

# *SD-WANs and Lifecycle Service Orchestration (LSO)*

*September 2017*

MEFV

SDN

Open

DevOps.

IOT

5G

LSO

OTT

**MEF**

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CTO, MEF

**MEF**

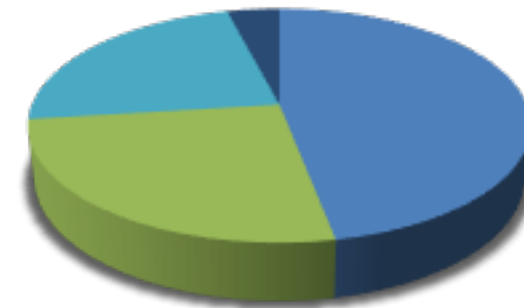
# MEF Created the \$80B\* Carrier Ethernet Market

Goal is to leverage the MEF's \$80B CE base to evolve into The Third Network of orchestration + new services



■ SPs ■ Vendors ■ Others

210+ Member Companies



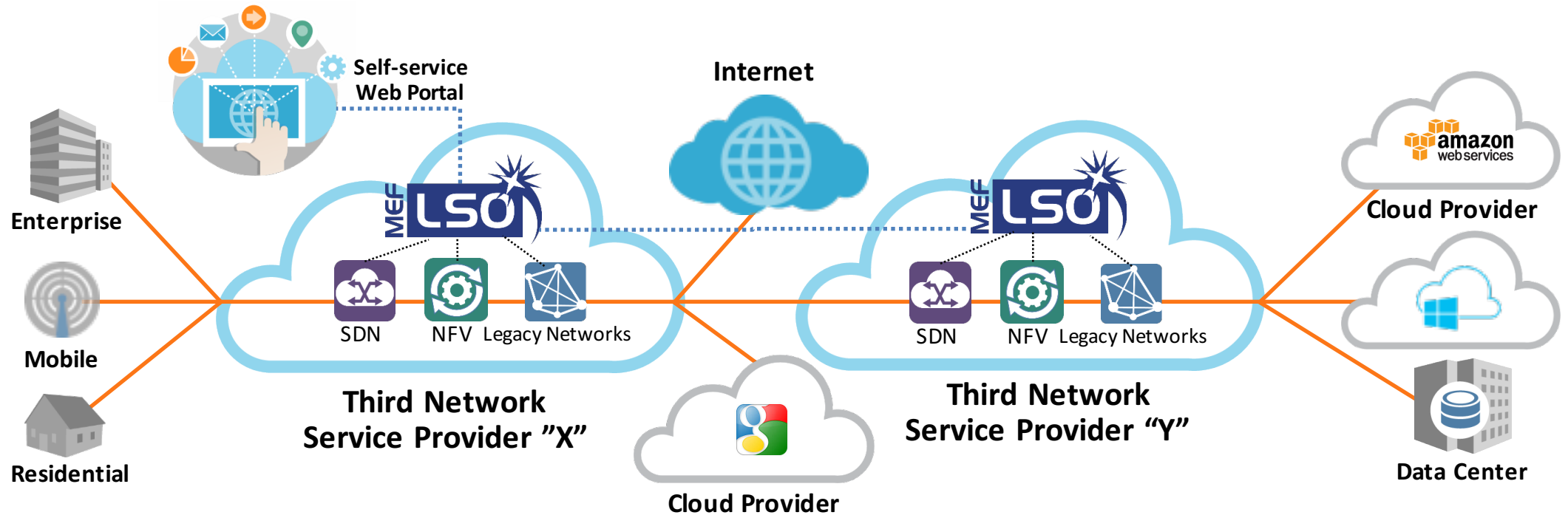
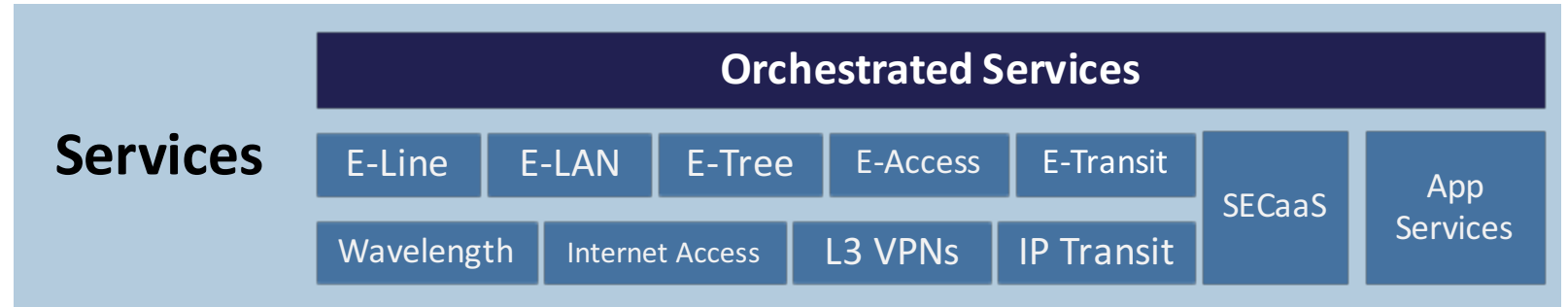
■ NA ■ EMEA ■ APAC ■ CALA

Global Contributions

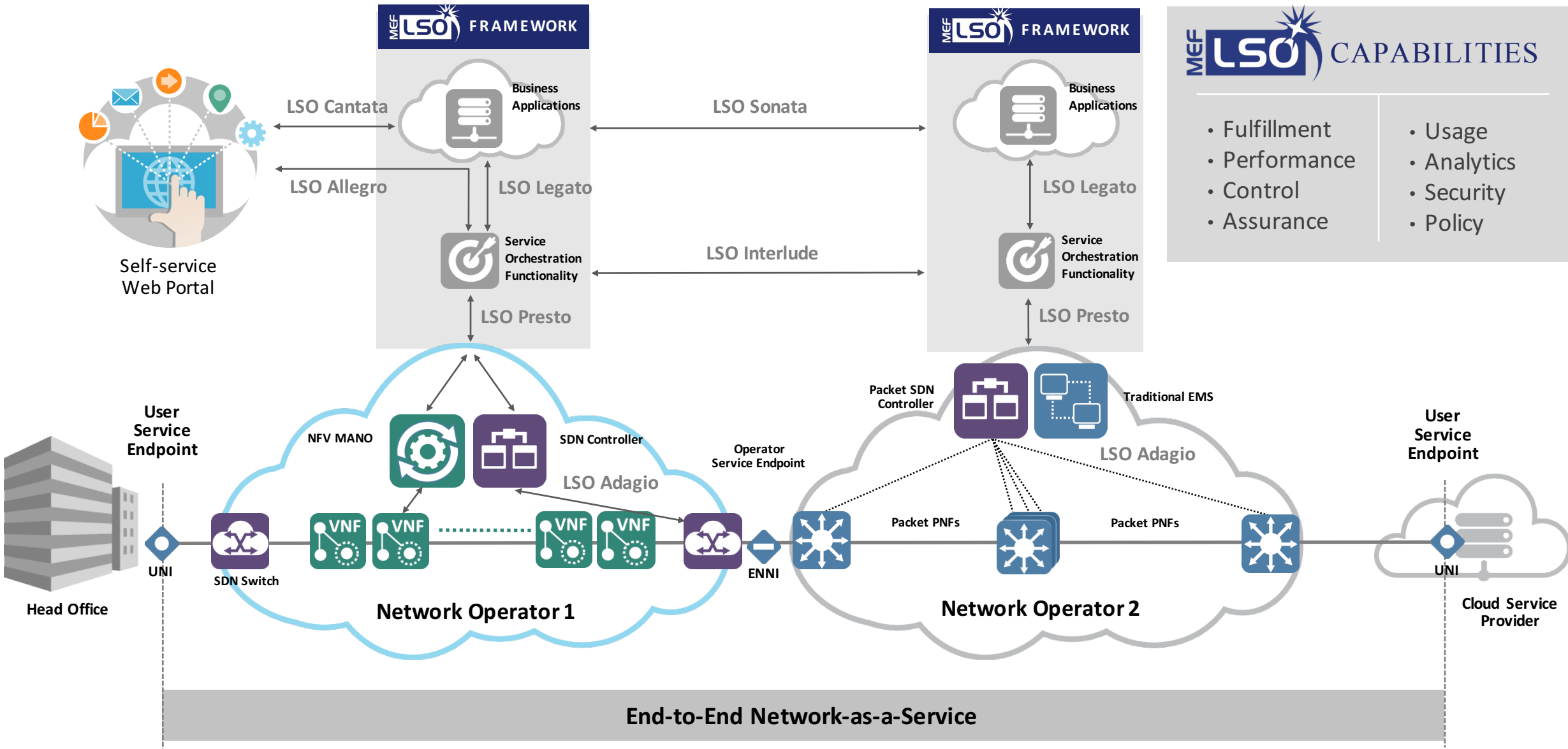
\*IHS Market Report

# TheThirdNetwork

Agile, Assured, Orchestrated



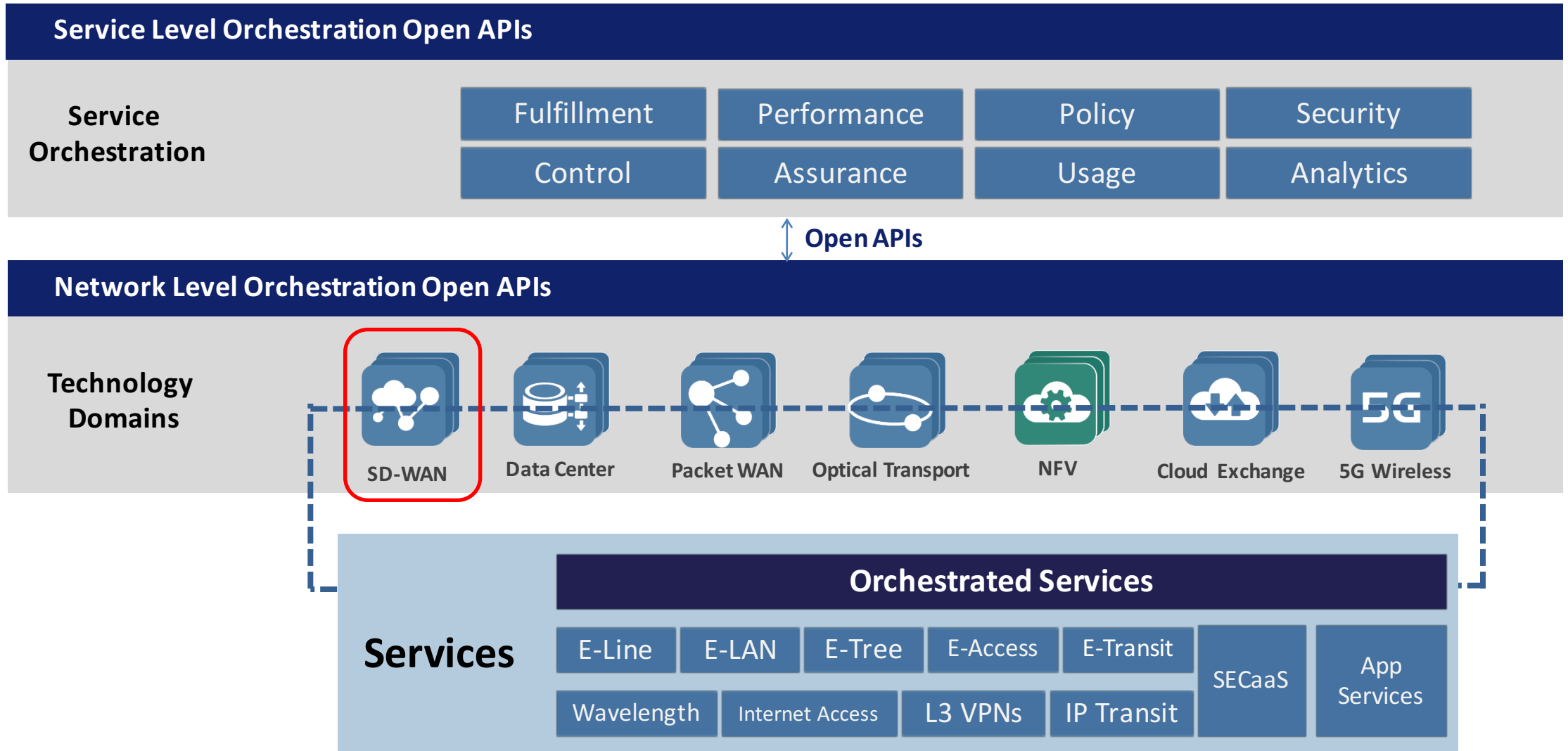
# MEF LSO Reference Framework



**MEF LSO CAPABILITIES**

- Fulfillment
- Performance
- Control
- Assurance
- Usage
- Analytics
- Security
- Policy

# MEF's Intra-Operator APIs and Open Initiatives



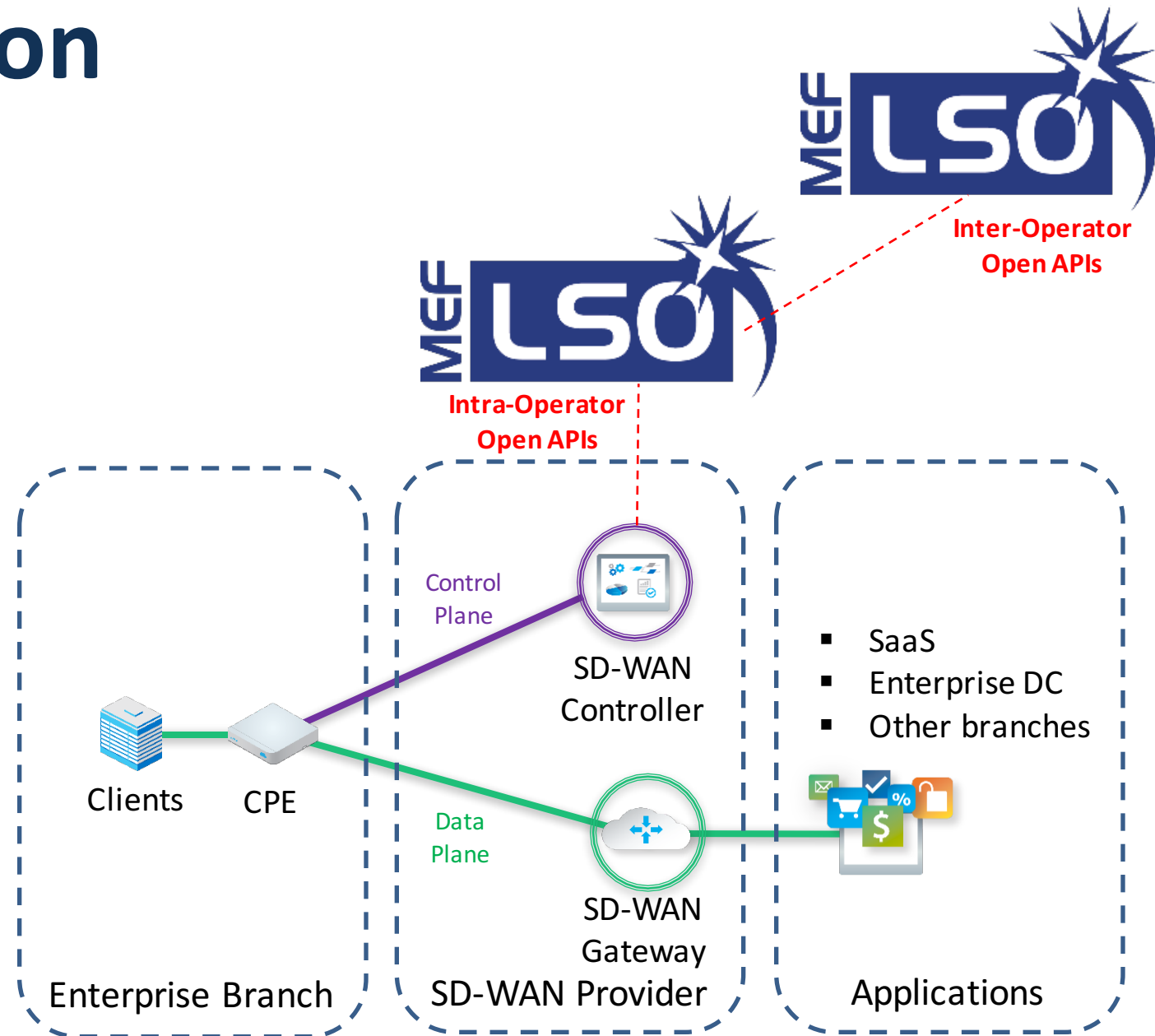
# The MEF and SD-WAN

- **Facilitate multi-vendor SD-WAN interoperability and operational agility as service providers look to streamline operational efficiencies and control network resources on demand**
- **OpenCS SD-WAN project that is focused on defining LSO APIs, SD-WAN reference implementations (RI) and proof of concepts (POCs) to facilitate and accelerate SD-WAN service deployments**
- **SD-WAN Market Education Project to explain MEF's position on SD-WAN and how it aligns with other initiatives focused on orchestrated Layer 1-7 services enabled by LSO APIs. Educational materials will include white papers, webinars, workshops, and use cases.**

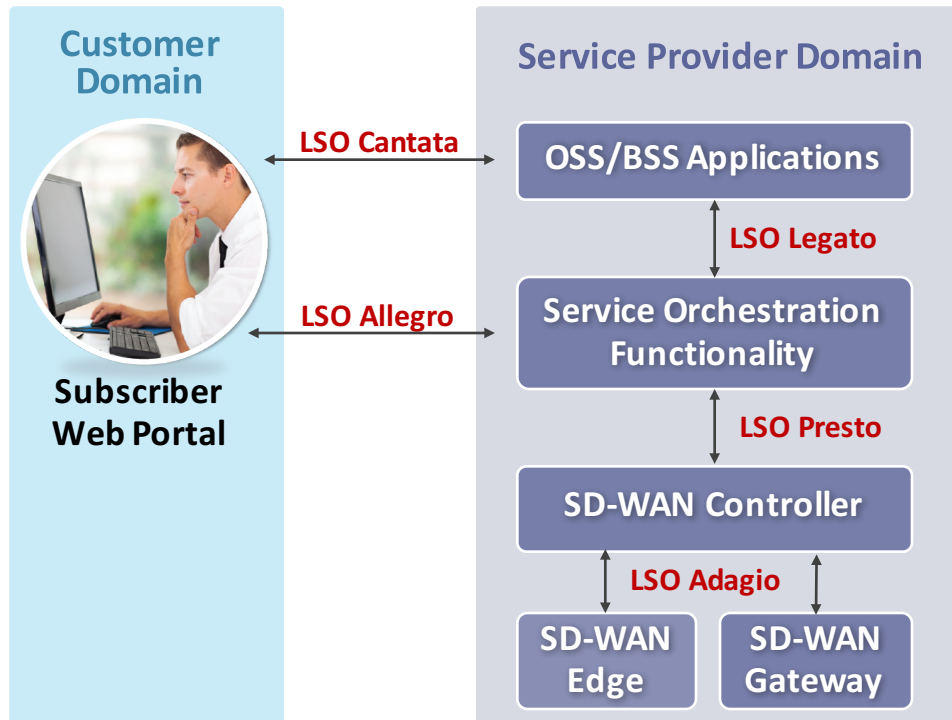


# MEF SD-WAN Position

- Focus on CSP/MSP SD-WAN managed services
- CSP LSO API integration with SD-WAN services
- Segregated control and data plane
- Provider SD-WAN components in the form of VNF's
- SD-WAN CPE in virtual or physical form factor



# SD-WAN Service using MEF LSO Reference Architecture (RA)



## Presto Interface

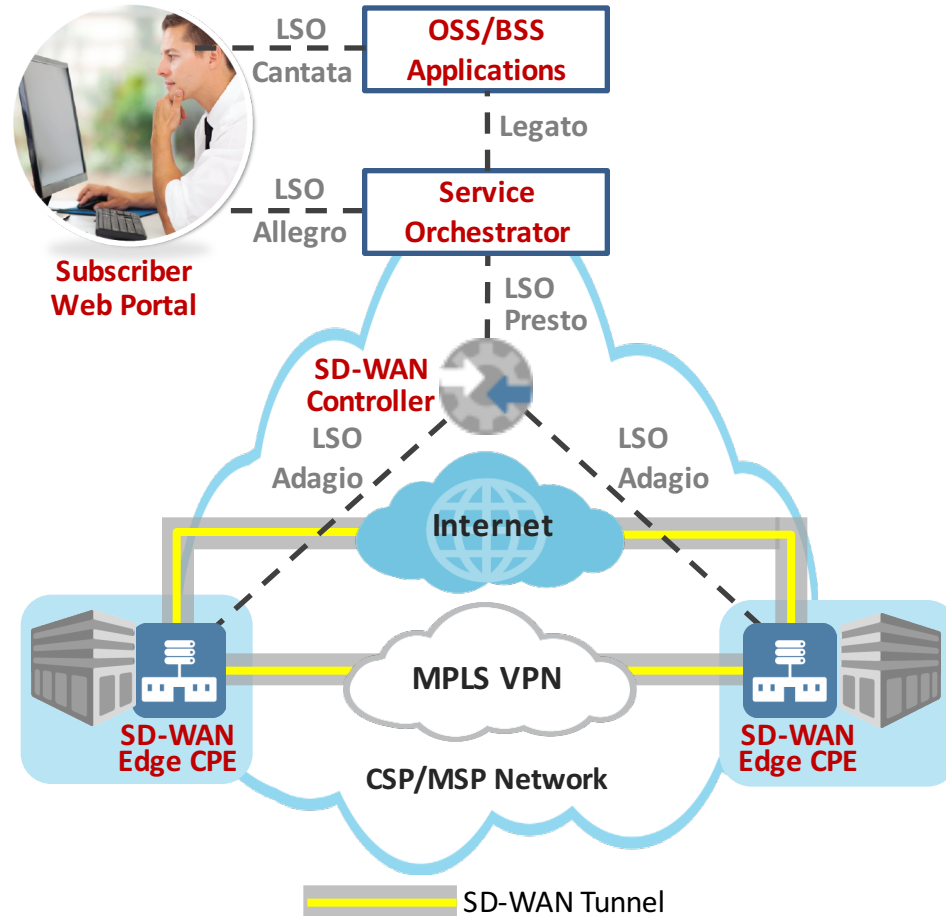
- Enables a Service Orchestrator to manage different vendor SD-WAN Controllers
- SD-WAN Controllers manage SD-WAN Edges in their domain
- MEF OpenCS SD-WAN Project focusing on functionality (SOF) at the Presto Interface



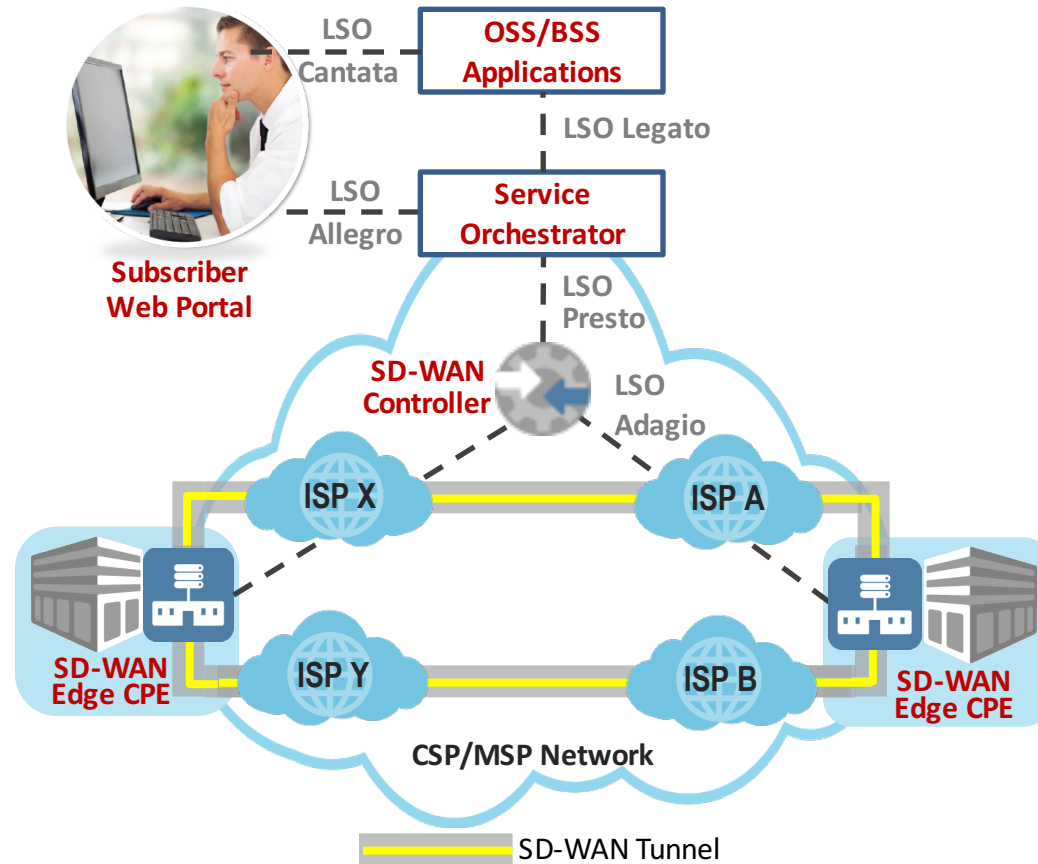
# LSO Presto API Focus Areas

- **LSO Provisioning**
  - Site
  - Networks (LAN, WAN, VLANs, etc)
  - Application policy → Complex definition
  - Features (VPN, ...)
- **LSO Status**
  - Sites, Links, Overlay, VPN
- **LSO Statistics**
  - Flows (applications, sources, destinations)
  - Users & devices
  - Link quality
- **LSO Analytic Events**
  - Link condition changes
  - Quality thresholds
  - Routing changes

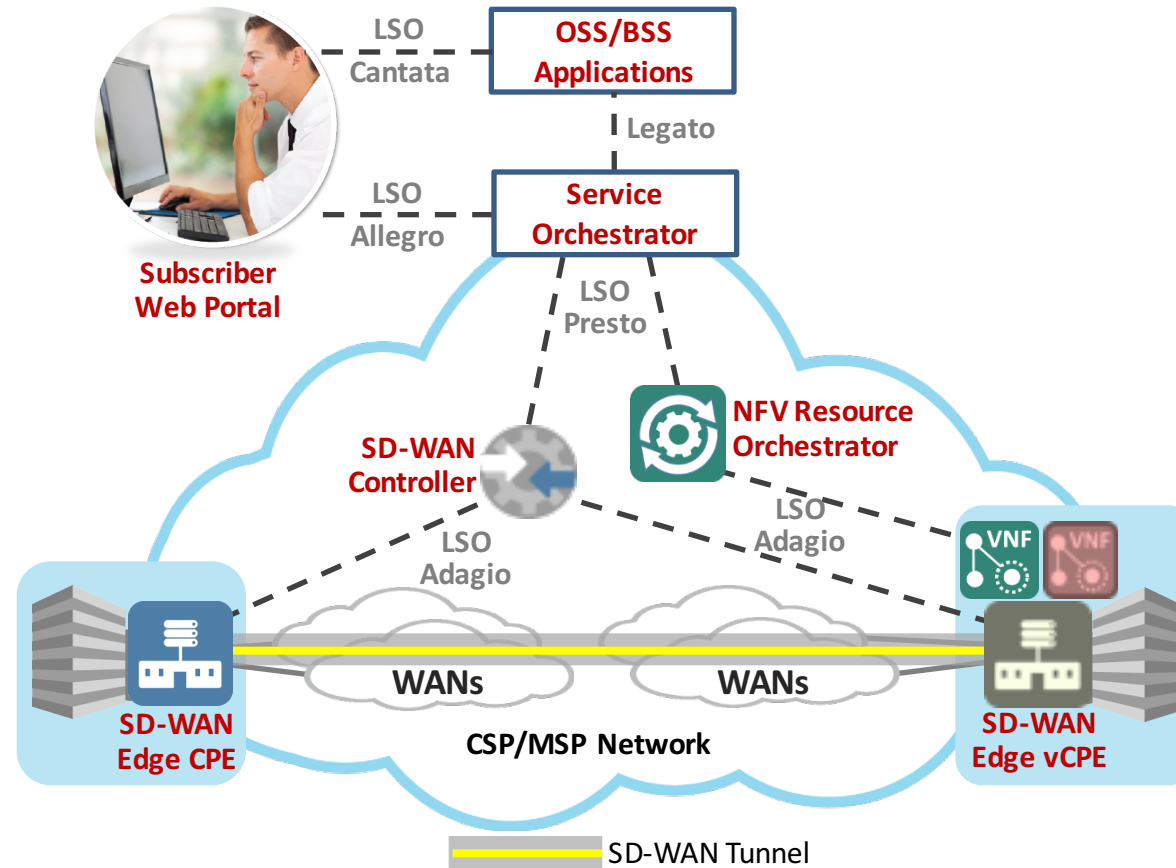
# SD-WAN Service Tunneled over Internet and MPLS WANs



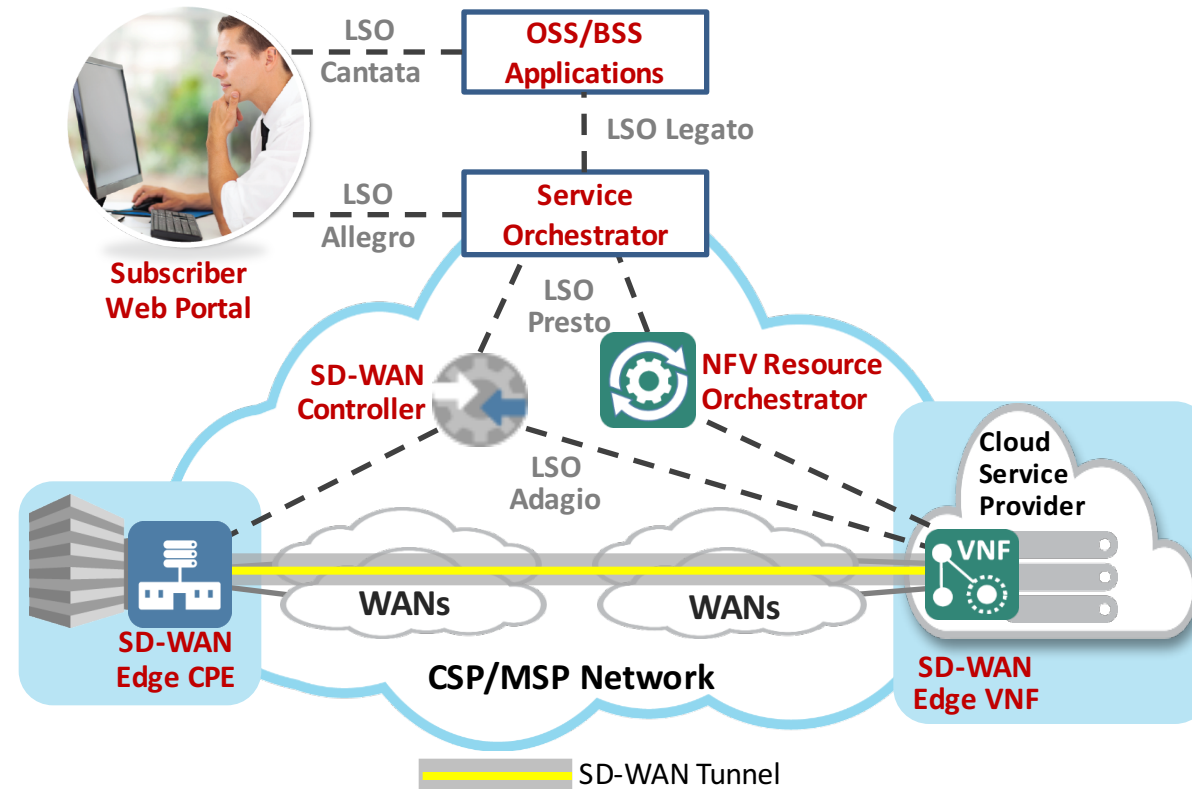
# SD-WAN Service Tunneled Over Four Different ISPs



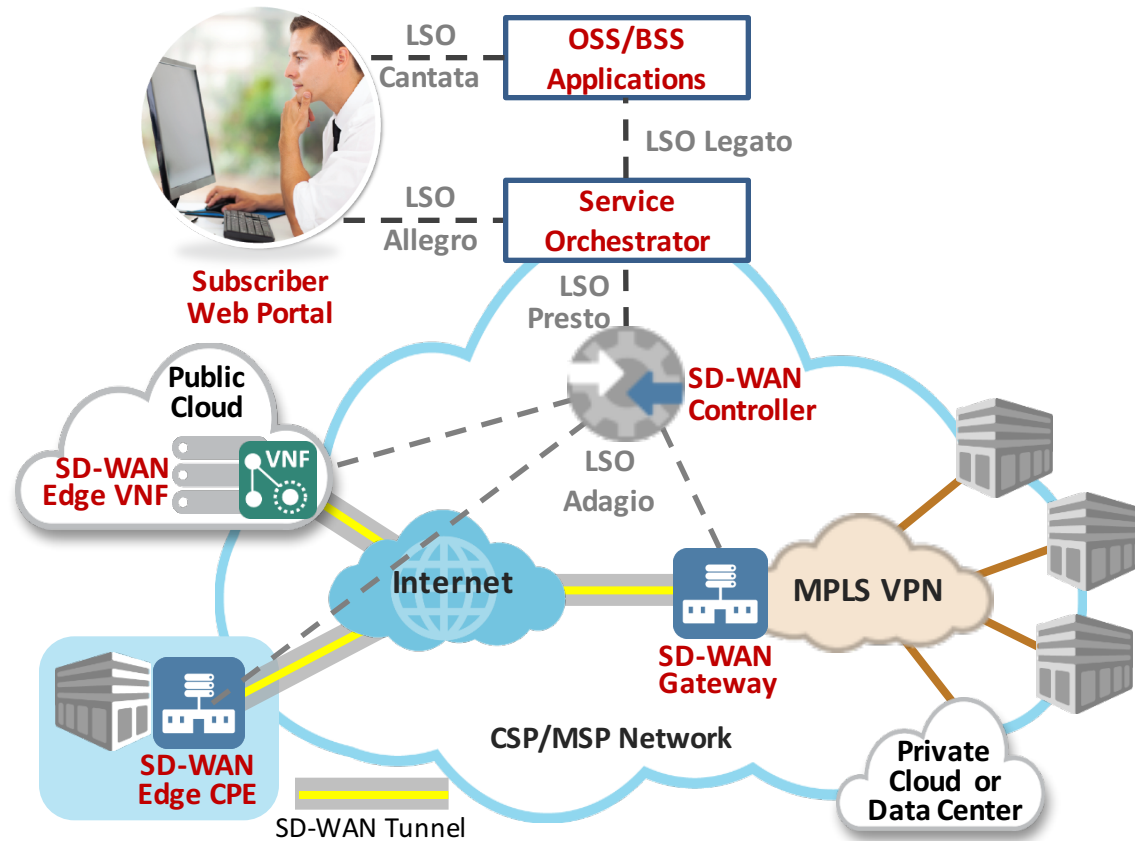
# SD-WAN Service with SD-WAN Edge vCPE Supporting Multiple VNFs



# SD-WAN Service with SD-WAN Edge VNF Running in the Cloud

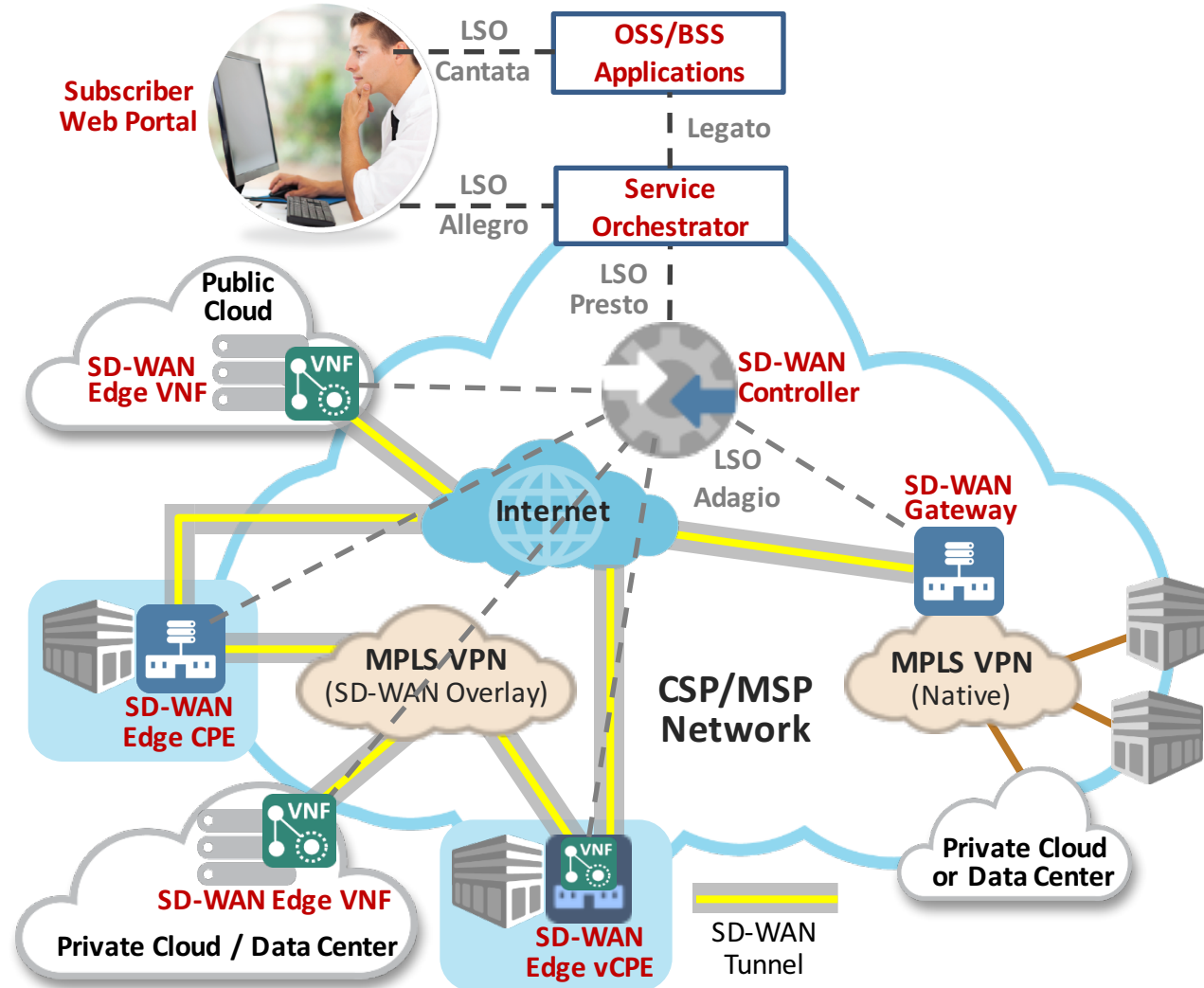


# SD-WAN Service Interoperating with MPLS VPN

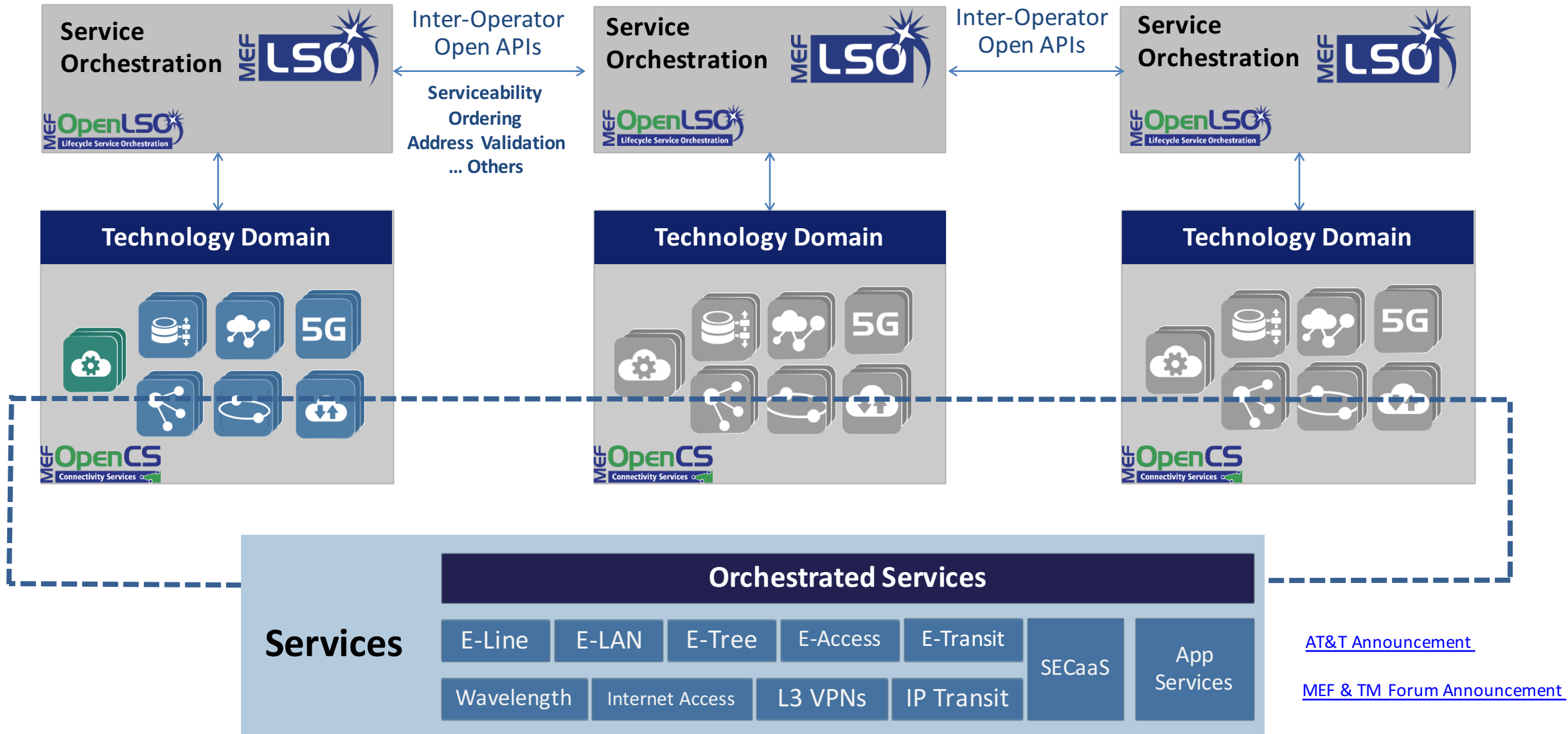




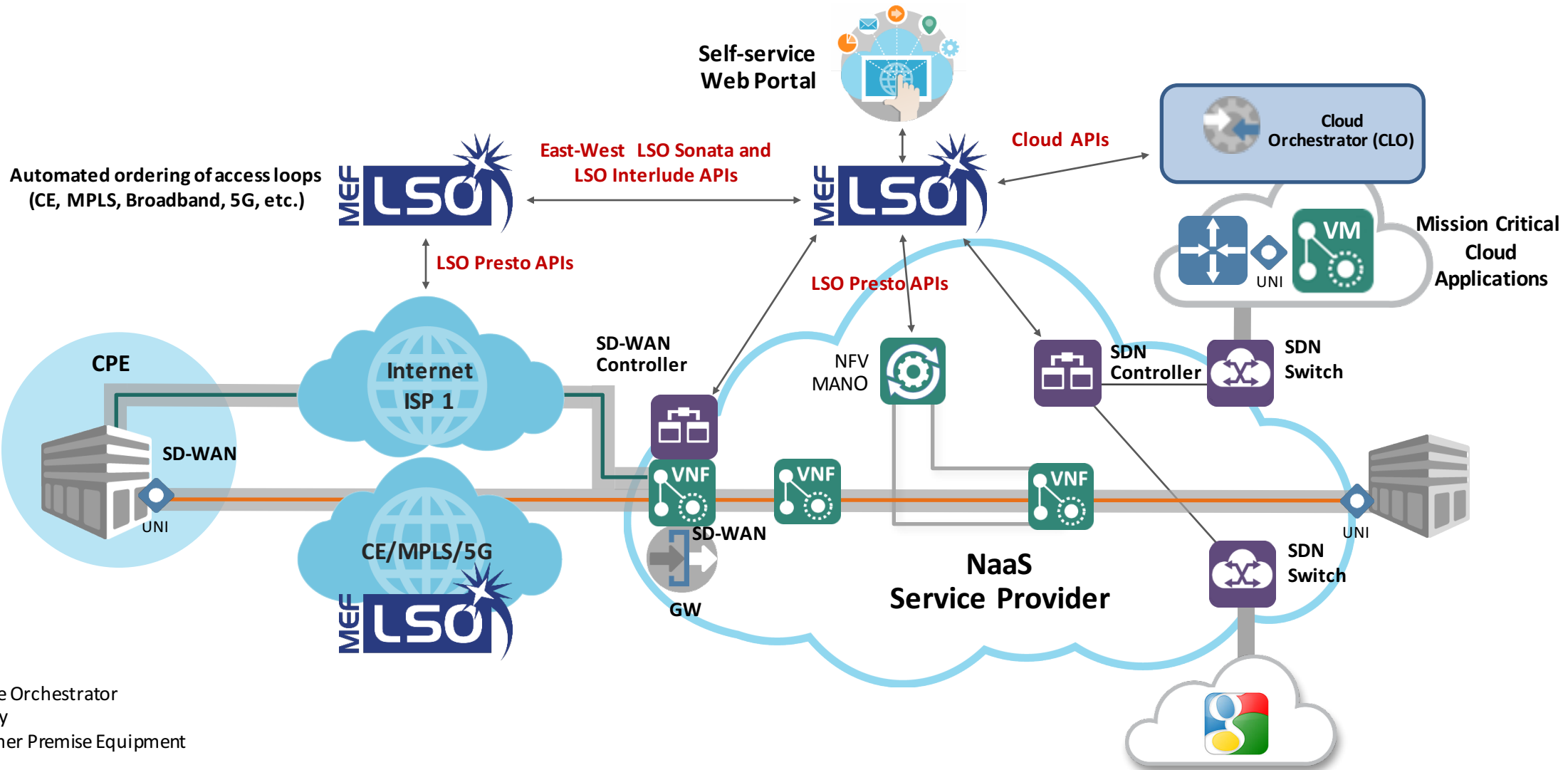
# Summary of SD-WAN Service Components in the LSO RA



# MEF's Inter-Operator APIs and Open Initiatives



# LSO-LSO to Automate Ordering of the Access Networks

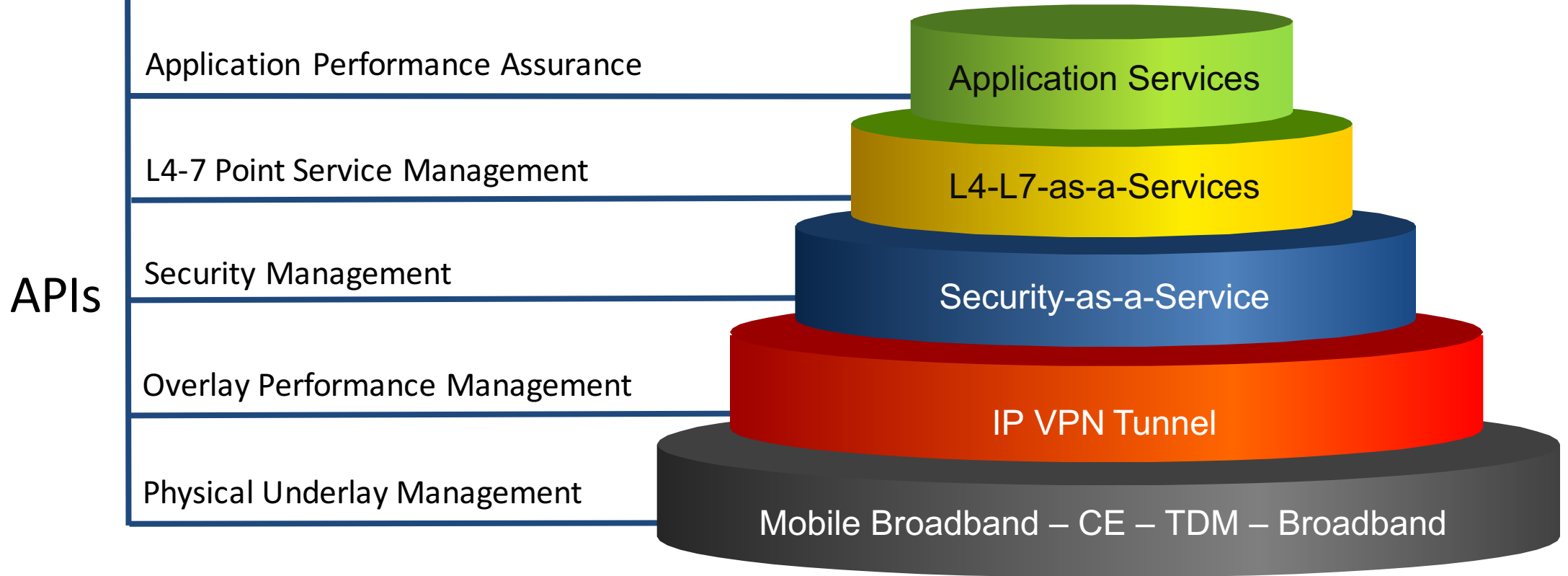


RO - Resource Orchestrator  
 GW - Gateway  
 CPE - Customer Premise Equipment

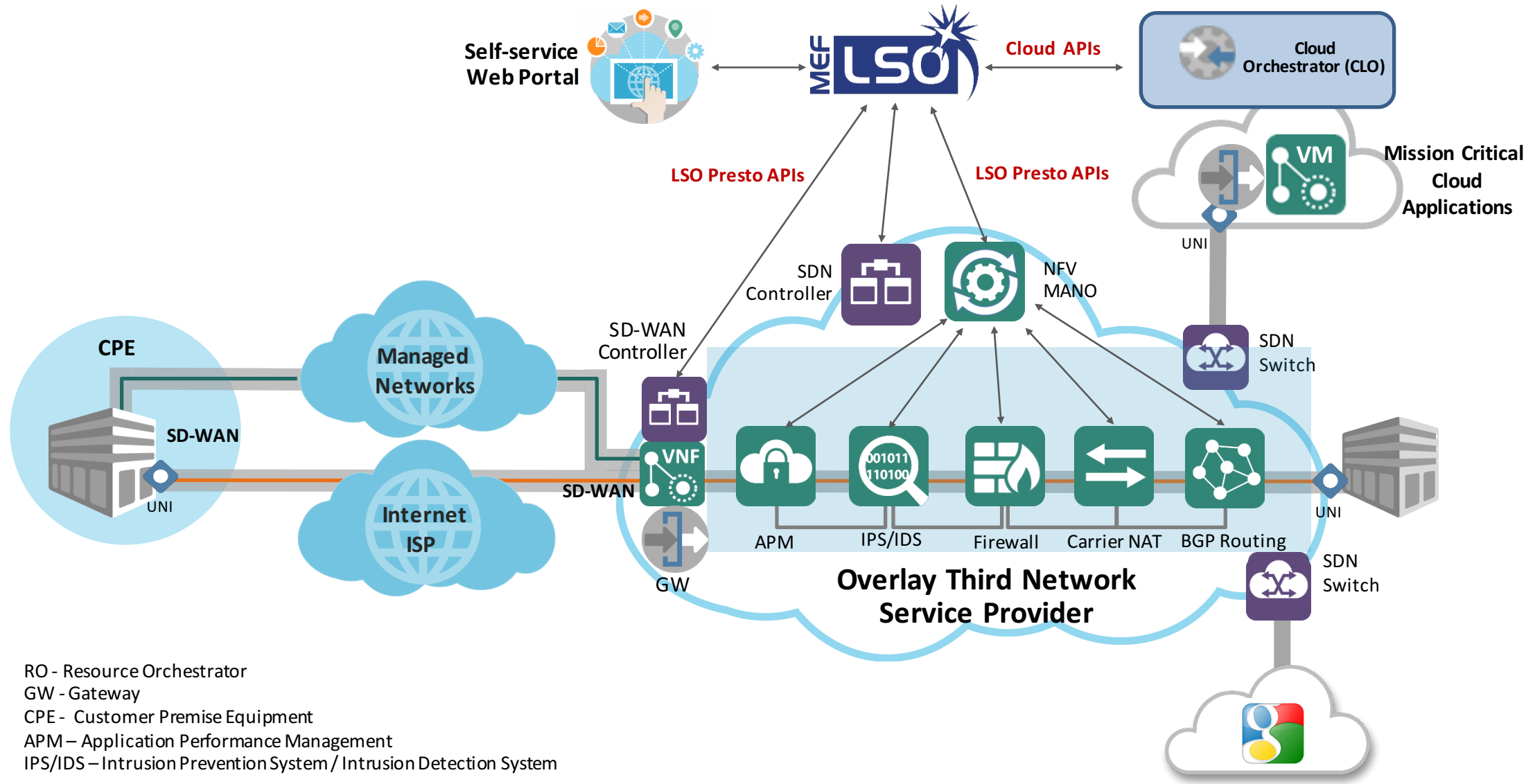
A world map in shades of blue, overlaid with a network diagram of nodes and lines. Various technology terms are scattered across the map in different colors and sizes, including '5G', 'IoT', 'LSO', 'NEW', 'SDN', 'Open', and 'DevOps'.

# Vision of the Evolution of SD-WAN

# The Evolution of Managed SD-WANs



# The Third Network Overlay Virtualized Model



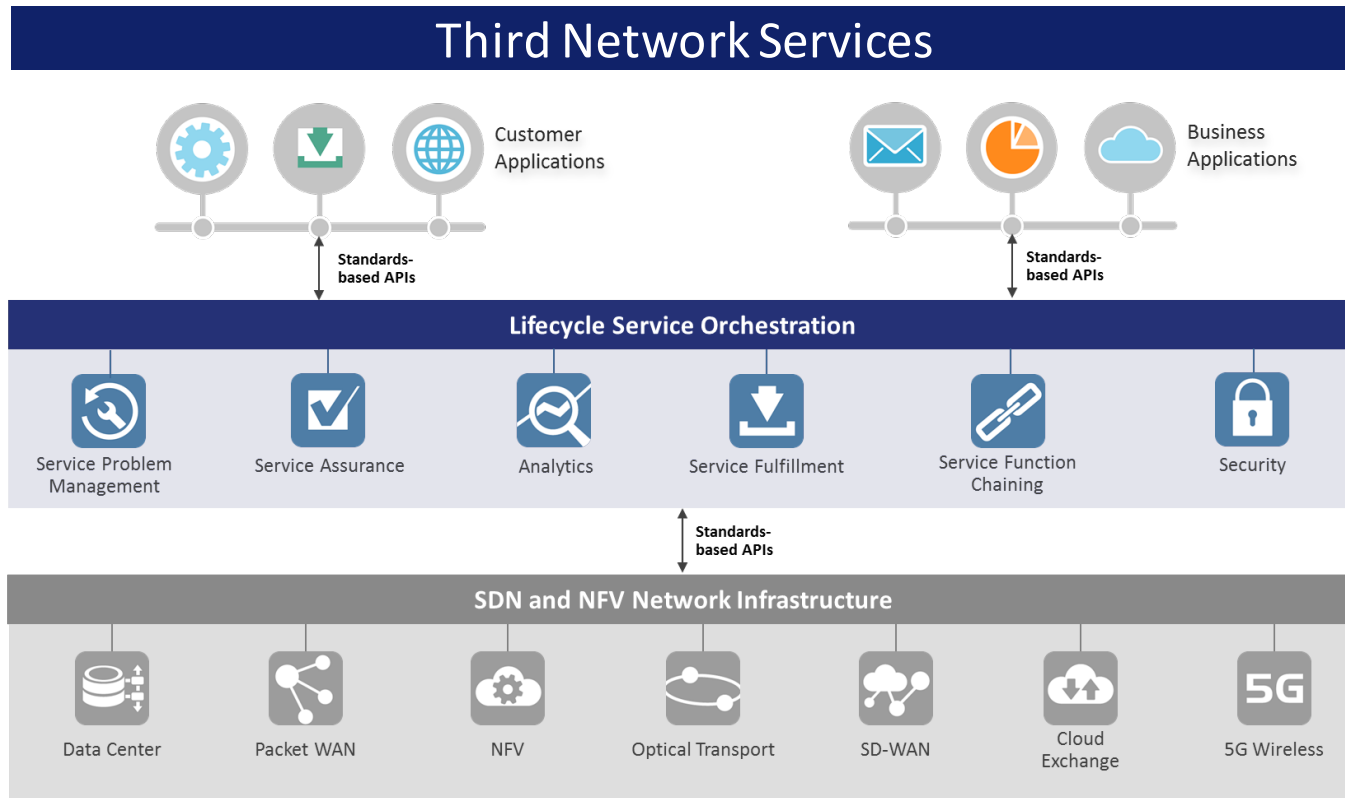
RO - Resource Orchestrator  
 GW - Gateway  
 CPE - Customer Premise Equipment  
 APM – Application Performance Management  
 IPS/IDS – Intrusion Prevention System / Intrusion Detection System



# Key Takeaways...

- **SD-WAN provides a virtual overlay service**
  - Does not interact with the underlay (transport) network
- **SD-WAN provides tremendous benefits to SPs and Subscribers**
  - Service Agility, Time to Service Velocity, ↓OpEx, Application-level awareness
- **MEF work on SD-WAN Services will help industry move forward**
  - Managed SD-WAN offerings done with MEF LSO Reference Framework
  - LSO APIs for SD-WAN
  - SD-WAN Project Reference Implementation of various use-cases
  - Standardized SD-WAN Service Definition

# Industry White Paper of Third Network Services



MEF

ONF OPEN NETWORKING FOUNDATION

CORD  
Central Office Re-architected as a Datacenter

OPEN DAYLIGHT

ON.LAB

onos  
Open Network Operating System

tmforum

OPNFV

OPEN.O

<http://mef.net/tgn>



Orlando, Florida USA



# Third Network Services for the Digital Economy & Hyper-Connected World

13-16 November, Orlando, Florida

High Quality Program Content



Senior-Level Networking



Live Proof of Concept Demonstrations



On-Site Open LSO API Development