

# INSTALLATION

## COURSE CATALOG

Alcatel • Lucent



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## ALCATEL-LUCENT INSTALLATION

### COURSE CATALOG

#### EMERGING TECHNOLOGIES

1. EMERGING TECHNOLOGIES OVERVIEW
2. UNDERSTANDING WIRELESS - PART I
3. UNDERSTANDING WIRELESS - PART II
4. INTRODUCTION TO EVDO
5. HOW EVDO WORKS
6. UNIVERSAL MOBILE TELECOMMUNICATIONS SERVICE
7. VOIP FUNDAMENTALS
8. WORKING WITH VOIP
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10. VOIP - ARCHITECTURE AND DESIGN
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12. WiMAX OVERVIEW
13. INTRODUCTION TO WiMAX
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15. PRACTICAL T1/T3 TESTING CONCEPTS
16. INTERNET PROTOCOL TELEVISION (IPTV)
17. IP MULTIMEDIA SUBSYSTEMS (IMS) AND NEXT GENERATION NETWORKING (NGN)
18. CERTIFIED FIBER OPTIC TECHNICIAN (CFOT) CERTIFICATION
19. ADVANCED FIBER OPTIC TECHNICIAN PROGRAM (AFOT)
20. BASIC SKILLS FOR ELECTRICIANS
21. OVERVIEW OF MODERN CARRIER NETWORKS

#### ROUTER TECHNOLOGIES

1. OVERVIEW OF CISCO ROUTERS
2. INTRODUCTION TO CISCO ROUTING
3. DEPLOYING CISCO ROUTERS
4. FUNDAMENTALS OF ROUTER CONFIGURATION
5. TROUBLESHOOTING CISCO ROUTERS
6. ADVANCED IP ROUTING AND TROUBLESHOOTING
7. INTRODUCTION TO THE ALCATEL-LUCENT 7X50 SERVICE ROUTERS

#### CUSTOMER SERVICE

1. CUSTOMER RELATIONSHIP BUILDING: INTERNAL AND EXTERNAL
2. CUSTOMER RELATIONS II

#### COMPUTER TRAINING

1. ALCATEL-LUCENT BASIC COMPUTER TRAINING



## EMERGING TECHNOLOGIES IN THE TELECOMMUNICATIONS INDUSTRY

**(16 Hours)**

This course is designed to fully acquaint participants with today's vast array of new and emerging technologies and their practical application in the marketplace. These will range from those found in Data Networking, Packet Switching, Transport, and Access. Wireless and VoIP will also be referred to. The related effects on Telcos and consumers are presented to allow participants to fully appreciate usage well beyond the installation of new technology.

The course will review how, when, where, and why new varieties of communications technologies continue to emerge. Apart from a strictly technical perspective, market demands and customer applications, are discussed and demonstrated. Alcatel-Lucent Technologies' products will be matched to the emerging technologies to provide a full understanding in relation to Alcatel-Lucent jobs.

### COURSE OUTLINE

#### **Evolution of Circuit Switching Technology**

- Analog Signal Fundamentals
- Manual, Step by Step, Crossbar
- Advent of Circuit Switching, Analog Standard Voice Channel
- Multiplexing, Frequency Division Multiplexing, L-Carriers
- Digitization Fundamentals
- Digital Switching, Time Division Multiplexing, D-Channel Banks
  - Metropolis ADM MultiService Mux
  - 5ESS Switch and 5E-XC Applications for Service Providers
- SONET and Optical
  - Metropolis Enhanced Optical Networking (EON) for Service Providers
  - Metropolis Wavelength Services Manager (WSM) for Service Providers
  - LambdaXtreme Transport for Service Providers
  - LambdaUnite MultiService Switch (MSS) for Service Providers
- North American Digital Hierarchy

#### **Evolution of Data Networking**

- Early Data Transmission using Analog, FAX, Modems
- LANs, WANs, SANs
  - Juniper Networks E-Series Router Portfolio for Service Providers
  - Juniper Networks T-Series Router Portfolio for Service Providers
  - Juniper Networks M-Series Router Portfolio for Service Providers
  - Metropolis DMX Access Multiplexer for Service Providers
  - CBX 500 Multiservice WAN Switch for Service Providers

- Packet Principles, Basic Packet Switching
- Packet Switching Advantages, Answering the Flexible Bandwidth Demand
- Internet/Intranet
- Frame Relay
- Asynchronous Transfer Mode (ATM)
- DSL
  - Stinger FS+ DSL Access Concentrator for Service Providers

#### **Evolution of the Access Network**

- AnyMedia Access System – 24 Channel for Service Providers
- AnyMedia Access System – 30 Channel for Service Providers
- POTS
- Premise Switching, Concentrators
- Fiber
- ISDN, ADSL
- Wireless
- Cable
- IP, VoIP



## UNDERSTANDING WIRELESS - PART I

**(8 Hours)**

This course is designed for telecommunication professionals who must understand today's wireless technologies, including mobile and fixed wireless communications. By the conclusion of the course, participants will have a solid knowledge concerning cellular concepts, access technologies, and services. The course will study the terminology and acronyms commonly used in the industry today, as well as compare and contrast the various wireless techniques and standards (such as CDMA, TDMA, and GSM). An overview of third generation systems is included.

### COURSE OUTLINE

#### **Introduction**

- Basic Cellular Concept
- The First Cellular Network
- Improved Mobile Telephone Service
- Introduction of Frequency Reuse

#### **Wireless Communications**

- Cell Division
- Cell Networks
- Types of Cellular Calls
- Cellular System Components
- Air-to-Ground Service

#### **Overview of Operation**

- Cell Configuration
- Cell Phone Transmitters
- Cell Handoff

#### **The Radio Spectrum and Allocations**

- FCC
- A and B Band
- Frequencies

#### **Mobile Telephone Switching Office (MTSO)**

- MTSO Primary Purpose
- Tracking
- Call Processing
- Call Handoff
- Traffic and Call Processing Statistics

#### **System Identification Codes (SID)**

- Electronic Serial Number (ESN)
- Mobile Identification Number
- System Identification Code (SID)

#### **Transmission Limitations and Impairments**

- Shadowing
- Multipath Interference
- Noise

#### **Advanced Mobile Phone System (AMPS)**

- Assigned Frequencies
- Digital Cell Phones

#### **Cellular Access Technologies**

- FDMA
- TDMA
- TDMA/GSM
- CDMA

#### **What Is 3G?**

- 2G Technologies
- Key Features of 3G Systems
- 3G System Capabilities

#### **Cellular vs. PCS**

- Dual Band vs. Dual Mode
- Problems with Cell Phones
- Cellular Antennas

#### **Applications and Technology**

- New Technology
- Strengths of CDPD
- IP-based and Open Specification

#### **Short Message Service (SMS)**

- Applications
- Limitations of SMS



## UNDERSTANDING WIRELESS - PART II

(8 Hours)

### COURSE OUTLINE

#### **Introduction**

- Fixed-Wireless Applications
- Wireline vs. Wireless
- Unique Aspects of Wireless
- Radio Spectrum

#### **Types of Fixed-Wireless Systems**

- Private Licensed Links (Microwave)
- Private Unlicensed Links (Spread Spectrum)
- 38-GHz Carrier Service
- LMDS (Local Multipoint Distribution Service)
- Satellite Systems
- Laser
- UNII (Unlicensed National Information Infrastructure) Band
- MMDS (Multichannel Multipoint Distribution System)

#### **Wireless Broadband Networks**

- What Is a Wireless Broadband Network?
- What Wireless Broadband Is Not
- Where Wireless Broadband Is Useful
- How Does Wireless Broadband Work?
- Frequency Band and Licensing Requirements for Broadband
- Distance Limitations on Wireless Broadband

#### **Cellular Calls**

- Overview of Operation
- Mobile Telephone Switching Office
- System Identification Codes
- Cellular Digital Packet Data (CDPD)

#### **Cellular Phone Technologies**

- CDMA vs. FDMA/TDMA
- Developers of the Technologies
- Government and International Support

#### **A Technical Look at CDMA and TDMA**

- The Digital Advantage
- Frequency Division Multiple Access (FDMA)
- Time Division Multiple Access (TDMA)
- GSM
- Analog Technology
- Enhanced 911 (E911) Position Location
- Applications of Wireless Location
- Overview of Radiolocation Methods
- Introduction to IEEE 802.11
- What Makes a Wireless LAN Unique?
- 802.11 Topologies
- Distribution Services
- 802.11 Media Access Control
- 802.11 Physical Layer (PHY)

#### **Introduction to the Wireless Application Protocol**

- Overview
- WAP and the Web
- Why Wireless? Why WAP?
- How Does It Work?
- The Business Case: Pros and Cons

#### **Bringing Internet Services to WAP Devices**

- WAP Devices
- Development Environmen
- Antenna Systems
- What Is a Smart Antenna System?
- Signal Propagation: Multipath and Cochannel Interference
- How Do Smart Antenna Systems Work?
- Who Can Use Smart Antenna Technology?



## INTRODUCTION TO EVDO

(8 hours)

Over the past few years the wireless technology industry has seen massive growth with ever increasing mobile subscriber rates. Simple analog radio tools have evolved into sophisticated adaptive technologies. Using advanced hardware, modulation and coding techniques EvDO (evolution of existing systems for data only) can now accomplish wireless solutions, unimaginable a decade ago. Introduction to EvDO is a very informative course that presents a simple and clear explanation of EvDO; its technical capabilities; and its operational benefits when coupled with the baseline wireless networks.

### COURSE OUTLINE

#### **Introduction**

- Introduction to EvDO and CDMA2000
- EvDO vs. Wi-Fi
- Technical and Operational Benefits of EvDO
- New and Innovative Applications
- Migration Paths from 2G Networks to EvDO

#### **Codes and Modulation**

- Orthogonal Variable Spreading Factors (OVSFs)
- Complex EvDO Walsh Codes
- EvDO Complex Spreading
- BPSK vs. QPSK
- 8-PSK vs. QAM

#### **EvDO Forward Link Structure**

- Data Rates and Modulation Parameters
- The Pilot Channel
- The Forward MAC Channel
- The Reverse Power Control Channel
- The Reverse Activity Channel

#### **EvDO Reverse Link Structure**

- Data Rates and Modulation Parameters
- The Access Channel
- The Pilot Channel
- The Ack Channel
- The Data Rate Control Channel and The Data Channel

#### **Channel Construction**

- Turbo Encoding; Turbo-Interleavers and Channel Interleavers
- Sequence Repetition; Scrambling
- Orthogonal Codes
- Quadrature Spreading
- 16-QAM

#### **Link Performance**

- Examples for various Data Rates
- Trade-Offs Discussions
- Coupling 1xEV-DO to CDMA2000-1x for Full 3G Capabilities



## HOW EVDO WORKS

(8 Hours)

For years the buzz in telecommunications has been centered around "network convergence" and the "explosive Internet." Companies have been touting Voice over Internet Protocol (VoIP) as the replacement for the Public Switched Telephone Network (PSTN) and the Bell System's circuit-switching network. Cellular technology has provided formidable competition to the landline networks, but nothing has proven to be as explosive an influence as the latest development, Evolution to Data Optimized Only (EvDO).

While EvDO is in some ways a part of the evolution toward network convergence, it is also revolutionary because it utilizes data only and segregates itself from voice traffic. Difficulties in developing an enterprise VoIP solution have led to the development of a data-only network that is predicted to provide crystal-clear video on demand, live-action 3D games, news, sports, music videos, and much more, in the palm of your hand. EvDO takes advantage of the Internet tolerance of bursty, data-only transmission. With only minor modifications required at CDMA-based cell sites, EvDO may make Internet cafes a thing of the past because it works everywhere a cell phone works.

### COURSE OUTLINE

#### **Telecommunications Evolution**

- The Original Public Switched Telephone Network (PSTN)
- Drivers of Change - Deregulation and Competition
- The Role of the "Switch"

#### **The Market Responds**

- The Drive to Digital
- Efficiency vs. Reliability
- Circuit vs. Packet Switching

#### **Cellular Review**

- Development of Cellular Technology
- Cellular Evolution - 2G, 2.5G, 3G
- FDMA, TDMA, CDMA

#### **CDMA2000 to EvDO Evolution**

- Differences
- Benefits of EvDO

#### **EvDO System Operation**

- Initialization
- Idle
- Initial Assignment/Access
- Connected Mode
- Dormant
- Over the Air Programming (OATP)
- EVDO Handoff Operation

#### **Cell Site Implementations**

- Safety
- Installation
- Continuity
- Documentation
- Tech Etiquette



# UNIVERSAL MOBILE TELECOMMUNICATIONS SERVICE (UMTS)

**(8 Hours)**

Did you ever wonder why a cell phone user in the United States cannot communicate with a cell phone user in Europe? What is this world coming to in wireless? Is it FDMA, TDMA, CDMA, GSM, EVDO, or UMTS? Well, the answer is: UMTS (Universal Mobile Telecommunications Service). UMTS is a third generation (3G) broadband protocol with packet-based text transmission, digitized voice, video, and multimedia at rates up to 2 Megabits per second (Mbps) that will offer a consistent set of services to mobile computer and phone users no matter where in the world they are located. This cutting edge development is just beginning to emerge in the United States. Find out about UMTS and why it is the latest buzz in the cellular/wireless arena. This course will explore and examine the many components that make up this developing, soon to be ready for prime time technology.

## COURSE OUTLINE

### **Wireless Evolution**

- Overview of today's cellular technology
- Wireless Evolution 2G, 2.5G, 3G
- FDMA, TDMA, CDMA, WCDMA

### **3G Systems**

- Standards Organizations
- International Telecommunications Union, European Telecommunications Standards Institute, Third Generation Partnership Project
- Benefits of UMTS

### **UMTS Industry**

- What is a UMTS Network?
- Applications
- Products

### **UMTS Services**

- Types of Services
- Four Types of Traffic
- Network QoS Classes

### **UMTS Architecture**

- UMTS Core Network (CN)
- UMTS Terrestrial Radio Access Network (UTRAN)
- UMTS User Equipment

### **Core Network**

- Switched and Packet Domains
- ATM

### **Radio Access**

- Base Station Equipment
- Functions of Node B
- Functions of Radio Network Controller (RNC)

### **User Equipment/3G Devices**

- Functionality of User Equipment
- Modes of Operation
- Current and Future 3G Devices



## VOIP FUNDAMENTALS

**(8 Hours)**

**Voice over Internet Protocol (VoIP)**, which integrates voice and data transmission, is quickly becoming an important factor in network communications. It promises lower operational costs, greater flexibility, and a variety of enhanced applications.

IP telephony, known in the industry as Voice over IP (VoIP), is the transmission of telephone calls over a data network like one of the many networks that make up the Internet. Many traditional telephone companies are already using it in the connections between their regional offices.

The objective of this course is to provide a technical and practical overview of VoIP. The course identifies the main elements of the technology and presents them in an easy-to-understand format.

### COURSE OUTLINE

#### **Market Forces Shaping VoIP**

- The Role of VoIP within Organizations
- VoIP Quality of Service
- Circuit-Switched Circuits vs. VoIP
- How VoIP Handles Calls

#### **How VoIP Works**

- Telephony and Data Comparisons
- Voice over IP Standards
- Problems in Deploying VoIP (delay, loss, and echo)

#### **Voice over IP Equipment and Standards**

- Terminals, Gateways, and Gatekeepers
- Multimedia Communications (H.323)
- Audio and Video CODECs

#### **Convergence — The Future of Communications**

- The Technology of Convergence
- The Impact of VoIP to Your Company
- VoIP as a Standard Communications Platform
- New Technologies in VoIP



## WORKING WITH VOIP

(16 Hours)

Voice over IP (VoIP), which integrates voice and data transmission, is quickly becoming an important factor in network communications. It promises lower operating costs, greater flexibility, and increased variety of enhanced applications. The objective of this course is to provide a practical overview of VoIP. The course identifies the main elements of the technology and presents them in an easy-to-understand format.

### COURSE TOPICS

#### **Overview of VoIP**

- What is VoIP?
- How does it work?
- How is it delivered?

#### **Quality/Cost/Speed**

- VoIP vs. POTS
- Equipment
- Provisioning
- Delivery
  - Circuit and Packet Switching
- Economics
- Time Frames
- Market

#### **Digital Basics**

- Analog vs. Digital
  - Characteristics
- Numbering Systems
  - Decimal and Binary
- Data Grouping
- Signaling
- Transmission
  - Analog to Digital
  - Digital to Analog
  - Multiplexing

#### **The Internet**

- History
- Evolution
- World Wide Web
  - Uniform Resource Locators
  - Hyper Text Markup Language
- Networks
  - Purpose
  - Devices

- Components
- LAN Topologies
- Network Access Methods
  - Token
  - Contention
- Network Connectivity
  - Bridge and Gateway
- Ethernet LANs
  - History
  - Topologies
- Encoding
- Network Types
  - WAN, MAN, LAN
- WAN
  - Connection Types
  - Connection Devices
  - Performance Factors
- LAN
  - Components
  - Internetworking
  - Expanding
  - LAN Networking Devices
  - LAN Performance
- The OSI Model
- Home Networks
  - Service Delivery
  - Networking Components

#### **Voice over IP (VoIP)**

- Market Factors
- Jitter
  - Definition
  - Buffering
- Deployment Challenges
  - Quality of Service
- Operational Delays

- Accumulation
- Processing
- Network Transit
- Lost Packets
  - Definition
  - Approaches
- Echo
  - Definition
  - Canceling Echo
- Approaches to VoIP
  - Point-to-Point
  - Client/Server
- Components
  - Terminals
  - Gateways
  - Gatekeepers
  - Multipoint Control Units
- Protocols
  - VoIP Format
  - Encoding/Decoding
  - Signaling
  - Transport
- Call Walk-Through
  - Call Setup
  - Control Signaling
  - Transmission
  - Call Release

#### **The Future: Convergence**

- The Future of Communications
- Summary of VoIP
- VoIP Advantages
  - Lower Costs
  - Higher Reliability
- Supporting Innovation
- Government Regulations
  - Voice vs. Data



## VOIP - MODERN TELECOMMUNICATION NETWORKS

**(16 Hours)**

Today there is a drive to enable voice networks with an intelligent control plane based on an evolution of IP and MPLS protocols. Such optical/IP internetworking will dramatically reduce the costs of operating these networks and will enable service providers to create more dynamic new services for their customers. Voice over MPLS (Multi Protocol Label Switching) is one of the most innovative data networking technologies to emerge since the rise of the Internet. MPLS is a rich, full-featured networking technology that provides benefits to enterprises and carriers alike. This course looks at the subject of MPLS and optical networks. Participants will see how it works, as well as look at some of the applications of MPLS.

### COURSE OUTLINE

#### **Introduction to MPLS**

- What is MPLS?
- Understanding the Fundamentals
- Basic MPLS Operation
- MPLS Terminology
- Label Encoding, Distribution, and Binding
- Proprietary Approaches to MPLS

#### **MPLS Distribution and Signaling**

- Routing of LSPs (Label Switched Paths)
- Label Distribution Methods
- RSVP as a Label Distribution Protocol
- Understanding RSVP
- MPLS extensions to RSVP
- The Label Distribution Protocol (LDP) and CR-LDP
- Label Retention Modes
- Comparison of RSVP and LDP

#### **Frame Relay, ATM and MPLS**

- Frame Relay and MPLS
- Frame Relay Switches as Label Switched Routers
- Label Encoding for Frame Relay
- Label Distribution
- ATM and MPLS
- ATM Essentials
- ATM Switches as Label Switched Routers
- Label Encoding for ATM
- ATM Specifics
- VP and VC Tunnels
- Mapping to ATM QoS

#### **MPLS Traffic**

- LSP Path Determination
- Explicit Routes and Constraint Based routing
- Fast Re-Routing: Taking Account of Network Failures
- MPLS Deployment "Edge or Core"
- ATM and Traffic Engineering

#### **Supporting Differentiated Services (Diff-Serv) with MPLS**

- Understanding the Diff-Serv Model
- The Aim of Diff-Serv
- How Diff-Serv Works
- Classification
- Mapping Diff-Serv onto MPLS
- Requirements for Label Distribution

#### **Voice over MPLS**

- Implementing a Voice Service over MPLS
- Reference Model
- Call Quality and QoS
- MPLS Network Requirements

#### **Introduction to Optical Networks and MPLS**

- Introduction to Light-Wave Communications
- Modern Optical Transport Networks
- Wavelength Division Multiplexing
- Categories of fiber optic cable
- Wavelength Division Multiplexing
- Basics of DWDM
- Optical Cross-Connects
- MPLS and Lambda Switching
- Emerging All-Optical Switching Techniques



## VOIP ARCHITECTURE AND DESIGN

**(16 Hours)**

The *VoIP Architecture and Design* course provides a comprehensive look at the distinctive qualities, dependencies, and requirements that VoIP and convergence will require when looking to architect and design-converged multimedia network infrastructures. Participants will learn the key network infrastructure requirements for VoIP and convergence; review the various convergence industry network segments; and apply network opportunities, restrictions, and potential issues.

### COURSE OUTLINE

#### **Introduction**

- Overview of IP Telephony
- Identification of the VoIP Architecture
- Overview of Types of VoIP
- Service Providers
- Virtual Private Networks
- Web-Based Telephony

#### **Quality of Service**

- Strategy and Approach to QoS
- Quality IP Telephony
- Design Strategy and Approach to Quality
- VoIP Quality Assurance
- IP Packet Quality
- VoIP Network Quality
- Identification of Quality Techniques

#### **Network Architecture**

- VoIP across LANs and WANs
- VoIP Media Servers
- Gatekeepers and Gateways
- Gateway Deployment Options
- IP Trunking
- Network Control of Bandwidth, Latency, Jitter, Loss
- Bandwidth and VoIP Networks
- Packet Size vs. Packet Rate
- Codec and Overheads
- Impact of VoIP on Network Architecture

#### **Multiservice Networks**

- Overview of Multiservice Topologies
- Wireless IP Telephony
- Mobile Telephony
- Second and Third Generation Mobile Services
- Session Initiation Protocol (SIP) and 3G Applications

#### **Security and Network Architecture**

- VoIP Encryption
- VoIP Firewalls
- Network Address Translation
- Port Address Translation
- Designing IP Telephony Solutions



## VOIP NETWORK IMPLEMENTATION

**(16 Hours)**

In this course participants develop a complete understanding of the equipment and applications that are driving the deployment of Voice over IP equipment and services. Participants will establish a practical step-by-step process for understanding VoIP protocols, and for connecting to existing voice and data equipment. The course will enhance participants' understanding of both the theoretical and practical aspects of VoIP.

### COURSE OUTLINE

#### **Network Architectures to Support VoIP**

- Voice over IP Requirements
- Fundamentals of TCP/IP
- IP Addressing and Routing
- Transmission Control Protocol (TCP)
- User Datagram Protocol (UDP)
- Voice Data Transport
- Encapsulation of Voice Data
- Voice Encoding and Packetization
- Real Time Transport Protocol (RTP)
- VoIP Signaling Approaches
- Call Control in IP Networks

#### **VoIP Signaling**

- VoIP Signaling Transport
- Overview of H.323 Architecture
- Overview of Session Initiation Protocol (SIP)
- SIP Call Process
- Call Setup: SIP to ISDN
- Call Setup: SIP to SS7
- Gateway Protocols
- Media Gateway Control Protocol (MGCP)
- MGCP and Megaco Protocol Architecture
- SIP and MGCP
- Protocol Comparison

#### **Application**

- Virtual Call Center
- Virtual Agent
- Virtual Centrex
- Sonus Solution

#### **Introduction to System Architectures**

- Introduction to Circuit-Side Signaling Protocols
- SS7 ISDN User Part (ISUP)
- ISDN Primary Rate Interface (PRI)
- Channel Associated Signaling (CAS)

#### **Traditional Circuit-Switched Call Flow**

- Trunk Circuit Identification
- Signaling Transfer Points
- Tandem and End Office Switches

#### **Circuit to Packet Call Flow**

- Packet Networks
- GSX9000
- Policy Request
- Signaling
- Database and Routing Tables
- Address Complete Message (ACM)
- Answer Message (ANM)
- Release (EL) and Release Complete Message (RLC)



## WiMAX

**(4 Hours)**

WiMax is coming. A wireless standard that makes Wi-Fi look mini, WiMax is designed to replace your Internet connection with one that is up to 80 times faster than today's broadband. The technology, officially known as 802.16, transfers data as fast as 75 Mbps and has a maximum range of 30 miles.

WiMax will be the wireless alternative to DSL or cable. It has obvious advantages for any place that is not wired already. WiMax can operate at frequencies below 11 Ghz. The receivers do not need to be able to see the base station; signals can penetrate clouds, trees, and walls.

This overview provides an introduction to WiMax technologies, applications and standards. Other important related topics such as protocol layers, quality of service, throughput, coverage, interoperability, interference and security are also discussed.

### COURSE OUTLINE

- WiMax components and installation
- Impact of WiMax on the future of communications
- WiMax air interface requirements and standards
- Radio frequency concepts
- WiMax vs. wired broadband
- Coverage and capacity
- Convergence of WiMax with TV and VoIP



## INTRODUCTION TO WiMAX

(8 Hours)

WiMax (Worldwide Interoperability for Microwave Access) has been described as the communications of the future. WiMax technology supports data sharing at ranges of several miles at speeds of up to 75 megabits per second. WiMax has the ability to transport data for many different types of technologies. With just one service, you can have data access through your cell phone, home phone, PDA, television, printer, or Internet. Voice, videos, audio, and high definition television are all accessible via the power of WiMax. In this course you'll learn about the upcoming WiMAX technologies and the deployment of this technology.

### COURSE OUTLINE

#### **Introduction to WiMAX and IEEE 802.16**

- WiMAX as a Wireless MAN Technology
- Regulations and Services
- Benefits
- Applications
- "Last Mile" Broadband Connections
- Frequency Bands
- Family of Standards

#### **802.16 Physical Layer Procedures**

- Introduction to Microwave
- Original 802.16 Standard and 10-66GHz Frequency Band
- Service Areas
- High Capacity Links, Uplink and Downlink
- Time Division Duplexing (TDD)
- Frequency Division Duplexing (FDD)

#### **WiMax Technical Information**

- WiMax Forum
- Interoperability Challenge
- 802.16a Amendment: 2 to 11GHz
- 25 MHz Wide Channel for Use in the 10-66 GHz Range

#### **802.16 Network Design**

- Base Stations Locations
- Access Point Frequency Assignments
- Changing Environments
- Interference Sources

#### **Coverage and Capacity**

- Propagation
- Complete Coverage of Target Space
- Adequate Capacity

#### **Voice and Video Transmissions**

- Delivery of Voice-over-IP (VoIP) Services
- QoS and VoIP
- Component of 802.16i for Reliable, High-Quality Voice Transmission



## UNIX

(16 Hours)

### COURSE OUTLINE

**1. What Is This Unix Stuff?**

- A. What Is Unix?
- B. A Brief History of Unix.
- C. Getting Help.

**2. Getting onto the System and Using the Command Line.**

- A. Logging In and Out of the System.
- B. Changing Passwords with password.
- C. Seeing What's Going On Around You.

**3. Moving About the File System.**

- A. What a Hierarchical File System Is All About.
- B. The Unix File System Organization.
- C. The Difference Between Relative and Absolute Filenames.
- D. The env, pwd and cd Commands.

**4. Listing Files and Managing Disk Usage.**

- A. The ls Command.
- B. Permissions Strings.
- C. Checking Available Disk Space with df.

**5. Ownership and Permissions.**

- A. Working with File Permissions.
- B. Understanding File Permissions Settings.
- C. Directory Permissions Settings.
- D. Modifying File and Directory Permissions with chmod.
- E. Calculating Numeric Permissions Strings.
- F. Identifying Owner and Group for Any File or Directory.

**6. Creating, Moving, Renaming, and Deleting Files and Directories.**

- A. Manipulating the Unix File System.
- B. Creating New Directories Using mkdir.
- C. Copying Files to New Locations Using cp.
- D. Moving and renaming file using mv.
- E. Removing Directories with rmdir.
- F. Removing Files Using rm.

**7. Looking into Files.**

- A. Looking Inside Files.
- B. Using file to Identify File Types.
- C. Exploring Unix Directories with file.
- D. Viewing the Contents of files

## **8. Filters and Piping.**

- A. Maximizing the Command Line.
- B. The Secrets of File Redirection.
- C. Counting Words and Lines Using wc.
- D. Removing Extraneous Lines Using uniq.
- E. Sorting Information in a File Using sort.

## **9. Wildcards and Regular Expressions.**

- A. Finding Needles in Haystacks.
- B. Filename Wildcards.
- C. Searching Files Using grep.

## **10. An Introduction to the vi Editor.**

- A. Editing the Unix Way.
- B. How to Start and Quit vi
- C. Simple Cursor Motion in vi.
- D. Moving by Words and Pages.
- E. Inserting Text into the File Using i, a, o, and O.
- F. Deleting Text.

## **11. Advanced vi Tricks, Tools, and Techniques.**

- A. Advanced Editing with vi.
- B. Searching Within a File
- C. The Colon Commands in vi.

## **14. Advanced Shell Interaction.**

- A. Which Shell Is Which?
- B. The Shell History Mechanisms.
- C. Using History to Cut Down on Typing.
- D. Command Aliases.
- E. Setting Custom Prompts.

## **16. Slicing and Dicing Command-Pipe Data.**

- A. The awk Programming System.
- B. Learning to Use awk.
- C. How to Use cut in Pipes.
- D. Intro to editing with sed and tr.

## **17. Job Control.**

- A. Wrestling with Your Jobs.
- B. Job Control in the Shell: Stopping Jobs.
- C. Foreground/Background and Unix Programs.
- D. Finding Out What Tasks Are Running.
- E. Terminating Processes with kill.



## PRACTICAL T1/T3 TESTING CONCEPTS

(24 hours)

The majority of companies in the industry today utilize DS1 and DS3 transport systems to connect their sites. Many times the wireless technicians are at the mercy of the provider when one of these connections is down. This is an extensive course focused on proper installation and maintenance techniques as well as addresses all types of test equipment. Test equipment is provided but students are encouraged to bring and learn on the actual equipment they will be using in the field.

### COURSE OUTLINE

#### T1/DS1 TESTING CONCEPTS

*Length: 2 days*

##### **Day 1 – Classroom (8 hours)**

###### **DS1/T1 Overview**

- Wireless applications
- Basic speeds/abilities

###### **DS1/T1 Technology**

- Multiplexing the signal
- Framing the signal (D4, ESF)
- Coding the signal (AMI, B8ZS)

###### **DS1/T1 Network Equipment**

- CSU, Multiplexers, DSX-1, DCS, Switch...
- Connections/cable
- Provider's equipment
- Demarcation

###### **DS1/T1 Test Equipment**

- Types of test equipment
- Equipment operation & setup
- Connections to a DS1/T1
- Testing techniques
- Test parameters

###### **Lab 1 – Test Equipment**

###### **Installing DS1/T1s**

- BERT
- Test Access points
- DS1/T1 loop back testing
- End/End Testing
- Verifying service parameters

###### **Lab 2 – Build T1 Span**

##### **Day 2 – Classroom (8 hours)**

###### **Maintaining DS1/T1s**

- Test access points
- Recommended test patterns
- Monitoring signal quality
- Monitoring alarms and errors
- Equipment emulation
- Verifying timing/clocking

###### **Lab 2 - Testing**

- Bit Error Rate Testing
- End-End Testing
- Loop Testing
- Signal Analysis

###### **Lab 3 – Troubleshooting I**

- Fault Detection

###### **Lab 4 – Troubleshooting II**

- Providing to provider there is a problem

###### **Lab 5 – CSU emulation**

- Using Test equipment as CSU/Cell Site/CPE

###### **Channelized Testing**

- Monitoring DS0s from DS1s
- Monitoring DS1s from DS3s
- Fractional DS1/T2s (FT1)
- Drop and Insert Testing
- VF (PCM TIMS) Testing
- ISDN (BRI/PRI) Testing

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#### T3/DS3 TESTING CONCEPTS

*Length: 1 day*

##### **Day 1 – Classroom (8 hours)**

###### **DS1/DS3 Overview**

- Wireless applications
- Basic speeds/abilities

###### **DS1 Review**

- Formatting the signal
- Equipment
- Basic testing concepts

###### **DS3 Technology**

- Multiplexing the signal
- Framing the signal
- Coding the signal

###### **DS3 Network Equipment**

- Multiplexers, DSX-3, DCS... Connections/Cable

- Provider's equipment
- Demarcation

###### **DS3 Test Equipment**

- Types of test equipment
- Equipment operation/setup
- Connections to a T3/DS3
- Testing techniques
- Test parameters

###### **Lab 1 – Test Equipment**

- Product Overview
- Loop Test

###### **Installing DS3s**

- BERT
- Recommended Stress patterns
- Test Access points
- DS3 loop back Testing
- End/End testing
- Verifying service parameters

###### **Lab 2 – Test Equipment**

- BERT
- Stress Patterns
- Measurements
- Signal Analysis

###### **Maintaining DS3s**

- Test Access points
- Monitoring DS1s/channels
- Monitoring signal quality
- Monitoring Alarms and Errors

###### **Lab 3 – End/End Testing**

- Verify signal/framing
- Analyze problems

###### **Channelized Testing**

- Monitoring DS1s from DS3s
- Monitoring DS0s from DS3s
- Monitoring Fractional T1s (FT1s) from DS3s
- Drop and Insert testing



## **INTERNET PROTOCOL TELEVISION (IPTV)**

**(8 hours)**

Today, hundreds of millions of dollars are being invested in IPTV and high-speed Internet access technology. The technology promises to transform television, and in the process re-energize telcos by reducing customer churn and introducing new revenue streams. Yet, IPTV is as uncertain as it is tantalizing, and making it work will be as complex as the end-user experience it promises will be easy.

### **COURSE OUTLINE**

- **Understanding IPTV**
- **IPTV Industry**
- **How Does IPTV Work?**
- **IPTV a Look from the Outside**
- **IPTV Network Hardware Technology**
- **IPTV Network Software Technology**
- **What Do I Need to Experience IPTV?**
- **The Set Top Box**
- **The Telco Role**
- **The Role of DSL**
- **Challenges of IPTV**
- **The Future of IPTV**



# IP MULTIMEDIA SUBSYSTEMS (IMS) AND NEXT GENERATION NETWORKING (NGN)

**(8 hours)**

Intense competition is expected in the information networking arena over the next 5-10 years. As the competition increases, it will be essential for companies to position themselves appropriately to take advantage of their core competencies and to prepare for the emerging telecommunications environment. This course provides an understanding of Next Generation Networking (NGN) and IP Multimedia Subsystems (IMS) and will help crystallize the requirements for the future of emerging computer network architectures and technologies. Learn how IMS will merge the Internet with the cellular world.

## COURSE OUTLINE

### **Introduction to IT Multimedia Subsystem (IMS)**

- History of IMS
- IMS Basic Principles
- Fixed/Mobile Convergence

### **Architecture**

- Access Network – Direct IMS terminals (mobile phones, PDAs, and computers)
- Core Network
- Call/Session Control

### **IMS Servers**

- Application Servers
- Media Servers
- Breakout Gateway
- PSTN Gateways

### **Introduction to Next Generation Networking (NGN)**

- Broadband Wireless
- Wi-Fi, WiMAX and software defined radios
- 3G Mobile Networks
- UMTS, HSDPA and HSUPA
- CDMA2000 1xEV-DO and 1xEV-DV
- 4G Wireless

### **IP Networks and Real-Time Applications**

- Voice and Video over IP
- SIP
- Peer-to-Peer (P2P) Networking
- Push-to-Talk
- Ethernet Ongoing Evolution
- IPv6

### **NGN Transport Technologies**

- Wireless Call Servers
- Routing Switch Platform
- Service Routers
- Service Access Switches



## **CERTIFIED FIBER OPTIC TECHNICIAN (CFOT) CERTIFICATION**

**(40 Hours)**

This 40 hour course has two components: A theory component, and a hands-on component where emphasis is placed on the practical aspects of working with fiber optic cables, including connectorization, fusion splicing, and testing. Participants in this dynamic course will learn the following:

### **COURSE OUTLINE**

- **The basics of fiber**
- **The different types of fiber and cables**
- **Information transmission and fiber optic LAN**
- **Sources of light loss in fiber**
- **How to specify fiber optic cable**
- **Types of fiber optic connectors, splicing, and tools**
- **Fiber polishing and cleaning**
- **Fiber cable hardware**



## **ADVANCED FIBER OPTIC TECHNICIAN PROGRAM (AFOT)**

**(40 Hours)**

In this hands-on course you will learn advanced connector technology. Topics will include why different connectors work for different applications to produce over 100 terminations including ST, SC, LC, FC, SCAPC and FCAPC connectors. You will also learn alternative terminations with anaerobic adhesive and fast terminating connectors.

### **COURSE OUTLINE**

- **Advanced cable technologies including outside plant cables, indoor riser and plenum**
- **Proper pulling techniques**
- **Pulling and terminating both distribution and loose tube cable**
- **Advanced technologies in single mode and multimode polishing**
- **Techniques to achieve low return loss values**
- **PC, UPC, and APC values**
- **Wiring closet procedures and proper workmanship procedures**
- **Connecting an actual network and test it using the latest equipment including OTDRs and return loss meters**
- **Properly wiring an enclosure using all approved NECA standards**
- **Modem fusion splice techniques**
- **Proper documentation techniques**

**Prerequisite: CFOT CERTIFICATION**



## **BASIC SKILLS FOR ELECTRICIANS**

**(32 Hours)**

This course is designed to provide the skill sets required for Electricians working with an electrical contractor. Problems, examples, applications of wiring methods, installation of panel boards, outlets, branch circuits, feeder, ground rods, switches and basic safety training.

### **COURSE OUTLINE**

Basic skill sets required for electricians, working for electrical contractors. Ohm's Law, types of wiring, switching, panel boards, outlets, rough-in work, finish work, inspections, codes and proper electrical installations reviewed. To include review of basic Ohms law, DC and AC circuits, voltage drop, national electrical codes, wire ampacity, conduit fill box sizing, straight and angle pulls, motor circuits and feeders, overload short circuit ground fault protection, standard and optional calculations, demand tables, service calculations, problems and examples.



## OVERVIEW OF MODERN CARRIER NETWORKS

**(8 Hours)**

The service providers of today are looking to deliver a new wave of residential, business and mobile services. The modern carrier networks deliver converged network transport services of high performance data, voice and video services. Participants in this course will learn about the factors leading to the converged services, key enabling technologies and all the issues that the technologies address.

### COURSE OUTLINE

#### **Converged Network Services**

- Internet Access
- Voice over Internet Protocol (VoIP)
- Internet Protocol Television (IPTV)

#### **Circuit vs. Packet Switching**

- Switching Techniques
- Circuit Switching
- Packet Switching

#### **Point-to-Point and Switched Services**

- Dial-Up Connections
- Leased Lines
- WAN Point-to-Point Services

#### **Residential High-Speed Internet Services**

- What Is a High-Speed Internet Connection?
- What Is DSL?
- What Is Cable?
- Other High-Speed Internet Technologies
  - Satellite Internet Access
  - Cellular 3G Services

#### **The Internet**

- History of the Internet
- Internet Growth Accelerates

#### **The OSI Reference Model**

- The OSI Layers
- Communications Protocols
- Communication Systems
- Protocol Stacks

#### **Transmission Control Protocol/Internet Protocol (TCP/IP)**

- The Protocol Stack
  - Packetization
  - Link Layer
  - Network Layer
  - Transport Layer
  - Application Layer
- Physical and Logical Addressing
- TCP/IP Routing
- IPv4 Addressing
- Ipv6
- TCP/IP as the Converged Network Services Transport
  - Data
  - Voice
  - Video

#### **Circuit Switched Performance on a Packet Switch Transport**

- The Meshing Problem
- Path-Oriented Packet Flow
- DiffServ vs. MPLS
- Bridging the Gap

#### **Multiprotocol Label Switching (MPLS)**

- MPLS Requirements and Objectives
  - MPLS Development
  - MPLS Advantages and Benefits
  - MPLS Services
- How MPLS Operates
  - MPLS Position
- Common Misconceptions about MPLS
- The Promise of MPLS
- MPLS Terminology
- MPLS Terms and Acronyms



## OVERVIEW OF CISCO ROUTERS

**(4 Hours)**

There are other important types of network devices besides the router, understanding how a router works will go a long way toward your understanding the whole of internetworking. Before you can learn how to configure and manage routers, you need to know the basics. This class will provide the participant with a general review of how Cisco Routers work.

### COURSE OUTLINE

#### **Router Overview**

- Router Features

#### **How a Router Works**

- Keeping the Message Moving

#### **Packets and Paths**

- Transmitting Packets
- The Path of a Packet
- Routing Packets
- Knowing Where to Send Data

#### **Addresses**

- Logical Addresses
- MAC Addresses

#### **Router Hardware and Memory**

- WAN Interfaces
- Router Memory

#### **Router Ports and Modules**

#### **Understanding the Protocol**

#### **Security**

- Denial of Service Attacks

#### **Backbone of the Internet**

#### **Lots More Information**

- Cisco Routers
- Comparison of Routers



## INTRODUCTION TO CISCO ROUTING

**(8 Hours)**

This Cisco training workshop is designed for working communication professionals who desire a practical understanding of Cisco router configuration procedures and techniques. The course provides technical descriptions and explanations of the software and hardware architecture, operation, capabilities and applications of Cisco routers. The course introduces the fundamentals of Cisco IOS software that provides learners with the basic skills and knowledge to configure a Cisco IOS router for network connectivity.

### COURSE OUTLINE

#### **Introduction**

- Enterprise networking defined
- Brief history of Cisco routers

#### **The OSI Reference Model**

- Critical layers in a network
- OSI model and protocols

#### **Cisco Router Basics**

- Introduction to hardware components
- Identification of and tests for Cisco router components
- IOS software versions and feature sets
- The boot sequence of a Cisco router
- IOS software commands and shortcuts

#### **The TCP/IP Protocol**

- TCP/IP Protocols
- Sockets and ports
- IP addresses
- IP network design with subnets
- Preparations for IP version 6

#### **Configuration of Cisco Routers**

- Basic router commands
- Operation and configuration of Cisco IOS devices
- Spanning Tree Protocol overview
- Interface Configuration
- IP routes determination
- Construction of topology and network addressing schemes
- Types of transport protocol
- IP traffic management with access lists
- Simple serial network design
- Point-to-point Ethernet LAN construction
- Connections to other networks



## DEPLOYING CISCO ROUTERS

(8 Hours)

In this course, you gain the basic knowledge and skills required to understand the processes, protocols and configurations of Cisco routers. The course explores the Cisco network design in depth, including network architecture, protocols, and physical and logical addressing. Participants will learn network solutions that include network topologies, LAN and WAN hardware and media, network-layer addressing, routing protocols, and network management strategies.

### COURSE OUTLINE

#### **Working with Cisco Networks**

- Review of Cisco architecture
- Configuration of I/O and virtual interfaces
- Interconnections of Cisco network
- Assembly and cabling of Cisco devices
- Operation and configuration of a Cisco IOS
- Configuration servers
- Routing and IP addressing
- Comparison of connected, static, default and dynamic routes
- Physical and logical addressing
- Introduction to Catalyst 1900 switch operations

#### **Interconnecting Cisco Routers**

- TCP/IP network connections
- IP route determination
- Basic IP Traffic management with access Lists
- Connections to the Internet using BGP-4
- DHCP services

#### **Advanced IP Routing Protocols**

- Enhanced IGRP
- EIGRP design objectives and terminology
- Comparison of EIGRP with RIP and OSPF
- Optimization of EIGRP operation for medium and large networks
- Scalable link state routing with OSPF
- Frame relay networks interfacing

#### **Networking to LANs and WANs**

- Serial Point-to-Point connections
- ISDN BRI call completion
- Frame relay PVC connection established
- Network management strategies
- Implementation of simple security policies



## FUNDAMENTALS OF ROUTER CONFIGURATION

**(8 Hours)**

*Fundamentals of Router Configurations* provides the participant with training necessary to understand how to support internal and external router configuration. Participants become familiar with Cisco IOS user interfaces, file management, and system management. Topics included are overview of configuration tasks, learning Cisco IOS command-line interface, user and privileged mode commands, and introduction to routing tables and protocols.

### COURSE OUTLINE

#### **Configuration Fundamental Overview**

- Supported Protocols
- The Cisco Three Layer Hierarchical Models
- Addressing Plans for Networks
- Routing and Networking Protocols
- Routing Tables and Protocols

#### **CISCO IOS User Interfaces**

- Using Command Line Interfaces
- Using Configuration Tools
- Configuring Operations Characteristics for Terminals
- Managing Connections, Menus and Systems Banners
- Using the Cisco Web Browser

#### **File Management**

- Using the Cisco IOP File System
- Loading and Maintaining System Images and "Microcode"
- Modifying, Downloading and Maintaining Configurations Files
- Maintaining Router Memory
- Rebooting a Router
- Configuring Additional File Transfer Functions

#### **System Management**

- Monitoring the Router and the Network
- Troubleshooting the Router
- Performing Basic System Maintenance
- Configuring the System Controller and Managing Shelves



## TROUBLESHOOTING CISCO ROUTERS

(16 Hours)

This course provides a comprehensive introduction to troubleshooting Cisco Routers. It is designed to provide participants with a fundamental understanding of different methods and router modes that can be used to identify and correct issues with Cisco routers. Topics covered in this module include configuration registers, different router modes, and password recovery. Upon completion of this course participants will have the skills necessary to troubleshoot the most common problems typically encountered with a Cisco router.

### COURSE OUTLINE

#### **Introduction**

- Support resources for troubleshooting
- Methods of troubleshooting
- Troubleshooting targets identification

#### **Cisco Router Boot Process**

- The boot image
- Boot options
- Configuration registers
- Changes to configuration register settings
- Password recovery
- Restoration of a missing or corrupt IOS image
- Generic problem-solving model

#### **Protocols**

- Connection-oriented versus connectionless
- Ethernet, IEEE 802.3, Token Ring
- FDDI
- Serial protocols
- TCP/IP

#### **Troubleshooting Tools**

- Applicable tools in troubleshooting
- Analysis of interface problems
- CiscoWorks uses
- Third-party tools

#### **Diagnosis and corrections of Router Operations**

- TCP/IP problems
- Novell networking problems
- Catalyst problems
- Troubleshooting VLANs on routers and switches
- Frame relay problems
- ISDN BRI problems
- Cisco diagnostic tools



## ADVANCED IP ROUTING AND TROUBLESHOOTING

(16 Hours)

*Advanced IP Routing* presents the concepts and knowledge required for any job function involving interaction with routing devices. Participants will gain knowledge and skills required to master advanced features of router configuration, including protocol prioritization, route redistribution, network security, and VLSM.

### COURSE OUTLINE

#### **Cisco Architecture**

- Router components and functionality
- Configuring I/O and virtual interfaces

#### **Routing and Addressing**

- Comparing Routes
- IP Subnetting with VLSM
- Public and Private Address Space

#### **Advanced IP Routing Protocols**

- Enhanced IGSP
- Scalable link state routing with OSPF
- Tuning OSPF

#### **Deploying Large-Scale IP Networks**

- Managing large address spaces
- Exploiting Network Address Translation (NAT)

#### **Improving Network Security**

- Employing IP standard access lists for address filtering
- Controlling applications traffic

#### **Wide Area Networks**

- Building frame relay networks
- ATM technology
- Multi-service IP

#### **Interfacing with External Networks**

#### **Troubleshooting**

- Isolating the trouble
- Router troubleshooting
- Network troubleshooting
- Configuration troubleshooting



## INTRODUCTION TO THE ALCATEL-LUCENT 7x50 SERVICE ROUTERS

**(8 Hours)**

The Alcatel-Lucent 7x50 Series Service Routers (SR) are superior multi-service edge routers built for service providers who are looking to deliver a new wave of residential, business and mobile services. Optimized for the delivery of high performance data, voice and video services, the Alcatel-Lucent 7x50 Series offers a wide range of interfaces with unmatched density and service performance. Participants in this introductory course will learn about the models within the series, key features, physical configurations and a general console navigation overview.

### COURSE OUTLINE

#### **Introduction to Service Routers**

- What is a service router?
- All in one router platform
- Benefits of a converged network architecture
- Role in the market place
- Making communications services portable

#### **Converged Networked Services**

- Triple-Play Services
  - Internet Access
  - Voice Over IP (VoIP)
  - IP Television (IPTV)/Video
- Evolution of Cable Carriers/Service Providers
  - Cable Television
  - Internet Access
  - Re-engineering of Delivery Network
  - Digital Video
  - Voice Over IP (VoIP)
- Evolution of Traditional Telephone Carriers/Service Providers
  - Telephone Services
  - Internet Access
  - Re-engineering of Delivery Network
  - Voice Over IP (VoIP)
  - Digital Video
- Evolution of Cellular Carriers/Service Providers
  - Analog Voice
  - Digital Voice
  - Internet Access
  - Re-engineering of Delivery Network
  - Digital Video
  - Voice Over IP (VoIP)

#### **Models across the of the 7x50 Series**

- 7450 ESS – Release 5.0 DR5
- 7710 SR – Release 5.0 DR5
- 7750 SR – Release 5.0 DR5

#### **Key Features of the 7x50 Series**

- Hardware High Availability Enhancements
  - Enhancements to Any Service Any Port (ASAP)
  - Bidirectional Forwarding Detection (BFD)
  - Ethernet in the first mile (EFM) OAM
  - Hierarchical Quality of Service (H-QoS) on Network Ports
- TCP/IP Enhancements
  - Multi-Chassis Link Aggregation (MC-LAG)
  - Multicast Connection Admission Control (CAC)
  - Internet Group Management Protocol (IGMP) Support
  - IPv6 Service Enhancements
  - IPv6 Layer 3 Filter on Layer 2 Services
- MPLS Enhancements
  - Provider Edge (PE) Routing Functionality
  - Pseudo-Wire Switching
  - LDP over RSVP-TE
  - Class-Based Forwarding

#### **Physical Configurations of the 7750 Series**

- SR1
- SR7
- SR12
- Expansion Options Overview
- Input/Output Modules (IOM)
- Media Dependent Adapter (MDA)
- Switch Fabric/Control Processor Module (SF/CPM)

#### **An overview of the Service Router Operating System (SR OS) startup**

- Configuration Components
- Configuration and Image Loading

#### **An overview of general Command Line Interface navigation**

- Accessing the Command Line Interface (CLI)
- Command Line Interface (CLI) Structure
- Command Line Interface (CLI) Prompts
- Basic Command Line Interface (CLI) Commands



## **CUSTOMER RELATIONSHIP BUILDING:** **INTERNAL AND EXTERNAL**

**(8 Hours)**

This course is designed for employees who deal with customers on a regular basis. It includes but is not limited to call centers, internal facilities and maintenance requests, and any other department involved with providing a service. This program will focus on specific processes already in place and will use real work situations to provide participants with skills to:

- Know what customers expect
- Increase your credibility and your value to the organization
- Manage stressful situations more effectively
- Find solutions to “people problems”
- Improve communications
- Understand the importance of viewing challenges from the other team’s perspective
- Deliver better customer service through improved interdepartmental cooperation and communication
- Build customer relationships through determining customer needs
- Deliver customer satisfaction with every contact

Lecture, exercises, role play and communications techniques are presented during the session to enable participants to review their current strategy and leave the session with concrete plans to implement an effective customer service process.

### **COURSE OUTLINE**

Your Sphere of Influence  
Customer Values/The Value Chain  
Behaviors of Highly Effective Installers  
Leadership Qualities  
Teamwork Principles  
Communication Skills  
Positioning Alcatel-Lucent with the Customer  
Intelligence Gathering  
Taking Stock and Action Plan



## CUSTOMER RELATIONS II

(8 hours)

### PREREQUISITES: CUSTOMER RELATIONSHIP BUILDING: INTERNAL AND EXTERNAL

This course is directed at providing delivery of “world class”, outstanding customer service in realistic situations (virtual experience) that will test the installer’s ability to listen, communicate and ultimately solve the customers’ problems. A significant amount of time will be spent role-playing with ample opportunity to review the role-plays and provide positive, user-friendly feedback to the participants. This course builds on the content and skills learned in the course CUSTOMER RELATIONSHIP BUILDING: INTERNAL AND EXTERNAL.

- Review some typical customer installation requests
- Review overall product and vendor selection including installation, training and testing
- Role-plays as both customer and the installation team
- Look at problems from customer and installation team
- Look at problems from customer’s vantage point and role-play dealing with resolving those problems as installers
- Installers “Scope of Influence”
- Exploring how to identify opportunities to influence customers future decisions
- Exercises on communication and listening skills
- Brainstorming techniques that can be used for problem solving

### COURSE OUTLINE

Customer Service – Key Factors  
Customer Service – Peripheral View  
Typical Customer Requirements  
Who are Your Customers & Their Needs?  
Effective Team Members  
Characteristics - Competent, Empowered Teams  
Problem Solving Process  
Empowerment & Communications Principals  
Competitive Stance



# ALCATEL-LUCENT BASIC COMPUTER TRAINING

(5-Day)

## COURSE OUTLINE

### **MODULE 1: INTRODUCTION TO THE PC**

- The boot process
- Operating systems, applications and disk drives
- The desktop
- Shutting down

### **MODULE 2: MICROSOFT WINDOWS 2000**

- Introduction to Windows
- Working with the desktop
- My computer and Windows Explorer
- Files and Folders

### **MODULE 3: MICROSOFT WORD**

- Introduction to Word
- Creating, saving and printing documents
- Editing documents

### **MODULE 4: MICROSOFT EXCEL**

- Introduction to Excel
- Editing spreadsheets
- Creating, saving and printing spreadsheets

### **MODULE 5: MICROSOFT OUTLOOK**

- Introduction to Outlook
- Creating e-mail
- Receiving and printing e-mail

### **MODULE 6: MICROSOFT INTERNET EXPLORER**

- Introduction to Internet Explorer
- Navigating web pages

### **MODULE 7: ALCATEL-LUCENT HOMEPAGE APPLICATIONS**

- Connecting to Alcatel-Lucent Remote Access
- Installation workflow and instructions
  - Orders and specifications process flow (looking up TEO's and specifications)
  - Materials process flow (Accessing materials lists / statuses, calling in orders, entering problem tickets)
- Additional Homepage Applications
  - OrderView / SpecView
  - InfoSWAP
  - MOPs (Methods and Procedures)
  - CIC
  - Post
  - Quality
  - Safety