

Hands-On TCP/IP Networking



Course Description

In this Hands-On TCP/IP course, the student will work on a live TCP/IP network, reinforcing the discussed subject material. TCP/IP is the communications protocol suite on which the Internet and most commercial networks operate. In this course, we will cover a comprehensive technical overview of TCP/IP. Extensive hands-on exercises provide the practical experience you need to configure a host, employ TCP/IP tools, use application services and access TCP/IP-based internetworks.

This Hands-On course is a structured approach to the concepts and principles of the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol suite, how the most important protocols function, and their basic configuration.

Students Will Learn

- **Understand The essential elements of the TCP/IP protocol suite**
- **Develop a hands-on skill set targeted at TCP/IP networking in the following key areas of IP Addressing and Subnetting, Routing protocols and the control plane of IP and Quality of Service**
- **Explore the 7-layer OSI model, and the TCP/IP suite of protocols**
- **Design IP networks and subnetworks using addressing expertise developed in this class**
- **Understand selection options of IP routing protocols**
- **Configure fundamental properties of IP Quality of Service**
- **Gain a fundamental understanding of Voice over IP, Video over IP and Multicast Services**
- **Understand the future of IP - IPv6**
- **Use a protocol analyzer to isolate and troubleshoot network problems**
- **Troubleshoot problems at each layer of a TCP/IP network**
- **And more...**

Target Audience

Technicians, Engineers, and Supervisors Operations individuals that will provide IP configuration and support services
Development Engineers that must know TCP/IP networking in order to provide hardware and software solutions
Network Design Engineers that need to understand TCP/IP services and applications
Network Management individuals that are providing element and network management tools
Network Administrators and IT professionals
Technical sales and marketing individuals that must be able to correlate features with functionality
Certification Track individuals that need to expand their knowledge and studies.

Prerequisites

This course encourages a basic understanding of PC and networking concepts and terminology.

Course Outline

Overview and Introductions

- Introduction to the TCP/IP
- Architectural Overview of the TCP/IP Protocol Suite
- Key TCP/IP application services
- Introducing TCP/IP protocol architecture
- TCP/IP layering
- Components of TCP/IP networks
- The Internet Protocol (IP)
- Fundamental internetworking concepts
- Internet addressing: IP address classes A, B, C, D, E
- Addressing
- Subnetting
- IP Routing
- Dynamic Host Configuration Protocol (DHCP)
- Host Name Resolution
- Domain Name System (DNS) Overview

The TCP/IP Stack Operation

- Application Layer
- Applications and Management Protocols
- File transfer protocols: FTP, TFTP
- Network Virtual Terminal (TELNET)
- Employing DNS BIND
- SMTP, POP3, Iand MAP4
- Layer 4: Transport Layer (TCP, UDP and SCTP)
- The Transmission Control Protocol (TCP)
 - TCP Ports
 - TCP packet structure
 - TCP performance issues
- The User Datagram Protocol (UDP)
- Layer 3: IP Layer
- IP Addressing
- IP Subnet Addressing
- IP Subnet Addressing Lab
- Basic IP Network configuration/Addressing Lab
- IP address resolution
- Private IP addresses: application proxy firewalls
- Resolving MAC addresses with ARP
- Using RARP, BOOTP and DHCP
- Introduction to IPv6
- Basic IP Network configuration/Addressing Lab
- IP Subnet Addressing Workshop

IP Routing Protocols

- Basics of IP Routing, RIP
- IP Routing with RIP Lab
- Interior and Exterior Gateway Protocols
- OSPF and BGP routing protocols
- Routing with BGP
- Exterior Routing with BGP
- Internetworking with IP Routers
- Implementing routed networks
- Common IP routing protocols: RIP, OSPF
- Subdividing IP networks (subnetting)
- Control messages on IP networks: ICMP
- Classless Inter-Domain Routing (CIDR)
- Network Address Translation (NAT)
- Troubleshooting problems
- IP Routing Workshop

Autoconfiguration and Name SERVICES

- DHCP in a Routed Network
- The ipconfig /release Command
- The ipconfig /renew Command
- DNS: Names Instead of Numbers
- A Distributed Service
- The DNS Tree
- Generic Top-Level Domains
- Sponsored Top-Level Domains
- Country Domains
- Name Server
- Primary and Secondary Servers
- DNS Database
- Name and Number Organizations
- Dynamic DNS
- Troubleshooting

Security in TCP/IP

- Threats
- Disaster Threats
- Attack Threats
- Attacks
- Malicious Code
- Types of Attackers
- Solutions
- Securing Systems
- User Authentication
- Security-Related Protocols and IPSec
- IPSec Components
- IPSec Session
- Virtual Private Networks (VPNs)
- Establishing a VPN Connection
- PPTP Encapsulation
- PPTP Encryption
- L2TP Encapsulation

- L2TP Encryption

Overview and Introductions to Ethernet

- Ethernet Protocol Basics
- Ethernet in the OSI Model
- Different Ethernet Versions
- Defining a LAN
- Topology Options
- Ethernet MAC Addresses
- Spanning Tree
- Understanding VLANs
- 802.1Q Encapsulation
- Gigabit Ethernet
- Encapsulation
- Auto-Negotiation
- Ethernet QoS
- Ethernet Workshop

IP Management, Services and QoS

- Managing TCP/IP networks
- Simple Network Management Protocol (SNMP)
 - SNMP evolution: MIB I and II, RMON, SNMPv2, SNMPv3
- Quality of Service (QoS) with IP Networks
- Basic IP Unicast Service
- IP Multicast Service
- IP Voice Service
- IP Video Services
- Basics of QoS
 - Scheduling
 - Marking
 - Policing
- Introduction to MPLS
- IP Management Workshop
- IP QoS Workshop

Labs and Exercises

- Working with Binary, Decimal and Hexadecimal Numbers
- IP Addressing and Subnetting
- Address Resolution Protocol
- Multicasting
- IP Processes
- Capturing and Analyzing an IP Datagram
- Routing
- Using Wireshark
- UDP Transactions and TCP Processes
- DHCP Process
- Domain Name System (DNS)
- ICMP Messaging
- TCP Applications
- Telnet
- FTP
- HTTP
- UDP Applications

- Voice over IP
- Internet Protocol version 6 (IPv6)
- Security
- Spoofing
- Ethical Hacking
- Wireless IP Security and Hacking

Delivery Method

Instructor led with numerous "Hands-On" demonstrations and exercises.

Equipment Requirements

(This apply's to our hands-on courses only)

BTS always provides equipment to have a very successful Hands-On course. BTS also encourages all attendees to bring their own equipment to the course. This will provide attendees the opportunity to incorporate their own gear into the labs and gain valuable training using their specific equipment.

Course Length

3 Days