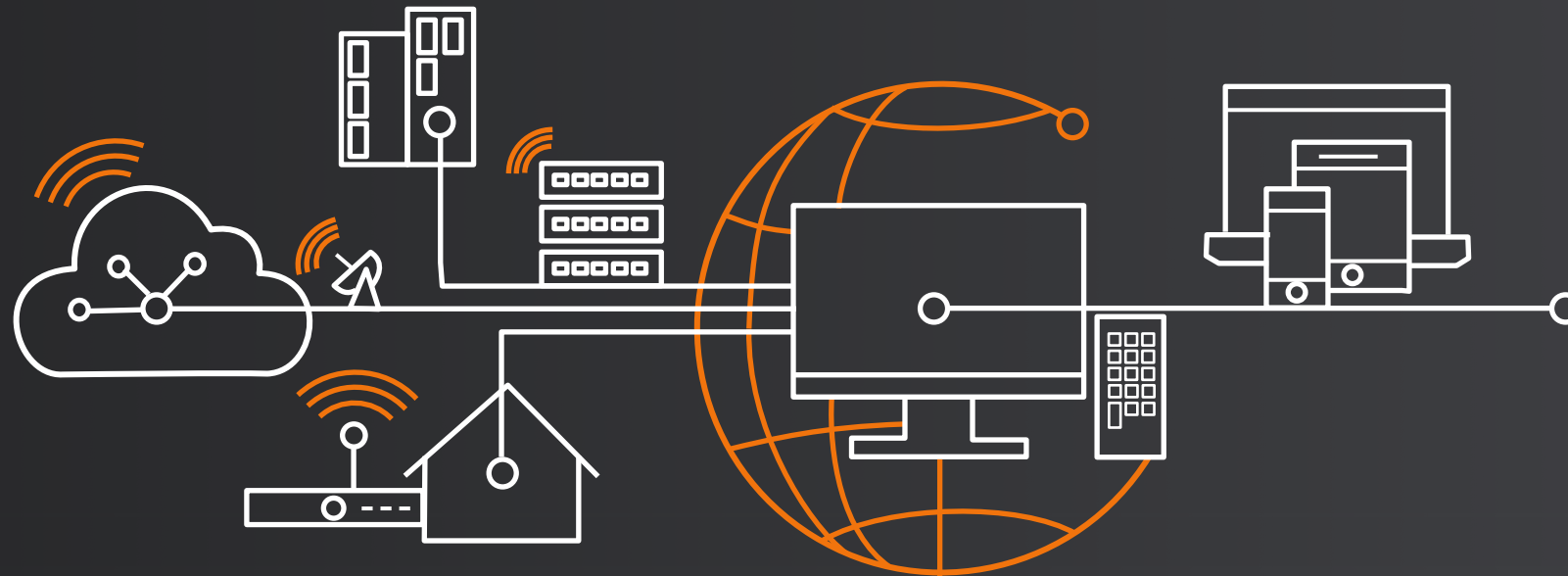# Lessons Learned from Using ONAP to Build a Multi-vendor SD-WAN Solution

Jack Raynor
Sr. Director Professional Services
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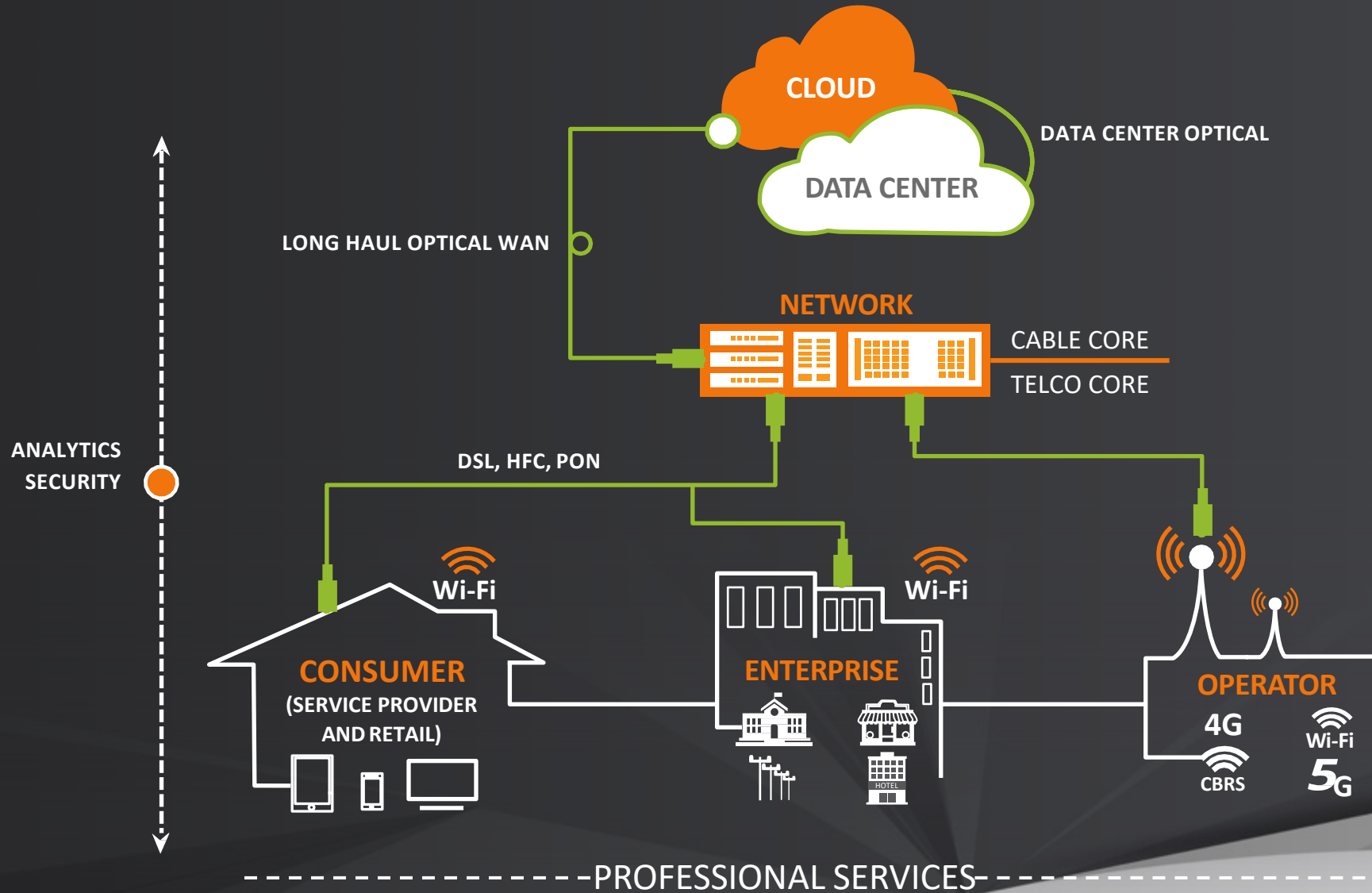**Jaspreet Sachdev**
PLM Orchestration
jaspreet.sachdev@arris.com

REDEFINING CONNECTIVITY

IF YOU HAVE DIGITAL TV OR BROADBAND SERVICES, YOU ARE MOST LIKELY USING **ARRIS** TECHNOLOGY

ARRIS

ARRIS

End-to-end technology innovation and the experience to bring it all together

CLOUD

DATA CENTER OPTICAL

DATA CENTER

LONG HAUL OPTICAL WAN

NETWORK

CABLE CORE

TELCO CORE

ANALYTICS
SECURITY

DSL, HFC, PON

Wi-Fi

Wi-Fi

CONSUMER
(SERVICE PROVIDER
AND RETAIL)

ENTERPRISE

HOTEL

OPERATOR

4G

CBRS

Wi-Fi

5G

PROFESSIONAL SERVICES

Multi-Domain Service Orchestration

"ARRIS provides software-defined solutions for Multi-Domain Service Orchestration that streamline service activation, enhance service agility and help Service Providers free themselves from the constraints of their legacy networks."

DIGITAL TRANSFORMATION

Control and Management

Access/Edge Network

Backhaul Network

Core Network

Virtualization/Disaggregation

| 5G | PON | CBRS |
| WiFi | HFC | FIBER |

Virtualization/Disaggregation

| EPC | CLOUD | NFV |
| SDN | 3rd Party | PHY |

MDSO PROFESSIONAL SERVICES

ARRIS Managed Networks
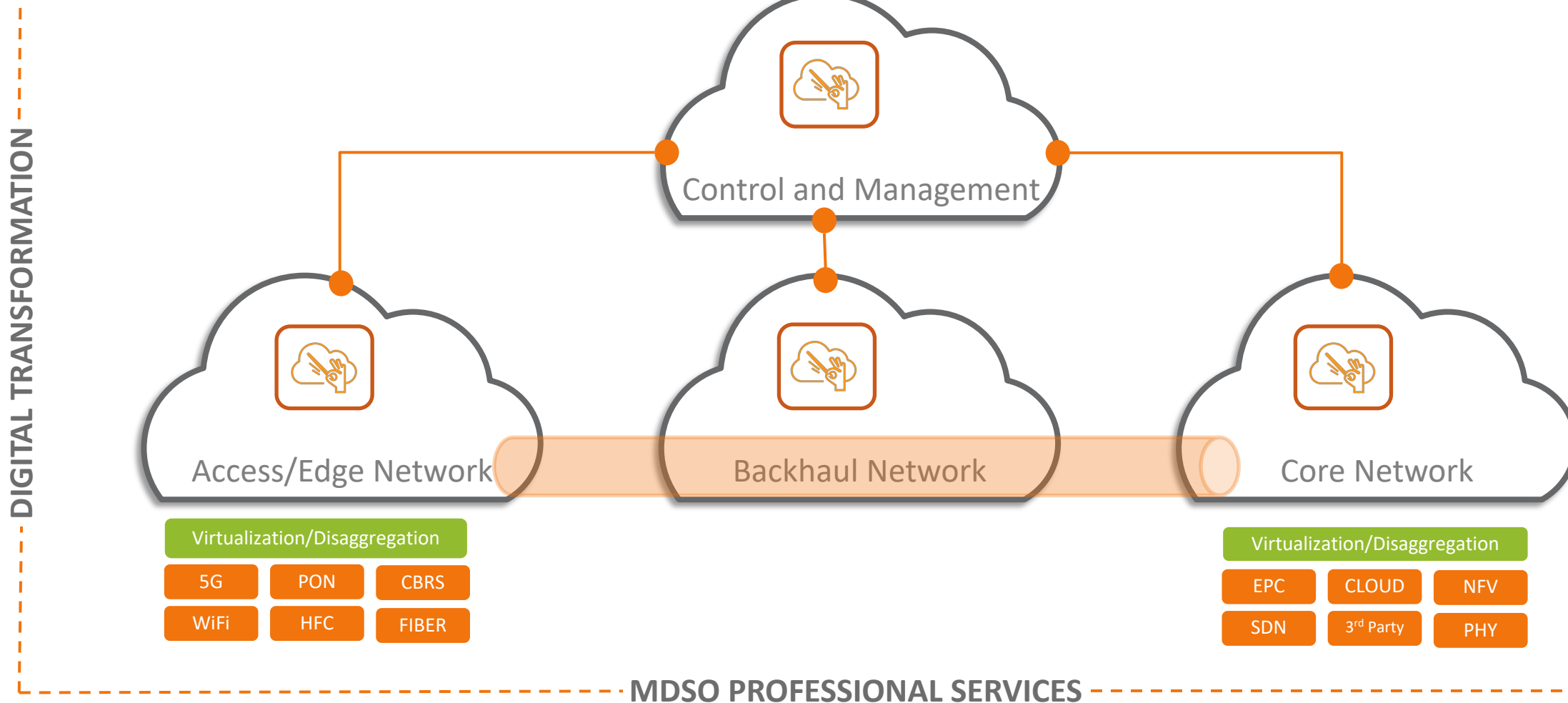
As ARRIS's Managed Network business scales, automation and orchestration are essential!

- ARRIS provides Managed Network Solutions for Service Providers serving SMB and Enterprise customers
  - Managed Wireless and Wired
  - Managed Router/Firewall
- Includes Operator-defined VNFs with service chaining
  - Firewall, Router, NAT, DHCP, Content Filtering, Intrusion detection
- Enables multi-vendor VNF ecosystem
- Leverages open source technologies

Strategy

ARRIS

Managed Network Services: Automation & Orchestration

Support a Multi-Vendor Ecosystem
- Create unique services agnostic of vendor-specific components
- Support various types of VNFs

Multi-Deployment Scenarios
- Universal CPE
- Virtual CPE
- Hybrid

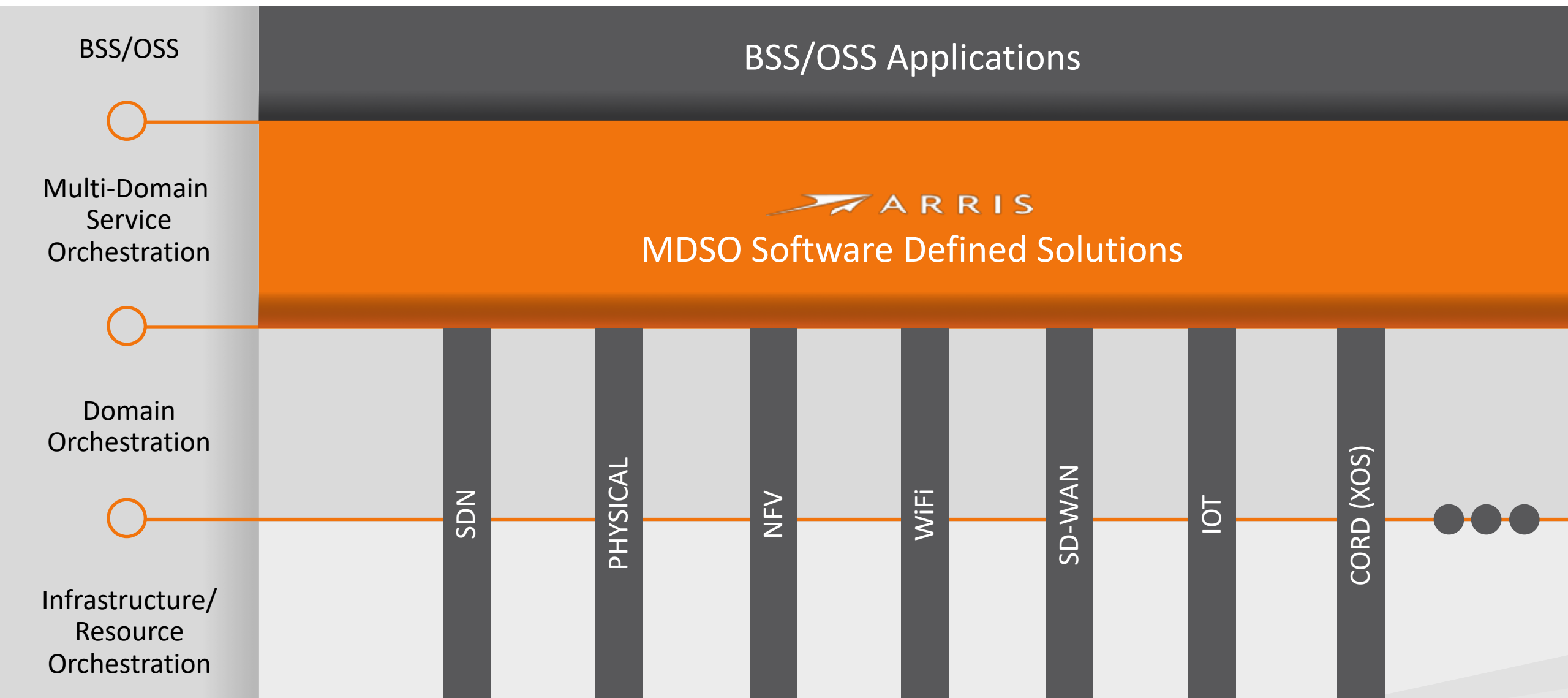### Open Source Software Approach
- ONAP, OSM
- Continue to avoid vendor lock

Standards Development Organizations
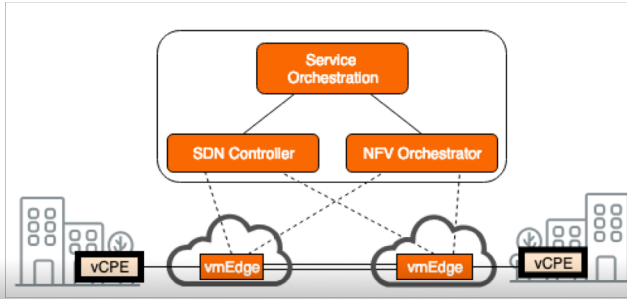- MEF, ETSI, IETF
- OASIS-TOSCA
- TMForum Alignment
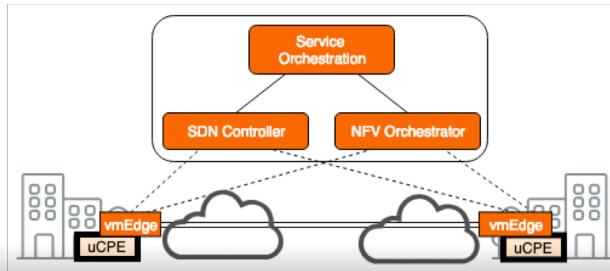
Mission: Digital Transformation

MDSO Architecture

BSS/OSS

BSS/OSS Applications

Multi-Domain Service Orchestration

ARRIS
MDSO Software Defined Solutions

Domain Orchestration

SDN

PHYSICAL

NFV

WiFi

SD-WAN

IOT

CORD (XOS)

Infrastructure/ Resource Orchestration

Different Deployment Scenarios
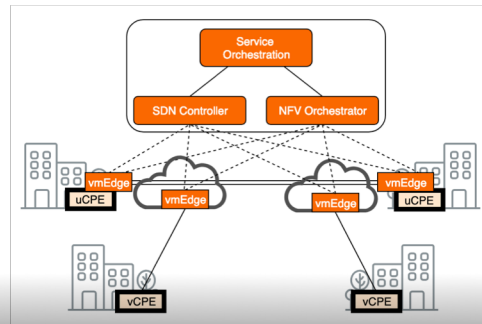

1 — "Thin" CPE (vCPE) tunnels traffic to Edge-Cloud VNFs

**2** — "Thick" CPE (uCPE) runs local VNFs

3 — Hybrid Scenario managed by same Orchestration layer

Why ONAP for Automation & Orchestration

Building blocks for Multi-Domain Service Orchestration

- ✓ Model Driven
- ✓ Standards-Based Interfaces
- ✓ Centralized Design Studio
- ✓ Modular & Microservices Architecture
- ✓ Policy Driven Run Time
- ✓ Multi-Tenancy
- ✓ L1-L7 Controllers
- ✓ Pluggable Architecture
- ✓ Edge Automation*

Approach

ITERATE

DESIGN	ORCHESTRATE	OPERATE
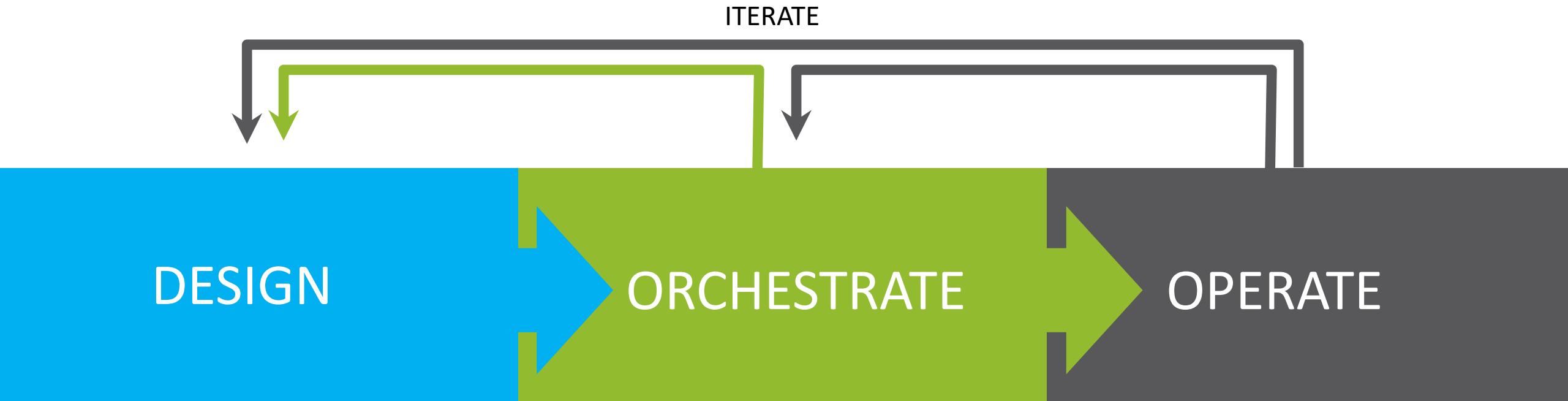
DESIGN
- Use Case Analysis
- VNF Evaluation
- VNF Onboarding
- Basic Functional Testing
- Service Function Chaining

ORCHESTRATE
- VNF LCM Validation
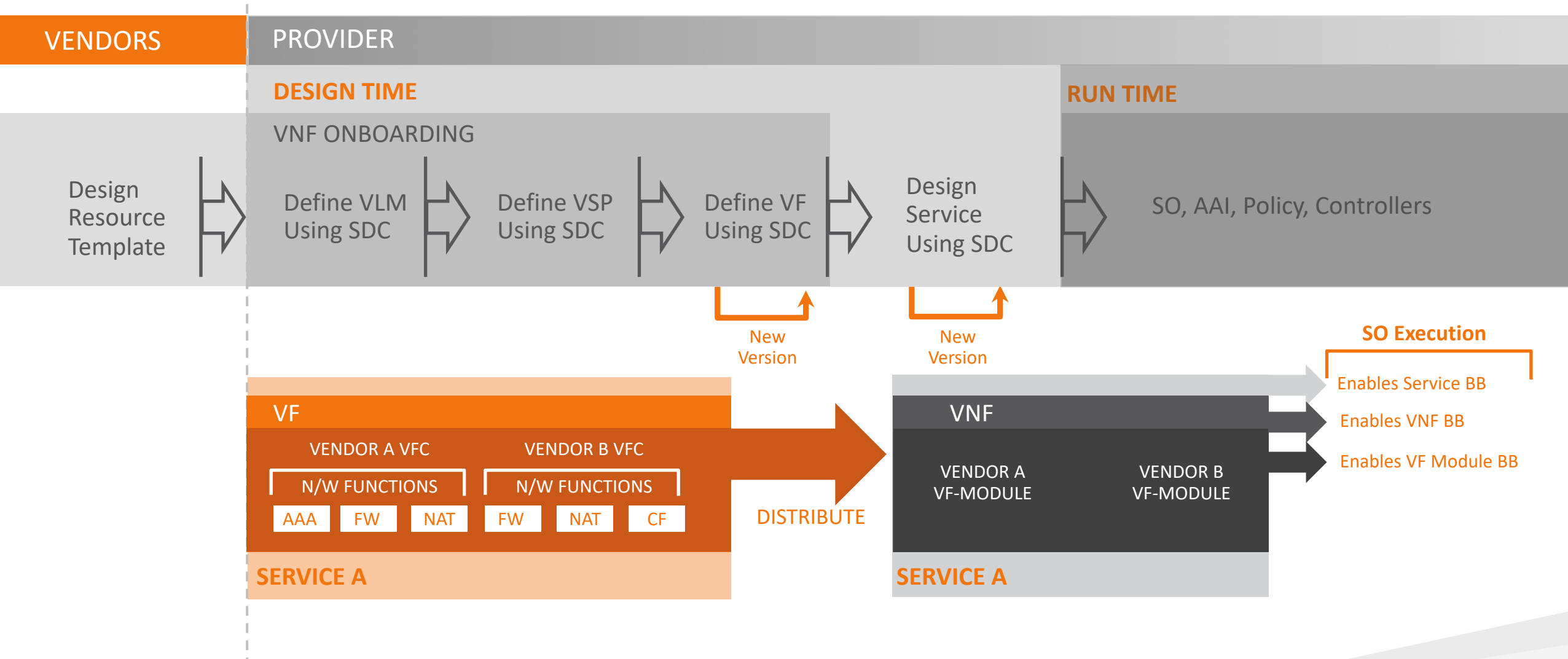- VNF CI & CD
- VNF Monitoring
- Network Service Chaining

OPERATE
- Lifecycle Management
- Closed Loop Integration
- Performance

VNF Terminology

Design Time View: **SERVICE A**

Run Time View: **SERVICE A**

VF

VENDOR A VFC	VENDOR B VFC
N/W FUNCTIONS	N/W FUNCTIONS
AAA FW NAT	FW NAT CF

VNF

VENDOR A VF-MODULE	VENDOR B VF-MODULE

VNF Onboarding Steps

Lessons Learned

Observations	What We Did
Limitations in validation and verification of onboarded VNF in ONAP	• Manual verification at different steps of onboarding and orchestration of VNF • Manual verification for compatibility checks, translation of design time entities to run time entities
Vendor VNF can provide multiple functions packaged in a single VM	• Developed integration wrapper on VNF to orchestrate deployment & key LCM operations • Used different BPMN flows in ONAP to support different LCM operations
Existing Network Services limit optimized use of VNFs.	• As a first step modeled VNF's to match current service scenarios and operations • Iterated analysis of use cases to generalize the build and deployment of VNFs
Many ONAP workflows – hard to choose best	• Study ONAP use cases to understand BPMNs, controllers and internal integrations. • Testing of ONAP components to pick between existing SO flows, customization or new flows
SDC framework limitations for complete onboarding	• Automated the pre-onboarding activities using the REST API of appropriate ONAP components

Summary

Iterate VNF design approach over several use cases	Allow for standard and propriety VNF onboarding	Iterate over service chaining scenarios	Design tools to simplify onboarding

What's Next?

Reusable building blocks to ensure service agility	CNF over Kubernetes VIM	Open API for cross provider automation	Performance commitment

THANK YOU