

Western Technical College

## 10150110 Cisco 1: Networking Fundamentals

### Course Outcome Summary

#### Course Information

**Description** This course introduces the student to computer network fundamentals, including network terminology and protocols, network standards, the OSI model, IP addressing, cabling, networking components, and basic LAN design. 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. **Examine basic computer concepts.**

##### Assessment Strategies

- 1.1. Lab Assignment
- 1.2. Written Objective Test

## Criteria

*You will know you are successful when*

- 1.1. you identify main internal PC components and connections.
- 1.2. you demonstrate proper safety procedures.
- 1.3. you connect peripheral components to a PC.
- 1.4. you install a network interface card.
- 1.5. you differentiate between operating system software and application software.
- 1.6. you convert binary numbers to decimal number and back.
- 1.7. you use a web browser.
- 1.8. you configure network settings with utilities and tools.
- 1.9. you explain the advantages and disadvantages of a peer to peer network.
- 1.10. you explain the advantages and disadvantages of client server network.
- 1.11. you explain the difference between a LAN and WAN.

## Learning Objectives

- 1.a. Identify basic computer hardware components.
- 1.b. Describe functions of operating systems.
- 1.c. Describe functions of computer software.
- 1.d. Explain the importance of the binary numbering system.
- 1.e. Define networks and networking.

## 2. Explore the main components of an Ethernet network.

### Assessment Strategies

- 2.1. Skill Demonstration
- 2.2. Lab Assignment
- 2.3. Written Objective Test

## Criteria

*You will know you are successful when*

- 2.1. you demonstrate correct usage of a cable tester.
- 2.2. you build and test a straight thru Ethernet cable following T568-X standards.
- 2.3. you build and test a cross-over cable.
- 2.4. you build and test a console cable.
- 2.5. you explain how a collision occurs.
- 2.6. you explain segmenting a network.
- 2.7. you draw six basic network topologies.
- 2.8. you demonstrate placement of devices at the Access, Distribution, and Core layers of the Hierarchical Design Model.
- 2.9. you install switches and routers.

## Learning Objectives

- 2.a. Describe basic LAN media.
- 2.b. Describe basic topologies used in networking.
- 2.c. Explain collisions and collision domains.
- 2.d. Describe the Hierarchical Design Model.

## 3. Examine the purpose and connectivity to an Internet Service Provider (ISP).

### Assessment Strategies

- 3.1. Written Objective Test

## Criteria

*You will know you are successful when*

- 3.1. you describe the three tiers of the ISP cloud.
- 3.2. you describe ISP services such as e-mail, web pages, DNS, and IP telephony.
- 3.3. you compare the ISP connections via DSL, cable, wireless, and satellite.
- 3.4. you describe of the operations of a Network Operating Center regarding redundancy and reliability.
- 3.5. you identify and describe the function of MDF's, IDF's and POP.
- 3.6. you sketch a diagram showing the relationship of MCC, ICC, and HCC.

- 3.7. you explain the function of surge suppressor and UPS.

#### **Learning Objectives**

- 3.a. Identify the services provided by an ISP.
- 3.b. Examine connectivity issues to an ISP.
- 3.c. Describe connectivity between ISPs in a "cloud".
- 3.d. Explain the functions of a Network Operating Center (NOC).
- 3.e. Explore MDF's, IDF's and POP.
- 3.f. Identify MCC, ICC, and HCC.

### **4. Examine the Internet Protocol (IP) address and subnet mask.**

#### **Assessment Strategies**

- 4.1. Drawing/Illustration
- 4.2. Project
- 4.3. Lab Assignment

#### **Criteria**

*You will know you are successful when*

- 4.1. you compare and contrast MAC addressing and IP addressing.
- 4.2. you explain the purpose of a subnet mask.
- 4.3. you differentiate between the network and host portion of an IP address using "ANDING".
- 4.4. you determine the subnet for Class C and Class B subnetting.
- 4.5. you create subnet masks based on required numbers of subnets and hosts.
- 4.6. you describe format of IPv6.
- 4.7. you convert 32 bit binary address to a dotted decimal IP address.
- 4.8. you discuss the advantages and disadvantages of static and dynamic addressing (DHCP).
- 4.9. you determine proper usage of the IP address, subnet mask and default gateway in a routed network.

#### **Learning Objectives**

- 4.a. List and describe IP address classes.
- 4.b. Compare IP and MAC addressing.
- 4.c. Explain the basics of subnetting
- 4.d. Create a subnet.
- 4.e. Explain the process of path determination.

### **5. Explore the Open Systems Interconnection (OSI) model.**

#### **Assessment Strategies**

- 5.1. Lab Assignment
- 5.2. Written Objective Test

#### **Criteria**

*You will know you are successful when*

- 5.1. you describe in detail the functions at layer 1.
- 5.2. you describe in detail the functions at layer 2.
- 5.3. you describe in detail the functions at layer 3.
- 5.4. you describe in detail the functions at layer 4.
- 5.5. you describe in general the functions at layers 5, 6, and 7.
- 5.6. you explain the use of protocols.
- 5.7. you explain the five steps in the encapsulation process.
- 5.8. you describe a datagram.
- 5.9. you list the characteristics of TCP and UDP.
- 5.10. you describe purpose of Networking devices at layers 1-3.

#### **Learning Objectives**

- 5.a. Describe the importance of a communications model.
- 5.b. Describe the OSI model.

### **6. Explore the transmission control protocol/Internet protocol (TCP/IP) model.**

#### **Assessment Strategies**

- 6.1. Drawing/Illustration

- 6.2. Lab Assignment
- 6.3. Written Objective Test

#### **Criteria**

*You will know you are successful when*

- 6.1. you describe the operation at Network Access Layer.
- 6.2. you describe the operation at Internet Layer.
- 6.3. you describe the operation at Transport Layer.
- 6.4. you describe the functions at Application Layer.
- 6.5. you compare TCP/IP model to the OSI model.
- 6.6. you provide the port numbers for well known ports: ftp, telnet, tftp etc.
- 6.7. you compare routed and routing protocols using examples.
- 6.8. you describe the concept of routing tables and path determination.
- 6.9. you differentiate between static and dynamic routing.
- 6.10. you compare and contrast the protocols TCP and UDP.
- 6.11. you use the ARP protocol mapping IP addresses and MAC addresses.

#### **Learning Objectives**

- 6.a. Describe ARP tables.
- 6.b. Compare routing and routed protocols.
- 6.c. Compare static and dynamic routes.
- 6.d. Compare connectionless and connection-oriented network processes.

### **7. Explore Wireless Technologies.**

#### **Assessment Strategies**

- 7.1. Lab Assignment
- 7.2. Written Objective Test

#### **Criteria**

*You will know you are successful when*

- 7.1. you explain the wireless access method Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA).
- 7.2. you install a wireless AP.
- 7.3. you configure a WLAN with a SSID.
- 7.4. you diagram a coverage area placing APs at optimum locations.
- 7.5. you configure encryption using WEP or WPA.
- 7.6. you configure traffic filtering and MAC filtering.
- 7.7. you configure authentication.
- 7.8. you secure routers from unauthorized users.
- 7.9. you explain the use of the different types of antennas in wireless transmissions.
- 7.10. you explain the features of the wireless WiFi standards defined in the IEEE 802.11x standards.
- 7.11. you explore the exploits, vulnerabilities, etc of wireless routers.
- 7.12. you connect a wireless device to an existing integrated secure LAN.

#### **Learning Objectives**

- 7.a. Explain the concepts used in wireless technologies.
- 7.b. Complete a site survey determining optimum number and location of APs.
- 7.c. Determine user requirements for bandwidth and coverage areas.
- 7.d. Implement security techniques.

### **8. Examine the role of security in a network environment.**

#### **Assessment Strategies**

- 8.1. Written Objective Test
- 8.2. Lab Assignment

#### **Criteria**

*You will know you are successful when*

- 8.1. you describe the different types of Hackers.
- 8.2. you establish policies regarding social engineering.

- 8.3. you identify virus protection software uses.
- 8.4. you explain the importance of installing Spyware and Spam blockers.
- 8.5. you install a firewall using a wireless router.
- 8.6. you employ basic Windows security features.

#### **Learning Objectives**

- 8.a. Determine basic security measures and policies needed in network security.
- 8.b. Recognize the types of security threats against a network.
- 8.c. Design proper placement of firewalls.
- 8.d. Describe effective use a DMZ.

### **9. Demonstrate proficiency in the use of Packet Tracer.**

#### **Assessment Strategies**

- 9.1. Skills Test
- 9.2. Lab Assignment

#### **Criteria**

*You will know you are successful when*

- 9.1. you download current version of Packet Tracer.
- 9.2. you diagram a home or small business network.
- 9.3. you install Packet Tracer on a PC.
- 9.4. you save diagrams.
- 9.5. you use Packet Tracer to prototype a network.
- 9.6. you troubleshoot a problem in PT diagram.

#### **Learning Objectives**

- 9.a. Recognize uses of Packet Tracer.
- 9.b. Plan a network design using Packet Tracer.
- 9.c. Apply IP addressing scheme to network.

### **10. Develop basic trouble shooting techniques.**

#### **Assessment Strategies**

- 10.1. Lab Assignment

#### **Criteria**

*You will know you are successful when*

- 10.1. you create documentation including topology maps, network maps.
- 10.2. you articulate the value of documenting FAQ, problem resolutions, and tracking open issues.
- 10.3. you explain structured trouble shooting techniques top-down, bottom-up, and divide-and-conquer.
- 10.4. you make observations to determine problems such as LED lights.
- 10.5. you use software utilities (ipconfig, ping, tracert, nslookup, netstat) to solve problems.
- 10.6. you resolve connectivity problems on a network.
- 10.7. you articulate the value of using the OSI model in developing a troubleshooting approach.
- 10.8. you use the ARP tables to resolve problems.
- 10.9. you capture and analyze frames on a segment using a protocol analyzer.

#### **Learning Objectives**

- 10.a. Explore standard trouble shooting techniques.
- 10.b. Determine the proper use of utilities such as ipconfig, ping, tracert, nslookup, netstat.
- 10.c. Document resources used to resolve issues such as helpdesks both internal and external.
- 10.d. Recognize the use of a protocol analyzer in monitoring a network.