Capturing the Wholesale Ethernet Interconnect Market with CE 2.0 Services

Gastón Cutignola
Senior Solution Engineer Latin America
Telco Systems
Starting Point: Strong, Growing CE Market

• CE 2.0 is digital fuel for digital economy
• $50B market, double-digit CAGR
  – 50+% of surveyed professionals representing ~50 service providers expect >10% revenue growth between mid-2015 and mid-2016

• Key drivers
  – Expanded service coverage
  – Bandwidth demand
  – Extraordinary performance/price advantages
  – Accelerated service rollout
  – TDM to CE transition

Sources: CE Services Market Trends Report, MEF and Frost & Sullivan (Sep 2015); market estimate by IHS Infonetics
MEF Carrier Ethernet 2.0

• Current Generation of MEF Services
• Carrier Ethernet delivers 3 powerful features:
  – Standardized Multi-Class of Service
  – Interconnected CENs
  – Manageability
• Globally adopted connectivity service framework
• Foundation for agile, assured and orchestrated connectivity services
CE 2.0 Attributes

CE 2.0 Multi-CoS

• Industry’s first standardized Multi-CoS application & distance-oriented Performance Objectives for Next Gen SLAs
• Enables new level of network efficiency, responsiveness for enterprises & MBH

CE 2.0 Interconnect

• Integrates autonomous, CE networks, as a single regional/global network
• Wholesale Service simplifies lowers costs, adds revenue

CE 2.0 Service Management

• Automated management brings scalability
• 3 Recent/New Specs for SOAM, FM/PM
• New Metrics
MEF Terminology

**MEF DEFINITIONS:**

- **CEN** – Carrier Ethernet Network
- **UNI** – User Network Interface
- **EVC** – Ethernet Virtual Connection
MEF Terminology

MEF DEFINITIONS:
- **CEN** – Carrier Ethernet Network
- **UNI** – User Network Interface
- **EVC** – Ethernet Virtual Connection
- **ENNI** – External Network to Network Interface
- **OVC** – Operator Virtual Connection
- **Operator** – Provide the Connectivity Services
- **Service Provider** – Service Owner
### CE 2.0 Retail Services Types

#### E-Line
- Ethernet Private Lines (EPL)
- Ethernet Virtual Private Lines (EVPL)
- Ethernet Internet Access

#### E-LAN
- Multipoint L2 VPNs
- Transparent LAN Service
- Multicast Networks
- EP-LAN, EVP-LAN

#### E-Tree
- Rooted Multi-Point L2 VPNs
- Traffic Segregation
- EP-Tree, EVP-Tree
MEF E-Access and E-Transit

The Wholesale Ethernet Game-Changer
What is an MEF E-Access Service?

- **Retail Service Provider** buys E-Access services to reach off-net customer locations
- **Wholesale Access Provider** sells E-Access services to provide access to locations on its network
- ENNI is point of interconnection between Retail and Wholesale providers
MEF 51 E-Access Services

E-Access Services: based on Operator Virtual Connection (OVC) between User Network Interface (UNIs) and External Network Network Interface (ENNIs)

**Key Characteristics of Access E-Line**
- Point-to-Point, UNI-ENNI
- Flexible OVC End Point Map at UNI
- Multi-CoS capable
- Service OAM
- Enhanced Access EPL/Access EVPL

**Key Characteristics of Access E-LAN**
- Multipoint-to-Multipoint, UNI-ENNI
  - Supports >1 UNI and/or >1 ENNI
- Flexible OVC End Point Map at UNI
- Multi-CoS capable
- Service OAM
New CE 2.0 E-Transit Services

- Key Characteristics of an E-Transit Service:
- Connects two or more CENs together using an Operator Virtual Connection (OVC)
- External Network Network Interfaces (ENNIs) at the CEN boundaries
- Point-to-Point or Multipoint-to-Multipoint OVCs provide the connectivity
- Can support all EVC-based services (i.e., ‘Private’ and ‘Virtual Private’)
- Multi-CoS capable
- Service OAM support
MEF 51 E-Transit Services

E-Transit Services: based on Operator Virtual Connection (OVC) between External Network Network Interface (ENNIs)

Key Characteristics of Transit E-Line
• Point-to-Point, ENNI-ENNI
• Flexible OVC End Point Map
• Preservation of CE-VLAN Tag
• Multi-CoS capable
• Service OAM

Key Characteristics of Transit E-LAN
• Multipoint-to-Multipoint, ENNIs
• Preservation of CE-VLAN Tag
• Multi-CoS capable
• Service OAM
Work of MEF - Wholesale
Work Of MEF - Wholesale

- **Service Architecture**
  - UNIs and ENNIs
  - EVCs and OVCs

- **Connectivity Services**
  - E-Line, E-LAN, E-Tree, E-Access, E-Transit
  - Information Model & OAM

- **Lifecycle Frameworks**
  - Product Catalogue
  - Service Ordering
  - Configuration & Setup
  - Performance Reporting

- **Standardized Architecture**

- **Standardized Services**
  - E-Transit
  - E-Access
  - E-Line
  - E-Tree
  - E-LAN

- **Lifecycle Service Orchestration (LSO)**

- **Network Infrastructure**
  - NFV
  - SDN
  - Existing WAN

- **Standardized Agile, Assured, Orchestrated Services**

- **Certified Services**

- **Standardized Lifecycle Frameworks**

- **MEF Certification**
MEF Services Interconnect Program

• MEF program launched to enable smaller access providers to:
  – Join the growing global community of standardized CE 2.0 Service Providers
  – Cost-effectively become MEF E-Access certified
  – Leverage the extensive wholesale work of the MEF to competitive advantage
One Answer to Hundred Questions...

Operator

“Ethernet Bitstream”

“VULA”

“Ethernet Leased Line”

“IP Bitstream”

“Ethernet Service”

Service Provider

<table>
<thead>
<tr>
<th>Color Forwarding?</th>
<th>OVC MTU Size?</th>
<th>Service Level Specification?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingress Bandwidth Profile?</td>
<td>CE-VLAN ID preservation?</td>
<td>Unicast Frame Delivery?</td>
</tr>
<tr>
<td>CoS Identifier?</td>
<td>Multicast Frame Delivery?</td>
<td>Broadcast Frame Delivery?</td>
</tr>
</tbody>
</table>
One Answer to Hundred Questions...

Service Provider

Operator

E-Access

MEF

CE 20 CERTIFIED
MEF Certifications for Wholesale

- **Service Certification**
  - E-Line, E-LAN, E-Tree,
  - E-Access, E-Transit
  - 195 Certified Services
  - 68 Service Providers, 24 Countries

- **Equipment Certification**
  - 333 CE 2.0 Network Devices
  - 42 Equipment Manufacturers

- **Professional Certification**
  - 4445+ MEF-CECPs
  - 445 Companies
  - 78 countries

- **E-Access and E-Transit certification simplifies RFPs**
- **Certified Equipment required at End Points**
Standardized Interconnection....

**EIP ARCHITECTURE**

- Facility
- ENNI Build and Attributes

**Service Provider**

- Carrier Ethernet Network
- End-to-End Carrier Ethernet Service

**Access Provider**

- Carrier Ethernet Network

**STANDARDIZED AGILE, ASSURED, ORCHESTRATED SERVICES**

- Lifecycle Service Orchestration (LSO)
- Network Infrastructure
  - NFV
  - SDN
  - Existing WAN

- Third Network Services
- APIs

**STANDARDIZED LIFECYCLE FRAMEWORKS (BUSINESS PROCESS)**

- Service Lifecycle
- Manual Processes
- APIs

**WHOLESALE SERVICES**

- E-Access, E-Transit
- Information Model & OAM

**MEF Rapid Prototyping**

**Lifecycle Service Orchestration**

**Lifecycle Frameworks**

**Connectivity Services**

**Service Architecture**

- MEF CERTIFIED

- MEF Rapid Prototyping
MEF 54: Ethernet Interconnect Points (EIP) Project

- Launched in November 2014, EIPs will be used to interconnect CE Networks, not just at the ENNI level. EIP is a mode of operation.
- Implementation Guidelines (currently in Letter Ballot) will cover from the physical ENNI to the LSO, including Service Operations Lifecycle and Product Lifecycle management.
- Migration from 100,000s of TDM “meet me” points to standardized Carrier Ethernet interconnects.

MEF 26.1 ENNI Port Interface Specification
MEF 33 Defines an “Access” Service Using MEF 26.1

ENN: External Network to Network Interface
UNI: User to Network Interface
Multi-Operator Service Orchestration

Self-service
Web Portal

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

Service Provider
Business Applications

Operator 1

Operator n

Network Infrastructure

Network Infrastructure

NFV
SDN
Existing WAN

NFV
SDN
Existing WAN

MEF LSO

MEF LSO
MEF Wholesale Action Plan

• Start with CE 2.0 Certification
• Adopt MEF 50 Service Lifecycle Process
• Get Workforce MEF-CECP Certified
• Prepare for Automation and LSO
  – Transition of OSS/BSS to support LSO
Q&A
Capturing the Wholesale Ethernet Interconnect Market with CE 2.0 Services

Gastón Cutignola
Senior Solution Engineer Latin America
Telco Systems