

# **Appendix L**

## **INFORMATION TECHNOLOGY (IT) YOUTH APPRENTICESHIP**

### **NETWORK SYSTEMS AND INFORMATION SUPPORT & SERVICES PATHWAY HARDWARE UNIT UNIT 4**

## **Unit 4: Network and Support & Services Pathway Hardware**

Competency

### **1. Maintain network records**

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Uses tracking systems to log requests, monitor progress, and track problem resolution
- Maintains logs related to network functions
- Manages maintenance and repair records as required
- Adds and deletes files on the network server ONLY as directed by the worksite professional
- Backs up network files regularly following facility procedure

Learning Objectives

- Identify network fundamentals
- Identify the benefits and risks of network computing
- Identify the relationship between computer networks and other communications networks (e.g., Telephone Network), and the Internet
- Describe the purpose of typical network records for uptime, access, network traffic, bandwidth, disk utilization

**Comments:**

## Unit 4: Network and Support & Services Pathway Hardware

Competency

### 2. Communicate with vendors

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Tracks and maintains vendor orders and receipt of order
- Contacts vendors to coordinate shipping items if needed
- Verifies receipt of order
- Compares items received to order
- Reconciles any discrepancies with worksite professional and vendor
- Records addition of items to inventory
- Returns a faulty product to the vendor
- Contacts vendors for warranty repairs
- Works with vendors to resolve hardware operating system issues

Learning Objectives

- Describe the role of the accounting function in processing purchase orders and packing slips
- Explain how documentation is necessary for maintaining proper inventory
- Explain the inventory processes at your facility
- Discuss the life cycles and costs of different types of hardware
- Explain the purpose of warranties and purchasing options for hardware purchases

**Comments:**

## Unit 4: Network and Support & Services Pathway Hardware

Competency

### 3. Perform basic technical network support duties

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- ***Assists to resolve customer problems***
- Provides technical support via telephone, E-mail, Web and onsite as needed
- Responds to user questions within realm of ***current training and learning***
- Chooses correct technical and computer tools to perform task
- Documents technical support provided
- Performs routine tasks as directed by worksite professional
  - Load computer tapes and disks onto network
  - Install software and printer paper/forms
  - Perform routine network startup and shutdown procedures
  - Help users with common operating systems, applications, and network-related procedures

Learning Objectives

- Identify computer classifications and hardware
- Identify major hardware components and their functions
- Identify the hardware associated with telecommunications functions
- Identify types of computer storage devices
- Identify how the four components of a network operating system support network operations (server platform, network services software, network redirection software, communications software)
- Compare and contrast local area networks (LANs), metro area networks (MANs), wide area networks (WANs), the Internet, intranets, and other data communications systems
- Trace the evolution of networks
- Analyze current trends and development in LANs
- Describe basic network classifications, topologies and network operating systems (NOS)
- Interpret basic networking terminology
- Identify the basic point-to-point network topologies (e.g., star, ring, tree, network, irregular)
- Differentiate between point-to-point and point-to-multipoint network topologies
- Identify the basic broadcast topologies (e.g., star, ring, bus)

**Comments:**

## Unit 4: Network and Support & Services Pathway Hardware

Competency

### 4. Assist to monitor network performance

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Monitors system status and performance regularly as required
- Follows power-up and log-on procedures
- Monitors network center dust, temperature, and humidity controls
- Monitors system status and performance via reports and diagnostic monitoring systems
- Operates master consoles to monitor the performance of computer systems and networks
- Identifies required service level
- Identifies abnormal system performance
- Recognizes system alerts
- Recognizes security problems
- Recognizes environmental problems
- Identifies patterns of failure
- Refers any noted issues to worksite professional
- Follows log-off and power-down procedures
- Documents monitoring activities and results

Learning Objectives

- List general characteristics of network operating systems
- Compare network operating systems (i.e., Windows XP, LINUX, UNIX, etc.)
- Discuss the difference between stand-alone, peer-to-peer and client-server networks and software
- Explain how information traffic priorities are determined and monitored
- Identify components and characteristics of public networks (e.g., telephone, cable, satellite, wireless)
- Describe server functions including specialized servers (e.g., Web, DHCP, DNS, mail, proxy)
- Identify hardware and software requirements for specialized servers

**Comments:**

## Unit 4: Network and Support & Services Pathway Hardware

Competency

### 5. Perform routine network system maintenance

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Follows preventive maintenance plan
- Runs diagnostics as required
- Refer system messages to worksite professional
- Performs preventive maintenance procedures on network, computers and peripheral devices
- Identifies new or replacement networking components needed
- Evaluates maintenance processes and outcomes with worksite professional
- Documents maintenance activities and results

Learning Objectives

- Describe the basic elements of network maintenance
- Identify available diagnostic tools used for network system maintenance
- Identify maintenance procedures and processes
- Explain the purpose and function of a routing protocol
- List characteristics and uses of network components (e.g., hub, switches, routers, firewall)
- Differentiate between a physical and logical topology
- Explain LAN transmission methods, standards and protocols
- Explain the difference between types of inputs such as DVI & VGA video and eSATA & USB & Firewire inputs
- Identify types of processing (e.g., batch, interactive, event-driven, object-oriented)
- Explain network architecture frame types and formats
- Explain the principles and operation of wire (coaxial, fiber optics, etc.) and wireless systems
- Explain the principles and operation of fiber optics, analog and digital circuits

**Comments:**

## **Unit 4: Network and Support & Services Pathway Hardware**

Competency

### **6. Assist to apply network upgrades, service packs, and patches**

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Obtains technical request for task
- Selects appropriate tools for the upgrade
- Reviews procedure and safety requirements for appropriate installation
- Backs up your files and data if required
- Inserts and accesses the pack or patch file source
- Installs and configures Internet software packages
- Upgrades network system software
- Follows any prompts to complete the installation
- Refers any error messages to worksite professional and refer to the installation directions/information
- Documents installation

Learning Objectives

- Explain the need for upgrades, packs & patches
- Discuss the benefits and drawbacks of custom configuration of network applications

**Comments:**

## Unit 4: Network and Support & Services Pathway Hardware

Competency

### 7. Upgrade portable devices

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Obtains technical request for task
- Selects appropriate tools for the upgrade
- Obtains portable device
- Verifies upgrade requirements with upgrade technical information
- Reviews procedure and safety requirements for appropriate installation
- Backs up files and data if required
- Inserts and accesses the upgrade file location source
- Follows the instructions to install the upgraded software
- Re-boots the device if needed
- Re-configures the device if needed
- Verifies operation of the device once upgraded
- Refers any errors to worksite professional
- Documents upgrade activities

Learning Objectives

- Give examples of emerging hardware technologies
- Identify hardware devices appropriate for specific tasks
- Compare processes of upgrading devices to upgrading desktop systems

**Comments:**



## Unit 4: Network and Support & Services Pathway Hardware

Competency

### 8. Replace inoperable computer components

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Obtains technical request for task
- Selects appropriate tools for the task
- Reviews procedure and safety requirements for appropriate replacement
- Backs up files and data
- Removes power source and cables
- Opens up computer device
- Cleans the internal components using appropriate procedures, if needed
- Labels all connections that attach to the damaged part
- Removes cables & connections from part to be replaced
- Removes old part
- Replaces with new hard drives, motherboards, and/or network cards as needed
- Ensures new part is securely fastened
- Reattaches all connections and cables as required for new part
- Closes up computer device
- Powers on the machine
- Reconfigures the settings
- Reboots and tests the new part as required
- Documents parts replacement
- Maintains the inventory of spare parts for emergency repairs

Learning Objectives

- Identify different pieces of hardware based on input/output; e.g., Identify if a card is PCI or if a hard drive is IDE/SATA
- Identify hardware components from the back end of the component or its connection
- Explain the required care for hardware components
- Discuss the danger from static when working with computer components
- Describe the preventive measures and protective equipment needed to work on internal computer components
- Explain the cleaning process for internal computer devices
- Describe visual inspection points for internal computer devices

**Comments:**

## Unit 4: Network and Support & Services Pathway Hardware

Competency

### 9. Assist to troubleshoot network system and data communication problems

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Detects problem
- Identifies available diagnostic tools used for system maintenance
- Performs appropriate analysis to identify problem cause
- Isolates system faults in hardware and various types of networks, cables, data modems, and networking carrier systems
- Identifies areas of operation that need upgraded equipment such as modems, fiber optic cables, and telephone wires
- Identifies criticality of problem
- Develops resolution plan
- Identifies possible solutions
- Tests identified solutions
- Documents troubleshooting results and solutions

Learning Objectives

- Define bandwidth
- Explain the concept of bandwidth as it pertains to network data communication problems
- Define packet-switching techniques
- Compare characteristics of connection-oriented and connectionless networks
- Identify emerging networks and technologies
- Describe basic telephony (analog vs. digital signals)
- Explain how analog speech is converted to digital
- Demonstrate knowledge of Voice over IP (VoIP) concepts
- Explain convergence issues, including codec choice, jitter, wander, and connecting analog telephone adapter equipment
- Explain the benefits of implementing convergence
- Identify standard high-speed networks (e.g., broadband, ISDN, SMDS, ATM, FDDI)
- Explain the purpose and function of the TCP/IP protocol suite
- Discuss interconnecting LANs using WAN services
- Explain the impact of wireless technologies on data communication
- Describe common wireless problems

**Comments:**

## Unit 4: Network and Support & Services Pathway Hardware

Competency

### 10. Assist to install or upgrade network equipment

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite
- while assisting a worksite professional

Performance Standard Criteria

**Performance will be successful when the learner:**

- Obtains technical request for task
- Selects appropriate tools for installation, configuration & upgrade
- Confirms prerequisites for the new equipment or upgrade
- Reviews procedure and safety requirements for appropriate installation
- Inserts and installs the equipment at the correct locations in the correct manner
- Inserts and installs software from the file location source
- Installs and configures network cabling, modems, routers, mail servers, etc.
- Installs and configures network management software
- Accesses needed technical information using software help facilities if needed
- Loads software with minimum disruption of process flow
- Tests integrity of all devices and software added or upgraded
- Resolves any system errors or compatibility issues
- Documents network system installation or upgrade activities

Learning Objectives

- Describe the design of the network system at your facility
- List the purpose and function of the necessary components that make up the network design
- Identify principles governing software acquisition and upgrades
- Discuss how data is commonly converted between different software packages and between software and the O/S
- Distinguish between routing and routed protocols
- Explain how to install and configure routers to simulate a LAN/WAN environment
- Describe server virtualization and its impact
- Discuss distributed storage technologies (e.g., SAN, NAS)

**Comments:**

## Unit 4: Network and Support & Services Pathway Hardware

Competency

### 11. Participate on a networking systems evaluation project team

Performance Standard Condition

**Competence will be demonstrated**

- at the worksite

Performance Standard Criteria

**Performance will be successful when the learner:**

- Reviews the scope and phases of the network systems evaluation project
- Reviews the needs analysis and decision evidence for the project
- Participates in the following network systems evaluation team activities as able:
  - Retrieve data for analysis of system capabilities and requirements
  - Analyze equipment performance records to determine the need for repair or replacement
  - Gather data pertaining to customer needs
  - Identify, predict, interpret, and evaluate system and network requirements
  - Confer with network team and users to solve existing system problems
  - Identify costs and benefits for networking solutions
  - Recommend changes to improve systems and network configurations
  - Determine hardware or software requirements related to such changes
  - Order, install or upgrade, and test changes
  - Monitor changes to ensure they brought about expected results
- Periodically reviews system project activities and completed results

Learning Objectives

- Identify site and network system constraints that impact your facility
- Identify power and power supplies
- Define power conversion
- Analyze a facilities' network capacity planning (power cable/wire conduit)
- Identify security requirements and the need for data protection
- Identify specific access levels that need to be accommodated
- Explain how a security system design is matched to identified security requirements
- Demonstrate knowledge of the role that routers, firewalls, intrusion detection systems, and VPNs play in security

**Comments:**