

COMPUTER NETWORKING

6th Semester Computer Technology

Subject Code: 28562

Computer network

- 1.1** Define Computer Network.
- 1.2.** State the concept of computer Network.
- 1.3** Mention elements of computer network.
- 1.4** Describe the advantages of Computer network.
- 1.5** State the application of computer network.
- 1.6** Describe client / server and peer-to-peer network.
- 1.7** State LAN, MANs and WANs.
- 1.8** Describe the general features of LAN, MANs and WANs

Computer network

A collection of computing devices connected in order to communicate and share resources

Connections between computing devices can be physical using wires or cables or wireless using radio waves or infrared signals.

- Network
 - A connected system of objects or people
- Computer network
 - A collection of computers and other hardware devices connected together so users can share hardware, software, and data, and electronically communicate
- Computer networks are converging with telephone and other communications networks
- Networks range from small private networks to the Internet
- In most businesses, computer networks are essential

Node (host)

Any device on a network

Data transfer rate (bandwidth)

The speed with which data is moved from one place to another on a network

Computer networks have opened up an entire frontier in the world of computing called the **client/server model**

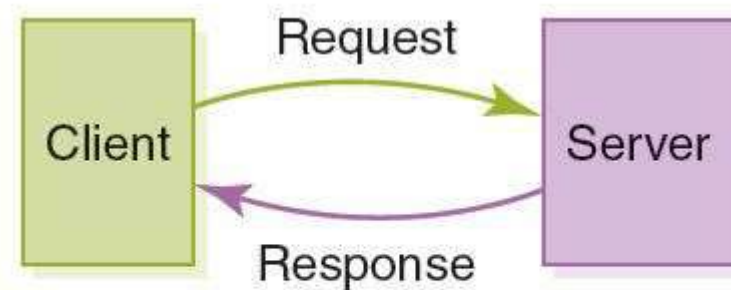


FIGURE 15.1 Client/server interaction

- **Computer Network Elements:** The objects basically used in a computer network are known as Computer Network Elements (CNEs). There are basically 4 computer networking elements:
 - Computers
 - Transmission medium (wired or wireless)
 - Protocols
 - Network software

- **Computers:**

A computer is a digital device that is able to accept data as input, a process that data using predefined algorithms and data structures, and perform tasks as output – that includes the transformation of raw data into information, then knowledge, and finally insight about the data's domain. The output also takes the form of the performance of physical tasks along with data storage, data transformation, and data retrieval. The network is also formed by computers for the purposes of data interchange and leveraging a distributed programming model for parallel processing.

- **Transmission medium:**
The means through which we send our data from one place to another is known as the Transmission medium. Signals are used to represent data by computers and other telecommunication devices. The signals (i.e., data or information) are transmitted in the form of electromagnetic energy from one device to another. These signals travel through a vacuum, air, or other transmission mediums to move from one point to another (from sender to receiver).
- The transmission medium is of two types:
- **(i) Wired or Guided:** For example, Twisted Pair Cable, Coaxial Cable, and Optical Fiber Cable.
- **(i) Wireless or Unguided:** For example, Radiowaves, Microwaves, and Infrared.

- **Protocols:**

There are some defined rules and conventions for communication between network devices.

These are called Protocols. Network protocols include mechanisms for devices to identify and make connections with each other, as well as formatting rules that specify how data is packaged into sent and received messages.

- Protocols may be of 3 types:
- Internet Protocols
- Wireless Network Protocols
- Network Routing Protocols

- **Network Software:**

Network software is a foundational element for any network. This type of software helps administrators deploy, manage and monitor a network. The traditional networks are made up of specialized hardware, such as routers and switches, that bundle the networking software into the solution.

Advantages of computer networking

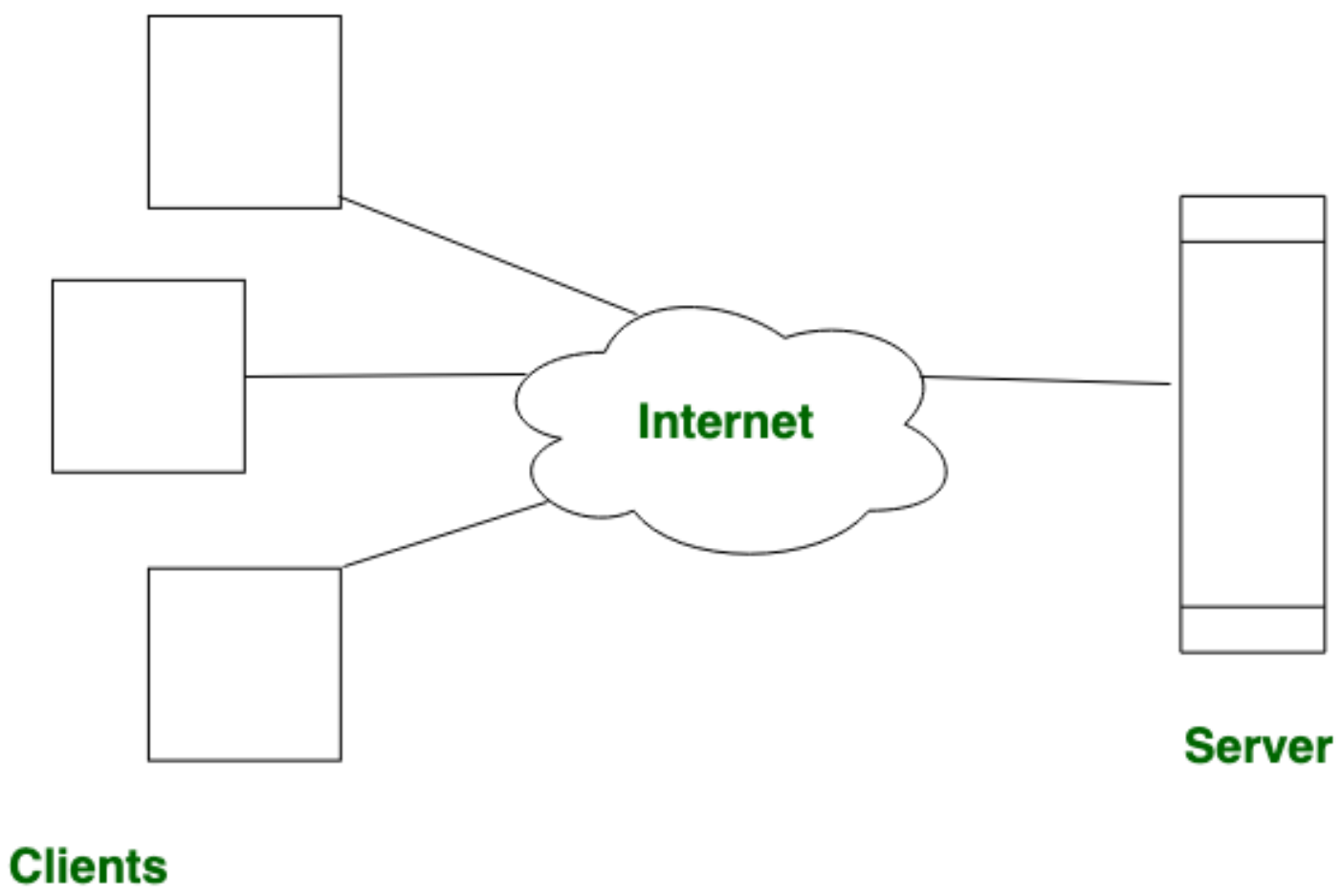
- The main benefits of networks include:
- File sharing - you can easily share data between different users, or access it remotely if you keep it on other connected devices.
- Resource sharing - using network-connected peripheral devices like printers, scanners and copiers, or sharing software between multiple users, saves money.
- Sharing a single internet connection - it is cost-efficient and can help protect your systems if you properly secure the network.
- Increasing storage capacity - you can access files and multimedia, such as images and music, which you store remotely on other machines or network-attached storage devices

Application of Computer Network

There are a variety of fields in computer networks that are used in industries. Some of them are as follows:

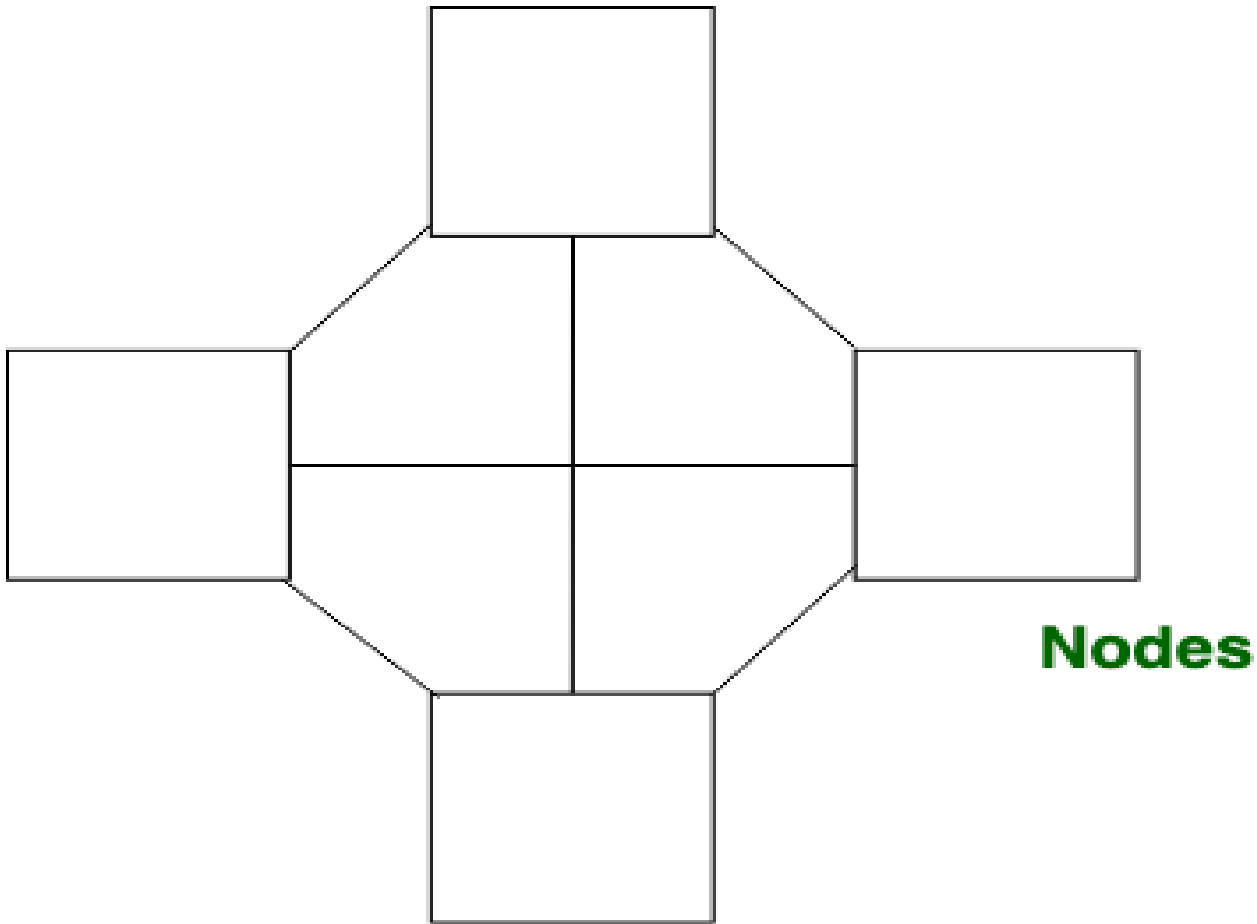
- **1. Internet and World Wide Web**
- **2. Communication**
- **3. File Sharing and Data Transfer**
- **4. Online gaming**
- **5. Remote Access and Control**
- **6. Social media**
- **7. Cloud Computing**
- **8. Online Banking and E-Commerce**
- **9. Enterprise Networks**
- **10. Healthcare**
- **11. Education**
- **12. Transportation and Logistics**
- **13. Internet of Things (IoT) and Smart Homes**
- **14. Scientific Research**
- **15. Government and Defense**

- **Client-Server Network:** This model are broadly used network model. In Client-Server Network, Clients and server are differentiated, Specific server and clients are present. In Client-Server Network, Centralized server is used to store the data because its management is centralized. In [Client-Server Network](#), Server respond the services which is request by Client.



Client-Server Network Model

- **Peer-to-Peer Network:** This model does not differentiate the clients and the servers, In this each and every node is itself client and server. In [Peer-to-Peer Network](#), Each and every node can do both request and respond for the services.
- Peer-to-peer networks are often created by collections of 12 or fewer machines. All of these computers use unique security to keep their data, but they also share data with every other node.
- In peer-to-peer networks, the nodes both consume and produce resources. Therefore, as the number of nodes grows, so does the peer-to-peer network's capability for resource sharing. This is distinct from client-server networks where an increase in nodes causes the server to become overloaded.
- It is challenging to give nodes in peer-to-peer networks proper security because they function as both clients and servers. A denial of service attack may result from this.
- The majority of contemporary operating systems, including Windows and Mac OS, come with software to implement peer



Peer-to-Peer Network Model

S.NO	Client-Server Network	Peer-to-Peer Network
1.	In Client-Server Network, Clients and server are differentiated, Specific server and clients are present.	In Peer-to-Peer Network, Clients and server are not differentiated.
2.	Client-Server Network focuses on information sharing.	While Peer-to-Peer Network focuses on connectivity.
3.	In Client-Server Network, Centralized server is used to store the data.	While in Peer-to-Peer Network, Each peer has its own data.
4.	In Client-Server Network, Server respond the services which is request by Client.	While in Peer-to-Peer Network, Each and every node can do both request and respond for the services.
5.	Client-Server Network are costlier than Peer-to-Peer Network.	While Peer-to-Peer Network are less costlier than Client-Server Network.
6.	Client-Server Network are more stable than Peer-to-Peer Network.	While Peer-to-Peer Network are less stable if number of peer is increase.
7.	Client-Server Network is used for both small and large networks.	While Peer-to-Peer Network is generally suited for small networks with fewer than 10 computers.

TYPES OF NETWORK BASED ON GEOGRAPHICAL SPREAD

Based on network span or geographical spread , network can be divided into two types:

(I) LAN (LOCAL AREA NETWORK)

(II) WAN (WIDE AREA NETWORK)

TYPES OF NETWORK BASED ON GEOGRAPHICAL SPREAD

LAN(LOCAL AREA NETWORK)

LAN (LOCAL AREA NETWORK)

Small computer network that are confined to a localised area (eg ; an office , a building or a factory) are known as LAN's.

The key purpose of LAN is to serve its users in resource sharing .

The hardware as well as software resources are shared through LAN's.

LAN users can share data , information , programs , printers , modems ,etc.,

TYPES OF NETWORK BASED ON GEOGRAPHICAL SPREAD

WAN (WIDE AREA NETWORK)

WAN (WIDE AREA NETWORK)

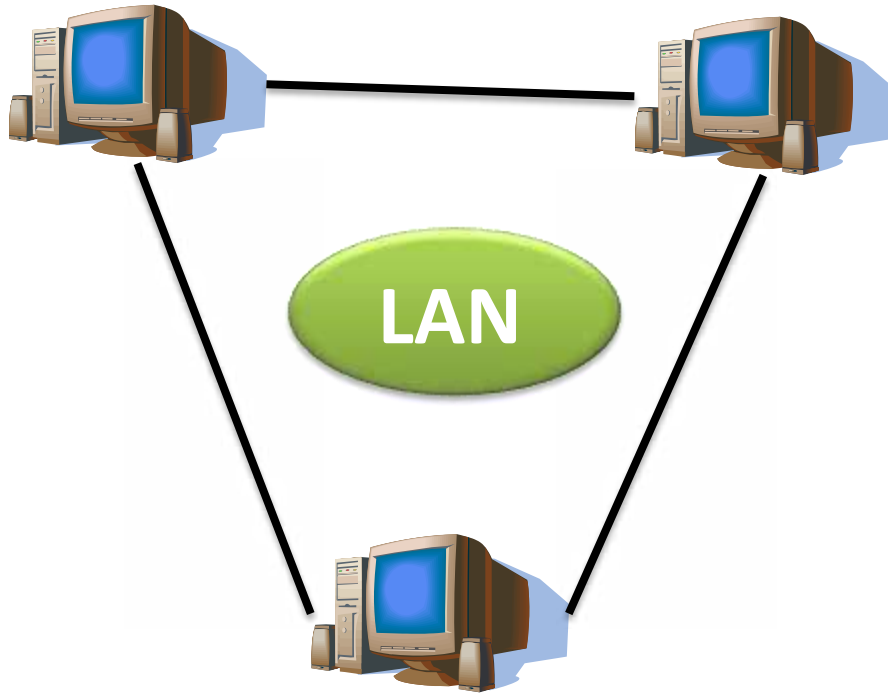
The network spread across countries (or) on a very big geographical area are known as WAN's.

It is a group of computers that are separated by a large distance and tied together .

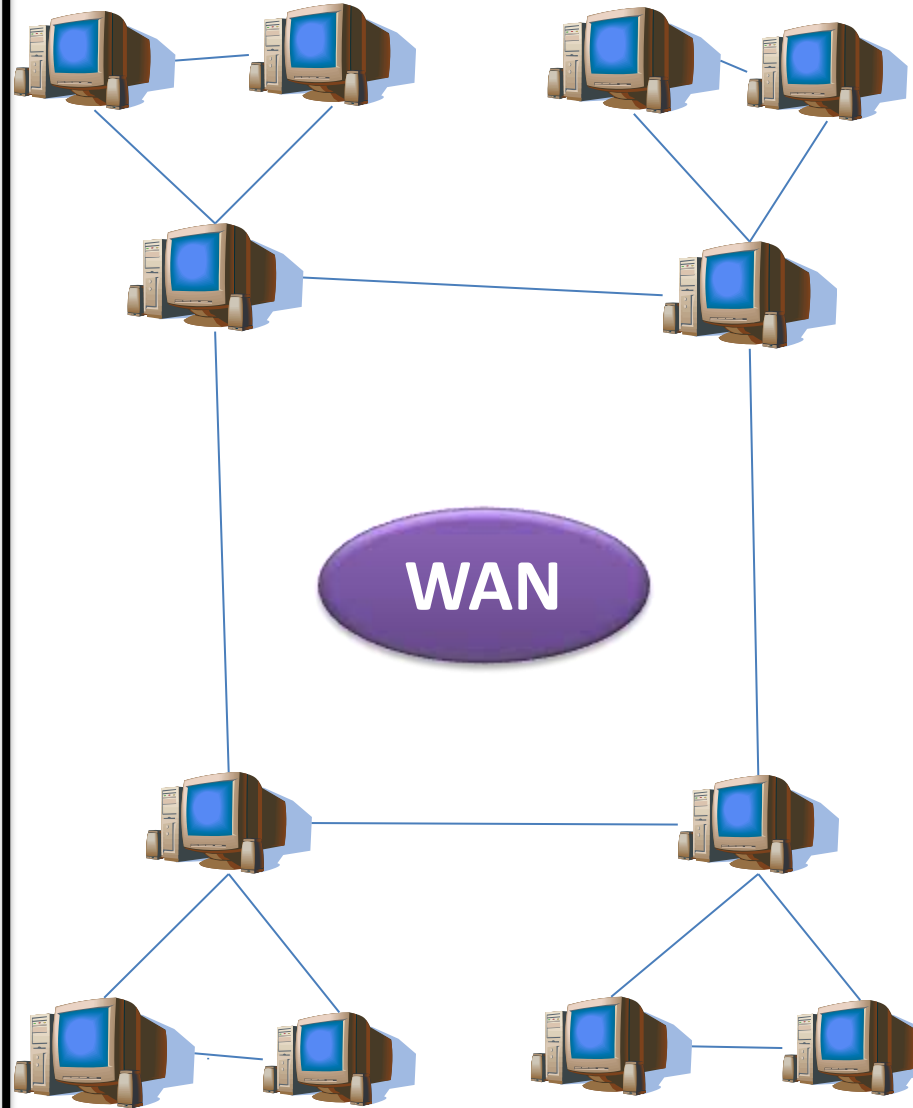
It can be a group of LAN's that are separated across several locations and connected together to look like one big LAN.

Computers are connected to a wide area network are often connected through public networks such as telephone systems .

LAN



WAN



DIFFERENCE BETWEEN LAN & WAN

DIFFERENCE BETWEEN LAN & WAN

S.NO	LAN	WAN
1)	IT IS SPRED OVER A SMALL AREA	IT IS SPREAD OVER A VERY LARGE AREA
2)	IT IS USUALLY COSTS LESS TO SET IT UP	IT COSTS HIGHER TO SET IT UP
3)	IT IS USUALLY A SINGLE NETWORK	IT IS USUALLY A NETWORK OF MANY NETWORK

Classification of Networks

- Classification by network geography.
- Classification by component roles.

Classification by Network Geography

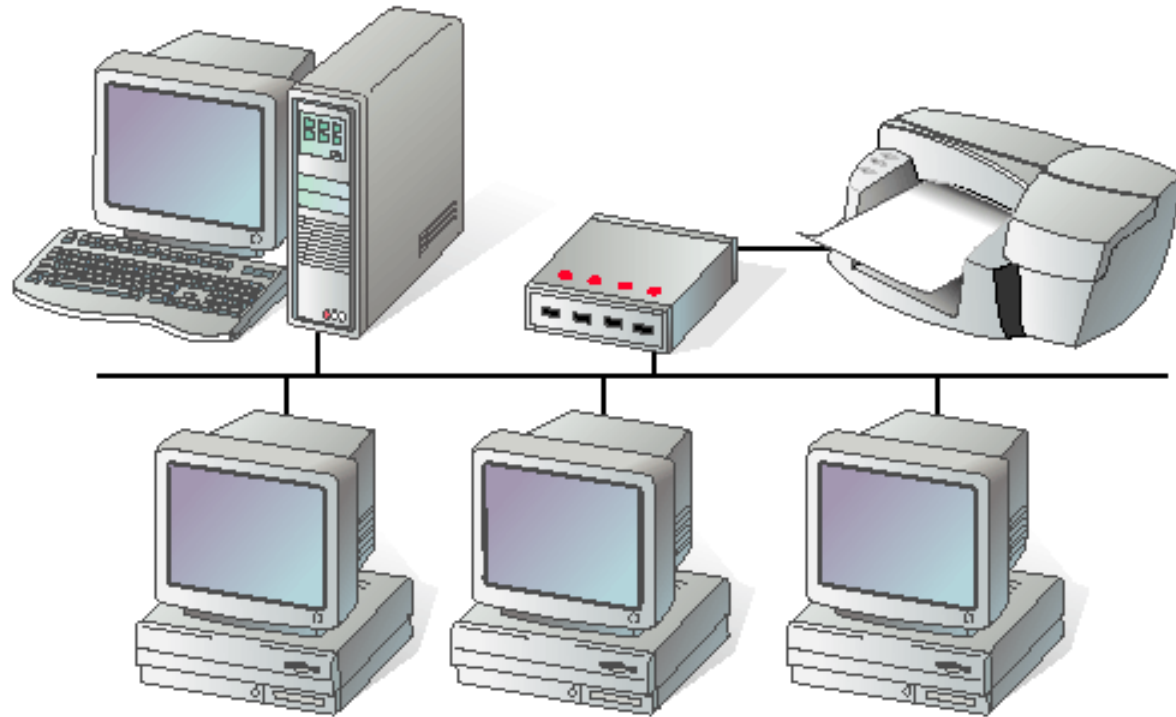
- Networks are frequently classified according to the geographical boundaries spanned by the network itself.
- LAN, WAN, and MAN are the basic types of classification, of which LAN and WAN are frequently used.

Classification by Network Geography

Local area network (LAN):

- A LAN covers a relatively small area such as a classroom, school, or a single building.
- LANs are inexpensive to install and also provide higher speeds.

Classification by Network Geography



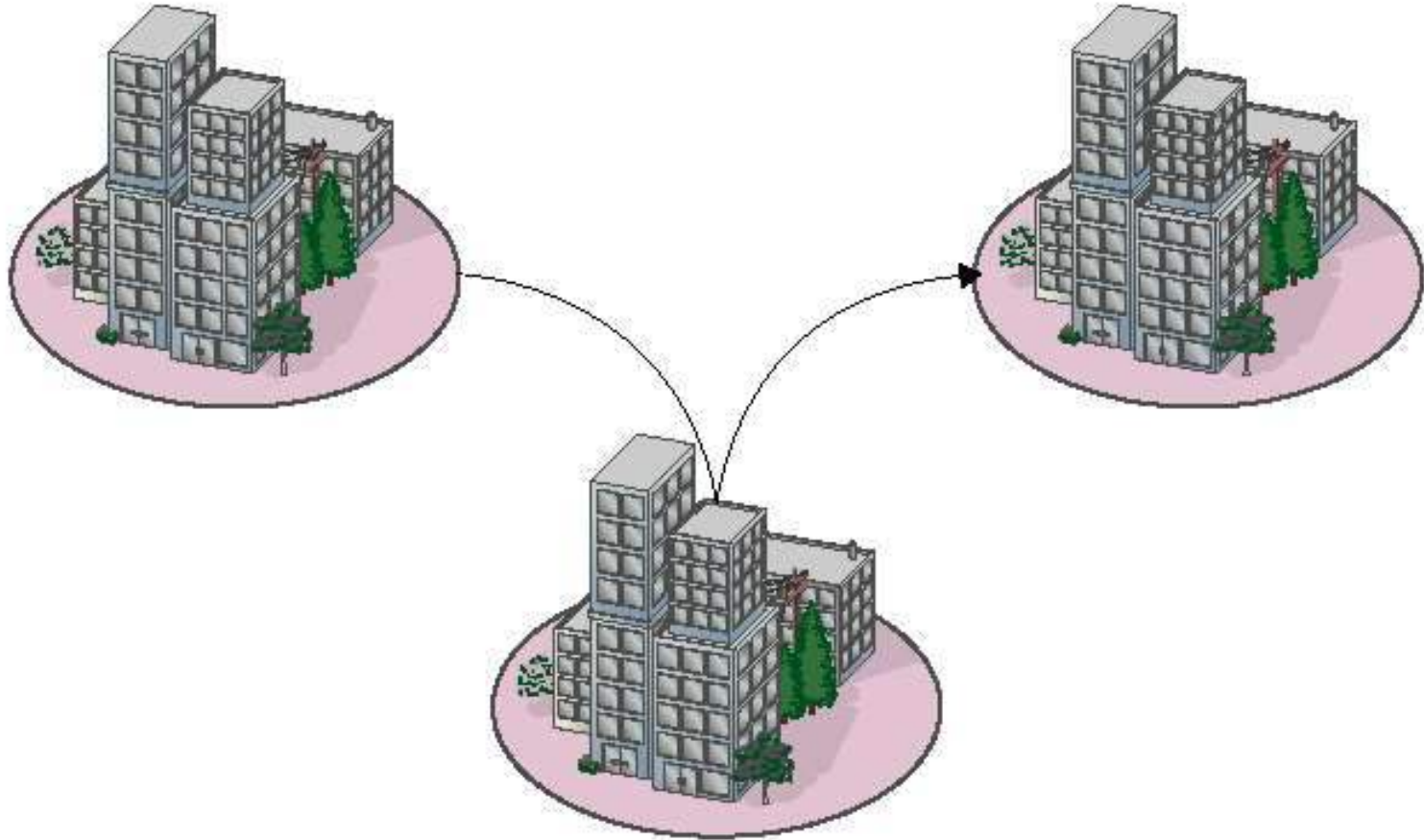
Local area network

Classification by Network Geography

Metropolitan area network (MAN):

- A MAN spans the distance of a typical metropolitan city.
- The cost of installation and operation is higher.
- MANs use high-speed connections such as fiber optics to achieve higher speeds.

Classification by Network Geography



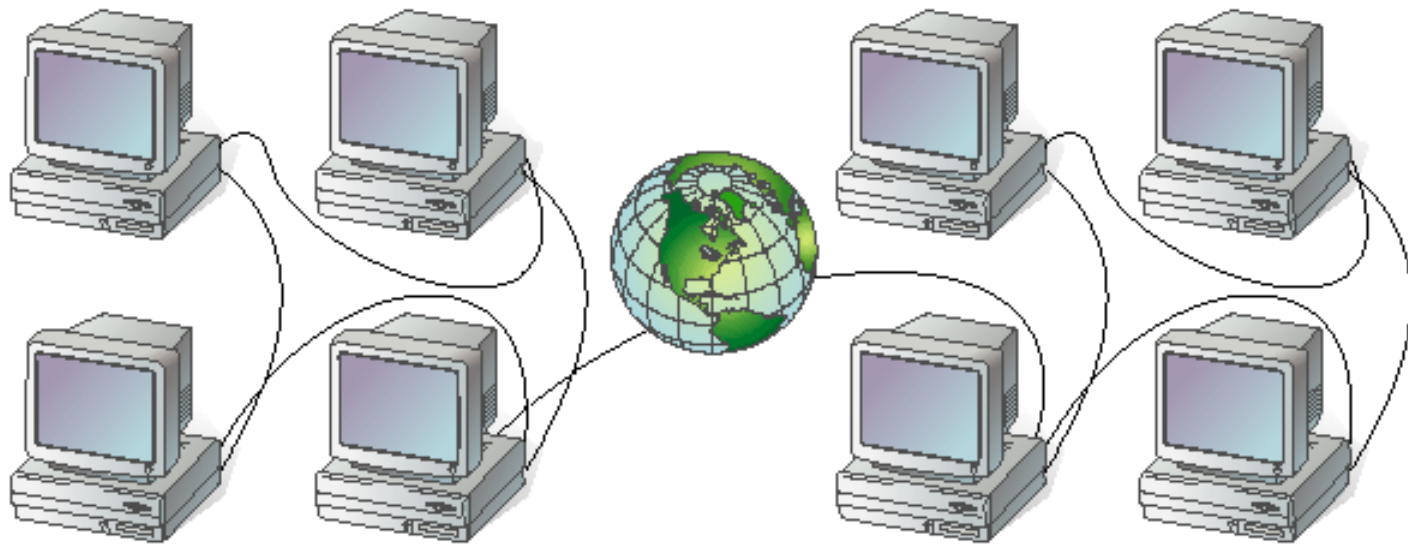
Metropolitan area network

Classification by Network Geography

Wide area network (WAN):

- WANs span a larger area than a single city.
- These use long distance telecommunication networks for connection, thereby increasing the cost.
- The Internet is a good example of a WAN.

Classification by Network Geography



Wide area network