

Lecture-1

Introduction

- ▶ **Data Communication**
- ▶ **Networks**
- ▶ **Protocols**

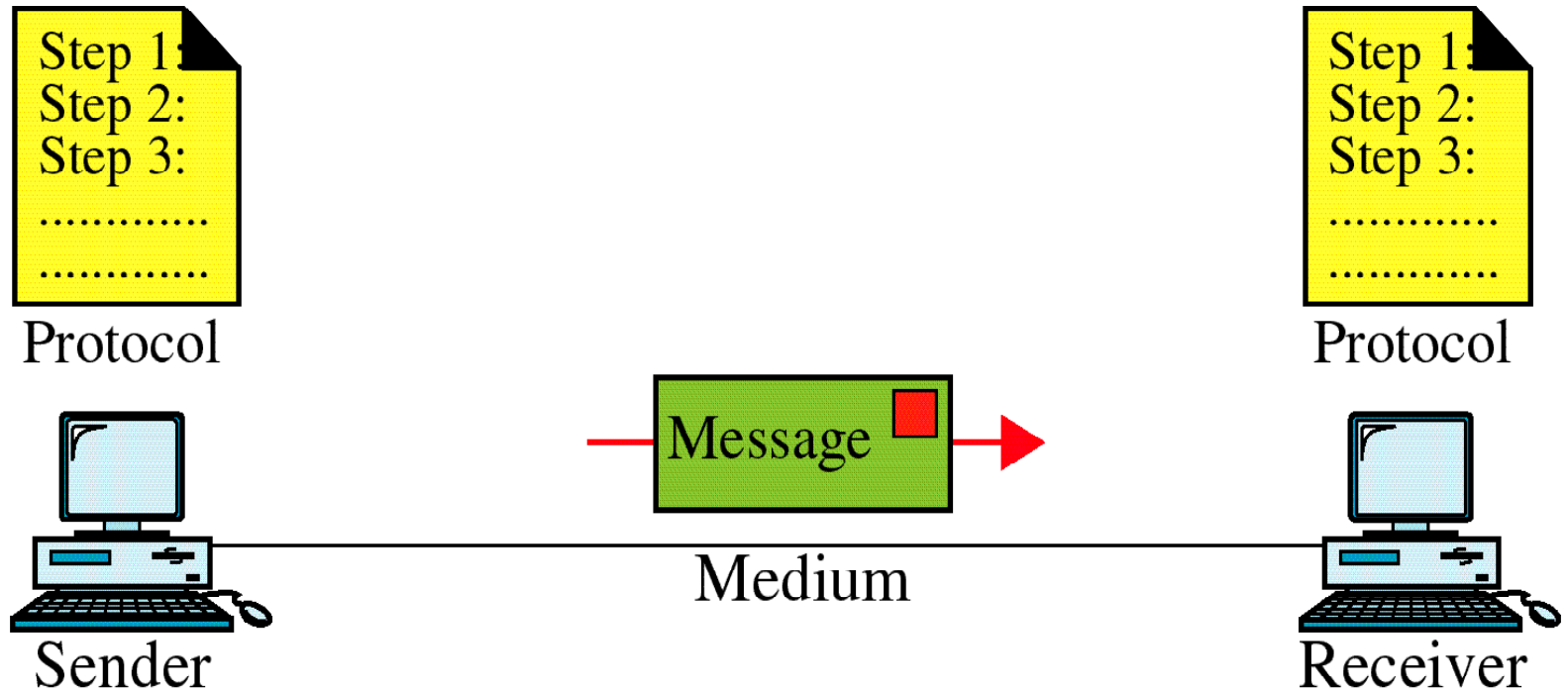
Data Communication System Components

Data communication is the exchange of data between two devices via some form of transmission medium such as a wire cable

Data communication system has five component

1. Message
2. Sender
3. Receiver
4. Transmission Medium
5. Protocol

Data Communication System Components



Type of Connection

```
graph TD; A[Type of Connection] --> B[Point-to-point]; A --> C[Multipoint]
```

Point-to-point

Multipoint

Type of connection

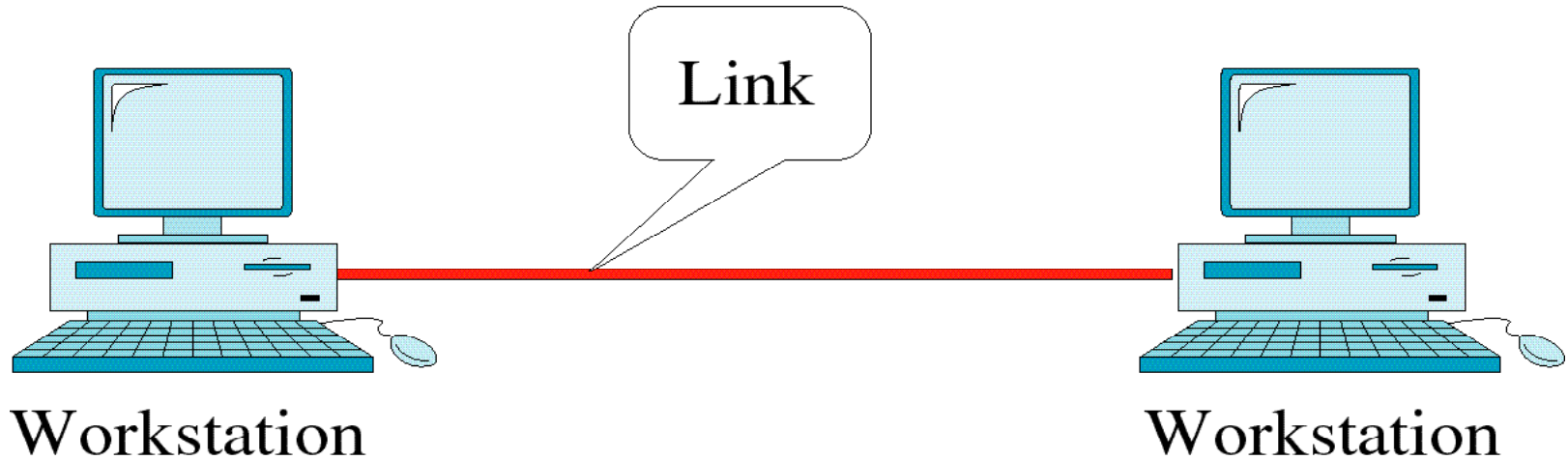
A network is two or more devices connected through links.

A link is a communications pathway that transfer data from one device to another.

For communication to occur, two devices must be connected in some way to the same time. There are two possible types of connections:

1. point-to-point
2. multipoint

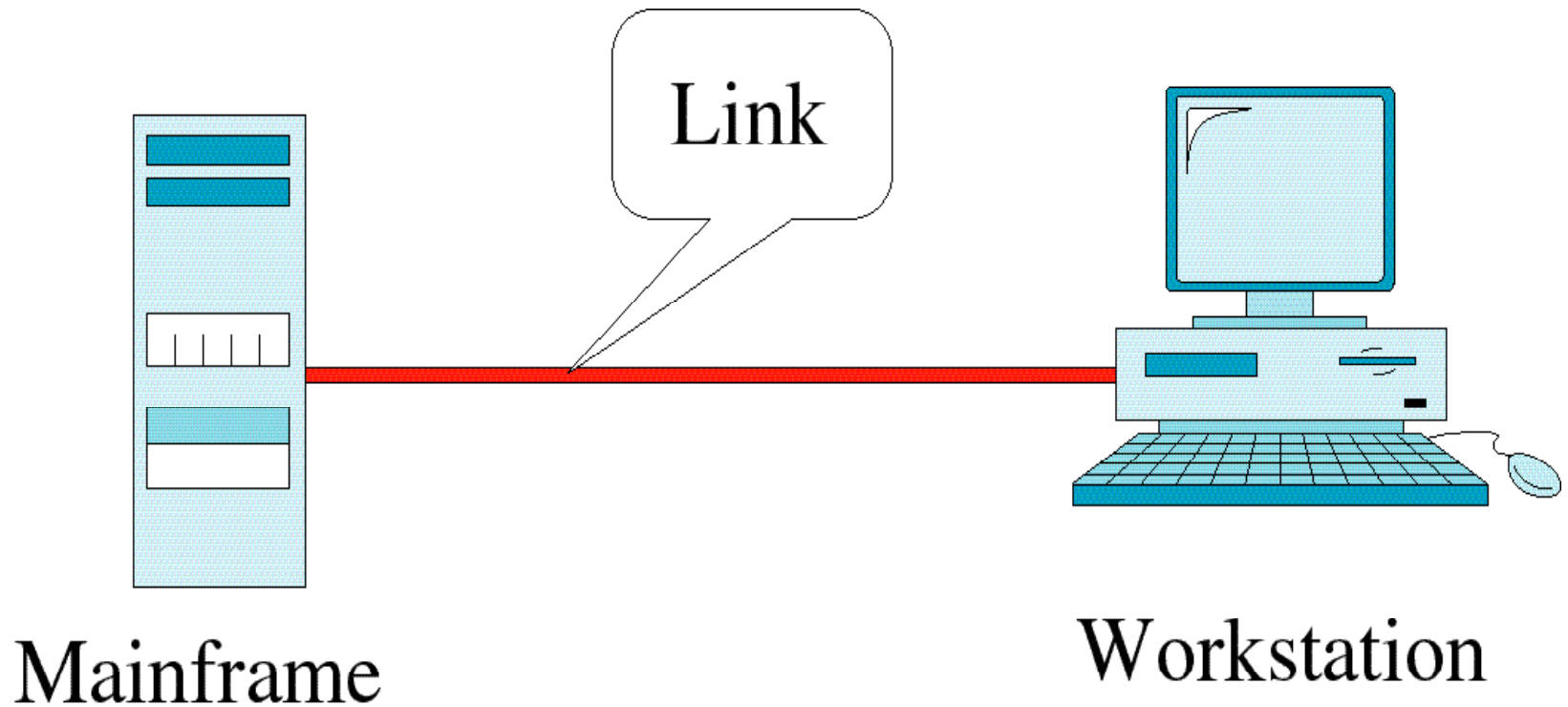
Point-to-Point Line Configuration



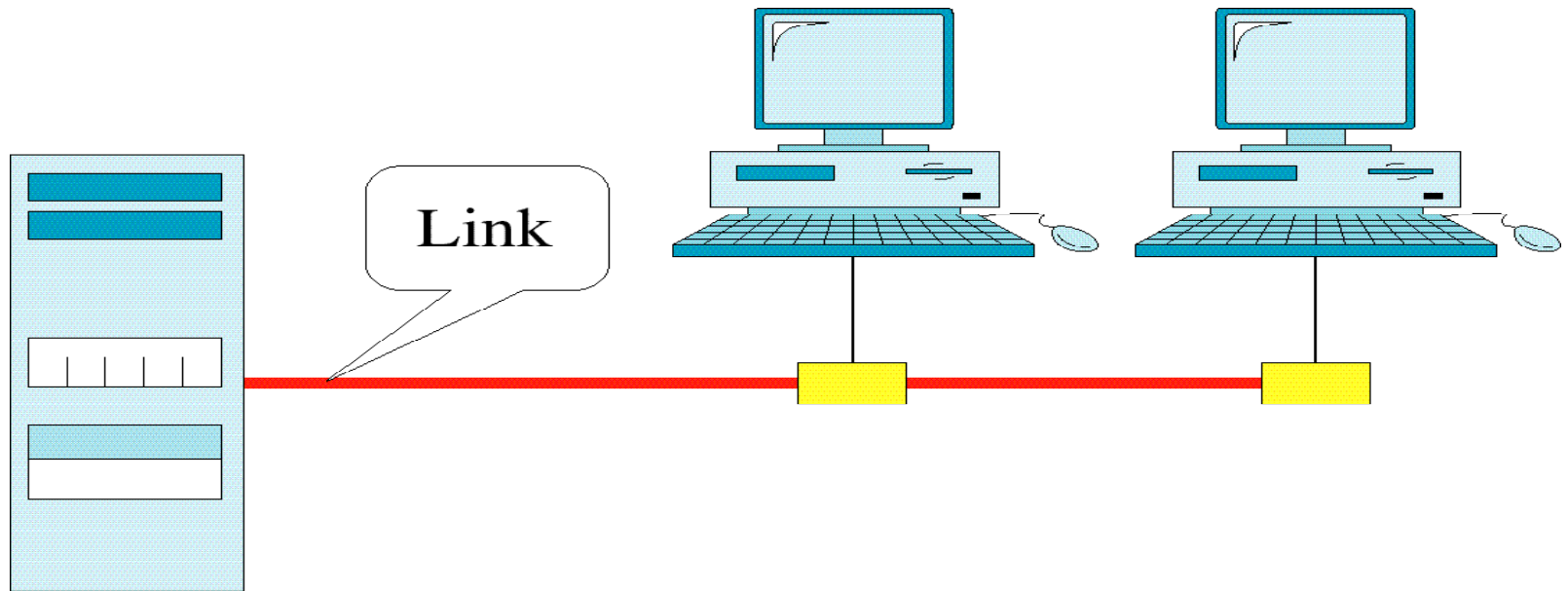
P2P provide a dedicated link b/w two devices. The entire capacity of the link is reserved for transmission between those devices

e.g when you change television channel by infrared remote control, you are establishing a point-to-point connection between the remote control and the television's control system.

Point-to-Point Line Configuration



Multipoint Connection



A **multipoint** (also called **Multidrop**) connection is one in which more than two specific devices share a single link. In a multipoint environment, the capacity of the channel is shared, either regularly or temporally. If several devices can use the link simultaneously it is a shared connection.

Direction of Data Flow

Communication between two devices
can be

- ✓ simplex
- ✓ half-duplex
- ✓ full-duplex

Simplex

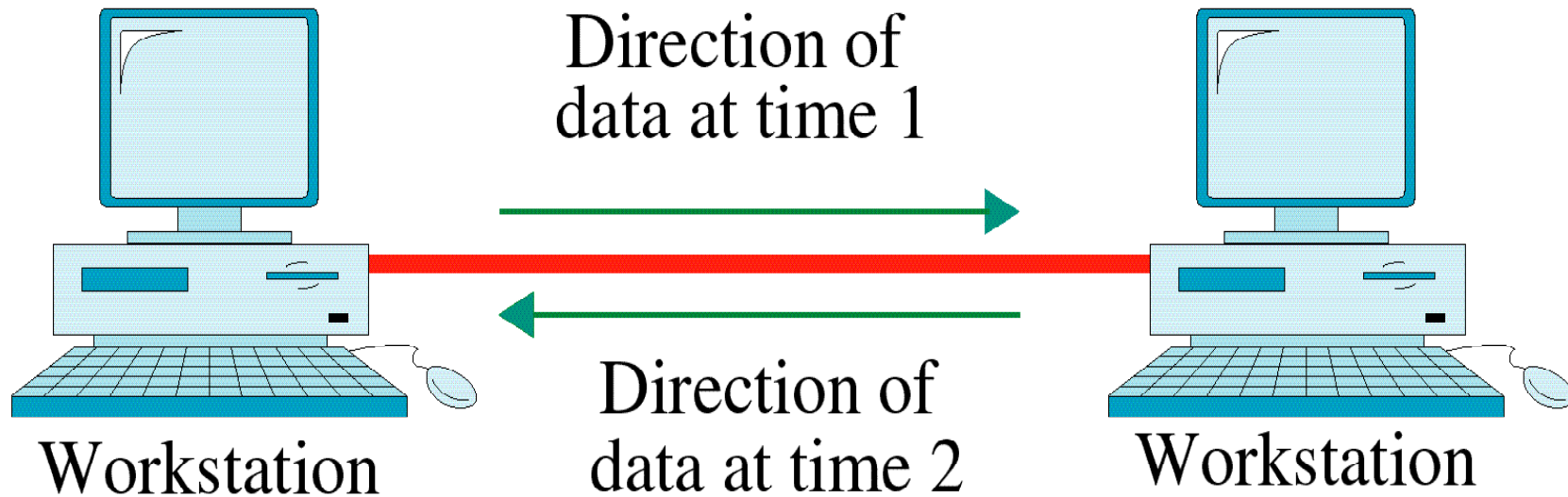
In simplex mode, the communication is unidirectional, as on a one-way street. Only one of the two devices on a link can transmit, the other can only receive.
e.g Keyboards



Half-Duplex

In half- duplex mode, each station can transmit and receive ,but not at the same time. when one device is sending the other can only receive and vice versa.

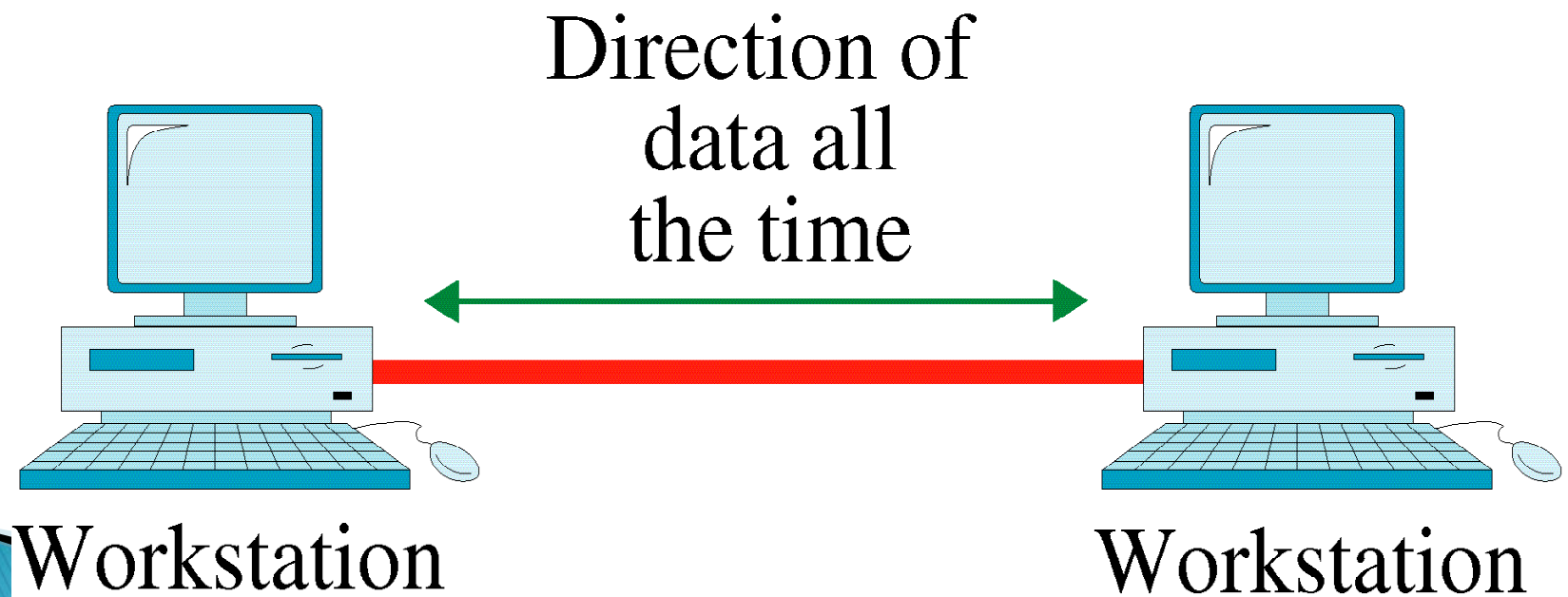
e.g walkies-talkies



Full-Duplex

In full-duplex mode both stations can transmit and receive simultaneously. The message flow in both directions at the same time.

e.g communication through chat .



Computer Network

A **computer network** is a group of interconnected computers.

Two computers are said to be interconnected, if they are able to exchange information. The connection need not be via a copper wire, fiber optics, microwaves and satellites can also be used.

The Advanced Research Projects Agency (ARPA) designed “Advanced Research Project Agency Network”(ARPANET) for the United States Department of Defense. It was the first computer network in the world in late 1960s and early 1970s.

Categories of Networks

LAN

MAN

WAN

Network

```
graph TD; Network[Network] --- LAN[Local area network (LAN)]; Network --- MAN[Metropolitan area network (MAN)]; Network --- WAN[Wide area network (WAN)];
```

Local area
network
(LAN)

Metropolitan area
network
(MAN)

Wide area
network
(WAN)

LAN

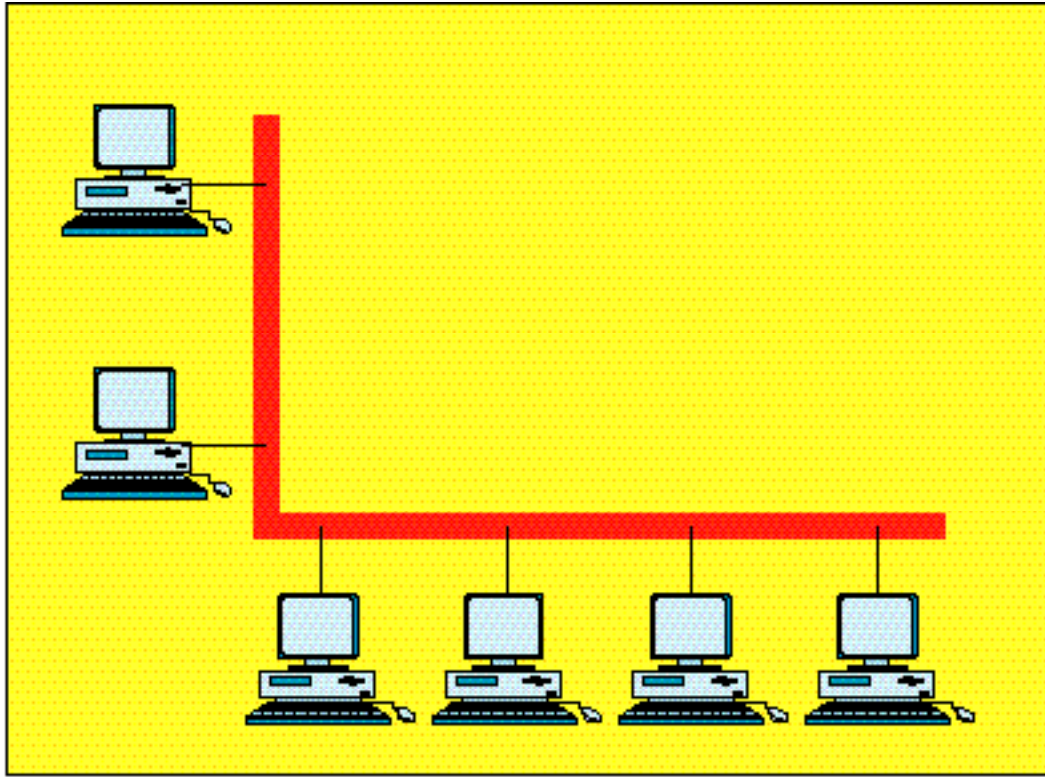
A local area network is a network used for connecting a business or organizations computers to one another.

A local area network usually links computers using a wired transmission medium over a area of about a hundred meters.

Components of a LAN

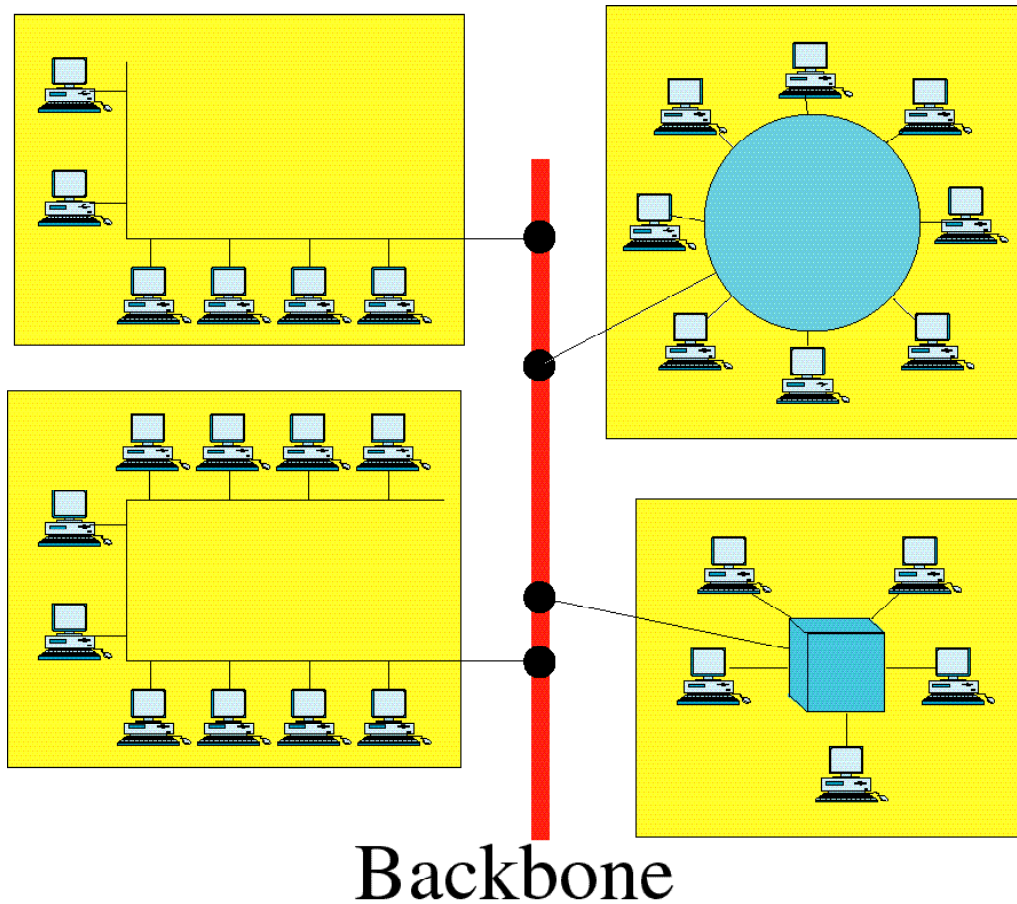
- The network card
- The transceiver
- The socket
- The physical connection medium
- Topologies

Local Area Network



Single building LAN

Local Area Network



Multiple building LAN

Connection Equipments

The primary hardware set up in local area networks is:

Repeaters

Hubs

Bridges

Switches

Gateways

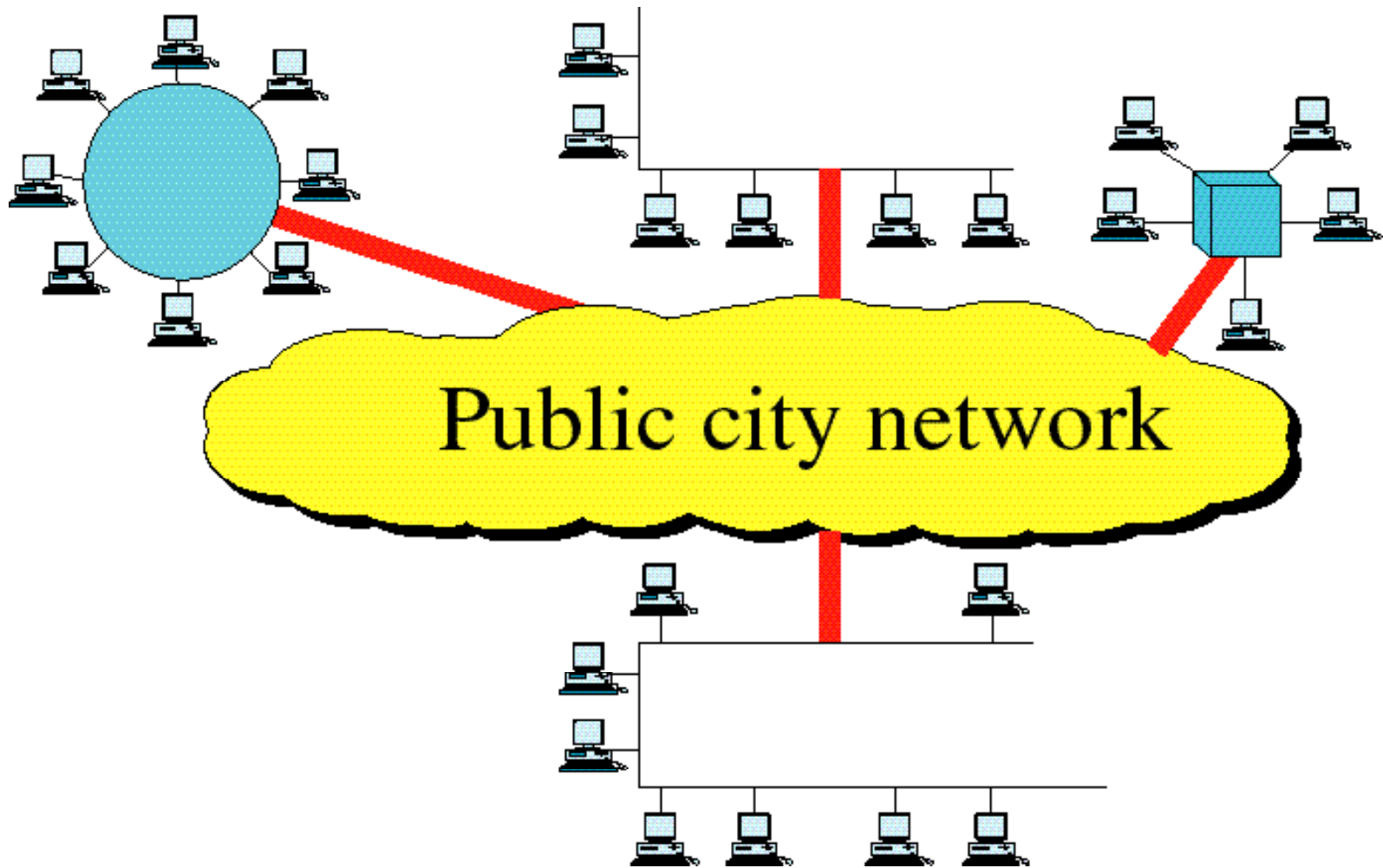
Routers

MAN

Metropolitan Area Network (MAN) is a computer networks usually spanning a campus or a city, which typically connect a few local area networks using high speed backbone technologies. A MAN often provides efficient connections to a wide area networks.

MAN adopted technologies from both LAN and WAN to serve its purpose.

Metropolitan Area Network

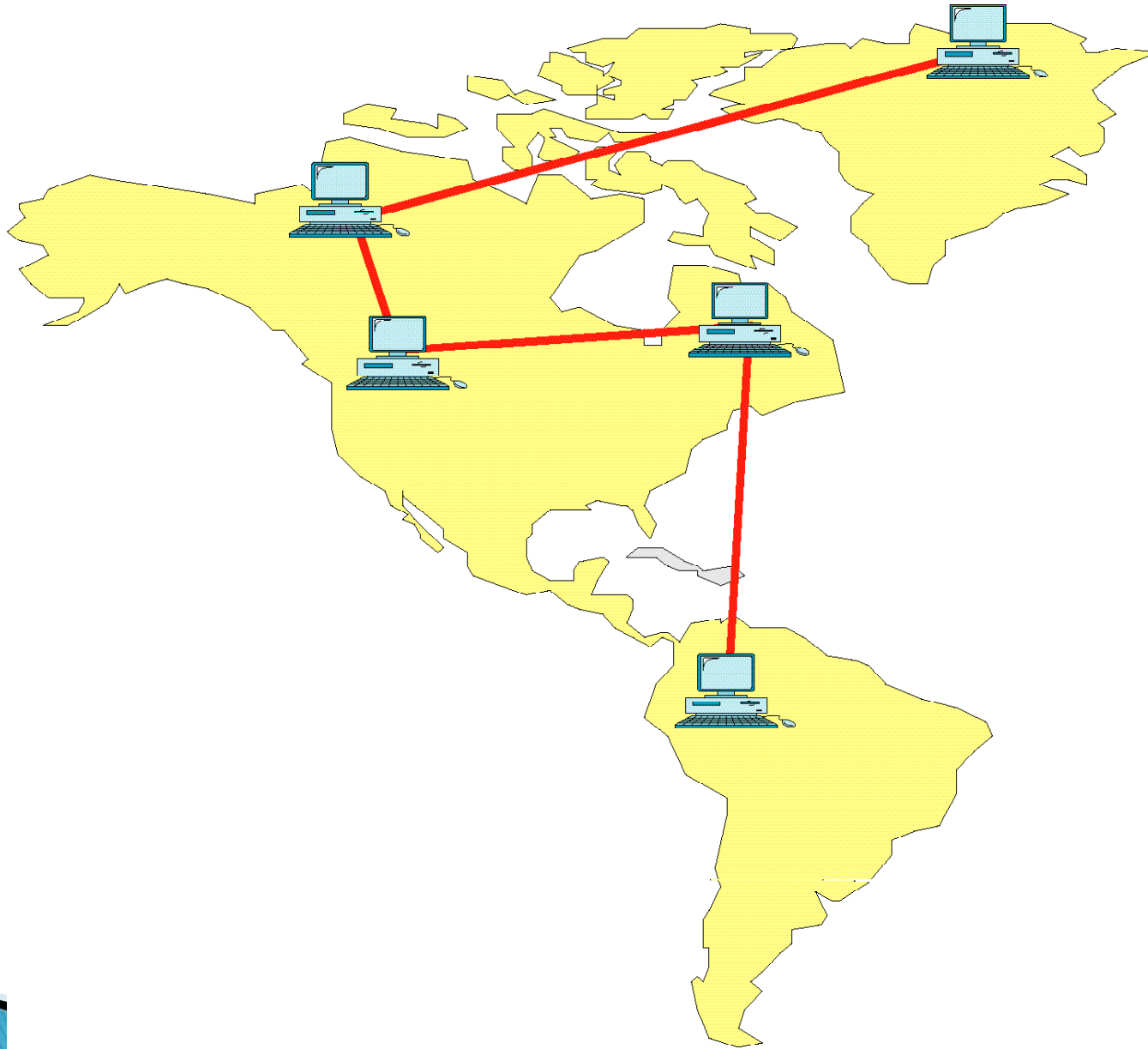


WAN

Wide Area Networks (WANs) connect large geographic areas such as United States, or the world. Dedicated cabling or satellite uplinks may be used to connect this type of network.

A WAN is complicated .it uses multiplexers to connect LAN and MAN to global communications networks like the internet.

Wide Area Network



Internetwork (Internet)

