working together results in less fragmentation, Interoperability, faster deployments and more streamlined innovation



Collaboration provides the standards community with a quick feedback loop on how standards specifications are being implemented



Contributes to faster adaption of both open source and standards by the market ecosystem composed of both vendors and service providers



Accelerate service providers networks transformation and services innovation



Thank you