MEF Seminars

Building Dynamic Third Network Services Powered by CE 2.0, LSO, SDN and NFV

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MEF Certification Update

Thomas Mandeville
Head of Operations & Customer Relations
iometrix, MEF Official Certification Test Lab
Agenda: MEF Certification Program

• Introduction to the MEF Certification Programs

• MEF-CECP Professional Certification
  – MEF-CECP Exam Process & Scope
  – Accredited Training

• CE 2.0 Services and Equipment Certification Program
  – CE 2.0 Services, MEF Specifications & Test Plans
  – CE 2.0 Test Topologies & Environment
  – CE 2.0 Certification Process and Timeline
  – Recent and Upcoming Additions (100G Certification, VNF-based product certifications)

• MEF Certification Program Roadmap
  – Enhanced and New Connectivity Services
  – MEF LSO APIs for Service Automation and Orchestration
MEF Certification Programs Highlights

Services Certification
- Certifies CE services
- Launched in 2013
- 68 Service Providers Worldwide
- 201+ Certified Services

Equipment Certification
- Certifies CE equipment
- Launched in 2012
- 42 Equipment Manufacturers
- 337+ Equipment Certified

Professional Certification
- Certifies individuals
- Launched in 2012
- 4485+ MEF-CECPs
- 445+ Organizations
42 CE 2.0 Certified Equipment Vendors

333+ Certified Devices
Professional Certification

- Now 4485+ MEF-CECPs in 445+ organizations in 78 countries
- Continued and sustained growth since launched

Number of MEF-CECPs Worldwide

- Charter: 639
- Level(3): 546
- Americas: 125

Chart showing growth from March 2012 to March 2016:
- March 2012: 140
- March 2013: 600
- March 2014: 1850
- March 2015: 3000
- March 2016: 4000
MEF Carrier Ethernet Certified Professional
MEF CECP Program & Exam

• MEF CECP Program:
  – MEF-CECP is a Globally Recognized, Vendor Neutral Certification Program
  – Designed to Ensure That Organizations Have a Common Baseline of Technical Carrier Ethernet Skills Across Many Organizational Functions

• MEF CECP Exam
  – 1h 45m online exam available worldwide
  – US$350 testing fee, two re-take exams are only $50 USD each
  – MEF membership not required

• MEF CECP Scope
  – Service definitions, UNI, ENNI, EVC & OVC attributes
  – Transport and access technologies
  – Management, Service OAM
  – Applications
Accredited Training

• Self-study
  – Many materials such as MEF specifications, whitepapers are available

• Accredited Training
  – 5 Global MEF Accredited Training Providers (MEF-ATPs)
  – Suited for Training of multiple employees in an organization
  – At customer premises or at the MEF-ATP premises
  – Group proctoring of examinees at the end of the MEF-CECP training
  – Pricing and scheduling agreed directly with the MEF-ATPs

More than 80% of MEF-CECPs studied with a MEF-ATP

MEF Accredited Training Provider

MEF

Carrier Ethernet Academy

Fujitsu

Perpetual Solutions

Tech 2000

Telefocal Asia
MEF CE 2.0 Services and Equipment Certifications
# CE 2.0 Services Certifications

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Port Based Service</th>
<th>VLAN Based Service</th>
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</thead>
<tbody>
<tr>
<td><strong>E-Line</strong></td>
<td>EPL Ethernet Private Line</td>
<td>EVPL Ethernet Virtual Private Line</td>
</tr>
<tr>
<td>Point-to-point EVC UNI to UNI</td>
<td><strong>E-LAN</strong></td>
<td>EP-LAN Ethernet Private LAN</td>
</tr>
<tr>
<td>Multipoint-to-multipoint EVC UNI to UNI</td>
<td><strong>E-Tree</strong></td>
<td>EP-Tree Ethernet Private Tree</td>
</tr>
<tr>
<td>Rooted-multipoint EVC UNI to UNI</td>
<td><strong>E-Access</strong></td>
<td>Access EPL Access Ethernet Private Line</td>
</tr>
<tr>
<td>Point-to-point OVC ENNI to UNI</td>
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CE 2.0 Specifications & Test Plans

MEF CE 2.0 Services Specifications

- MEF 10.2
- MEF 6.1
- MEF 23.1
- MEF 26.1
- MEF 33

600+ Test Cases Covering Full Set of CE 2.0 Services & Attributes

- TEST PLAN PART 1
- TEST PLAN PART 2

Used for Equipment and Services Certification testing
CE 2.0 Test Bed for Retail Services

- **Live Network**: Tests performed on services configured on the service provider’s production network.

- **3 Distributed Sites**: To be selected, typically at CO or POP facilities, located in major market areas and covering a metro, regional, national or international coverage.

- **Use CE 2.0 Certified Equipment**: Highly recommended by MEF at the services UNI end points.

- **Network infrastructures**: Various types of access and transport technologies can be used.

- **Test Probes**: Installed at each site, connected to services to be tested and controlled by Iometrix remotely.
**CE 2.0 Test Bed for Wholesale Services**

- **Live Network** Tests performed on services configured on the service provider’s production network

- **2 Distributed Sites** To be selected, typically at CO, POP or Co-location facilities, located in major market areas and covering a metro, regional, national or international coverage

- **Use CE 2.0 Certified Equipment:** Highly recommended by MEF at the services ENNI and UNI end points

- **Network infrastructures** Various types of access and transport technologies can be used

- **Test Probes** Installed at each site, connected to services to be tested and controlled by Iometrix remotely

**Test Probe at ENNI emulates service provider partner interconnect**
# CE 2.0 Certification Process

<table>
<thead>
<tr>
<th><strong>Registration</strong> (+/- 60 days)</th>
<th><strong>Test Preparation</strong> (+/- 10 days)</th>
<th><strong>Test Probes</strong> (+/- 20 days)</th>
<th><strong>Testing</strong> (+/- 15 days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Submit online registration form</td>
<td>• Specify full set of service attributes and parameters</td>
<td>• Shipped pre-configured by Iometrix</td>
<td>• Tests conducted remotely by Iometrix test engineers</td>
</tr>
<tr>
<td>• Specify services to be tested and basic test environment</td>
<td>• Provisioning of services for testing on production network</td>
<td>• Installed by service providers at each site</td>
<td>• Pre-testing allows service provider to re-configure services according to Iometrix observations</td>
</tr>
<tr>
<td>• Sign NDA</td>
<td>• Prepare remote access for test probes</td>
<td>• Connected to internet to allow remote access</td>
<td>• Official test run</td>
</tr>
<tr>
<td>• MEF membership</td>
<td></td>
<td></td>
<td>• CE 2.0 Certificate</td>
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<tr>
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<td></td>
<td></td>
<td>• CE 2.0 Test Report</td>
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<td></td>
<td>• Listing on MEF Registry</td>
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<tr>
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<td>• CE 2.0 Certified logo</td>
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</table>
First 100G CE 2.0 Certifications

• 100G Services and Equipment Certifications
  – Introduced in Q4, 2015
  – Based on CE 2.0 Test Plans with added Test Cases for 100G

• Aims to support acceleration of 100G products and services deployment

• First CE 2.0 100G certifications delivered to:
  - Alcatel-Lucent
  - ciena
  - Cisco
  - Coriant
  - Huawei
  - Infinera
  - PCCW Global
CE 2.0 Certification for VNF-based Products Underway

• Increasing number of equipment vendor offer VNFs for use on x86/white box platforms
  – In addition to their existing CE 2.0 hardware/firmware-based products.

• The CE 2.0 certification testing is identical for both traditional networking devices and for VNF-based products:
  – This is the result of the CE 2.0 certification paradigm which is agnostic to the combination of hardware and software used to deliver CE 2.0 services at external interfaces.

• Pilot phase testing currently underway – Registration still open

• MEF to announce / highlight first MEF members to achieve certification of VNF-based CE 2.0 products
From ‘Services Certification’ to ‘Orchestrated Services Certification’

MEF Certification Program Roadmap
From ‘Services Certification’ to ‘Orchestrated Services Certification’

- **Certification of enhanced and new Connectivity Services**
  - Candidates are Access E-Line, Transit E-Line, IP and Optical services (Not Limited to CE services)

- **Certification of LSO APIs based on the LSO Reference Points**
  - Candidates are LSO Cantata, LSO Sonata, LSO Presto and LSO Legato

- **New certifications to be introduced over time as services and LSO APIs are defined by MEF**
  - ‘Dynamic’ certification program
First LSO Certification Pilot Phase – 2017

Testing of an Orchestrated E-Line Service Using the LSO Presto NRP API:

- LSO PRESTO NRP API allows dynamic and automated configuration of services
- Example: EPL service provisioned, modified and deleted using the LSO PRESTO NRP API
- Testing to verify if service remain compliant when modified

<table>
<thead>
<tr>
<th>Initial EPL</th>
<th>Value</th>
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<tr>
<td>Key attributes</td>
<td>Value</td>
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<td>Mapping</td>
<td>All-to-one</td>
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<td>L2CP</td>
<td>Option 1</td>
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<td>EBS</td>
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<table>
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- Query Suspend Resume Query
- Test CE 2.0
- Modify Re-Activate
- Deactivate Delete
- Create Activate

Test CE 2.0
Current Certification Program Roadmap

CE 2.0 Services Certification

- 2016
  - E-Line, E-LAN, E-Tree, & E-Access Services
  - 1G-10G-100G

- 2016
  - NFV implementations can be submitted to CE 2.0 Certification

- 2017
  - **MEF16**
    - Launch first LSO Orchestrated Services Certification - Using the PRESTO NRP API for **ALL** CE 2.0 services

- 2017
  - **CE 2.0 Certification Blueprint**
    - Updated for all CE 2.0 services to support LSO orchestration

- 2018
  - **Ongoing development of LSO Orchestrated Services Certification** - Using Presto, Interlude, Sonata, Legato, Cantata, Allegro LSO Interfaces APIs

  - **Next candidate**: LSO Presto Performance Monitoring (PM) API

- 2018
  - **Letter Ballot**
    - LSO Presto NRP API
  - **ITS**
    - LSO Presto NRP API

Connectivity Services Certification

- 2018
  - First IP Services added to the Services Certification

Note: The timeline and events are placeholders and should be replaced with actual content.
Why Service Providers Become CE 2.0 Certified

• Positioning products as high quality, standards compliant
  – Differentiation from competition in RFPs
  – Prioritization in customers’ qualification process
  – Increasingly a mandatory checklist item to enter bids

• Streamlining and accelerating qualification process
  – 634 MEF-designed test cases and MEF approved-lab implementation
    • Less internal testing = faster time to market for product
    • Less customer qualification testing = faster time to business

• Identifying roadblocks before the customer
  – Avoiding customers discovering lack of key compliance during engagement process (e.g. due to non-standard equipment/firmware deployment)
MEF Certification Update

Thomas Mandeville
Head of Operations & Customer Relations
Iometrix, MEF Official Certification Test Lab