
Carrier Ethernet Access – Winning The Last Mile

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Panelists

- **Craig Easley**
Associate VP Marketing, Actelis
- **Gary Bolton**
VP of Marketing and Product Management,
Hatteras Networks
- **Bob Mandeville**
President & Founder, Iometrix
- **Mike Tighe**
Chairman of the Metro Ethernet Forum
Director of Corporate Strategy, Verizon Business



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Agenda

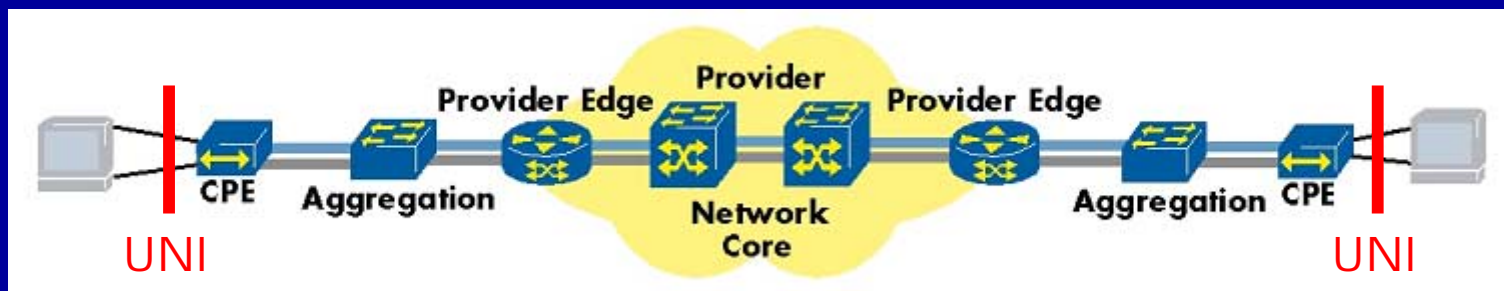
- What is Carrier Ethernet?
- Current status of the technology with regards to feature support and interoperability
- Carrier Ethernet at the edge
Solutions and challenges
- Panel discussion



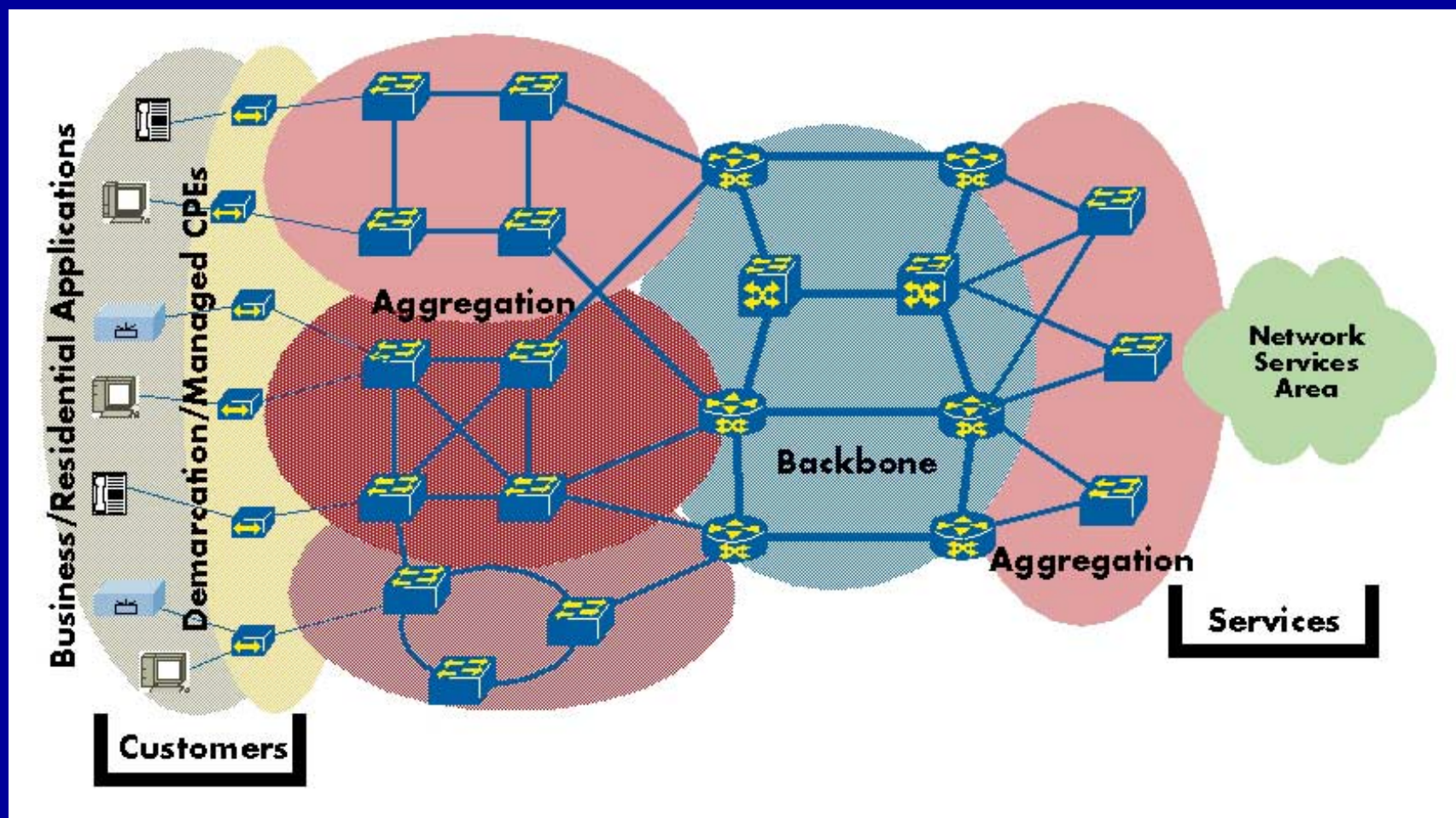
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What is Carrier Ethernet?

- Transparent business data service on the Ethernet layer
 - No Internet / IP routers involved
- User-Network Interface (UNI) standardized by the Metro Ethernet Forum (MEF)
- Point-to-point service: E-Line
- Multipoint service: E-LAN



Typical Architecture



Multi-Vendor Interop Testing



Madrid, Sept 25-29, 2006

Organized by



Hosted by



- Naturally: Improve Multi-Vendor Interoperability
- Validate New Carrier Ethernet Standards
- Demonstrate Sample Network Design



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Participating Vendors



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MEF Ethernet Service Goals

Quality Of Service

- End-to-End SLAs
- Performance characteristics (CIR, frame loss, delay and delay variation)

Service Management

- Monitor, diagnose, manage through vendor independent implementations
- Carrier Class OAM
- **Rapid Service Provisioning**

Standardized Services

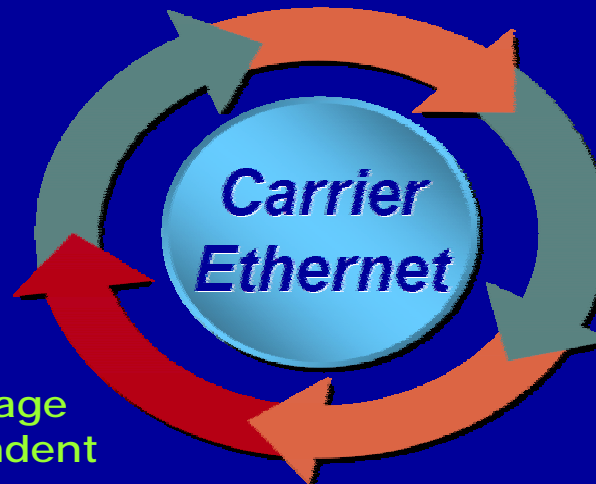
- E-Line and E-LAN
- Converge voice, video and data networks

Scalability

- Large scale deployment
- Wide variety of physical infrastructures

Reliability

- Automatic (Link) Failure detection and recovery
- 50ms recovery time



■ Tested at CEWC

■ Partly Tested

■ Not Covered

■ EANTC ■

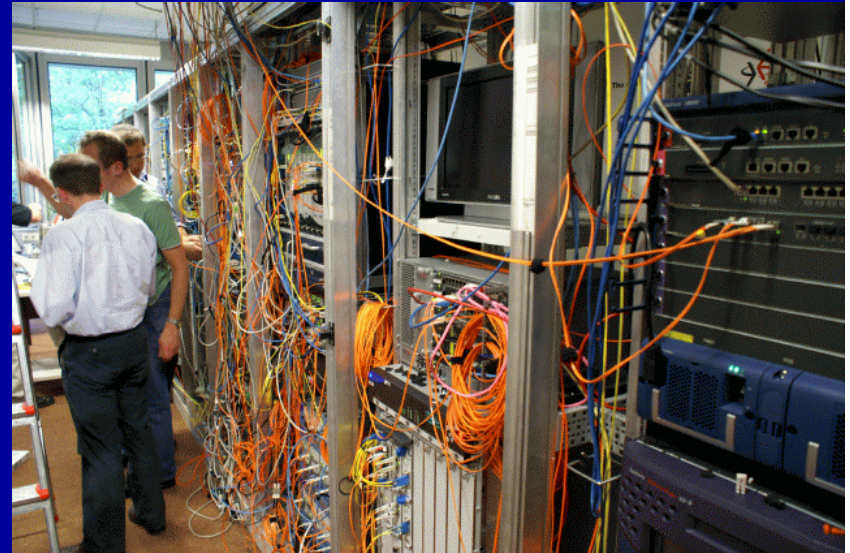
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Hotstaging

- Extensive tests conducted at EANTC in Berlin Sept 6-15
- Verified end-to-end interoperability under NDA
- With on-site support from all participating vendors
- Service provider support

 (on-site)

 (test plan review)



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Some Figures ...

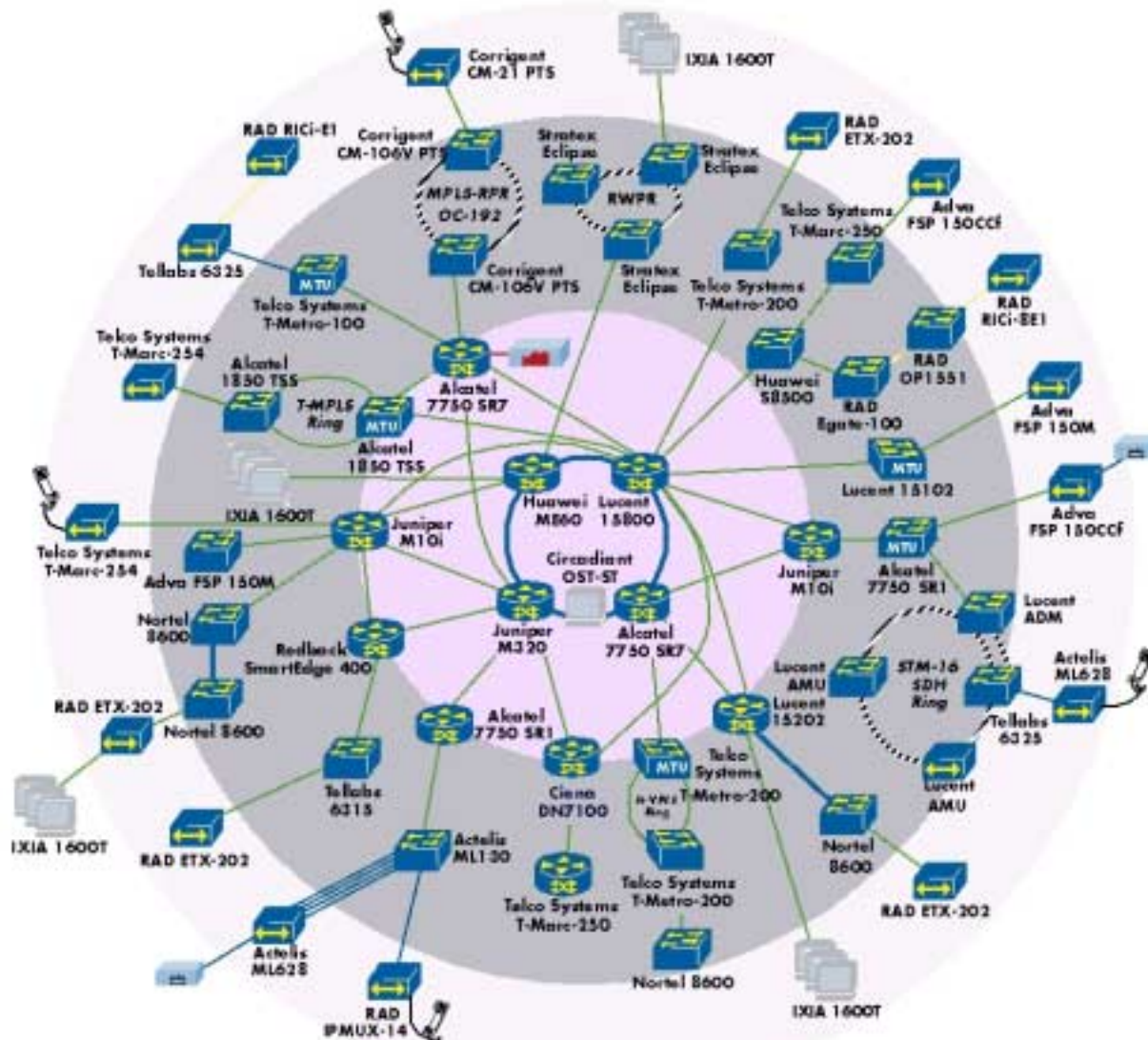
- 50+ devices
- 30 kVA power
- 300 network links
from E1 to 10GigE
- 3 months preparation
- 8 days of testing
- 53 engineers
- 3.5 tons of equipment shipped
- 175 liters coffee

See Video at
<http://www.eantc.de/cewc2006>



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Network Topology



Transport Technologies

- MPLS
- VLAN-based Ethernet
- Provider Bridges
- Provider Backbone Bridges
- Ethernet over RPR and Wireless (RWPR)
- Ethernet over SDH Rings
- Ethernet over E1
- Ethernet over Copper



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Results Highlights

E-Line Service Performance

- Zero packet loss throughout the whole network
- Less than 1 ms end-to-end frame delay (7+ GigE hops)
- Bandwidth Profiles widely implemented, enabling and enforcing service levels at the edge

MPLS Services

- 7 devices implemented point-to-point and multipoint services
- Few issues seen; mature technology



Results Highlights (2)

First Ethernet OAM

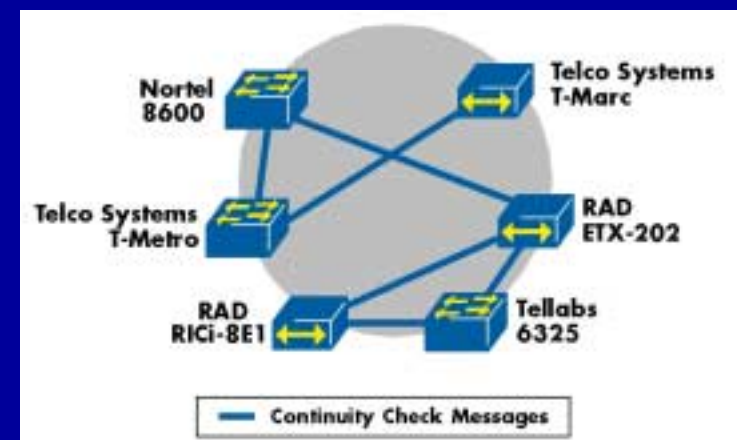
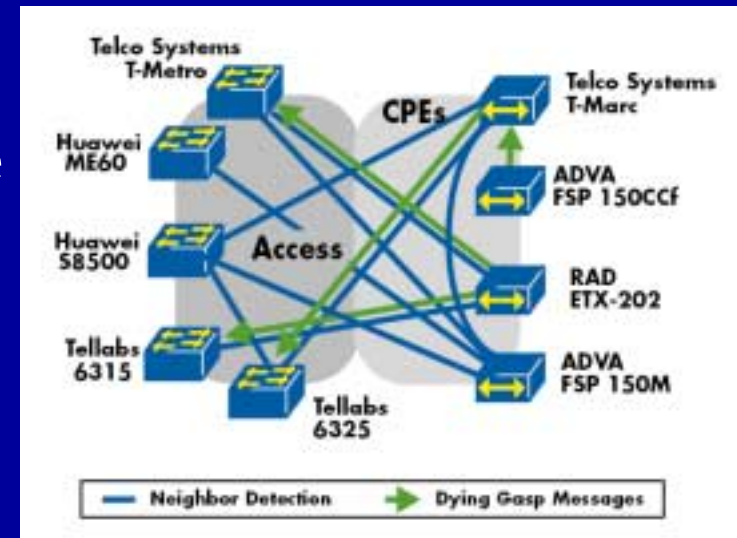
Multi-Vendor Tests, Worldwide

1. Physical Layer OAM (IEEE 802.3ah)

- "Dying Gasp" Message

2. VLAN-based OAM (IEEE 802.1ag Draft 7)

- Continuity Check



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Certification AND Interop Testing

- Certification provides a good foundation for multi-vendor testing
- By nature of conformance testing, MEF certified devices don't necessarily work with other MEF certified devices
 - Implementation of parameters
 - Scalability
 - Fault management, provisioning
- Interoperability testing goes hand in hand with certification
- Required on the way to reach MEF's service goals



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Importance of the Edge

Carrier Ethernet in the backbone is great.

- Standardized Services
- Quality of Service
- Reliable
- Scalable

But how are these services transported to the customer?

- E1/T1 – Old, expensive technology that does not scale
- DSL, Cable – Designed for mass markets with low customer expectations



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The Perfect Carrier Ethernet Last Mile

- Standardized and implemented by multiple vendors
- Provides fine-grain service levels
- Uses existing physical networks
- Scales to any bandwidth required
- Allows easy service provisioning and service maintenance
- Available today
- Devices and networks certified
- Inexpensive



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The Perfect Carrier Ethernet Last Mile

... Does it exist?



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Thank You For Your Interest!

For further information, please contact us:

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