

TCP/IP NETWORKING

Course Code: 9025

Exclusive - Learn the essential skills needed to set up, configure, support, and troubleshoot your TCP/IP-based network.

TCP/IP is the globally accepted group of protocols at the core of the Internet and organizational intranets. A solid understanding of each of these protocols and how they work will give you the ability to deploy the most effective network for your organization in three key areas:

- Efficiency: You will be able to run a more efficient network through proper implementation of subnetting and understanding how different protocols and applications impact network performance.
- Dependability: You will reduce downtime in the event of a network failure as you will be better equipped to quickly identify and resolve problems as they occur. You will also be able to solve problems in-house rather than incurring the extra costs and time required to hire a consultant.
- Future growth: Proper planning will ensure that your network can accommodate growth, including the implementation of more robust network technologies, such as IPv6.

In this course, you will gain the essential knowledge and skills required to set up, configure, support, and troubleshoot your TCP/IP-based network. Our expert instructors and extensive hands-on labs will prepare you to face and overcome the challenges of today's complex networks. This course—the longest running of its kind in the industry—also prepares you for more specialized courses in network security, wireless integration, and Voice over IP (VoIP) as well as for product-specific training such as Cisco, Avaya, and Microsoft.

What You'll Learn

- Describe the essential elements of the TCP/IP protocol suite
- Explain the functions of various devices in a TCP/IP network
- Subnet an IP network using variable-length subnet masking (VLSM), calculating appropriate subnet values to improve network efficiency
- Describe different TCP/IP protocols—ARP, IP, ICMP, TCP, UDP, and so forth—including their functions and relationships
- Examine IP routing and the protocols that support it, such as RIP, EIGRP, OSPF, and BGP
- Explain how applications like FTP, HTTP, Telnet, and others work in a TCP/IP

network

- Analyze UDP and TCP application traffic to identify normal versus abnormal sessions
- Automate address assignment and name resolution using DHCP and DNS
- Analyze multicasting and Voice over IP (VoIP) traffic to determine how these protocols affect network performance
- Troubleshoot problems at each layer of a TCP/IP network using a variety of tools, including a protocol analyzer, traceroute, ping, and DNS and ARP cache manipulation
- Analyze ICMP variation reports to determine the cause of a network failure
- Explore network security protocols, including PPTP, L2TP, IPSec, SSL, TLS, and SSH
- Analyze network traffic to determine security risks
- Explore the functions of IPv6 and its related protocols

Who Needs to Attend

Anyone who is responsible for designing, installing, configuring, and maintaining TCP/IP networks or who needs to understand TCP/IP protocol structures and functions will benefit from this course. This course also provides excellent preparation for more advanced networking training.

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CLASSROOM LIVE

\$3,495 USD

5 Day

Classroom Live Outline

- 1. TCP/IP Overview
- Origins of TCP and IP
- ARPANET Requirements Documents
- Collaborative Network Requirements
- Documentation and RFCs
- 1. TCP/IP Numbering Systems
- Introduction to Numbering Systems
- Positional Numbering System Basics
- Numbering Systems Used in Data Systems
 - □ Decimal Numbering
- Converting between Numbering Systems
- Counting
- Guidelines for Determining the Base of a Number
- 1. Network Access Review
- Introduction
- MAC Addressing
- The Ethernet Header
- The Ethernet Frame
- Protocol Analysis Tools

- 1. IPv4 Addressing
- Logical Addressing
- IP Address Features
- Dotted Decimal Notation
- Classful Addressing
- Reserved Addressing
- Network Mask: Boolean Logic
 - Network Mask: Comparing Addresses
- A Flat Network
- Classful Address Limitations

 - □ Private Addressing
- Network Address Translation
- Classless Inter-Domain Routing

Module Review and Discussion Questions

- 1. IPv4 Subnets
- Subnetting Overview
- FLSM vs. VLSM
- Calculating Subnet Values
- VLSM Example: Determine Needs

 - A Future Fourth Subnet
- CIDR and VLSM
- 1. Address Resolution Protocol
- Address Mapping
- ARP Restrictions
- ARP Cache
- ARP Commands
- ARP Message Fields
- Additional ARP Capabilities
- 1. Multicasting
- What Is Multicasting?

- Uses for Multicasting
- Multicasting Overview
- Reserved Multicast Addresses
- Internet Group Management Protocol
- Multicast Routing
 - Mapping Class D IP Address to an Etherent Multicast Address
- Putting It All Together
- 1. Internet Protocol Version 4
- Internet Protocol Overview
- Self-Healing Networks
- IPv4 Header

 - □ DS Field

 - M Protocol Field
- IPv4 Sample Data Exchanges
- 1. IP Routing
- IP Routing Overview
- Routing Function
- IP Routing Algorithm
- Types of Routing Protocols
- Choosing the Best Path
- Routing Tables
- Routing Information Protocol
- Open Shortest Path First
- Enhanced Interior Gateway Routing Protocol
- RIP vs. OSPF vs. EIGRP
- Border Gateway Protocol
- Layer 3 Switching
- 1. UDP Sessions
- TCP/IP Protocols

- Connectionless Protocols
- Connection-Oriented Protocols
- Low Overhead vs. Reliability
- UDP Header Layout
- UDP/TCP Ports
- UDP Ports and Sockets
- UDP Application Port Examples
- Sample UDP Data Exchanges
- 1. TCP Sessions
- TCP/IP Protocols
- Reliable Transport Services
- TCP Characteristics
- TCP Header Overview

 - Acknowledgment Number
 - M Header Length
 - Session Flags
 - M Window Size

 - Maximum Segment Size and Window Size
- TCP Connection Establishment
- TCP Data Flow
- TCP Connection Termination
- TCP Congestion Management
 - □ Default Congestion Management
 - Advanced Congestion Management
 - M Explicit Congestion Notification and TCP
- TCP Sample Data Exchanges
- 1. Autoconfiguration
- TCP/IP Protocols
- Manual vs. Automatic Assignments
- Historical Solutions
 - Reverse Address Resolution Protocol
- DHCP Overview
- DHCP New Lease Acquisition Process
 - □ DHCP Discovery Example
 - □ DHCP Offer Example
 - □ DHCP Request Example
 - □ DHCP Acknowledgment Example
- DHCP Message Format

- DHCP Scopes and Options
- IP Lease Renewal
- DHCP in a Routed Network
- Multiple DHCP Servers
- Troubleshooting DHCP
- 1. Domain Name System
- TCP/IP Protocols
- Name and Number Organizations
- The DNS Name Space
- DNS Name Servers
- A Distributed Service
 - □ DNS Name Resolution Process
 - DNS Message Format
 - □ DNS Resource Records
 - □ DNS Query Example
 - □ DNS Answer Example
- Reverse Lookup
- Dynamic DNS
- Troubleshooting DNS
- 1. ICMP Diagnostic and Error Reports
- ICMP Overview
- ICMP Basics
- ICMP Message Destinations
- Silent Discard vs. Informed Discard
- ICMP Message Layout
- ICMP Message Types

 - □ Destination Unreachable Example
- ICMP Sample Data Exchanges
- 1. Common TCP Applications
- TCP/IP Protocols
- Telnet
- File Transfer Protocol

- E-Mail
- World Wide Web
- 1. Common UDP Applications
- TCP/IP Protocols
- Trivial File Transfer Protocol
- Simple Network Management Protocol

 - SNMP Agent Model

 - Remote Network Monitoring
- 1. VOIP Implementation
- Introduction
- Benefits of VolP
- TCP/IP Protocols Used by VoIP
- VolP System Components
- VoIP Protocols
- Session Initiation Protocol

 - SIP Proxy Function
- Session Description Protocol
- VolP Codecs
- Real-Time Transport Protocol
 - RTP Header Layout
- 1. TCP/IP Security
- TCP/IP Security Concerns
- The CIA Triad
- TCP/IP Vulnerabilities
- TCP/IP Security Protocols

- □ DNSSEC
- 1. Internet Protocol Version 6
- Overview
- IPv6 Addresses
- IPv6 Headers
- ICMPv6
 - □ Destination Unreachable
 - □ Packet Too Big

 - □ Parameter Problem

 - Router Advertisement
 - Neighbor Solicitation
 - Neighbor Advertisement
- IPv6 DNS Records
- IPv6 Routing Services and Protocols
- Internet2

Classroom Live Labs

- LAB 1: TCP/IP Math
- LAB 2: Lab Setup and Ethernet Header Analysis
- LAB 3: IP Addressing and Fixed-Length Subnetting
- LAB 4: Variable-Length Subnetting
- LAB 5: ARP Analysis
- LAB 6: Multicasting
- LAB 7: Identify Network Access problems
- LAB 8: IP Header Analysis
- LAB 9: IP Routing
- Lab 10: Use traceroute to Identify Network Problems

LAB 11: UDP Transactions

LAB 12: TCP Analysis

LAB 13: Identify Transport Layer Problems

LAB 14: DHCP Process Analysis

LAB 15: DNS Analysis

LAB 16: ICMP Analysis

LAB 17: TCP Application Analysis

LAB 18: UDP Application Analysis

LAB 19: VOIP Protocol Analysis

LAB 20: Secure Shell

LAB 21: IPv6 Protocol Analysis

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Jan 12 - 16, 2026 | 8:30 AM - 4:30 PM EST

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May 18 - 22, 2026 | 8:30 AM - 4:30 PM EDT

Jul 13 - 17, 2026 | 8:30 AM - 4:30 PM EDT

Sep 14 - 18, 2026 | 8:30 AM - 4:30 PM EDT



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PRIVATE GROUP TRAINING

5 Day

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