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 | $3,395 USD | 5 days |

Classroom Live Outline

1. TCP/IP Overview
   - Origins of TCP and IP
   - ARPANET Requirements Documents
   - Collaborative Network Requirements
     - One Protocol?
     - The TCP/IP Networking Model
   - Documentation and RFCs
     - Types of RFCs

1. TCP/IP Numbering Systems
   - Introduction to Numbering Systems
   - Positional Numbering System Basics
   - Numbering Systems Used in Data Systems
     - Decimal Numbering
     - Binary Numbering
     - Hexadecimal Numbering
   - Converting between Numbering Systems
     - Converting Binary or Hexadecimal to Decimal
     - Converting Decimal to Binary or Hexadecimal
     - Converting between Hexadecimal and Binary
   - Counting
   - Guidelines for Determining the Base of a Number

1. Network Access Review
   - Introduction
   - MAC Addressing
   - The Ethernet Header
     - Ethernet Protocol Types
   - The Ethernet Frame
     - Ethernet Frame Format Modifications
   - Protocol Analysis Tools
1. IPv4 Addressing
   • Logical Addressing
   • IP Address Features
   • Dotted Decimal Notation
   • Classful Addressing
     ◦ Classful Addressing: Class A
     ◦ Classful Addressing: Class B
     ◦ Classful Addressing: Class C
     ◦ Classful Addressing: Class D
     ◦ Classful Addressing: Class E
   • Reserved Addressing
   • Network Mask: Boolean Logic
     ◦ Network Mask: Comparing Addresses
   • A Flat Network
   • Classful Address Limitations
     ◦ Subnetting Classful Address Blocks
     ◦ Private Addressing
   • Network Address Translation
     ◦ Variable-Length Subnet Masking
   • Classless Inter-Domain Routing
     ◦ CIDR Prefix Notation
     ◦ CIDR Address Blocks

Module Review and Discussion Questions
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   • Subnetting Overview
   • FLSM vs. VLSM
   • Calculating Subnet Values
   • VLSM Example: Determine Needs
     ◦ The Default Mask
     ◦ The First Subnet
     ◦ The Second Subnet
     ◦ The Third Subnet
     ◦ The Current Picture
     ◦ Sequential Allocation Error
     ◦ 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
  º Joining Multicast Groups
• Multicast Routing
  º 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
  º IPv4 Header Layout
  º DS Field
  º Explicit Congestion Notification
  º Total IP Length
  º Identification Field
  º Fragmentation
  º Time To Live
  º Protocol Field
  º IPv4 Header Checksum
  º IPv4 Address Fields
  º IPv4 Options
• IPv4 Sample Data Exchanges
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  • IP Routing Overview
  • Routing Function
  • IP Routing Algorithm
  • Types of Routing Protocols
• Choosing the Best Path
  º Routing Metrics
  º Administrative Distance
• Routing Tables
  º Workstation Routing Tables
  º Router Routing Table
• Routing Information Protocol
  º RIP Basics
  º RIP Route Loops
• Open Shortest Path First
• Enhanced Interior Gateway Routing Protocol
• RIP vs. OSPF vs. EIGRP
• Border Gateway Protocol
• Layer 3 Switching
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• 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
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• TCP/IP Protocols
• Reliable Transport Services
• TCP Characteristics
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• TCP Connection Termination
  ◦ TCP Reset
• TCP Congestion Management
  ◦ Default Congestion Management
  ◦ Advanced Congestion Management
  ◦ Explicit Congestion Notification and TCP
• TCP Sample Data Exchanges
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• TCP/IP Protocols
• Manual vs. Automatic Assignments
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  ◦ Reverse Address Resolution Protocol
  ◦ Bootstrap Protocol
• DHCP Overview
• DHCP New Lease Acquisition Process
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  ◦ Root Servers
  ◦ Primary and Secondary Name Servers
• A Distributed Service
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  ◦ DNS Resource Records
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  ◦ DNS Answer Example
• Reverse Lookup
• Dynamic DNS
• Troubleshooting DNS
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• Session Description Protocol
• VoIP Codecs
• Real-Time Transport Protocol
  • RTP Header Layout
1. TCP/IP Security
• TCP/IP Security Concerns
• The CIA Triad
• TCP/IP Vulnerabilities
  • TCP/IP Vulnerabilities: Network Access Layer
  • TCP/IP Vulnerabilities: Internet Layer
  • TCP/IP Vulnerabilities: Transport Layer
  • TCP/IP Vulnerabilities: Application Layer
• TCP/IP Security Protocols
  • Network Access Security Tools
  • IP Security
  • Virtual Private Networks
  • TLS and SSL
DNSSEC
Secure Shell Protocol

1. Internet Protocol Version 6
   • Overview
   • IPv6 Addresses
     ◦ IPv6 Address Categories
     ◦ Breaking Down IPv6 Addresses
     ◦ Global Unicast Address Format
     ◦ Interface ID Structure
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   • IPv6 Headers
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     ◦ Neighbor Solicitation
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     ◦ Redirect Message
   • IPv6 DNS Records
   • IPv6 Routing Services and Protocols
   • Internet2

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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
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LAB 18: UDP Application Analysis
LAB 19: VOIP Protocol Analysis
LAB 20: Secure Shell
LAB 21: IPv6 Protocol Analysis

Nov 4 - 8, 2019 | 8:30 AM - 4:30 PM | MORRISTOWN, NJ
Dec 2 - 6, 2019 | 8:30 AM - 4:30 PM | HOUSTON, TX
TCP/IP NETWORKING
Course Code: 9025

Virtual Classroom Live Outline

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   • Address Mapping
   • ARP Restrictions
   • ARP Cache
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Sep 16 - 20, 2019 | 8:30 AM - 4:30 PM EST
Sep 23 - 27, 2019 | 11:30 AM - 7:30 PM EST
Sep 30 - Oct 4, 2019 | 9:30 AM - 5:30 PM EST
Oct 7 - 11, 2019 | 8:30 AM - 4:30 PM EST
Nov 4 - 8, 2019 | 8:30 AM - 4:30 PM EST
Dec 2 - 6, 2019 | 9:30 AM - 5:30 PM EST
Dec 9 - 13, 2019 | 8:30 AM - 4:30 PM EST
Dec 16 - 20, 2019 | 11:30 AM - 7:30 PM EST
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ON-DEMAND  $895 USD  90 days

On-Demand Outline

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  ◦ Management Information Base
  ◦ Remote Network Monitoring
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• TCP/IP Protocols Used by VoIP
• VoIP System Components
• VoIP Protocols
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  ◦ SIP Proxy Function
• Session Description Protocol
• VoIP Codecs
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   - IPv6 Routing Services and Protocols
   - Internet2

On-Demand 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
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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
TCP/IP NETWORKING

Course Code: 9025

Blended Live Outline

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PRIVATE GROUP TRAINING 5 days

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