

Course ID
BHAUL-AI
Course Duration
2-3 days

Course Title
Mobile Backhaul Architecture and Implementation

Related Courses

- Mobile Backhaul Business and Technology Briefing™ (BHAUL-BRIEF, 1 day)
- Mobile Backhaul Market Briefing (BHAUL-MKT, 1 day)
- Mobile Backhaul Application Case Studies (BHAUL-APP, 1 or more days)
- Mobile Backhaul Standards and Protocols (BHAUL-STND, 2-3 days)
- Mobile Backhaul Security (BHAUL-SEC, 1 day)
- Mobile Backhaul End-to-End (BHAUL-E2E, 1 day)

Aimed At

Individuals involved in the evolution, planning, architecture, design, implementation, procurement, and sale of mobile/wireless backhaul systems will benefit most from this course.

Group Size

5-25

Prerequisites

The participants should have a working knowledge of IP networking, TDM and Virtual LAN (VLAN) concepts, operations and standards prior to taking this course.

Course in a Nutshell

Every new wireless device with any form of IP data, be it “traditional” browser data, texting, Voice over IP, video or other variations – which is virtually every wireless device today – must cross the “bridge” from the point where the wireless signal hits the cellular tower or wireless access point to the cloud. This course will provide a comprehensive look at how wireless signals cross the bridge from the cellular tower, leaving the wireless access point for another class. The approach to mobile backhaul for the cellular environment is vastly different than for the wireless access points because the bridge typically uses variations on traditional telco facilities, though this course will also discuss other architectures and options.

Customize It!

This program can be scheduled as a 2-3 day standalone course, with other modules as part of a multi-day course or as one hour modules for delivery over the World Wide Web. Any combination of selected modules may be scheduled for web delivery. The course can be optionally taught as a hands-on workshop at no added cost.

Learn How To

- Choose the proper technology for cellular backhaul
- Distinguish between cellular backhaul solutions and wireless access point connections
- Describe Virtual LAN usage within the Carrier Ethernet context including tags and QoS issues
- Configure VLAN IDs, prioritization and Quality of Service on backhaul
- Decide between TDM backhaul and packet backhaul solutions
- Interpret key standards and apply them to backhaul implementation
- Configure bandwidth and oversubscription to optimize service performance
- Explain the specific Metro Ethernet Forum specifications applicable to Ethernet transport
- Describe some of the key technical characteristics of Ethernet transport
- List the operational issues of the end-to-end components and the interfaces between them
- Provide an in-depth description of reliability and survivability aspects of the system and discuss alternatives

Course Outline

- Basic Carrier Ethernet Concepts
 - Ethernet History, State-of-the-Art and Future Trends
 - Who Is Bob Metcalfe? Why Do We Care?
 - LAN Ethernet
 - Wireless Ethernet
 - Optical Ethernet
 - Metro and Wide Area Ethernet
 - Ethernet Interconnection
 - Ethernet Switching and MPLS
 - Metro Ethernet vs SONET/SDH
 - Metro Ethernet Forum
 - Metro and WAN Ethernet Requirements and Services
 - Resiliency
 - Reliability
 - Redundancy
 - Interoperability
 - Quality of Service/SLA Support
 - Security
 - Multicast Support
 - Services
 - VPN Services

- TDM/CES Support
- Triple Play Services
- Service Management
- E-Line and E-LAN Services
 - E-LAN
 - E-Line Services Defined by the MEF
 - Ethernet-over-PDH/SONET (EoPDH/EoS) - Concept
- EVPL Service
- Initial Ethernet Service Offering
- Generic
- VLAN Tag Insertion
- CE-VLAN Bundling and Pass-thru
- Security
- MPLS in Backhaul Networks
 - IP/MPLS Forum 20.0.0
 - Centralized Mobile Networks
 - Flat Mobile Networks
 - Generic Requirements for MPLS Backhaul Transport Networks
- Architecture
 - Physical View
 - Logical View
 - Implementation View (Example)
 - Ethernet Architecture Description
 - Components, Attributes and Configuration
 - Relationships between VCGs, EVCs, and VLANs
 - VCG and EVC Configurations
 - UNI Port Attributes
 - EVC Service Attributes
- Implementation
 - Adding Ethernet at Existing DS3 Cell Sites
 - Equipment View
 - Logical View
 - Alternative (replace 'C' / 'Z' mux)

- Alternative Equipment View
- Ethernet at New DS3 End Sites
 - Equipment View
 - Logical View
- Adding Ethernet at 3xDS3 Cell-Sites
 - Equipment View
 - Logical View
- Adding Ethernet at OC3 Cell Sites
 - Equipment View
 - Logical View
- Cell-Site Ethernet Components
- MSC Aggregation and Handoff
 - Equipment View
 - Logical View
 - Ethernet Components
 - GigE Handoff Protection Option 1: 1+1 Optical Protection
 - GigE Handoff Protection Option 2: 1:1 Optical Protection using LAG and LACP
 - Cell-Site to MSC Delivery: Logical View
 - Role of Network Interface Device (NID)
 - Fiber versus Copper for Ethernet Handoffs
- New Ethernet-only End-Sites
- New Ethernet-only End-Sites: Logical View
- VLANs and Quality of Service (QoS)
 - VLANs and VLAN Stacking Using Q-in-Q
 - VLAN Tag Fields
 - Customer Traffic Policing
 - Egress Port Queuing and Class of Service (CoS) Mapping
 - Typical Service Offerings
 - CBR EVC
 - Multi-Priority Tag Classification within the EVC
 - Traffic Flow Mapping

- EVC CoS, CE-VLAN, Internal Header and CoS Queue Mappings
- Relationship between an EVC and SP-VLAN Tag
- VLAN to VCG Mapping at the Cell-Site
- VLAN to VCG Mapping at the MSC
- Multiple VLANs to VCG; Unique CE-VLANs
- Multiple VLANs to VCG; Non-Unique VLANs
- Reliability and Survivability
 - Path Diversity of VCG Members
 - GigE UNI 1:1 Protection Switching at the MSC
 - GigE UNI 1:1 Protection Switching at the MSC – Proprietary Options
 - Restoration Architecture
 - 50ms Inter-MSC Restoration
 - 50ms Intra-MSC Restoration with Odd-Even VLANs
 - 50ms Inter-MSC Restoration
 - 50ms Intra-MSC Restoration with Odd-Even VLANs
- Troubleshooting and SLA Compliance
 - NID Features and Functions
 - End-to-end Continuity Check (CC) OAM
 - End-to-end Loopback (LB) OAM
 - End-to-End Performance Monitoring (PM) OAM
 - End-to-End OAM and SLA Verification
 - Pertinent End-to-end PM Counters per EVC on NID
 - Pertinent End-to-End Traffic Statistics per VLAN or EVC on NID
- Conclusion

Revised

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