

Convergence Technologies Training Program – (CTT) Courseware

Official CTT Classroom Courseware

The Convergence Technologies Training Program (CTT) provides skills training and assessment for the objectives covered in the multiple CTT modules, sessions and there exams. The CTT courseware contains 45 hours of instructor led training comprised of 13 modules delivered in 30 sessions (90 minutes per session) which covers the following topics:

Courseware Modules:

1. Telephony – Basics (2 sessions)
2. Telephony – Advanced (2 sessions)
3. LAN / WAN Fundamentals (4 sessions)
4. Ethernet Switching & PoE Technologies (2 sessions)
5. Convergence Technologies – Essentials & Applications (2 sessions)
6. Broadband T1 & DSL – Basics, Troubleshooting and Testing (2 sessions)
7. TCP/IP v4, v6 with Subnetting (4 sessions)
8. Router Setup and Configuration – Basics (2 sessions)
9. Virtual Private Networking (VPN) and Firewall Security (2 sessions)
10. Convergence Technologies – Support & Troubleshooting (2 sessions)
11. Deployment and Best Practices (2 sessions)
12. Lifecycle Management and Monitoring – (2 Sessions)
13. Finding the Opportunity - (2 Sessions)

Benefits:

- Cost effective voice / data / video training
- Industry experts and experienced instructors
- Real-time instructor led interactive distance learning gives you and your staff the benefits of classroom learning without traveling – saving you thousands of \$
- Courses are focused on the technologies used or sold in your daily duties
- Preparatory course to CTP, CCNA or other manufacturer courses
- Providing “how to” training vs. training to pass a certification test
- Training for qualification vs. certification
- Licensed by company and site vs. by individual student

Who Should Attend?

- Sales professionals and sales engineers
- Telephony and data technicians, field engineers, project managers, trainers, and customer service staff
- Companies with IT Management, system administrators and support staff
- End-user organizations with IT / Telecom staffs purchasing or deploying Voice over IP systems (VoIP), including Video over IP systems
- Individuals planning to attend a CTP, CCNA or manufacturer convergence certification course or exam



CTT – Telephony Basics Module

Benefits:

- **This class evolves from the beginning of telephony up to current technology.**
- **This evolutionary process lays the foundation for a student to more easily understand and grasp more complex technologies.**
- **This foundation will bring clarity to already understood skills and technologies.**

Who Should Attend? This class would benefit the novice and advanced voice and data technicians, customer service and sales staffs.

Subject: The Telephony Basics Class will teach the student a variety of topics. Some of these topics are: Telecom in the Early Years, Basic 5 Telephone Networks; Centralized Switching; Lines, Loops, Trunks, and Media; Numbering Plans; Exchange Rate Areas; Tandems; LATAs; ITSPs calls; Local Service Features; Reliability of Local Service; Integrated Access; Centrex; RBOCs; MUX; T-Carrier Formats; D-4; ESF; B8ZS; Network Clocking; Loaded Coils; and DSL.

Learning Objectives:

A. The student with the aid of this reference will be able to understand the following:

1. Telecom in the early years
2. The basic 5 telephone networks
3. The definition of centralized switching
4. The differences between lines, loops, trunks, and media
5. Numbering Plans and Exchange Rate Areas concepts
6. The relationships of Tandems, LATAs, and ITSPs calls
7. Local Service Features and Reliability of Local Service features
8. The Integrated Access, Centrex, and RBOCs concepts
9. MUX, T-Carrier Formats, D-4, ESF, and B8ZS carrier technologies
10. Network clocking, loaded coils, and DSL networking features

Duration: 2 sessions

CTT – Telephony Advanced Module

Benefits:

- **A wider understanding of the telephony network will bring many expert technicians to a new skill level.**
- **Customer Service and Sales representatives will understand advanced Telco services.**
- **The understanding of these technologies will allow the technician to creatively troubleshoot networking issues.**

Who Should Attend? This class would benefit the novice and advanced voice and data technicians, customer service and sales staffs.

Subject: The Telephony Advanced Class will provide the student with an understanding of many of the industries complex technologies. Some of the areas covered: Types of network with an emphasis on copper wire, loops, lines, and loading coils; BRI and PRI ISDN network architecture; ADSL, HDSL, SDSL, and VDSL; Switching Concepts; Local, Tandem, and Toll Switches; Network, Hierarchical, and Dynamic Routing; BORSCHT; Network Signaling: DTMF; and Call Flow and Setup

Learning Objectives:

A. The student with the aid of this reference will be able to understand the following:

1. The various types of networks
2. How ISDN BRI and PRI function
3. How DSL, and all of its varieties, will work
4. The switching concepts and the different types of switches
5. The different types of Network routing
6. BORSCHT and network signaling concepts
7. How DTMF, call flow, and call setup work

Duration: 2 sessions



CTT – LAN / WAN Fundamentals Module

Benefits:

- **This class will build on many of the basic data technologies and theories.**
- **This step-by-step process is essential for the complete understanding of the advanced data technologies discussed later in this and other classes.**

Who Should Attend? The “LAN / WAN Fundamentals” course is designed to benefit the novice and experienced voice and data technician, customer service, and applications sales staffs.

Subject: The LAN / WAN Fundamentals Class will cover many topics, and this class will start with the basic concepts and terms, and it will work up to some of the more complex topics. These topics are: What is a Network?, Networking Terms and Concepts; Protocols; Units of Measurement; Network Models; LAN and WAN Concepts; Types of Data Transmission; Media; Electrical Properties; Bandwidth and Throughput; Digital and Analog; Base band and Broadband; Media Connectors; Open System Interconnect Model (OSI); Switching Technologies; Topologies; IEEE 802.x Standards; Physical Devices; Ethernet Theory; Troubleshooting tips; Testing Tools.

Learning Objectives:

- A. The student with the aid of this reference will be able to understand the following:
1. The components of a network
 2. Different networking terms, concepts, and protocols
 3. The differences between the open vs. closed system
 4. Networking and LAN / WAN concepts
 5. Data transmission, media, and electrical properties concepts
 6. The differences between bandwidth and throughput
 7. Digital, analog, base band, and broadband signals
 8. The Different type of media connectors
 9. The OSI model
 10. Switching technologies, topologies, and the IEEE 802.x standards
 11. Physical devices, Ethernet theory, and troubleshooting tips

Duration: 4 sessions

CTT – Ethernet Switching & PoE Technologies Module

Benefits:

- **Will provide the proper skills to assist in the understanding and design of switched and routed Local Area Networks (LAN).**
- **Will help the administrator increase the efficiency and response times of a network by proper configuration, segmenting and use of VLAN's.**
- **Insight into the “how” and “why” a switched local area network should be setup.**

Who Should Attend? This class would benefit the novice and advanced voice and data technicians, system engineers, and application sales staffs.

1. **Subject: The Ethernet Switching Course covers the following topics; Layer 2 Switching (and Bridging); Spanning Tree Protocol; Switching Technology; Duplex Operations; MAC Address Table; VLANs; Switching Protocols; Switches; Details about setup, configuration, auto-cluster configuration, administration of the Cisco 2950 and 3550 Switches; Power over Ethernet with details on network device; wireless WAN applications; IP Telephony, and surveillance cameras; Power over Ethernet technologies; pin-out specifications; and Troubleshooting Tips.**

Learning Objectives:

- A. The student with the aid of this reference will be able to understand the following:
1. Layer 2 switching and bridging concepts
 2. Details about the spanning tree protocol
 3. Switching Technologies and duplex operations
 4. The MAC address table
 5. How VLANs, switching protocols, and switches work



6. Details about setup, configuration, auto-cluster configuration, and administration of ether switches
7. Power over Ethernet (PoE) technologies with details on network device, wireless WAN applications, IP telephony, and surveillance cameras

Duration: 2 sessions

CTT – Convergence Technologies – Essentials & Applications Module

Benefits:

- **Learn vendor-independent convergence networking, skills and concepts.**
- **Understand Convergence Industry standards and protocols.**
- **Apply VoIP networking knowledge to properly engineer and implement a VoIP system including remote sites and Teleworkers.**

Who Should Attend? This class would benefit the novice and advanced voice and data technicians, system engineers, LAN / WAN system administrators and application sales staff.

Subject: Data networks; voice networks; VoIP; H.320; H.323; VoIP & NAT; Gateways; Gatekeepers; H.2xx Video Codec's; G.7xx Audio Codec's; and QoS.

Learning Objectives:

A. The student with the aid of this reference will be able to understand the following:

1. Convergence networking protocols
2. What is VoIP
3. H.320 & H.323 standards
4. VoIP bandwidth, signaling and NAT issues
5. Media Gateways & Gatekeepers
6. Video Codec standards
7. Audio Codec's G.7xx series
8. QoS and Bandwidth planning and concerns

Duration: 2 sessions

CTT – Broadband T-1 & DSL – Basics, Troubleshooting & Testing Module

Benefits:

- **This class will build a solid foundation of basic T-1 & DSL theory and operation for the inexperienced and experienced Voice and Data technicians, or system engineers.**
- **Understanding the effects of T-1 signaling errors on a network.**
- **Understanding of the causes of T-1 signaling errors.**

Who Should Attend? This class would benefit the novice and advanced voice and data technicians, system engineers, and WAN administrators.

Subject: The "WAN T-1 Basics, Troubleshooting & Testing Class" will cover, among other topics: Types of Data Networks; the OSI Model; Encapsulation; Network Architecture; Protocols; Analog and Digital; Binary and Scientific Notation; Channels and T-1 Carriers; ISDN; Data Transmission Speeds; MUX and T-1 Frame; Frame Relay; the CSU/DSU and PBX; and Line Signaling. T-1 Error Signals; Loop-back Testing; Troubleshooting Test Steps; Physical Devices; CSU/DSU; T-1 Cable Distances; Async and Sync signaling; DSL and Cable Modem Access.

Learning Objectives:

A. The student with the aid of this reference will be able to understand the following:

1. Analog and digital signals
2. Channels and T-1 carriers
3. ISDN signaling
4. Data transmission speeds
5. MUX and T-1 frame concepts
6. Line Signaling (D-4, ESF, AML, and B8ZS)



7. The different type of T-1 error signals
8. Loop back testing (The Where and Why)
9. Troubleshooting test steps
10. The CSU/DSU device and capabilities
11. Asynchronous and synchronous signaling
12. DSL and cable modem Internet access

Duration: 2 sessions

CTT – TCP / IP and Subnetting Module

Benefits:

- **This class is a must for all technicians, system engineers, and LAN / WAN administrators.**
- **Understanding IP is vital if you want to completely understand networking.**
- **The proper ways to manipulate and assign an IP address.**
- **The technical person who understands IP will likely have a better understanding of network troubleshooting.**

Who Should Attend? This class would benefit the novice and advanced voice and data technicians, system engineers, and LAN / WAN system administrators.

Subject: TCP / IP and Subnetting Course will thoroughly cover the IP protocol stack, and the topics covered are as follows: The OSI Model; Binary to Decimal – With Lab; IP Address Version 4, Subnet Mask, and Default Gateway; IP Classes; the ANDing Process; Subnetting; CIDR; Super netting; VLSM; IP Assignments; NAT; and TCP/ IP Address Version 6.0.

Learning Objectives:

A. The student with the aid of this reference will be able to understand the following:

1. The OSI model
2. Converting Binary to Decimal, and vice versa
3. IP addresses Version 4.0, subnet mask, and the default gateway
4. The different IP classes
5. The ANDing process and subnetting
6. How CIDR, Super netting, and VLSM work
7. How to assign an IP address
8. The NAT process
9. TCP/IP Version 6.0

Duration: 4 sessions

CTT – Router Setup and Configuration Module

Benefits:

- **This course will train the Converged Voice and Data Technician or Engineer, whether experienced or not, to configure and manage a router.**
- **The many topics covered that will benefit the experienced networking technicians with their troubleshooting skills.**

Who Should Attend? This class would benefit the novice and advanced voice and data technicians, system engineers, LAN / WAN administrators.

Subject: The Router Setup and Configuration Class will cover the following topics: A Router's Role in a LAN/WAN; Connecting Multiple WANs – Frame Relay, etc.; WAN Schematic – Layer 1 through 3; A Router's Relationship with the CSU/DSU; Hardware and Software; Understanding boot process; Access Methods; Modes of Operation; Passwords and Configuration commands; Command Prompts; Connectivity Testing; Router Access Methods; Understanding Route Statements; and Monitoring Protocols. Distance Vector and Link State; Protocols – Interior and Exterior; TFTP Function; Access Lists; Troubleshooting Tips; and Serial and Frame Relay Connections.



Learning Objectives:

A. The student with the aid of this reference will be able to understand and perform the following:

1. A router's role in the LAN / WAN
2. How to connect multiple WANs
3. The hardware and software of the router
4. Access methods and Modes of operation
5. How to set Passwords and use some of the configuration commands
6. Router access methods, route statements, and monitoring commands and protocols concepts
7. Advanced networking commands in the router
8. Interior and exterior protocols
9. Troubleshooting tips

Duration: 2 sessions

CTT – Virtual Private Networking (VPN) and Firewall Design & Configuration Module

Benefits:

- **Provides the advanced knowledge and skills to configure routers for VPN and firewall services**
- **Provides the student the ability to understand VPN's, encryption, corporate network security**
- **Provides ability for technical staff to better manage VPN's and firewall**

Who Should Attend? This class would benefit the novice and advanced voice and data technicians, systems engineer, and WAN administrator.

Subject: Computer security is paramount today, and protecting your company's network is essential for success in today's market. Our "VPN & Firewalls Design & Configuration" class is excellent for the security conscious network administrator, technician or systems engineer. Corporate LAN / WAN Security will be covered at a variety of levels. An array of security topics are covered, and these topics range from physical desktop security, proper password selection, stopping network intrusion, and many other topics. Please look below for a complete inventory of the subject matter.

Learning Objectives:

A. The student with the aid of this reference will be able to understand and perform the following:

1. LAN Security
 - a. Goals for Computer LAN Security
 - b. System Access Controls and Proof of Access
 - c. Selecting and Protecting Passwords
 - d. Proof of Authentication and Data Access Controls
 - e. Natural and Physical Threats to Systems
 - f. Virus', Anti Virus, and Virus Recovery
 - g. Threats to Security
 - h. Day-to-Day Administration
2. VPN
 - a. VPN what is it?
 - b. Security and Architecture
 - c. Rule order and Rule Base
 - d. Authentication and Tunneling
 - e. Client Administration
 - f. Dynamic Addressing
 - g. Protocols for Remote Access
 - h. Selecting and Setting up a VPN Solution and System
 - i. Private Line vs. Local Loop
 - j. IP Latency
 - k. Types of VPN Connections
 - l. Software, Hardware, and hybrid solutions
 - m. Point-to-Point Protocol (PPP), HDLC, and SLIP
 - n. Synchronous and Asynchronous Technologies



3. Firewall
 - a. Setting Firewall Expectations
 - b. Methodology of The Firewall
 - c. Rule base
 - d. Authentication and Encryption
 - e. Logging and Tools
 - f. TCP and UDP Filtering
 - g. Time To Live (TTL) – Firewalking
 - h. Gateway, Server, and Proxy Server
 - i. Remote Access and Personal Firewall
 - j. Intrusion Detection – The Goal and The Solution
 - k. Implementing the Alert Script

Duration: 2 sessions

CTT – Convergence Technologies – Support & Troubleshooting Module

Benefits:

- **Learn to troubleshoot VoIP systems and applications**
- **Learn to test and qualify network issues**
- **Gain a greater understanding of QoS & bandwidth management**
- **Learn best practices for VoIP implementation, testing & ongoing system management**

Who Should Attend? This class benefits voice and data technicians, system engineers, and LAN / WAN system administrators.

Subject: Perform basic network pre-assessment tests; Implement VoIP systems to existing networks; troubleshooting networks & devices; understand how to isolate quality issues and work with IT staffs or vendors for resolution.

Learning Objectives:

A. The student with the aid of this reference will be able to understand the following:

1. VoIP Implementation issues
 - i. IP addressing within an existing network
 - ii. Bandwidth utilization – current, required & ongoing
 - iii. Ether switching and PoE design & network optimization
2. Causes of poor voice quality or drop call conditions
3. Troubleshooting process to isolate causes, resolution and testing
4. Working with onsite IT staff or other IT vendors
5. QoS testing and validation process
6. QoS for business & home Internet access
7. Remote Troubleshooting methods for devices and bandwidth

Duration: 2 sessions

CTT – Convergence Technologies – Deployment and Best Practices

Benefits:

- **Become aware of best practices for successful VoIP deployment**
- **Examine the requirements for a converged voice and data network**
- **Understand how the TCP/IP protocols, routers and MPLS operate in a converged environment**
- **Planning the implementation of an IP Telephony solution**
- **Assessing the LAN/WAN and closet requirements for VoIP**
- **Learn the basics on how to manage WAN bandwidth, performance and MPLS services**
- **Understand how to measure voice quality i.e. QoS**
- **Analyze the failures and problems that will arise in an IP Telephony operation**



Who Should Attend? This class benefits voice and data technicians, system engineers, and LAN / WAN system administrators.

Duration: 2 Sessions

CTT – Convergence Technologies – Lifecycle Management and Monitoring

Benefits:

- Learn how to determine customers actual costs associated with purchasing VoIP Including - staff training, equipment infrastructure and broadband services
- Determine what is the lifecycle of VoIP?
- Understanding the 3 distinct phases required to offer carrier grade VoIP service
 - Network Assessment
 - Deployment Verification
 - On-Going Monitoring
- Understand Network Performance Monitoring and Utilization
- Reporting and Real Time Monitoring
- Real-Time Notification & Monitoring of:
 - Network errors, outages, high bandwidth and processor utilization periods
 - Equipment and power failures, SLA verification and back-up
- Helpful Internet links and resources

Who Should Attend? This class benefits voice and data technicians, system engineers, and LAN / WAN system administrators.

Duration: 2 sessions

CTT – Convergence Technologies – Finding the Opportunity

Benefits:

- How to determine Strengths, Weaknesses, Opportunity and Threats - S.W.O.T.
- Apply a step-by-step process to analyze current systems and infrastructure
- Convergence S.W.O.T. Application Checklist
- Evaluate opportunities/needs to establish the business justification for VoIP
- Strategic planning. Grounded in specific business needs and issues
- The five step process for creating a scope of work
- Setting the customers expectation for a successful VoIP implementation
- Successful customer implementations - checklist and plan
- Measuring results following cutover and tuning the plan based on the outcome
- Identifying customers, verticals and applications – Dealer/VAR forum
- Increase your sales and margins

Who Should Attend? This class benefits voice and data technicians, system engineers, and LAN / WAN system administrators.

Duration: 2 Sessions

