MEF's Lifecycle Service Orchestration (LSO) Reference Architecture and Framework

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What is MEF LSO?

- Lifecycle Service Orchestration is an agile approach of streamlining and automating the lifecycle of a service in a sustainable fashion for coordinated management and control across network domains responsible for and end to end delivery of a connectivity service.

- LSO overcomes existing complexity by defining product, service, and resource abstractions that hide the complexity of underlying technologies and network layers from the applications and users of the services.

- LSO, in combination with SDN and NFV, is designed to enable the Third Network vision.
LSO Reference Architecture and Framework

• This is a layered architecture that characterizes the management and control domains and entities that enable the cooperative LSO capabilities for Connectivity Services
• Defines high level operational threads describing orchestrated Connectivity Service behavior as well as interactions among management entities, expressing the vision of the MEF LSO capabilities
• Identifies management interface reference points that characterize interactions between LSO ecosystem components
MEF LSO Ecosystem Capabilities

LSO Capabilities

Fulfillment | Performance | Control | Assurance
Usage | Analytics | Security | Policy
Moving Up The Curve

Fixed Connectivity Model | Programmable Cloud-Centric Model

- Adaptive
- Automation
- Coordinated
- Dynamic
- Real-Time PM
- 100GE UNI
- 100G Transport
- Standardized Services
- Multi-CoS
- SLAs
- Faster Service Turn Up
- E-Access
- Layer 2 / 3 VPNs
- 10GE UNI
- Multiple Access Options
- Standardized Ethernet Services
- Low Latency

2004 | 2015 | Future

Scalable, Dynamic, Customized, Ubiquitous
Network as a Service - Single Domain

- Some service providers offer ....
  - Fast service fulfillment
  - Rich service feature sets
- But moving up the curve is...
  - Costly and slow to add new features
  - Limited to single domain
Adaptive Dynamic API driven Automation

10GE UNI Standardized Ethernet Services
Layer 2 / 3 VPNs Multiple Access Options Low Latency

100GE UNI Multi-CoS SLAs Standardized Services Faster Service Turn Up
E-Access 100G Transport Real-Time PM Programmable Cloud-Centric Model

Fixed Connectivity Model
Programmable Cloud-Centric Model

Single Domain Service Provider

Single Domain Service Provider

Moving Up The Curve – Single Domain

Scalable, Dynamic, Customized, Ubiquitous

Single Domain Service Provider

CE 1.0

10GE UNI Standardized Ethernet Services

Single Domain Service Provider

2004 2015 Future
Network as a Service – Multi Domain

- Manual processes between Operators dominate
- Limited feature sets
- Even slower to add new service features
- Exponential complexity for 3 or more Operators
Adaptive Dynamic API driven Automation

Standardized Ethernet Services
Layer 2 / 3 VPNs
Multiple Access Options
Low Latency

10GE UNI
Multi-CoS
SLAs
Standardized Services
Faster Service Turnup
E-Access
100GE UNI
100G Transport
Real-Time PM
Programmable Cloud-Centric Model

Moving Up The Curve - Multi-Domain

Fixed Connectivity Model

Programmable Cloud-Centric Model

Scalable, Dynamic, Customized, Ubiquitous

The Third Network
Agile, Assured, Orchestrated

Adaptive
Automation
Coordinated
Dynamic
API driven

Multi-Domain Service Provider 1
Operator 1A
Operator 1B
10GE UFI
Standardized Ethernet Services

Multi-Domain Service Provider 2
Operator 2A
Operator 2B

Multi-Domain Service Provider 3


Multi-Domain Service Provider 1
Operator 1A
Operator 1B
10GE UNI
Standardized Ethernet Services

Multi-Domain Service Provider 2
Operator 2A
Operator 2B

Multi-Domain Service Provider 3

The Third Network
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Multi-Domain Service Provider 1
Operator 1A
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Multi-Domain Service Provider 2
Operator 2A
Operator 2B

Multi-Domain Service Provider 3


2004
2015
Future
LSO Helps to Bring It All Together

- **Cloud – Flexibility and Scale**
  - Infrastructure and compute for applications and VNFs

- **NFV – Network Functionality**
  - Cost-effective, flexible network functionality

- **SDN – End-to-End Control**
  - Automation and streamlined operations

- **Carrier Ethernet – Connectivity**
  - Connectivity between endpoints across a WAN chaining between VNFs to form a service
Lifecycle Service Orchestration Helps to Bring It All Together

LSO Capabilities

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

Product Catalogue*
Service Ordering*
Service Activation*
Service Qualification Questionnaire (MEF 53)
Performance Reporting (MEF 52)

Service Lifecycle Process Model (MEF 50)

* Future MEF Framework Specification
MEF LSO Ecosystem Capabilities

E2E Fulfillment Orchestration

Lifecycle Services Orchestration

- Service delivery orchestration
- Testing orchestration and turn-up
- Coordination of all provisioning tasks
- Order and Request management and tracking
- Design of E2E services and assignment of resources
MEF 50 leverages the TM Forum’s Business Process Framework, also referred to as the enhanced Telecom Operations Map (eTOM).
LSO-Related MEF Activities

- **LSO Reference Architecture & Framework**
- **Common Information Models**
- **MEF LSO Reference Architecture & UNITE**
- **MEF Service Definitions** (including virtualization)
- **API Implementations Certifications**
- **NRP API Test Suite**
- **LSO Hackathon, ODL project, OPNFV**
- **API Specifications & Data Models**
- **Interface Profiles**
- **Business Process Flows**
- **Profiles for LSO Presto, LSO Legato, etc.**
- **MEF 6.2, 33, 51, 10.3, 26.2, etc.**
- **MEF 7.3, Common Model, Resource Model, Cloud Services**
- **MEF 50.x**
- **NRP, YANG, etc.**

**Ops Area:** Product Catalog, Ordering, Performance Reporting, Serviceability
LSO Example with SDN and NFV

- **LSO Business Applications**
  - CANTATA APIs
  - SONATA APIs
  - LEGATO APIs

- **Subnetwork / WAN Managers**
  - PRESTO APIs

- **SDN Controllers**
  - OpenFlow, ADAGIO and others

- **NFVO**
  - VNFM
  - EM
  - VIM
  - VNF

- **End User Apps**
- **Partner Domain**
- **Network Infrastructure**
- **SDN Infrastructure**
- **End User Apps**
- **LSO Customer Application Coordinator**
LSO 2016 Work Items

• LSO RA (MEF 55) was approved in March 2016
• Work on next LSO RA Revision and / or Supplements
  – Detailed Operational Threads / Use Cases
  – Details of Interface Reference Point Interactions
  – Interface Reference Point Functional Requirements
  – SOF Architecture and Functional Requirements
  – Mappings: MEF 50 update; TM Forum APIs, etc.
  – Definition of the role of OASIS TOSCA in LSO
  – Analysis of information model layering for orchestration
  – Relationship with ONF SDN & ETSI NFV
  – OpenLSO for Cloud and OpenCS
Summary

• MEF’s Third Network:
  – Combining the best of Carrier Ethernet and the Internet
  – Agile, Assured and Orchestrated!

• MEF’s LSO Vision:
  – Automation of each function of the service lifecycle

• LSO will enable:
  – Third Network’s Agile, Assured, and Orchestrated NaaS across network/operator domains
Q&A
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