Hands-On

Metro Ethernet

for Field Support and Business Technicians

Course Description

Carriers have offered connectivity services based on traditional TDM, Frame Relay and ATM for many years. However customers now use Ethernet as the interface of choice for virtually all services and applications. The cost of operating separate networks to provide each service, as well as the need to sell higher bandwidth services than can be offered with traditional networks, is forcing carriers to move to newer, more cost effective technologies, namely Ethernet, Backbone Bridging, IP and MPLS.

Ethernet and IP have allowed networks to deliver high bandwidth and new services with greater flexibility, while MPLS has allowed these new services to become more "carrier-class", offering the connection-oriented behaviour, quality of service, and reliability normally associated with traditional technologies. However the signalling and routing costs of MPLS and layer 3 solutions have still been significant, which has lead to the development of other layer 2 Provider Backbone Transports (PBT) and Provider Backbone Bridging (PBB) solutions for small to medium scale carrier metro services.

The Metro Ethernet Forum has evolved a set of standard service definitions for the kinds of Ethernet services customers now require. These can deliver services between sites that look to customers like end to end Ethernet. For carriers they can emulate other traditional TDM services over the same infrastructure and deliver all services over a common unified network by adding Pseudo Wire Emulation edge to edge (PWE3).

This course provides an overview of carrier Ethernet technologies, their installation, testing and troubleshooting for Technicians.

Students Will Learn

- Describe in detail Metro Ethernet Services and Functions

- Describe typical service configuration
- Identify key service profiles and how to undertake validation testing of them
- Interface services to customer equipment
- Install and test new services
- And More...

Target Audience

This course is designed for Field and Business technicians and anyone who plans on using, evaluating or working with MetroE, applications and services.

Prerequisites

Attendees should have a good understanding of IP and WAN principles. They should also understand the basics of Next Generation Networks.

Course Outline

Module I: Metro Ethernet Carrier Services

- Metro Ethernet Forum Service Definitions
- MEF standards: MEF 6.1, MEF 10.1 and MEF10.2
- Ethernet Service Attributes
- Virtual LANs
- Emulated LAN using multipoint services
- E-Line Services for Point to Point
- E-LAN MultiPoint to MultiPoint
- Physical Interfaces
- Traffic Parameters

- Classes of Service
- Models for carrier services
- Control Plane vs Data plane
- Requirements for requested QoS and Protection
- Technologies upon which Carrier Ethernet is Build
- Fiber Optics
- MPLS and High Speed Switching

Module II: Carrier Ethernet Primer

- Ethernet Speed Evolution to 10Gbit/s and beyond
- How Ethernet Evolved
- Evolution from 10 Mbit/s LAN to Gigabit Ethernet
- Impact of Optical transmission
- Removing the distance limitations

Hands-on Analysis of Ethernet services

- Ethernet switching
- Bridging functions
- Learning Bridges
- Removing Loops
- 802.1d Spanning Tree and Rapid Spanning Tree
- Ethernet Addressing
- Address characteristics
- Routability of address structures
- Problems with MAC address Tables
- Analyzing MAC Address tables
- Multicasting
- IGMP
- Multicasting over Ethernet

Hands-on Monitoring Multicasting over Ethernet

- Using VLANs within customer environments
- VLANs in Carrier Environments

- Service Separation
- Impacts on Security
- What limits the number of VLANs
- Scaling Services
- Q-in-Q solutions
- Provider Layer 2 VPN Solutions Options
- Provider Backbone Bridging: IEEE 802.1ad
- Delivering Provider Backbone Transport: IEEE 802.1ah

Module III: Testing Services in Carrier Environments

- Analysing What Identifies QoS
- Bandwidth
- Delay
- Delay variation
- Availability
- Access to Service Features
- Delivering Bandwidth and Delay

Hands-on Measuring, Packet Loss and Variation in Delay

- Monitoring QoS
- Aggregation and Protection
- Ethernet Aggregation
- 802.3ad Aggregation and Bridging
- Example aggregation network applications
- IPTV service protection
- Aggregation for bandwidth increase
- Hands-on Monitoring Ethernet Aggregation

Module IV: Deploying Services in Existing Networks

- Fiber Optic Installation
- Fiber Termination and connection
- Fiber splicing and pulling
- Service Level Agreements

- Testing MTU issues
- Metro Ethernet Technician’s Tool Kit
- Operations, Administration and Management

Hands-on Troubleshooting Carrier Ethernet Services

- IEEE 802.1ag and ITU Y.1731 Management solutions
- Operational Service Monitoring

Delivery Method

Instructor-Led with numerous Hands-On labs and exercises.

Equipment Requirements

(This apply's to our hands-on courses only)

BTS always provides equipment to have a very successful Hands-On course. BTS also encourages all attendees to bring their own equipment to the course. This will provide attendees the opportunity to incorporate their own gear into the labs and gain valuable training using their specific equipment.

Course Length

3 Days