Hands-On

ATM Troubleshooting

Course Description

Voice, data, and video traffic over ATM networks creates tremendous cost efficiencies. If not properly configured and tested, however, the implementation can represent numerous headaches for network engineers and managers.

Learn to establish a structured and logical approach to troubleshooting and managing today's ATM networks using network management and troubleshooting tools from industry-leading vendors.

Students Will Learn

- **ATM Troubleshooting Basics**
- **ATM Component Review**
- **Permanent Virtual Connections**
- **ATM Network Protocol Analyzers**
- **ATM Traffic Testing and Troubleshooting**
- **ATM Performance Testing and Troubleshooting**
- **ATM Switched Virtual Connections**
- **Soft Permanent Virtual Connections**
- **PVP Tunneling**
- **And More...**

Target Audience

Anyone tasked with monitoring, administering, and/or managing an ATM network, especially those working for product manufacturers, carriers, and service providers.

Prerequisites

Our ATM Essentials course

Course Outline

1. ATM Troubleshooting Overview

- Identifying challenges
- Troubleshooting arsenal
    - Knowledge of the technology
    - Recognizing symptoms and problems
    - Knowledge of available tools
- Testing vs. troubleshooting
- ATM troubleshooting methodology
- Basic approaches
    - Dj vu method
    - Delta method
    - Napoleonic method
    - Sesame street method
- Documentation
- Problems unique to ATM testing and troubleshooting
- ATM technology review

2. ATM Component Review
- ATM protocol stack
    - Physical layer
    - Cell layer
    - Cell header fields
    - AAL layers
- Traffic management concepts
    - The traffic contract
    - ATM cell layer service categories
    - UNI signaling
        - SAAL
    - NNI signaling: IISP and PNNI

3. Permanent Virtual Connections
- PVC explanation
    - Construction of a PVC
    - Everything permanent?
    - The road to nowhere and the road to everywhere
- Testing PVCs
- The basics of OAM cells
- Circuit establishment troubleshooting

4. ATM Network Protocol Analyzers
- Equipment categories
    - Platform
    - Line speed
- Performance functions
    - Configuration
    - Monitoring
    - Management
- Access methods
    - Break and insert
    - Passive taps
    - Port copying
    - Circuit steering

5. ATM Traffic Testing and Troubleshooting
- Traffic management concepts
    - The UPC function
    - The traffic contract
    - QoS parameter definitions
    - ATM traffic descriptors
    - Generic cell rate algorithm
    - Leaky bucket algorithm usage
- Policing configuration options
    - ATM cell layer service categories
    - Congestion control
    - Congestion recovery
    - ABR flow control
- ATM layer OAM
    - Applicability example
    - Cell formats
    - Types and functions
    - Loopback functions
- AIS and RDI operation

6. ATM Performance Testing and Troubleshooting
- ATM traffic descriptors
- QoS parameter definitions
    - Terminology and cell transfer outcomes
    - Cell delay variation
    - Cell loss ratio
    - Cell transfer delay
    - Cell error ratio and severely-errored cell block ratio
    - Cell misinsertion rate
    - QoS parameter definitions
    - ATM layer service categories
- Performance specifications and measurements
    - OAM cells

7. ATM Switched Virtual Connections
- Role of signaling
    - Q.2931 signaling overview
    - Message types
    - Signaling ATM adaptation layer
    - ATM end system address
    - Integrated Local Management Interface (ILMI)
- Lifecycle of a Switched Virtual Connection
    - SSCOP: assured delivery
    - Signaling capture process

8. Soft Permanent Virtual Connections
- Soft PVC overview
- Configuring soft PVCs
    - Rerouting connections
    - Physical layer
    - Consistent switch-to-switch protocol
    - Edge devices
    - Ingress switch
    - Egress switch

9. PVP Tunneling

- PVP overview
- Configuring customer edge into ASP tunnel
- Configuring ASP tunnel switches
- Configuring customer edge into and out of ASP tunnel
- Troubleshooting considerations

10. LAN Emulation (LANE)
    - LANE overview
    - LAN common denominator
        - Address Resolution Protocol (ARP)
    - Emulating a LAN over ATM
    - LANE client
    - Broadcast and unknown server
    - LANE server
        - LECS
    - LANE virtual channel connections
        - Flush protocol
        - Configure the LEC
        - Configure the LECS
        - Configure the LES/BUS
    - LANE troubleshooting
        - LANE services

Hands-on Course Labs Hands-On Lab 1: Setting up a Network
Set up and use ATM equipment and network cable connections, and establish basic network connectivity.

Hands-On Lab 2: Constructing PVCs
Build PVCs necessary for bi-directional connectivity on an assigned logical interface, troubleshoot PVCs and send traffic over PVC connections.

Hands-On Lab 3: PVC Troubleshooting
Troubleshoot bi-directional connectivity between UNIX workstations via PVCs; isolate and correct various problems with your assigned PVC network.

Hands-On Lab 4: Using the ATM Analyzer
Learn the setup of the analyzer and its operations relating to physical layer reporting, connect analyzers to an network UNI interface in full duplex mode, and monitor physical layer (SONET and ATM) statistics using WinPharoah for ATM.

Hands-On Lab 5: Capturing and Decoding Traffic
Use basic VP/VC monitoring and capture/decode operations of the network analyzer, and monitor video traffic to determine traffic rate, AAL type, VPI value, and VCI value. Capture and decode traffic for analysis.

Hands-On Lab 6: Traffic-Based Policing
Define traffic policies, test a PVC, configure UPC parameters on an ingress switch, and test results after changing UPC parameters.

Hands-On Lab 7: Traffic Shaping
Initiate traffic shaping at edge devices, configure traffic shaping at a UNIX workstation, and reconfigure UPC parameters in ATM switches to allow for additional connections.

Hands-On Lab 8: QoS Testing with Analyzer
Initialize the analyzer, run internal loopback functions, select transmit options, and insert error connections.

Hands-On Lab 9: Capturing SVC Signaling
Perform a capture and decode of steady state signaling conditions and call-initiated signaling.

Hands-On Lab 10: Troubleshooting SVCs

Use skills developed in lab 8 to troubleshoot an SVC connection request using an ATM analyzer, and capture and decode signaling messages to identify SVC creation problems.

Hands-On Lab 11: Constructing SPVCCs
Convert the PVC built in lab 2 to an SPVCC, and configure your ingress to activate the SPVCC. Break the primary link and determine if the connection is maintained via the backup link.

Hands-On Lab 12: SPVCC Troubleshooting
Use skills developed in lab 10 to isolate, analyze, and correct an ATM network problem associated with SPVCCs.

Hands-On Lab 13: Configuring PVP Tunnels
Configure unique VPTs, configure a VCC switch table to convert VPI cell flows, configure a PVC switching table based on VPI values, and create a PVC cell flow at the edge of the network using a VPV tunnel approach.

Hands-On Lab 14: PVP Troubleshooting
Use skills developed in lab 12 to isolate and correct various problems with your unique network tunnel.

Hands-On Lab 15: LAN Emulation
Configure and enable a LANE configuration server, a broadcast and unknown server. Enable and establish connectivity between two LAN clients.

Hands-On Lab 16: LANE Troubleshooting
Use skills developed in lab 14 to isolate and correct various problems with your unique LANE environments.

Hands-On Lab 17: Solving Real-World ATM Problems
Read the problem log from the previous shift, collect data, and analyze and isolate the problem.

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