

# Interconnecting Cisco Networking Devices Part 1 (ICND1)

## Course Overview

This course will teach students about building a simple network, establishing internet connectivity, managing network device security, building a medium-sized network, and IPv6.

### Course Introduction

2m

Course Introduction

### Module 01 - Building a Simple Network

3h 13m

Networking Functions

Network Connections

Components of a Network

Looking at a Network Diagram

Applications Found on the Network

Design Issues of a Network

Physical Topology Types

Logical Topologies

Summary

Understanding the Host-to-Host Communications Model

Examples of Host-to-Host Communications

OSI Reference Model

The TCP/IP Stack

The Encapsulation Process

Data De-Encapsulation

Communicating Peer-to-Peer

Summary

Introducing LANs

Describing the LAN

Components of the LAN

Understanding the Collision Domain

About the Switch

Summary

Introduction to the IOS

Why the IOS

Basic Functions of the IOS

The User EXEC Mode

Privileged EXEC Mode

Getting CLI Help

Example of Using Context-Sensitive Help

Example Error Messages

Managing IOS Configurations

Viewing the Running-Config

Viewing the Startup-Config

Managing Cisco IOS Configuration  
Managing the IOS Configuration  
Copy Options  
E-MACS  
Improving the Use of the CLI  
Summary  
Starting a Switch  
Installing the Switch  
Understanding the LED Indicators  
Initial Console Connection  
Configuration Basics  
Viewing the Initial Startup Status  
Summary  
Understanding Ethernet and Switch Operation  
Media for Ethernet  
Ethernet Frames  
Communication Types  
Introducing the MAC Address  
How the Switch Works  
Understanding Duplex  
Configuring Duplex and Speed  
Results of Duplex Settings  
Results of Duplex/Speed Settings  
Summary  
Troubleshooting Common Switch Media Issues  
Troubleshooting Tools  
Problems with Media  
Troubleshooting Flow Chart  
Understanding Interface Status  
Understanding Interface Statistics  
Interface Statistics  
Port Problems  
Troubleshooting Flow Chart 2  
Troubleshooting Port Issues  
Summary  
Demo - Perform Switch Startup  
Demo - Troubleshooting Switch Media Issues  
Demo - Command Line Help  
Module 01 Review

## **Module 02 - Establishing Internet Connectivity**

5h 2m

Understanding the TCP/IP Internet Layer  
IP  
Breaking Down the IPv4 Address  
IP Header  
Number Systems  
Base X Number System (eNotes)  
Conversion to Binary  
IPv4 Address Classes  
Reserved IPv4 Addresses

What is DNS  
Verify a Windows Host IP  
Verify Switch IP Configuration  
Summary  
Understanding IP Addressing and Subnets  
Why Subnets  
Using a Subnet Mask  
Subnet Mask Values  
Default Class A Subnet Mask  
Default Class B Subnet Mask  
Default Class C Subnet Mask  
Default Gateways  
Host and Subnet Combinations for Class B  
Using Subnet Masks  
Network Addressing Scheme  
VLSM  
VLSM Scenario  
Summary  
Understanding the TCP/IP Transport Layer  
Transport Layer Functions  
TCP vs. UDP  
Comparing TCP and UDP  
UDP  
The UDP Header  
TCP  
TCP/IP Application Layer  
TCP 3-Way Handshake (eNotes)  
Summary  
Exploring the Functions of Routing  
The Router's Role  
Router Components  
Function of the Router  
Best Path Determination  
The Routing Table  
How Routes are Learned  
Dynamic Routing Protocols  
Comparing the DV to the LS  
Summary  
Configuring a Cisco Router  
Initial Power On  
Initial Router Setup  
Router Configurations  
Exploring Router Neighbors  
Answer: CDP  
CDP  
Show CDP Details  
LLDP  
LLDP Limitations  
LLDP Benefits  
Summary

Exploring the Packet Delivery Process  
Ethernet Addressing  
Layer 3 Addressing  
What is ARP  
Host-to-Host Packet Delivery  
What the Switch Does  
Summary  
Enabling Static Routing  
Routing Operations  
Static vs Dynamic Routes  
Should You Use a Static Route?  
Configure a Static Route  
Default Routes  
Verify Static Routes  
Summary  
Managing Traffic Using ACLs  
What is an ACL?  
How an ACL Operates  
Wildcard Masking  
Types of ACLs  
Testing an IP Packet on a Numbered ACL  
Basic ACL Configuration  
Summary  
Enabling Internet Connectivity  
The Demarcation Point  
What is DHCP  
Service Provider Options  
Configure a Static Provider Assigned IP Address  
Configuring the Router as a DHCP Client  
What is RFC 1918 Private Addresses  
What is NAT?  
Nomenclature of NAT  
Example of NAT  
NAT Options  
Static NAT  
Static NAT Configuration  
Verifying Static NAT  
Dynamic NAT  
Verifying Dynamic NAT  
What is PAT?  
Configuring PAT  
Verifying PAT  
Troubleshooting NAT  
Troubleshooting Scenario  
Summary  
Demo - Performing Initial Router Setup Media Issues  
Demo - Connecting to the Internet  
Demo - Life of a Packet  
Module 02 Review

## **Module 03 - Managing Network Device Security**

3h 53m

- Securing Administrative Access
- Overview of Network Device Security
- Securing Remote Access
- Service Password Encryption
- Securing Physical Access
- Securing VTY Lines
- Using SSH
- SSH Clients
- Remote Access Reply
- SSH
- Encryption Process (eNotes)
- Configuration Steps
- Using ACL for Remote Access Security
- Other Authentication Options
- Using the Login Banner
- Summary
- Implementing Device Hardening
- Reducing Attack Vectors
- How to Disable a Port
- Introducing Port Security
- How to Configure Port Security
- Verify Port-Security
- Disabling Services
- Turning Off Unused Services
- NTP
- How to Configure NTP
- Verify NTP
- AAA
- Authentication
- Authentication (eNotes)
- AAA Configuration
- Authentication Servers
- AAA Configuration (Cont.)
- Summary
- Implementing Traffic Filtering with ACLs
- Filtering Traffic with ACLs
- How an Outbound ACL Functions
- How to Apply ACL to an Interface
- Introducing the Extended ACL
- Creating a Numbered Extended ACL
- Using a Named ACL
- Best Practices
- Monitoring ACLs
- Troubleshooting ACL – Take 1
- Troubleshooting ACL – Take 2
- Troubleshooting ACL – Take 3
- Troubleshooting ACL – Take 4
- Troubleshooting ACL – Take 5
- Troubleshooting ACL – Take 6

Troubleshooting ACL – Take 7  
Summary  
Demo - Enhancing the Security of the Initial Configuration  
Demo - Device Hardening  
Demo - Filtering Traffic with ACLs  
Demo - Configuring SSH  
Demo - Configuring NTP  
Demo - AAA  
Demo - DHCP Snooping  
Module 03 Review

### **Module 04 - Building a Medium-Sized Network**

3h 49m

Implementing VLANs and Trunks  
Problems with a Poorly Designed Network  
Introducing VLANs  
Trunks and 802.1Q  
Using Trunks  
How to Create a VLAN  
Verify the VLAN  
Assign VLAN to an Access Port  
Creating a Trunk  
VTP  
VTP Modes  
VTP Configuration  
VLAN Design Practices  
Designing Redundancy  
Summary  
Routing Between VLANs  
Introducing Inter-VLAN Routing  
Ways to do Inter-VLAN Routing  
Summary  
Using a Cisco Network Device as a DHCP Server  
Why DHCP  
How DHCP Works  
Configuring DHCP on a Router  
DHCP Monitoring  
DHCP Relay Agent  
Summary  
Introducing WAN Technologies  
Introducing WANs  
Comparing WANs and LANs  
Routers and the WAN  
Types of WAN Links  
Using Point-to-Point Connections  
Summary  
Introducing Dynamic Routing Protocols  
Why Use a Dynamic Routing Protocol  
Classifying Routing Protocols  
IGP: Distance Vector and Link-State Routing Protocols  
Understanding the Link-State Protocol

RIPv2  
RIPv2 Limitations  
Metric  
RIP Configuration  
RIPng  
Summary  
Implementing OSPF  
Describing OSPF  
Adjacencies  
The SPF Algorithm  
Router ID  
Configuring Single Area OSPF  
Verify OSPF  
Summary  
Demo - Configuring Expanded Switch Networks  
Demo - Configuring DHCP Server  
Demo - Implementing OSPF  
Demo - Troubleshooting OSPF  
Demo - Implementing RIPv2  
Module 04 Review

### **Module 05 - Introducing IPv6**

1h 50m

Introducing Basic IPv6  
Problems With IPv4  
New Problems With the IPv4 Solutions  
Features of IPv6  
IPv6 Address Description  
IPv6 Transmission Types  
The IPv6 Unicast Address  
EUI-64 Automatic Host ID  
IPv6 Address Allocation  
Basic IPv6 Commands  
Example IPv6 Static Configuration  
Verify IPv6 Address  
Basic Connectivity Tests  
Summary  
Understanding IPv6  
Review of the IPv4 Header  
The IPv6 Header  
ICMPv6  
Discovery Messages  
SLAAC  
SLAAC for Routers  
Summary  
Configuring IPv6 Routing  
IPv6 Routing  
Supported Routing Protocols  
IPv6 Static Route  
Dynamic Routing Protocols  
Summary

Demo - IPv6 Addresses  
Demo - Configure and Verify IPv6 Routing  
Demo - IPv6 ACL  
Demo - IPv6 RIP  
Module 05 Review  
Course Closure

**Total Duration:** 17h 49m