

TCP/IP Fundamentals

Course Objectives: Upon completion of this course the student will be able to:

- Differentiate the popular communication models
- Explain the functions of the IP suite of protocols
- Describe the architecture of IP addressing
- Design a medium size network addressing scheme
- Compare and contrast IP routing protocols

Audience: Individuals that need a broad knowledge to support switched and routed networks.

Duration: 2 days • **Course Type:** Instructor-Led

Course Description: This course introduces the student to the concept of the Internet Protocol and the suite of associated protocols. Through a series of discussion modules and exercises, the student will gain knowledge in the TCP/IP suite of protocols. The course wraps up with a case study where the students will work in teams to examine and design a solution. This solution is then presented to the class.

Prerequisites: Our “Networking Foundations: Fundamentals Level I” and “Networking Foundations: Fundamentals Level II” are highly recommended or an understanding of networks and data communications.

Course Outline

Introduction to IP

- History of Communication
- History of IP
- Benefits of IP
- Internet Architecture
- IAB
- Request for Comments (RFC)
- IETF
- Internet, Intranet, Extranet

Communication Models

- Overview
- OSI Communications Model
- TCP/IP Communications Model
- Internetworking architecture
- Shared, bridged and router networks

Internetworking Layer

- IPv4 Overview
- IP Relationships between layers
- IPv4 Header Format and Options
- Fragmentation of IP packets
- Time-to-Live Operation
- Source Routing
- Explicit Routing

Transport Protocols

- TCP/UDP Overview
- Services of TCP/UDP
- Applications of TCP/UDP
- TCP/UDP Details

- TCP/UDP Flow
- How TCP/UDP operate in switched and routed networks
- Detail examples of TCP
- Detail examples of UDP

IP Applications

- Address Resolution Protocol
- Reverse ARP
- Bootstrap Protocol
- Dynamic Host Configuration Protocol
- Simple Network Management Protocol
- Domain Name System
- Internet Control Message Protocol

IP Addressing

- Overview of IP Addressing
- Architecture
- IP Address Classes
- Private Addressing
- IP Address Format
- Subnetting
- Architecture of Subnetting
- Example of Subnetting
- Issues with Subnetting
- Variable Length Subnet Mask
- Network Example

IP Routing

- Define Routing and the need to Route
- Operation of a Router

- Example Network
- Diagram Flow
- Types of Routing
- Types of Routes
- Routing Protocols Overview
- Autonomous Systems
- Interior Gateway Protocols
- Exterior Gateway Protocols
- RIP/RIP2
- OSPF/OSPF2
- IGRP/EIGRP
- BGPv4

IPv6 Overview

- Limitations of IPv4
- Addresses
- Routing
- Other Protocols in the Internet
- Security
- Payload
- Solutions: IS-IS and IPv6
- Architecture
- Addressing
- Details of IPv6
- Examples of IPv6 Networks
- Migration of IPv4 to IPv6
- Summary

Case Study

- Students work in teams to design or solve a sample network