

An abstract graphic composed of numerous thin, light green lines that swirl and curve together to form a central, irregular shape resembling a stylized 'O' or a flower. The lines are set against a solid dark blue background.

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OCP
SUMMIT

Networking:
Hardware

Real Examples of Telecom Services Built Using White Boxes

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Outline

- Legacy telecom practice
- New directions in telecom
- Case studies from MEF18
- Forward trajectory

Legacy telecom practice

- Branded HW
- Bundled SW
- Per-product management interfaces
- No programmability
- Box-by-box reliability



Resulting in

- Brittle networks
- Little service differentiation
- High Capex, high Opex
- Complex management
- Slide to commodity transmission





New telecom direction

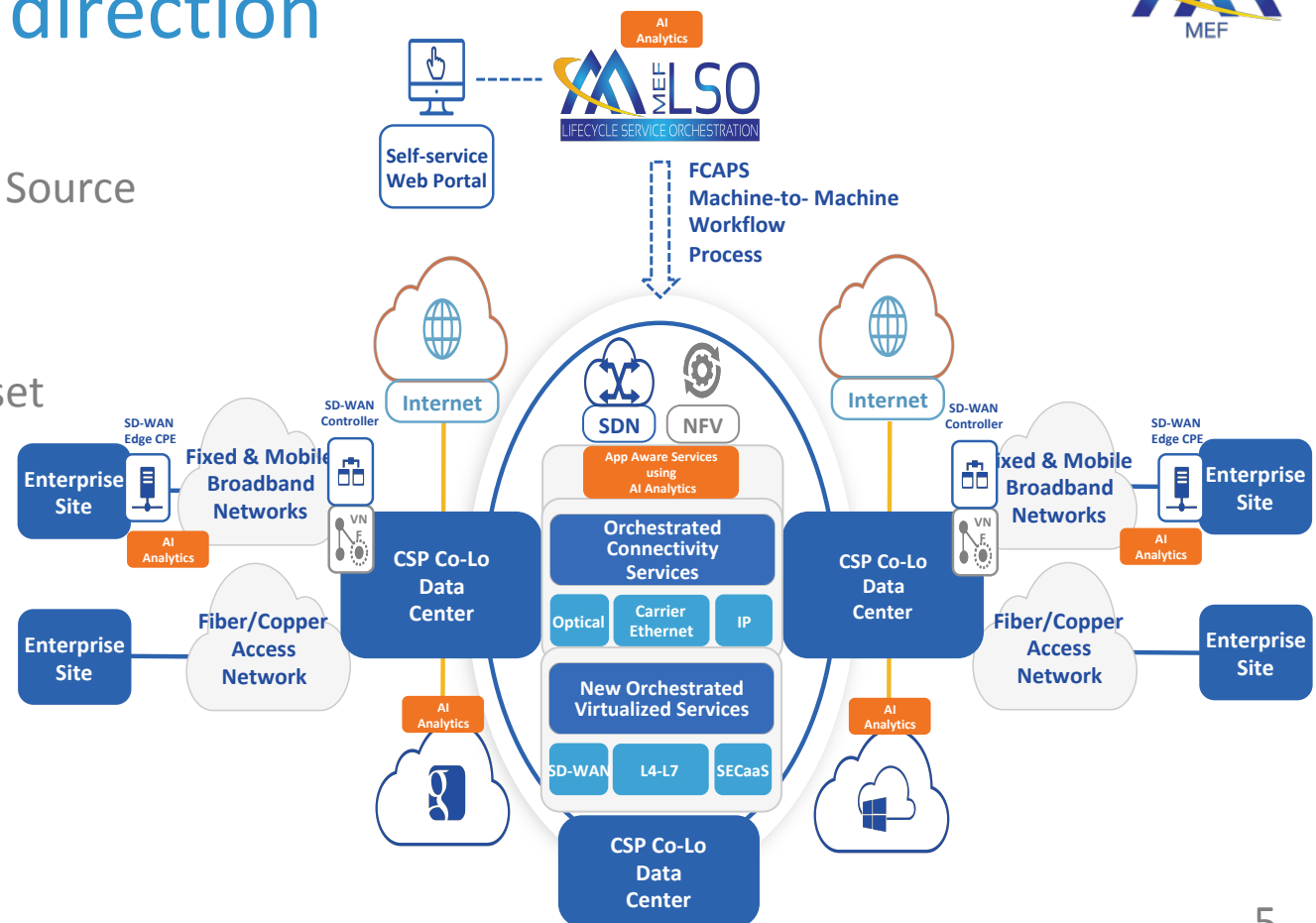
- SDN – NFV – Cloud
- Disaggregation – Open Source

Via

- Open north-south APIs
- Software-centric mindset

Disrupting

- Supply chain
- Employee skill base
- System integration
- Service creativity
- Service placement





About disaggregation

- SDN → control software separate from forwarding hardware
- NFV → software modules, not appliances
- SDN + NFV → software remote from hardware
- Separate software → COTS servers (& switches)
- Remote software → datacenter model
- Datacenter model → OCP

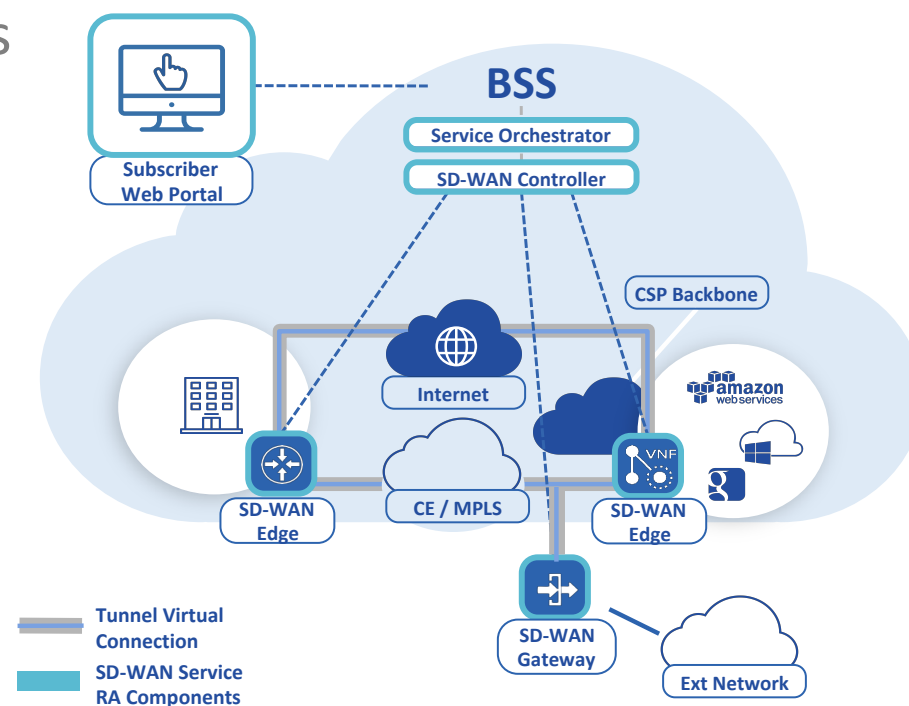
Universal CPE

- Microcosm of SDN+NFV+Disaggregation
- COTS HW + network ports + VNFs
- Byproduct of SD-WAN

So what's the issue?

- What HW?
- What SW?

Hence two PoCs at MEF18





Proof of Concept
SHOWCASE

Boosting uCPE with SDN/NFV/Legacy Capabilities

Includes Network and VNF Service Chain Monitoring & Plugware for Universal Access & Brownfield Deployments



Your Network's Edge

Silicom Ltd.
Connectivity Solutions



PoC goals

- Multivendor Interoperability
 - Function consistency across multiple uCPE
- Make uCPE truly Universal for a global deployment
 - In Greenfield and Brownfield deployments
- Ensure reliability and availability
 - Boosting service reliability and security with performance assurance



Accelerate uCPE-based services



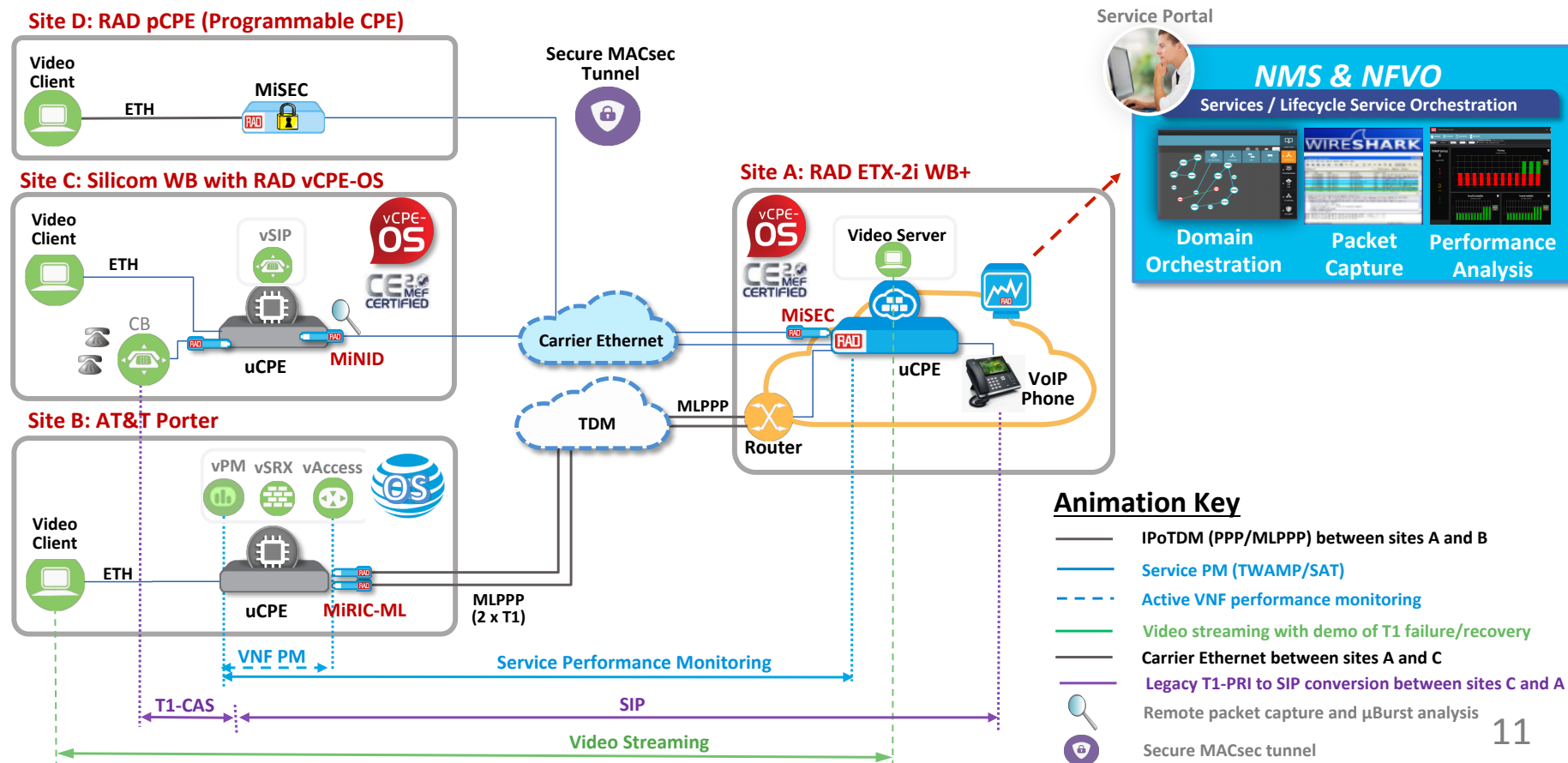
PoC overview

- Universal CPE: virtualize appliances using COTS
 - Reduce OPEX associated with installation, configuration, testing, maintenance of multiple appliances requiring different skillsets
- Universal access and specialized functions:
 - Legacy interfaces for brownfield (legacy voice and TDM services)
 - Hardware acceleration e.g. MEF CE2.0, Timing, L2/L3 forwarding, traffic analysis, encryption
- Service assurance and troubleshooting
 - Networks, uCPE Infrastructure, Service Function Chaining
- Standard management interfaces, APIs

Proven technology already in production

Boosting uCPE-based Services with SDN/NFV/Legacy Capabilities

incl. Network and VNF service chain monitoring and plugware for universal access and brownfield deployments



PoC innovations



Multivendor Interoperability: Function consistency across multiple uCPE

AT&T and RAD OS Interop.

RAD Plugware

RAD & Third-Party VNFs

vPM vSIP vFW vAccess

Service Portal

NMS & NFVO
Services / Lifecycle Service Orchestration

Domain Orchestration Packet Capture Performance Analysis

Enhancing uCPE for Greenfield and Brownfield Network Deployments

PPP/MLPPP MEF CE 2.0 T1-PRI/CAS to SIP Conversion TDM Circuit Emulation



Integrating VNF-based services with legacy infrastructures

Performance Assurance: Boost Service Reliability and Security

VNF SFC Monitoring Network PM Advanced Diagnostics Secure MACsec Encryption



Traffic analysis and diagnostics managed by SDN (ETSI NFVI - OMC platform)



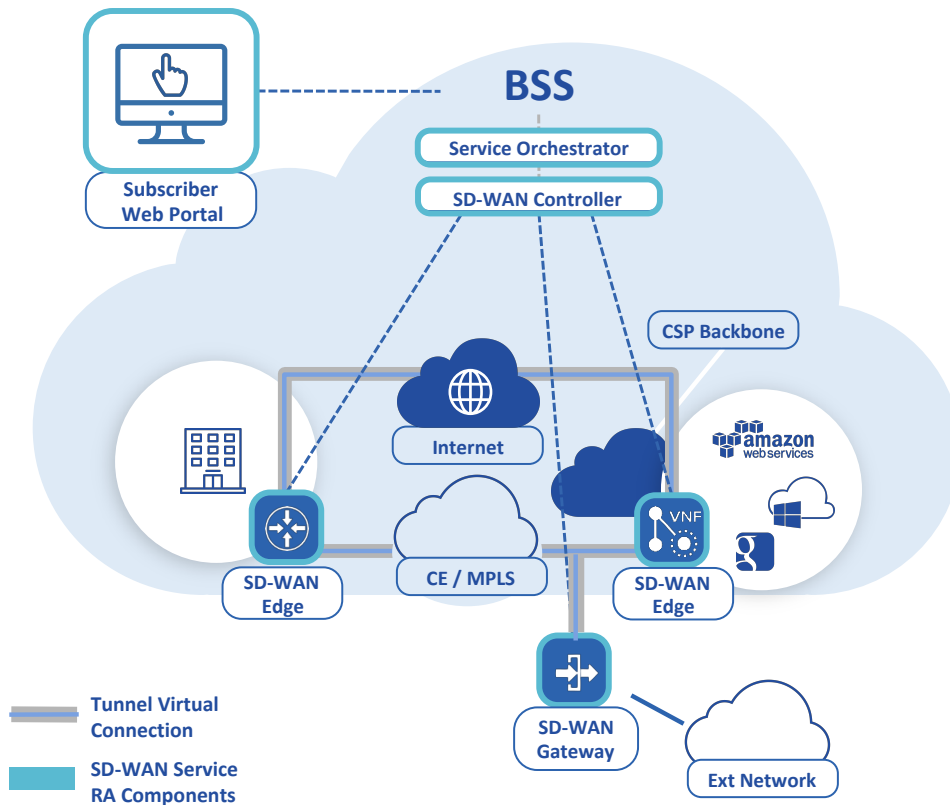
Proof of Concept
SHOWCASE

Towards a Multi-Vendor Orchestrated SD-WAN:

LSO-enabled Solution with Open Source
Orchestrator and Container-based uCPEs



MEF managed SD-WAN specification framework



SD-WAN Edge
Physical or virtual

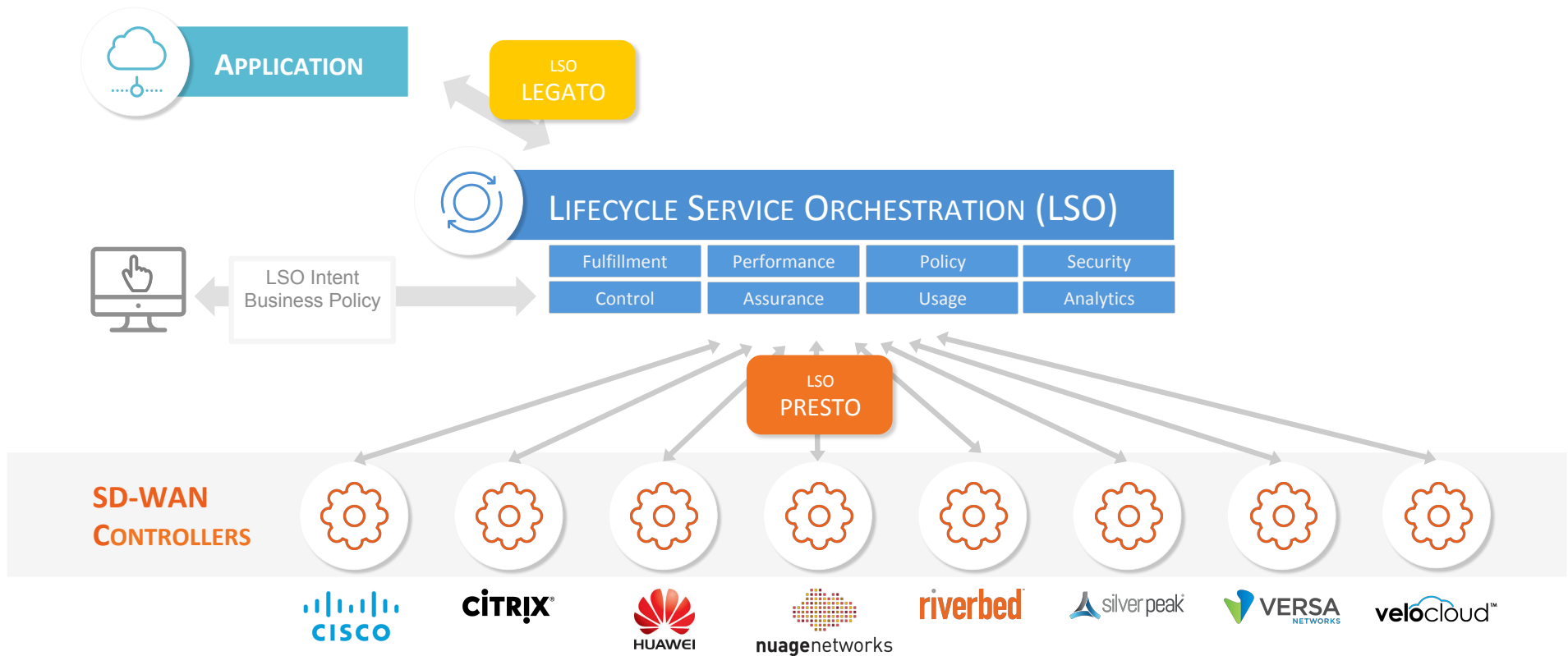
SD-WAN Gateway
Between SD-WAN and external connectivity services

SD-WAN Controller
Centralized management of SD-WAN edges & gateways

Service Orchestrator
Lifecycle Service Orchestration of SD-WAN and other services

Subscriber Web Portal
Subscriber service ordering and modification

LSO Presto to orchestrate multi-vendor SD-WANs





PoC overview

WHAT?

- A cost-effective **SD-WAN**-enabled service realized through the use of **MEF LSO Presto**, containerized **uCPE**, and **TOSCA**-based orchestration

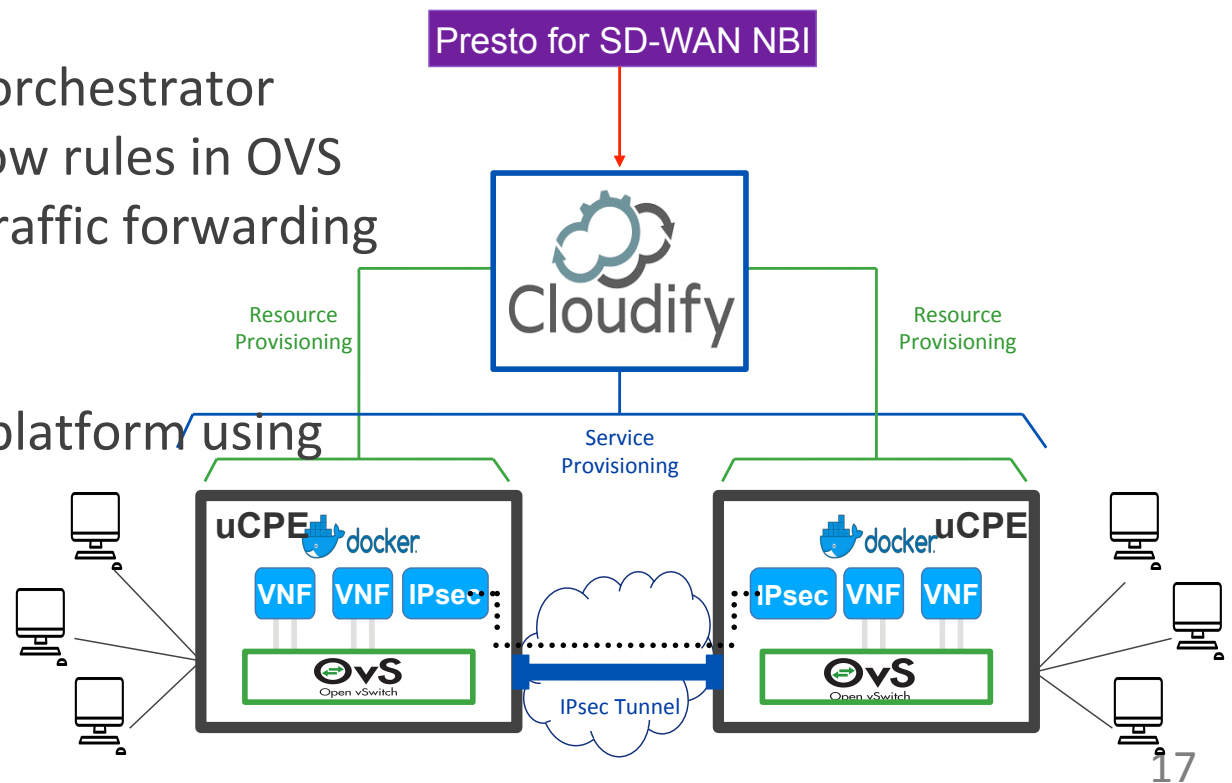
WHY?

- Lay the foundation for the next generation, **technology- and vendor-agnostic** SD-WAN-enabled services
- Provide customers with a **multi-vendor, orchestrated** SD-WAN solution, fully compliant with **MEF framework** and **technical specifications**
- Showcase the **Presto Interface Profile** for SD-WAN

PoC architecture & components



- Presto-API-capable NBI
- Cloudfify TOSCA-based orchestrator
 - Configures OpenFlow rules in OVS
 - For VNF chaining, traffic forwarding
- ETSI GS NFV standards
- RFC 8040 (Restconf)
- Container-based uCPE platform using
 - Open vSwitch
 - Docker





Lessons learned

- White box
 - Value as vendor-neutral HW platform for VNFs
 - COTS PC big improvement over proprietary vendor appliances
- uCPE
 - Critical component for managed services
 - Essential for future-proofing for new services
 - Power, cooling, noise highly constrained
 - Hence containerized VNFs, not VMs
 - HW specs not well understood at all



Telecom trajectory

- White box
 - Will continue to seek; sounds good in theory; much to learn about specs
- Data center
 - Still unclear on how to architect: in cloud, at edge
- CPE
 - High-function, low-cost imperative
- OCP+MEF
 - Opportunity to educate MEF telco members about OCP (MEF)
 - Opportunity to address telco needs (uCPE, white box, DC) in OCP (OCP)



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