

Western Technical College

## 10150120 Cisco 2: Routing Technologies

### Course Outcome Summary

#### Course Information

**Description** The emphasis in this course is on routing theory and router technologies. The student will examine router elements, identify the functions of the TCP/IP transport-layer protocols, configure IP addresses, monitor and verify selected access list operations, and more. The course is delivered using a combination of lectures, lab projects, and the Internet.

PLEASE NOTE: A Windows operating system is recommended for this course. Required software used in this course is not compatible with Mac operating system.

<b>Career Cluster</b>	Information Technology
<b>Instructional Level</b>	Associate Degree Courses
<b>Total Credits</b>	3
<b>Total Hours</b>	90

#### Textbooks

No textbook required.

#### Program Outcomes

1. Implement computer networks.
2. Implement client systems.
3. Implement network security components.
4. Develop technical documentation.
5. Troubleshoot network systems.
6. Maintain the network infrastructure

#### Course Competencies

1. **Explain the use of the internet and the development of ISPs.**  
Assessment Strategies

1.1. Written Objective Test

**Criteria**

*Your performance will be successful when:*

- 1.1. Learner explains the three tiers that ISP can connect to the internet.
- 1.2. Learner differentiates between, DSL, cable and satellite ISP service.
- 1.3. Learner explains the need for redundancy, salability and reliability for internet service.
- 1.4. Learner explains the various support functions of an ISP.
- 1.5. Learner explains the bandwidth and usage of T1, T3 and OC-3 connections.
- 1.6. Learner runs the utilities ping and tracer mapping internet locations.

**Learning Objectives**

- 1.a. Describe the hierarchical structure of the Internet.
- 1.b. Explain the services offered by an ISP.
- 1.c. Describe the various connects to the internet.
- 1.d. Explain the need for reliable and scalable ISP services.

**2. Explain the levels of support at a "helpdesk" and how they relate to the OSI model.**

**Assessment Strategies**

- 2.1. Written Objective Test

**Criteria**

*Your performance will be successful when:*

- 2.1. Learner defines of the function of Level 1, Level 2 and Level 3 support.
- 2.2. Learner demonstrates data flow into segments, packets, frames and bits.
- 2.3. Learner understands the functions of a trouble ticket in a help desk.
- 2.4. Learner relates varies problems to the corresponding layer of the OSI model.
- 2.5. Learner describes the purpose of service level agreement (SLA).

**Learning Objectives**

- 2.a. Describe the functions of a help desk.
- 2.b. Describe the levels of support of a help desk.
- 2.c. Describe the encapsulation process.
- 2.d. Identify problems based on the layers of the OSI model.

**3. Plan a network addressing scheme and implement an IP addressing scheme.**

**Assessment Strategies**

- 3.1. Lab Assignment
- 3.2. Skill Demonstration
- 3.3. Written Objective Test

**Criteria**

*Your performance will be successful when:*

- 3.1. Learner gives examples of valid host addresses for a given subnet.
- 3.2. Learner determines subnet mask needed to meet specified requirements for hosts and networks.
- 3.3. Learner identifies the parts of an IPv6 IP address.
- 3.4. Learner creates a VLSM addressing scheme.
- 3.5. Learner completes binary to decimal conversions.
- 3.6. Learner identifies broadcast addresses within subnets.
- 3.7. Learner applies NAT and PAT schemes to a router configuration.

**Learning Objectives**

- 3.a. Describe IP addressing and subnetting.
- 3.b. Describe IP addressing configuration with CIDR.
- 3.c. Assign subnetting ranges to segments.
- 3.d. Identify public and private IP addressing.
- 3.e. Recognize the need and functions of IPv6.
- 3.f. Describe the purpose of NAT and PAT.

**4. Examine router and switch components.**

### **Assessment Strategies**

- 4.1. Lab Assignment
- 4.2. Skills Test
- 4.3. Written Objective Test

### **Criteria**

*Your performance will be successful when:*

- 4.1. Learner identifies console, serial, and ethernet ports on a router.
- 4.2. Learner successfully connects to a router using hyperterminal.
- 4.3. Learner explains the function of RAM/DRAM, NVRAM, FLASH and ROM.
- 4.4. Learner observes the startup sequence of a router and switch.
- 4.5. Learner researches and makes recommendation in selecting a router.
- 4.6. Learner researches and makes a recommendation in selecting a switch.
- 4.7. Learner plans proper cabling for horizontal, vertical and backbone cabling of network devices.

### **Learning Objectives**

- 4.a. Describe external components of a router.
- 4.b. Describe internal components of a router.
- 4.c. Describe configuration methods to program a router.
- 4.d. Document devices on a network.

## **5. Configure network routers and switches.**

### **Assessment Strategies**

- 5.1. Lab Assignment
- 5.2. Skills Test

### **Criteria**

*Your performance will be successful when:*

- 5.1. Learner assigns an IP address and subnet mask to an interface.
- 5.2. Learner sets up password security to console and VTY.
- 5.3. Learner sets up router table with networks and default routes.
- 5.4. Learner explains the purpose of global configuration.
- 5.5. Learner uses the user mode prompt and privileged mode prompt.
- 5.6. Learner demonstrates the use of help functions when entering commands.
- 5.7. Learner copies running configuration to startup configuration.
- 5.8. Learner erases the startup configuration.
- 5.9. Learner backs up the startup configuration using hyperterminal and TFTP.
- 5.10. Learner restores a configuration file using hyperterminal and TFTP.
- 5.11. Learner completes a password recovery.
- 5.12. Learner uses SDM Express to configure a router.
- 5.13. Learner effectively uses Packet Tracer to simulate lab assignments.

### **Learning Objectives**

- 5.a. Configure a router using CLI starting with an erased startup configuration.
- 5.b. Describe user and privileged modes.
- 5.c. Explain the difference between startup and running configuration.
- 5.d. Configure a router using SDM (Security device Manager).

## **6. Research router IOS support options.**

### **Assessment Strategies**

- 6.1. Written Objective Test

### **Criteria**

*Your performance will be successful when:*

- 6.1. Learner lists the three parts included in the Cisco IOS naming convention.
- 6.2. Learner demonstrates how to use a TFTP server to save and restore a Cisco IOS.
- 6.3. Learner demonstrates the use of the show version command to obtain information about the IOS version.
- 6.4. Learner demonstrates how to change the default configuration register to enter ROM monitor mode.

- 6.5. Learner backs up an IOS.
- 6.6. Learner explains the IOS search sequence.

#### **Learning Objectives**

- 6.a. Describe the process the router uses to locate an IOS.
- 6.b. Describe Cisco IOS naming conventions.
- 6.c. Describe the process for creating and loading an IOS backup image.
- 6.d. Identify commands to display information about Cisco IOS.

### **7. Build network routing tables and explain their usage.**

#### **Assessment Strategies**

- 7.1. Lab Assignment
- 7.2. Skills Test
- 7.3. Written Objective Test

#### **Criteria**

*Your performance will be successful when:*

- 7.1. Learner creates RIP routing table.
- 7.2. Learner explains why RIP Version 2 was created.
- 7.3. Learner initiates RIPV2.
- 7.4. Learner explains the use of autonomous system numbers.
- 7.5. Learner explains the need for BGP.

#### **Learning Objectives**

- 7.a. Implement router RIP protocol.
- 7.b. Create a network diagram using routing tables.
- 7.c. Explain the use of BGP (Border gateway Protocol) in a network design.

### **8. Identify security policies and procedures at an ISP.**

#### **Assessment Strategies**

- 8.1. Written Objective Test

#### **Criteria**

*Your performance will be successful when:*

- 8.1. Learner creates an ACL to filter traffic.
- 8.2. Learner research and recommends an anti-virus software product.
- 8.3. Learner captures packets using a network monitoring tool, like Wireshark.
- 8.4. Learner uses telnet to manage remote devices.
- 8.5. Learner develops a backup strategy using full, incremental and differential services.

#### **Learning Objectives**

- 8.a. Describe the use of ACL for security.
- 8.b. Recognize the need for anti-virus software.
- 8.c. Develop a backup strategy.

### **9. Correct network problems using the OSI model.**

#### **Assessment Strategies**

- 9.1. Lab Assignment
- 9.2. Skills Test
- 9.3. Written Objective Test

#### **Criteria**

*Your performance will be successful when:*

- 9.1. Learner demonstrates the use of ping, traceroute, and telnet to isolate connectivity problems.
- 9.2. Learner configures and troubleshoots problems a basic network configuration.
- 9.3. Learner uses router show commands to identify configuration problems.
- 9.4. Learner lists common errors that occur at Layers 1, 2, and 3 of the OSI model.
- 9.5. Learner use debug commands to monitor network traffic.

#### **Learning Objectives**

- 9.a. Use telnet, ping, tracert to test connectivity.
- 9.b. Use router "show" commands to identify problems.
- 9.c. Describe a trouble shooting model to solve network problems.
- 9.d. Use debug commands to check real-time traffic