LIFEPAC®

Business Computer Information Systems

Student Book

Unit 9

Alpha Omega Publications®

BUSINESS COMPUTER INFORMATION SYSTEMS

UNIT NINE

Computer Networks

LIFEPAC Business Computer Information Systems

Production Manager:

Alan Christopherson

Editorial:

Managing Editor:

Alan Christopherson

Copy Editor:

Laura Messner

Art, Layout, and Design:

Layout and Design:

Brian Ring, Melissa Fransen

Illustration:

Brian Ring, Melissa Fransen

Cover Design:

Ryan Egan

Alpha Omega Publications®

804 N. 2nd Ave. E.
Rock Rapids, IA 51246-1789

Foreword

Business Computer Information Systems is a ten-unit high school elective that explores the use of technology applications in both business and personal situations. Occupations have transitioned from those that primarily produced things to those that manipulate and manage information. Whether it is at home, in a factory, at a school, for a business, or in an office, almost everyone today uses many forms of technology on a daily basis. This course will explore the software applications and information technologies that everyone is likely to use in business situations.

In this course the students will learn computer terminology, hardware, software, operating systems and information systems that relate to the business environment. The units will concentrate on learning the standard applications of word processing, spreadsheets, database management and graphical presentation packages. In addition, skills in personal and interpersonal communications and in communication technologies will be studied.

The course is intended to help students arrive at the following understandings:

- Effective communication skills and productive work habits can increase employees' success.
- Technology solutions can help employees be more productive and effective.

Keyboarding is a stated prerequisite for this course. While there are some keyboarding reviews in the course, there is no keyboarding instruction.

Business Computer Information Systems covers topics from TEKS §120.23 and §120.64.

Business Computer Information Systems contains the following units:

Unit 1 — Communication Skills

Unit 2 — Business Technology

Unit 3 — Word Processing

Unit 4 — Spreadsheets

Unit 5 — Databases

Unit 6 — Telecommunications Technology

Unit 7 — Desktop Publishing Technology

Unit 8 — Presentation Technology

Unit 9 — Computer Networks

Unit 10 — Computer Operating Systems

Unit 9: Computer Networks

Introduction

In this unit, you will learn about computer networks. Most businesses today are unable to operate without computers. Generally, business computers are connected to networks, which work to increase the organization's productivity and effectiveness.

Your goals for the unit include the following:

- Describe the purpose and function of network components.
- Compare network systems.
- Explain the factors that influence the choice of a computer networking system.

In Section One, you will learn about computer networks. You will be introduced to how they work and the benefits they provide for businesses.

Section Two focuses on the basics of networking. You will learn about network architecture, or topology; the areas networks can span; network models; and hardware and software.

Section Three focuses on the factors used to determine what type of network best meets an organization's needs. You will also learn about the factors that are considered when designing a network.

The objectives for this unit include the following:

- Explain how computer networks work.
- Describe the benefits provided by computer networks.
- Discuss the advantages and disadvantages of different network topologies.

- Describe the criteria businesses use to determine what type of network they need.
- Compare network models.
- Describe the function of network hardware components.
- Describe the function of network operating systems.
- Identify the factors that must be considered when designing a network.
- Discuss the ways in which business operations affect network design.

I. An Introduction to Networking
Why Use A Network?

Please refer to the media CD to view Your Social Network.

The network described above is your social network. In it are the people you have connections to. Computers have their own kind of networks. The computer you use at school is most likely part of a network. The computers in most businesses today are part of a network. Computer networks help to increase productivity in the workplace.

Have you ever used the Internet? If you have, you've used a computer network. The Internet is the largest computer network on earth.

Are you able to print documents at school? If you retrieve your printed document from a printer that is not connected to your computer, the computer you are using is most likely part of a computer network.

Objectives:

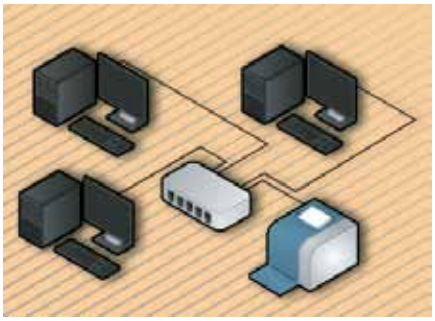
- Explain what a computer network is.
- Describe the benefits provided by computer networks.

Vocabulary:

groupware - software application that enables workers to collaborate and share information.
network - two or more connected computers.
peripheral - external hardware connected to and controlled by a computer.
server - computer that provides resources for other computers on the network.
shared drive - device for storing and retrieving computer files that can be accessed by authorized users.

What Is a Network?

A network is two or more computers that are connected to each other for the purpose of sharing resources—data, files, software, or hardware, such as printers, scanners, or facsimile machines.



Networks come in many different sizes. They can be as small as two computers linked together or as large as the Internet.

Networks are not confined by geographic boundaries. They can exist in a single building, such as a small business, or even your home. (If you have two or more computers in your house that share a common printer, you have a computer network.) Networks can also cover vast geographic areas. For example, many businesses have more than one office in a town, city, country, or all over the globe. Computer networks enable employees at these businesses to share resources.

How Are Computer Networks Used in the Workplace?

Businesses use computer networks in a number of ways and for many different purposes. However, the main reason that businesses create computer networks is to increase their productivity. Let's take a look at some of the ways in which computer networks benefit businesses.

Sharing. Perhaps the largest benefit that networks provide is enabling employees to share information, software, and equipment. Networks help workers access and exchange information stored in files quickly, easily, and efficiently. A network application known as **groupware** makes such sharing possible.

Networks also enable the sharing of software, such as word processing, spreadsheet, database, and other applications. This makes installing and updating software

easier and more efficient. Software can be installed and updated in a central location rather than at each employee's computer. Authorized users, connected to the network, are able to run the applications stored on it.

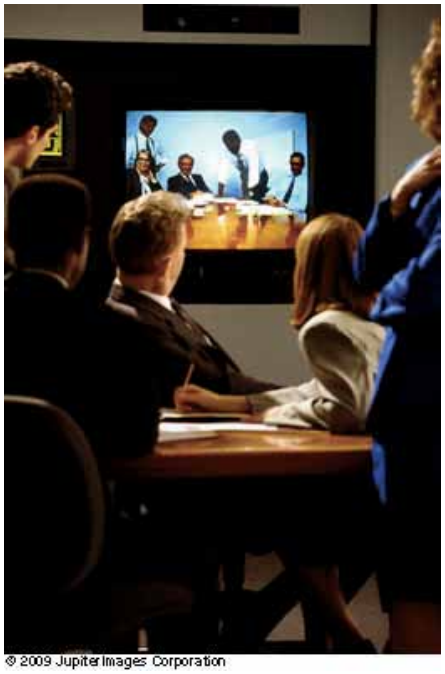
In addition to files and programs, networks also make the sharing of computer equipment—**peripherals**, such as printers, scanners, and facsimile machines—possible. The sharing of peripherals reduces an organization's operational costs. Most employees need to print documents as part of their job. With a network, many computers can share the same printer, reducing the number of printers needed by networked organizations.

Communication. Effective communication is vital to an organization's success. Networks are frequently set up to enable employees to exchange electronic communication (e-mail) using an internal e-mail system. An organization's internal e-mail system generally functions the same way as other e-mail systems that transmit messages over the Internet. The difference is security. Messages that travel over the Internet are not as secure as messages sent on an organization's internal network. This security is a significant concern, especially when dealing with financial and confidential data. Using their internal networks, workers can safely send messages. They can also share files by attaching them to e-mail messages. Communication is not limited to text alone—voice, video, and pictures can also be transmitted over the network.

E-mail is not the only type of communication that benefits from the use of a network. Networking has also increased the use of teleconferences and videoconferences. In a teleconference, people in different locations can have "real time" discussions using either their telephone or computer systems (if they have the right equipment and applications).

Teleconference

A videoconference takes conferencing to the next level; those with the appropriate hardware and software can not only talk to each other, they can see each other!



Videoconference

Collaboration. Networks make collaboration between employees easier and more efficient. They make it possible for groups of employees to collaborate on and revise documents. In the workplace, employees frequently need to access, and sometimes revise, the same information. For example, an employee in the accounting department may need to access the spreadsheet containing the addresses of their suppliers. At the same time, in the warehouse, the warehouse manager has just received a shipment and needs to revise the spreadsheet to reflect the changes to their inventory. Because the spreadsheet is stored on the network, both employees can access the file.

When documents are stored on the network, employees can be certain that they are working with the most current version of a file. They can add to a document, make deletions, and post comments. After saving the revised document to a **shared drive** on the network, their changes will be reflected in the document when it is accessed by other employees. The completed document contains all the changes made and represents the group's collaborative efforts.

Let's take a look at how this might work.

Victoria, in accounting, receives a change of address from one of her suppliers. She opens the spreadsheet containing this information and changes the address. Lyle, also in accounting, is paying bills. He needs to access the same spreadsheet to find out how much is owed. He sees that one of the invoices is incorrect. He adds a comment to check this out. Chloe, the warehouse manager, upset that merchandise delivered by one of their suppliers is inferior, decides to remove the vendor from the approved supplier list. She opens the spreadsheet and deletes the vendor. The changes made by Victoria, Lyle, and Chloe will be reflected when other employees access the spreadsheet.

Please refer to the media CD to view Network Collaboration.

Remote Access. In businesses that are networked, employees do not have to be in the same room—or even in the same building—to collaborate on a project. Using network tools, they can communicate and even work on the same document at the same time, even if they are working in different towns, states, countries, or even on different continents.

The annual board meeting of International Widgets Corporation will be held in Melbourne, Australia. The corporation has divisions all over the world. At the meeting, a report will be presented to the board that includes the budgets for each division. Because the corporation is networked, the division presidents in Austin, Texas; London, England; Sydney, Australia; Lima, Peru; and Tokyo, Japan can all work on the same report.

Organization. Software applications, such as groupware, coordinate schedules by using a common calendar. For example, Garrett needs to schedule a meeting of his company's department heads. Using the company calendar, he can see when each department head is available and schedules the meeting at a time when all can attend. He sends out invitations to the meeting. When those invited accept the invitation, the meeting is added to their calendars. Before the meeting, those invited will receive an electronic notice reminding them about the meeting. Before the company's calendar was networked, Garrett had to spend hours coordinating meetings like this. Now the process takes only a few minutes, and Garrett can move on to other tasks.

Vocabulary
A server is a large, central computer on a network that has lots of storage space. Important documents are generally saved on an organization's server. Servers also house software applications. Authorized users who are connected to the network can access the server's resources. Servers are sometimes also referred to as network servers, application servers, or file servers.

Data Protection. Documents created by employees within an organization are of great value to the organization. For this reason, it is important that they be backed up on a regular basis. When an organization has its computers networked, it is easier to automate the backup process, so individual employees don't have to remember to do it. Network software can be set up so that the files saved on the network's **server** as well as on individual employees' workstations are backed up on a set schedule.

Your Turn

In this lesson, you learned about the benefits networks provide for businesses. Read the scenarios below and describe how a network would increase worker productivity. Once you have entered your responses, click the Submit button. Suggested responses will be displayed. Your answers probably won't be exactly the same, and this is okay.

Please refer to the media CD to complete Network Case Studies.

Lets Review!

In this lesson, you learned that organizations using computer networks reap many benefits. The most important of these include:

- Increased productivity—workers who once spent a great deal of time scheduling meetings or locating needed files and information can perform their jobs more efficiently using networked resources. Resources are backed up on a regular basis to ensure against losing valuable work.
- Improved communications—business networks provide the structure for fast, secure communication.
- Easier collaboration—networking enables employees to work together on projects and files regardless of their physical location.
- Reduced cost—using network resources saves money. Businesses have to purchase less peripheral equipment. Installation and upgrades to software applications can be done at a central location.

Multiple Choice

1.1 Computer networks can consist of as few as_____computers.

A. 3
B. 5
C. 10
D. 2

1.2 Computer networks enable the sharing of_____.

A. files
B. hardware
C. software
D. all of the above
E. none of the above

1.3 A printer is a type of_____.

A. groupware
B. peripheral
C. server
D. shared drive

1.4 What benefit do internal networked e-mail systems provide over Internet-based systems?_____

A. allows files to be shared by sending attachments
B. allows e-mail to be sent to co-workers
C. enables the transmission of videos
D. provides increased security

1.5 A(n) _____is a central computer that enables authorized users to access networked resources.

A. peripheral
B. server
C. LAN
D. application

Multiple Select

1.6 In what ways does a computer network make setting appointments easier? _____

A. by providing a common calendar
B. by reassigning workloads to enable attendance
C. by sending electronic reminders
D. by sending out invitations
E. by telephoning those involved

True or False

1.7 True/False With remote access network tools, Raul in Colombia can enter data into a spread sheet. Olivia in England can access the spreadsheet a few minutes later and use Raul's data in her report.

Multiple Choice

1.8 How do networks help protect data?_____

A. by preventing access by more than one person at a time
B. by restricting access to department chairs
C. by scheduling regular backups
D. by shutting down at 5:00 p.m. each evening

How do Networks Work?

If you're like most people your age, you've probably been involved in a group project once or twice in your life. You may have worked with a group to complete a school assignment. Perhaps you were part of a group that organized and ran a car wash to raise funds for a nonprofit organization. Regardless of the type of project you worked on, it is likely that members of the group had different roles or jobs to do.

Let's take a closer look at the fundraising car wash. Jamal is very good at organizing things. He's taken on the role of the leader and is responsible for the overall success of the project. Clarissa is an excellent writer. She's been assigned to write a press release for the local newspaper, describing the organization's purpose and announcing the car wash. Derek is the artist in the group. His job is to design the flyer that will be distributed in the area. Jeanine and Domino are the group's track stars. They are in charge of distributing the flyers. Jamal has recruited twenty "volunteers" from the group to work at the car wash. Kayla and Connor are crackerjack mathematicians. Their job will be to figure out where they can get the best price on the supplies they need for the car wash and to handle donations at the event.

Computer networks function similarly to group projects. Each part, or component, of the network has its own job to do. Network components work together to ensure the efficient operation of the network as a whole.

Objectives:

- Describe the function of network components.
- Explain how computer networks work.

Vocabulary:

configure - set up computer hardware or software to function in a certain way.
network administrator - the person in charge of a computer network.
network interface card - a circuit board installed in a computer that enables it to be connected to a network.
network operating system - software that runs the network.
node - a device connected to a computer network.
peripheral - external hardware connected to and controlled by a computer.
server - computer that provides resources for other computers on the network.

Network Components

Computer networks have a job to do. To understand how they do their jobs, you must first know about their various components. Let's start with a workstation. The workstation is similar to the membership involved in the car wash you read about at the beginning of the lesson. Workstations are generally the largest group on the network. As you can probably tell by their name, they do the work of the organization. A workstation is a computer people use to do their jobs. When this computer is part of a network, it is called a **node**. Nodes can be computers or **peripherals**, such as printers, scanners, or facsimile (fax) machines that are connected to the network.

Each network node is connected to a **server.** The server, which may be referred to as the file server, network server, or application server depending on the services it provides, is generally a fast computer with a large storage capacity. It might be helpful for you to think of the server as a type of computerized filing cabinet. Here, the network's resources—its files, software, and other resources—can be stored. Users working at network nodes may access the resources stored on the network server if they have the proper permissions.

Administering the Network

Permissions are granted by the **network administrator**. The network administrator, like Jamal in our car wash example, has a very important job to do. It is the administrator's responsibility to set up and maintain an organization's network and to make sure it runs efficiently. Network administrators do their jobs with the help of the network operating system (NOS). The NOS helps the administrator monitor the use of the network and manage its resources.

The administrator **configures** the network to help employees be more productive on the job. For example, it would be very inefficient if Stacy in bookkeeping had to run up two flights of stairs to retrieve a document she printed. For this reason, the network administrator

configures the network so that Stacy's documents will be printed on the printer in the bookkeeping office.

The network administrator also controls who may access the network's resources. Not all employees in an organization need to access all of its resources. For example, the personnel department needs access to employee social security numbers and salary information. The network administrator has configured the system to allow them to access this data. Workers in the sales department, on the other hand, have no legitimate need for this information and therefore are not provided with access privileges to this information by the network administrator.

One of the ways in which the network administrator controls who is able to access certain resources is by providing people and workgroups with certain permissions. Permissions provide the ability to access certain files or programs or to use certain equipment, such as networked printers or facsimile machines. To establish permissions, the administrator provides employees with user names and passwords. In this way, the network administrator manages and controls the use of the network.

Connectivity

Connectivity is an important part of networking. Network nodes need to be connected in order to communicate and use network resources. Without connectivity, there is no network.

Networks can be connected through "wired" or "wireless" connections. Until recently, wireless networks were practically unheard of. Networks only came in the wired variety and—except for very small businesses—are the type of network in use in most businesses today. Wired networks have several advantages over wireless networks. These advantages include:

- Speed—Wired networks are usually faster than wireless networks, enabling organizations to move large amounts of information between nodes quickly and efficiently.

- Security—Wired networks are more secure than wireless networks. The cabling of wired networks makes it more difficult for unauthorized users to access the network.

On the downside, wired networks can be expensive due to the cabling required to connect the parts of the network. The greater the number of devices on the network, the more expensive it will be.

Vocabulary
A bit, short for binary digit has a value of either zero or one. Bit is often confused with the term byte. A byte consists of eight bits and is also known as an octet. A single letter of the alphabet is composed of eight bits or one byte. For example, A= 01000001 and Z= 01011010.

People often confuse bit and byte. An easy way to know the difference is to remember that a bit is smaller than a byte. The word bit has three letters and the word byte has four letters.

Connectors. So how do these devices get connected? Network nodes and servers are physically connected through cables that send data from one access point to another. These cables transmit data at various rates of speed that are generally measured according to the number of bits that can be transmitted per second. A bit is the smallest piece of data that can be stored in a computer.

Use the table below to compare the terms used to describe transmission speeds.

Abbreviation	Term	Definition	Numeric Value
Kbps	kilobits per second	one thousand bits per second	1,000
Mbps	megabits per second	one million bits per second	1,000,000
Gbps	gigabits per second	one billion bits per second	1,000,000,000

Some of the most common types of connectors are described below.

Twisted pair cable, as the name suggests, are two wires twisted around each other and encased in plastic. In the case of shielded twisted pair (STP) cables, each wire is individually coated in plastic before it is twisted around the other. This twisting minimizes interference in the transmission of data. These cables are used with small local area networks (LANs). Their range is short, approximately three hundred feet. Twisted pair cable comes in two types:

UTP or unshielded twisted pair is used by businesses that want to connect several nodes together. It can transmit data between four and one hundred Mbps. The approximate cost of UTP is $90 for each workstation.

STP or shielded twisted pair receive less interference than UTPs and can transmit data between sixteen and 155 Mbps. The approximate cost of STP cabling is $125 for each workstation.

Coaxial cable has two conductors—a center conductor and another that surrounds it. These connectors are used with larger LANs. Their range is between six hundred and 2,500 feet. Transmission speeds are ten Mbps and their cost ranges between $25 and $50 per workstation.

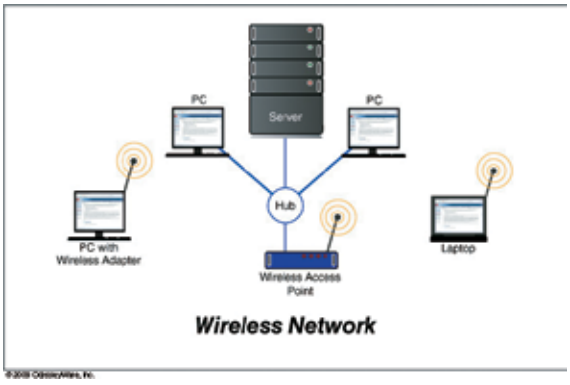
Fiber optic cable is a thin strand of glass. Unlike the above connectors that transmit data using electric current, fiber optic cable transmits data using light. These connections are generally used for wide area networks (WANs). They are the most difficult and expensive to install; however, they are worth their trouble because their use eliminates interference. They can transmit data between one hundred Mbps and two Gbps. The cost per workstation depends on the type of fiber optic connection used, averaging approximately $250 per workstation for the multimode connection.

The chart below compares wired connections.

Type	Used for	Transmission Speed	Transmission Range	Approximate Cost per Workstation
UTP	small LANs	4-100 Mbps	300 feet	$90
STP	small LANs	16-155 Mbps	300 feet	$125
Coaxial	large LANs	10 Mbps	600-2500 feet	$25-50
Fiber Optic	WAN	100 Mbps-2 Gbps	1-25 miles	$250

Network Interface Cards. Computers are connected to network cables through network interface cards (NIC). A NIC is installed on each computer on a network. This card lets the network nodes communicate with each other and the server. The NIC provides the computer with a unique address known as its media access control (MAC). The MAC is used to direct traffic between computers.

The use of wireless connections has increased significantly in your lifetime, particularly for home use. Many feel that wireless networks (also known as WiFi Technology) are the future of network connections. This technology allows users to be more mobile. Connections to the network are made through access points.



Wireless networks provide the easiest and least expensive way to network computers. Because there are no wires to get tangled up, it is easy to move a laptop computer from one place to another without losing its connection. Wireless networks, however have several disadvantages. These include:

- Security—wireless networks are less secure than wired networks and require extra steps to protect the network.
- Speed—generally, wireless networks are slower than wired networks.
- Obstacles—in order to transmit data over a wireless network, a direct connection is needed. There can be no objects that get in the way of the signal. If a building or hill is between two network nodes, data cannot be sent between them without adding additional hardware to the network.

The two most common wireless connections are infrared and microwave.

Infrared. Networks using infrared transmit data using light emitting diodes (LEDs) or lasers. If an object is between two network points, the signal is blocked and the transmission does not reach its destination. Transmission distance ranges from three to one thousand feet. Transmission speed is between 100 Kbps and 16 Mbps. The cost of infrared connections varies based upon the technology being used and the distance between points.

Microwave is another way to transmit information between network nodes without the use of cables. Microwave transmissions can be terrestrial (by land), using microwave towers to transmit signals from one place to another. Signals can also be transmitted using satellites. Satellites receive data from network nodes and transmit it to other nodes requesting the information. The cost for microwave varies depending on the type used (satellite vs. terrestrial) and the distance the data needs to travel.

The chart below compares wireless connections.

Type	Used for	Transmission Speed	Transmission Range	Approximate Cost per Workstation
Infrared	LAN	100 Kbps - 16 Mbps	3-1000 feet	varies
Microwave	LAN	6 Mbps	31 Miles	varies

Although most organizations use wired networks, the use of wireless networks is expected to become more common in businesses in the future. The table below compares the advantages and disadvantages of both method types of connection.

Connection type	Advantages	Disadvantages
Wired	fast data transmission; increased network security	cabling can be expensive
Wireless	inexpensive; allows greater flexibility	slow data transmission; unobstructed route required; hard to protect network

Your Turn

You have learned about some of the basic components that make up a computer network. In the exercise below, you are provided with network components. Describe the function of each one in the space provided.

Please refer to the media CD to complete Network Components.

Lets Review!

In this lesson, you learned that networks have two types of connections—wired and wireless. Wired connections enable greater speed and security and are used by most businesses. Wireless networks are increasing in popularity and are currently mainly used in homes and small businesses. Although wireless networks are less expensive and provide more flexibility, they are often slow and more difficult to secure.

Network components—nodes, servers, connectors, NICs, and the NOS all have specific jobs to do.

It is the network administrator's job to make sure the network runs smoothly. The administrator controls network use by providing employees and workgroups with the permissions needed to access the network's resources.

Multiple Select

1.9 Which of the items below are nodes? _____

A. fax
B. NIC
C. NOC
D. printer
E. twisted pair cables
F. workstation

Multiple Choice

1.10 A(n)_____is a fast computer with lots of storage.

A. STP
B. infrared
C. UTP
D. server

1.11 Isabel and Jared work for the same company but in different departments. Their workstations are both part of the company's computer network. Over lunch, Isabel was discussing an application that she was having a problem with. Jared was familiar with the software even though he didn't use it on the job. Jared offered to help Isabel and they went to his desk to open the program. Jared couldn't open it. The reason Jared couldn't open the program was probably because_____.

A. he had not been given access privileges by the network administrator
B. he was connected to the network using coaxial cables that did not transmit data fast enough
C. he was using a laptop computer
D. his workstation did not have a network interface card

Multiple Select

1.12 What is the job of the network administrator? _____

A. assign MACs
B. configure the network
C. control network usage
D. file resources on the network server
E. maintain the network

Multiple Choice

1.13 Speed and security are advantages generally associated with_____networks.

A. wired
B. wireless

1.14 A_____is the smallest amount of data stored in a computer.

A. byte
B. NOS
C. microwave
D. bit

1.15 Wired networks are connected using_____.

A. cables
B. infrared
C. microwave
D. radar

1.16 The device that connects computers to network connectors is called a_____.

A. fiber optic
B. network interface card
C. network operating system
D. peripheral

Multiple Select

1.17 Microwave transmits information between network nodes using _____.

A. towers
B. satellite
C. coaxial cables
D. fiber optics

Paragraph

1.18 In 5–10 sentences, describe how computer networks work.

Teacher Check: _____ Initial _____ Date

Self Test 1: An Introduction to Networking

Multiple Choice

1.01 What is the minimum number of computers that can make up a network?_____

A. 1
B. 2
C. 5
D. 10

Multiple Select

1.02 Computer networks make the sharing of these resources possible. _____

A. bank accounts
B. files
C. hardware
D. passwords
E. software

Multiple Choice

1.03 A networked scanner is a type of_____.

A. groupware
B. peripheral
C. server
D. shared drive

1.04 This is a central computer that enables authorized users to access networked resources._____

A. LAN
B. NOS
C. peripheral
D. server

Multiple Select

1.05 Candice's job has become a lot easier since the installation of the new computer network. The network makes the scheduling of appointments much more efficient by _____.

A. providing a common calendar
B. reassigning workloads to enable attendance
C. sending electronic reminders
D. sending out invitations
E. telephoning those involved

Multiple Choice

1.06 Conrad, the office manager, has noticed an increase in the productivity of the company's employees since the installation of a computer network. Frequent computer crashes often resulted in the need to re-create lost or corrupted files. The network makes it easier to protect the company's data by_____.

A. backing up the network on a regular basis
B. not allowing more than one person to access the network at a time
C. restricting access to employees in management positions
D. turning off the network at midnight each day

1.07 Flexibility and cost reduction are advantages generally associated with_____networks.

A. wireless
B. wired

1.08 Most businesses use_____networks.

A. wireless
B. wired

1.09 A network administrator determines who may access network resources by assigning users_____.

A. NICs
B. nodes
C. permissions
D. UTPs

Multiple Select

1.010 These can be nodes in a computer network. _____

A. computers
B. network interface cards
C. network operating systems
D. peripherals

Multiple Choice

1.011 This is a device that enables computers to be connected to a network._____

A. NIC
B. NOS
C. server
D. STP

1.012 Wired networks are connected using_____.

A. cables
B. infrared
C. microwaves
D. sonar

Score: _____ **Teacher Initial:** _____ **Date:** _____

Each Answer = 1 point; Essay and Paragraph Questions = 5 - 10 Points