



Convergence Technologies Professional (CTP)

Course 1: Data Networking

The *Data Networking* course teaches you the fundamentals of networking. Through hands-on training, you will learn the vendor-independent networking skills and concepts necessary for entry-level professionals seeking employment in the Information Technology (IT) or telecommunications industries.

In *Data Networking*, you will learn to identify networking models and topologies, describe the function and purpose of network operating systems, and monitor system performance. You will learn how various networking components map to the layers of the Open Systems Interconnection reference model (OSI/RM). You will also learn about the process of packetization; learn to identify key networking protocols; and explore the nature, purpose and operating essentials of protocols that make up the TCP/IP suite.

You will learn about various LAN, WAN and wireless standards, and about wireless vulnerabilities and security. You will explore the routing process, study Internet addressing, learn to identify address classes, learn about the use of private addresses, and learn to perform subnetting. You will also learn how to use various TCP/IP diagnostic and troubleshooting tools.

This course prepares you to take the Telecommunications Industry Association (TIA)-endorsed CTP (Convergence Technologies Professional) exam. This course has been written to standards specific to North America and Japan. However, the CTP exam does not focus on differences between EMEA and North American standards.

All CTP courses offer Case Studies for class discussion about real-world skills applications. Guided, step-by-step labs provide opportunities to practice new skills. You can challenge yourself and review your skills after each lesson in the Lesson Summary and Lesson Review sections. Additional skill reinforcement is provided in Activities, Optional Labs, Lesson Quizzes and a Course Assessment that are available from your instructor.

This coursebook includes a supplemental CD-ROM containing the lab files used in class. To practice the skills presented in class or to perform any labs that were not completed, refer to the Classroom Setup section for information about system requirements and lab files.



Topics

Introduction to Data Networking

Networks Defined
Network Topologies
Networking and Telephony Standards Organizations
OSI Reference Model
Data Encapsulation
Packets
Introduction to TCP/IP

Transmission, Communication and Wiring

Transmission Types
Digital Signaling
Communication, Ports and Connectors
Transmission Media
Proper Cabling Procedures

LANs and WANs

Basics of LANs and WANs
Common Network Components
Networking Methods and Standards
IEEE LAN Standards
WAN Methods and Standards
Remote Access Concepts and Methods
Virtual Private Networks (VPNs)

VPN Protocols and Standards
VPN Benefits and Vulnerabilities
Wireless Technologies
Wireless LANs
IEEE 802.11 Wireless Standards
Wireless Network Security Issues
Wireless Network Security Solutions
Wireless Network Configuration Settings
Attaching an Access Point to a Wired Network

TCP/IP Suite and Internet Addressing

TCP/IP
Reviewing the TCP/IP Four-Layer Model
Introduction to Routing
Routing Protocols
Data Fragmentation and the Maximum Transmission Unit (MTU)
Connection-Oriented and Connectionless Protocols
Port Numbers
Internet Addressing
Internet Address Classes
IP Addressing Rules

Private IP Addressing
Subnetworks
Custom Subnet Masks
Classless Interdomain Routing (CIDR)
IP Address Conservation
IP-Enabled Device Configuration Parameters
IPv6 Addressing Essentials

QoS, VLANs and Troubleshooting

Quality of Service (QoS)
QoS Technologies
QoS on Wireless Networks
Virtual LANs (VLANs)
Troubleshooting Overview
Overview of TCP/IP Troubleshooting Tools
Internet Control Message Protocol (ICMP)
General Network Troubleshooting Commands
Name and Address Commands
Network Analyzers
Review of Troubleshooting Tools
Troubleshooting Considerations

Target Audience

Field technicians, voice and telephony technicians, networking administrators, systems engineers, data-communications technicians, technical sales and marketing professionals, telephony professionals who need data, and any individual interested in pursuing or advancing a data or convergence technologies career.

Job Responsibilities

Implement products and services in accordance with industry standards, apply basic troubleshooting practices, verify interoperability, identify components of a converged network and the challenges of integrating circuit-switched and packet-switched networks, properly implement IP addressing plans, and establish Voice-over IP (VoIP) requirements.

Course Length

Data Networking is a 12-hour course.

Prerequisites

Candidates who hold certifications such as CIW Foundations, CIW Server Administrator, CompTIA Network+ or Cisco CCNA will derive the most benefit from this course. At least 12 months of networking experience is recommended before taking this course. For example, students should already be familiar with configuring a basic TCP/IP network.