Cable Commercial Services: Metro Ethernet Services & Architecture Overview

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Key Drivers for Evolving Metro Area Services – Enterprise Applications

- E-Commerce
- Distributed Web-based Integration
- Grid Computing
- Virtualization
- Storage Area Networks
- Data Replication
- Extended back-ups
- On-Demand Computing
- High Bandwidth Network
- Peer-to-Peer
- Flexible
- Workforce Optimization
- Multimedia collaboration
- IP Communications
- Supply Chain
- Enterprise Extranets
Issues with Existing MAN/WAN Technology

Typical LAN is Ethernet:
- Speeds 100 Mb/1GE
- 98% of all data traffic is in Ethernet format
- Highly scalable

Most MAN/WANs are PL/FR/ATM:
- Typical access speeds nx64, T1, nxT1
- 1/3rd of installed FR cannot scale beyond nxT1
- Not IP/data optimized
- Scaling and provisioning is complex
What Does Ethernet as a LAN/MAN/WAN Transport Offer?

- Ethernet becomes the ubiquitous interface: **single technology** for LAN, MAN and WAN
- Efficient packet-based infrastructure: **IP friendly**
- Cost effective interface with **flexible bandwidth offerings**: 10/100/1000/10000 Mbps
- **Geographical independence**: Ethernet over Optical, IP or MPLS
- **Economically attractive** Second Mile aggregation technology
Metro Ethernet Service Framework

Ethernet-Based **Connectivity** Service

Ethnet **Access**-Based Additional Services

SP has many Transport & Service Options
Metro Ethernet—Service Descriptions

Ethernet Wire Service—EWS (Like a Leased Line)

Ethernet Relay Service—ERS (Like Frame Relay)

Ethernet Multipoint Service—EMS (Enhanced with VPLS, Port Mapping)

Ethernet Relay Multipoint Service—ERMS (New service where the SP cloud acts like a LAN, VLAN Mapping)
Metro Network Architecture
Roles and Objects (IETF Nomenclature)

- **Core Layer (P)**
  - Fast Packet Forwarding, Supports sophisticated Traffic Engineering & Congestion management

- **Service Application Layer – Network facing PE (N-PE)**
  - IP Service Application layer: L3VPN, Internet Access
  - Value Added Services: Content, Managed IDS, Firewall, Hosted Telephony, L2 Service Inter-working

- **Aggregation Layer (PE-AGG)**
  - Traffic aggregation and congestion management

- **Edge Layer – User facing PE (U-PE)**
  - Admission control, Security Policy Enforcement, Classification, Policing and Marking
  - Service Enforcement layer; E2E SLA monitoring and reporting
  - L2VPN Services: ERS, EMS, ERMS, EWS,…
  - L3VPN

Network Management
OSS integration, self-provisioning networks, service on-demand, advanced service and support,…
Summary of Ethernet-based Services

Ethernet-Based Services

<table>
<thead>
<tr>
<th>Layer 1</th>
<th>Layer 2</th>
<th>Layer 3</th>
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<tbody>
<tr>
<td>Point-to-Point</td>
<td>Multipoint</td>
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<tr>
<td>Ethernet Private Line</td>
<td>Ethernet Relay Service</td>
<td>Ethernet Multipoint Service</td>
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<tr>
<td>Ethernet Wire Service</td>
<td>Ethernet Relay Multipoint Service</td>
<td>MPLS VPN</td>
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Analogous to Private Line over SONET/xWDM Network

Analogous to Private Line over a Packet Network

Analogous to Frame Relay

Hybrid ERS+EMS

Transparent LAN Service/Emulated LAN
Metro Ethernet Services
L2 Ethernet VPN – Inter Metro WAN Deployment

Scale/Extend Services Across Metro using IP/MPLS
Additional Metro Ethernet Considerations

- Key Considerations in building a Metro Ethernet service
  - Quality of Service (QoS)
  - Security
  - High Availability

- QoS allows differentiated levels of service
  - Optimize network performance, better meet customer needs, extract value from differentiated levels of service

- Security
  - Critical requirement for customer and SP network protection

- High Availability
  - Increased network reliability, decreased OPEX, higher customer satisfaction & retention
Summary

- **Enterprise Impact** – Growing demand for higher bandwidth MAN/WAN services driven by mission critical business applications
- **Metro Ethernet** – Provides a low-cost, flexible solution to the MAN/WAN bottleneck
- **Service Flexibility** – Bandwidth, connectivity topology, transport options, CPE, etc.
- **Key Considerations** – QoS/SLA, High Availability, Security