Course Name: From Transport to IP

Course Overview: This course addresses convergence between wireless, telecom, datacom, and networking concepts. In addition to covering the key technical topics of Layers 1-3 of the OSI model, we will spend time on troubleshooting and element management techniques. This course will be 50% hands-on.

Course Length: 4 days

Who should attend?

- Field Service Technicians
- Field Engineers
- Managers/ Field Supervisors
- Design Engineers

You will learn:

- Transport technologies
- Modern data services
- Ethernet from LAN to WAN
- Internet Protocol (IP)
- Addressing
- Troubleshooting

Course Content:

Transport Introduction

- Communications Model
- Applications
- Services

Modern Data Services

- Convergence
- Packet vs. Circuit Switched
- Real-time Services
- Non Real-time services
- Digital vs. Analog

Physical Backhaul Technologies

- Copper, Twisted Pairs, and COAX Cables
- Fiber Optic Cables
- Radio Frequencies
    - Microwave

    - Cellular
- WAN Based Technologies
    - T1/DS1
    - T3/DS3
    - SONET
    - DWDM

Transport Fundamentals
- Multiplexing
- Timing
- Channels
- Framing
- Overhead
- Transmission Coding

DS1 Technology
- Timing and Clocking
- Channels
- Multiplexing
- Framing
    - Types
    - Out-of-Band
    - Overhead
    - Checksum
- Coding
- HDSLx Overview

T1 Equipment
- Office/Switch
- Outside Plant
- Customer
- Test Access Points
- Connections

T1 Testing
- In Service
- Out of Service
- Chanel Testing
- Termination
- Looping
- Patterns
- Alarms
- Errors
- Signal Levels
- Equipment Optioning

- Timing Checks

DS3 Technology
- Channels
- DS3 over COAX, Fiber, and Microwave
- Multiplexing Stages
- Framing and Overhead Types
- Coding

T3 Equipment
- Digital Signal Cross-Connect (DSX-3)
- Multiplexers
- Fiber Optic Terminals
- RF Systems

T3 Testing
- In-service Monitoring
- Out of Service Testing
- Drop and Insert
- Alarms
- Framing Errors
- Parity Errors
- Far-end Responses
- Signal Quality
- Test Patterns
- Bit Error Rate Testing
- Looping

Fiber Optics Primer
- Overview of Fiber Optics
- Comparison to Copper technologies
- Elements
- Components
- Cable Types
- Connectors
- Cleaning
- Attenuation

SONET
- Overview of SONET
- Applications
- Passive vs. Active Systems
- Amplification vs. Regeneration

- Timing and Clocking
- Layers
- Add/Drop Multiplexing
- Overhead
- Equipment
- Topologies
- Ring Types
- Monitoring and Testing
- Splitters
- Alarms
- Parity Checks
- Errors
- Far-end Indicators
- DWDM Overview

Packet Data

- OSI Model
- Packets
- Quality of Service (QoS)
- Serial Data
- Encapsulation
- Linking Technologies Together

Ethernet

- Overview of Frames
- Point-to-Point Switching
- Equipment
- Cable types
    - Twisted-pair
    - Fiber
- Topologies
- Speed and Duplex
- MAC Addressing
- Power-over-Ethernet

Internet Protocol

- Overview of IPv4 and IPv6
- End-to-End Routing
- Equipment
- Packets
- Addressing
- IP Address
- Subnet Masking
- Default Gateway

- DNS
- Routing

Installation and Maintenance

- Network Overview
- PING
- Trace Routing
- SNMP
- Troubleshooting Procedures
- QoS
- Latency and Delay
- Throughput
- Retransmission
- Packet Loss
- Monitoring