

Introduction

DATA COMMUNICATIONS

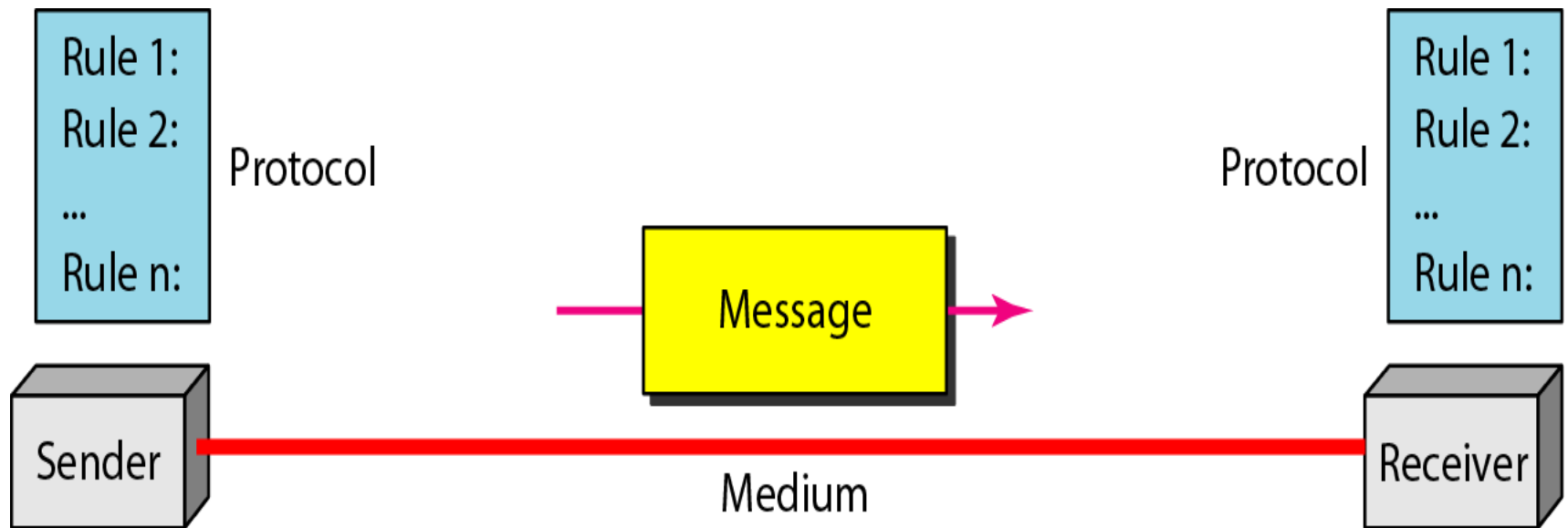
- The term telecommunication means communication at a distance. The word data refers to information presented in whatever form is agreed upon by the parties creating and using the data.
- Data communications are the exchange of data between two devices via some form of transmission medium such as a wire cable or may be wireless.

Effectiveness of Data Communication

Four Fundamental Characteristics

- Delivery
- Accuracy
- Timeliness - *-real time*
- Jitter

Components of a Data Communication System

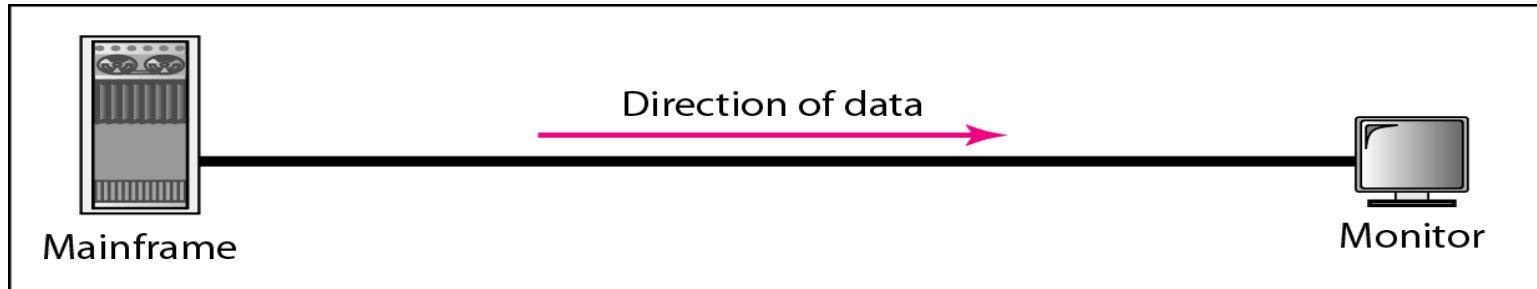


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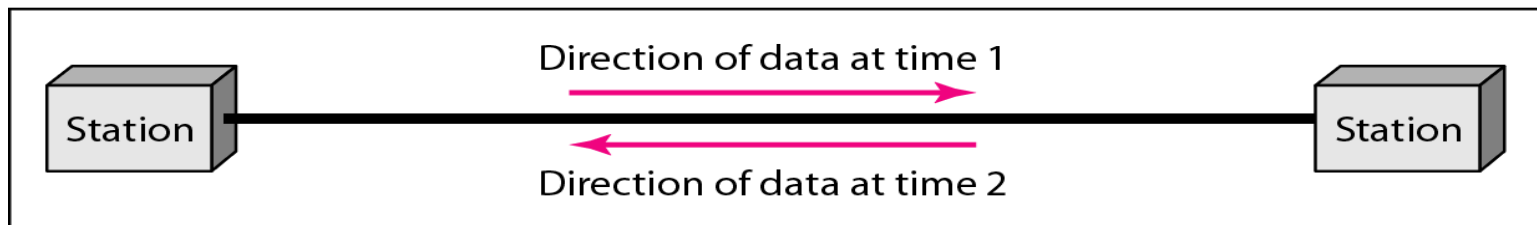
Five Components:

- Message- *Text, Number, Image, Audio, Video*
- Sender
- Receiver
- Transmission Medium
- Protocol

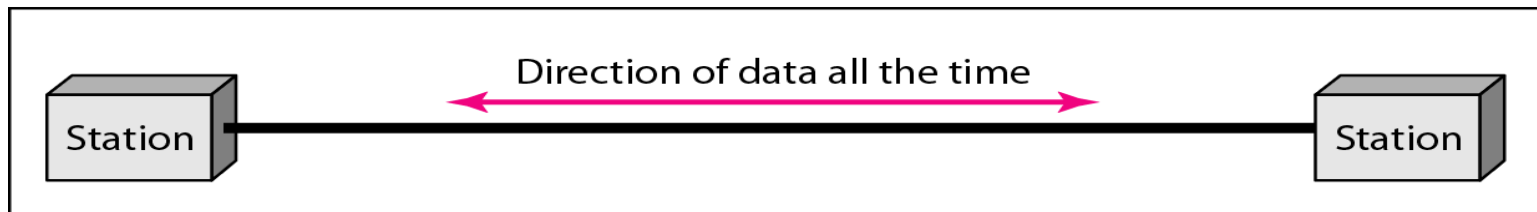
Data flow (Simplex, Half-duplex, and Full-duplex)



a. Simplex



b. Half-duplex



c. Full-duplex

NETWORKS

- A network is a set of devices (often referred to as nodes) connected by communication links. A node can be a computer, printer, or any other device capable of sending and/or receiving data generated by other nodes on the network.
- A link can be a cable, air, optical fiber, or any medium which can transport a signal carrying information.

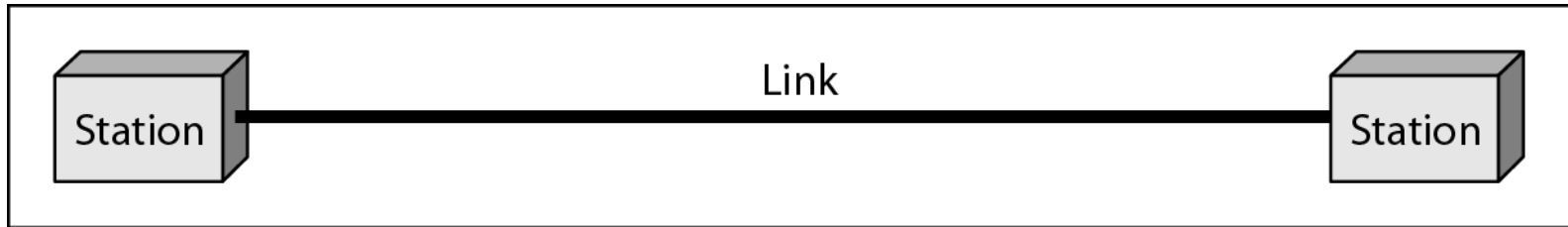
Network Criteria

- Performance
 - Depends on Network Elements- Transmit time, Response Time, Number of users, type of transmission medium, hardware, software.
 - Measured in terms of Delay and Throughput
- Reliability
 - Failure rate of network components.
 - Time to recover from a failure.
 - Measured in terms of availability/robustness
- Security
 - Data protection against corruption/loss of data due to:
 - Errors
 - Malicious users/ Unauthorized access.

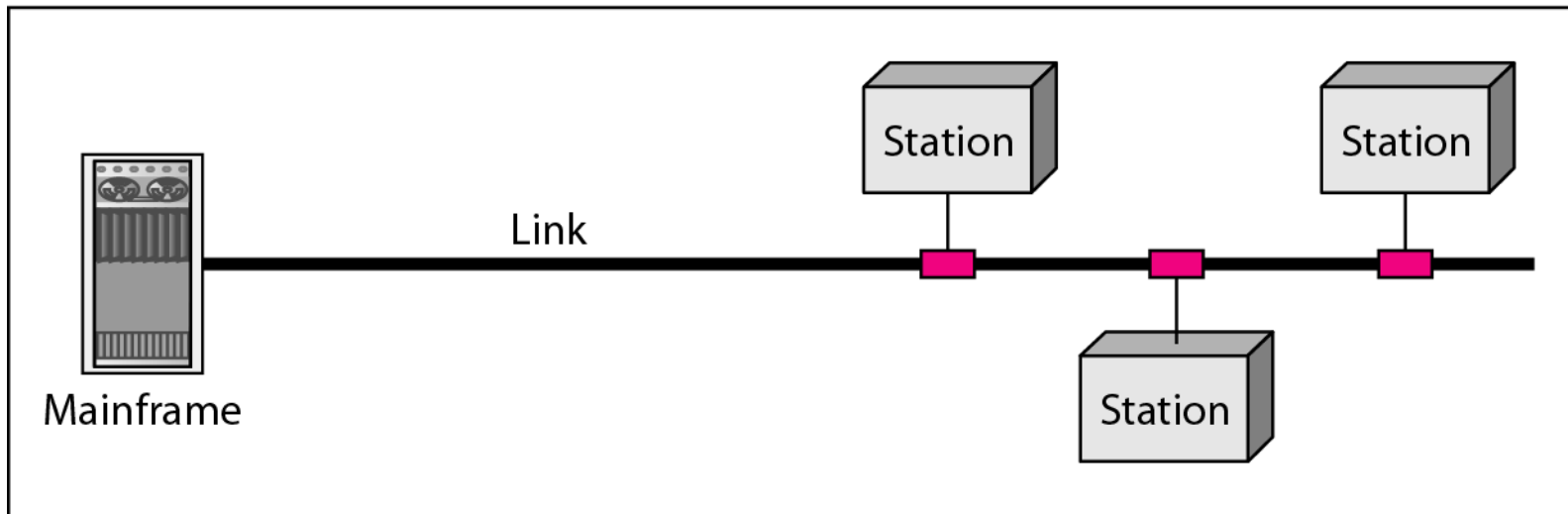
Physical Structures

- Type of Connection
 - Point to Point - single transmitter and receiver
 - Multipoint - multiple recipients of single transmission
- Physical Topology
 - Connection of devices
 - Type of transmission - unicast, mulitcast, broadcast

Types of connections: point-to-point and multipoint



a. Point-to-point



b. Multipoint

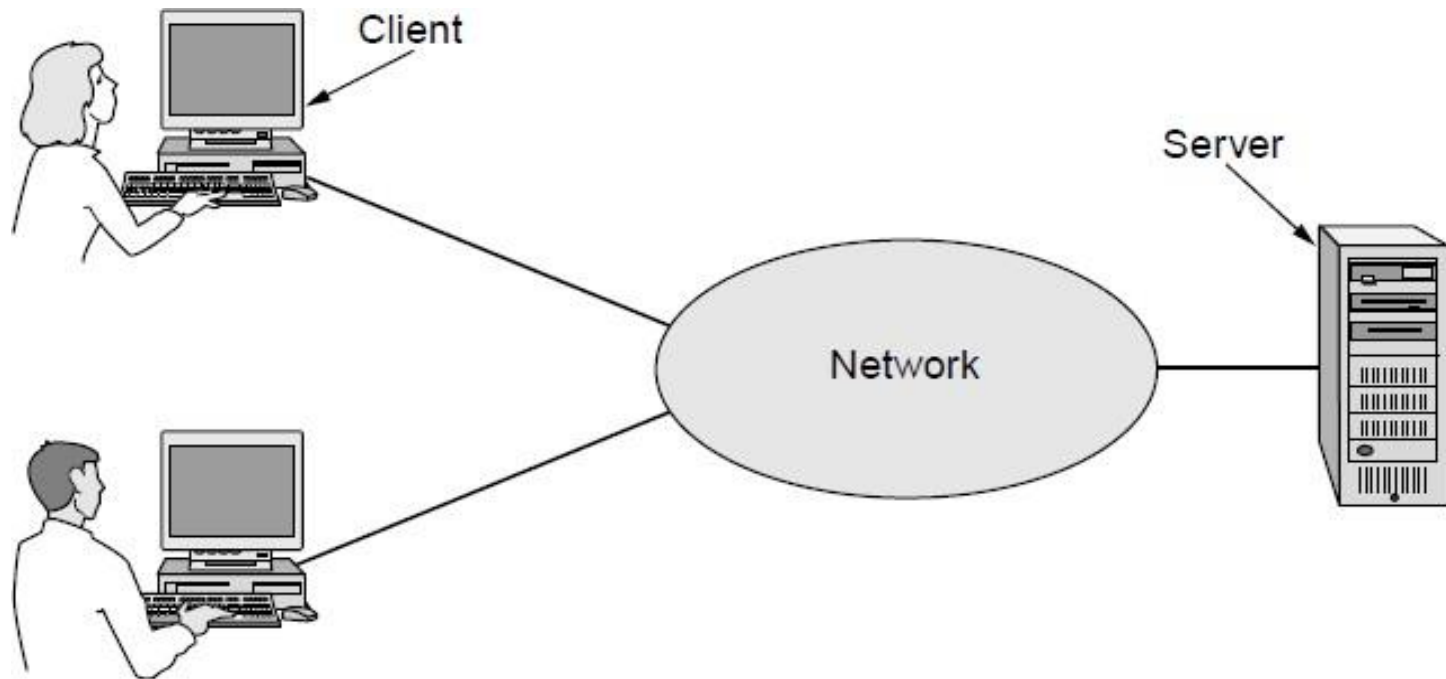
Uses of Computer Network

- Business Applications
- Home Applications
- Mobile Users
- Social Issues

Business Applications

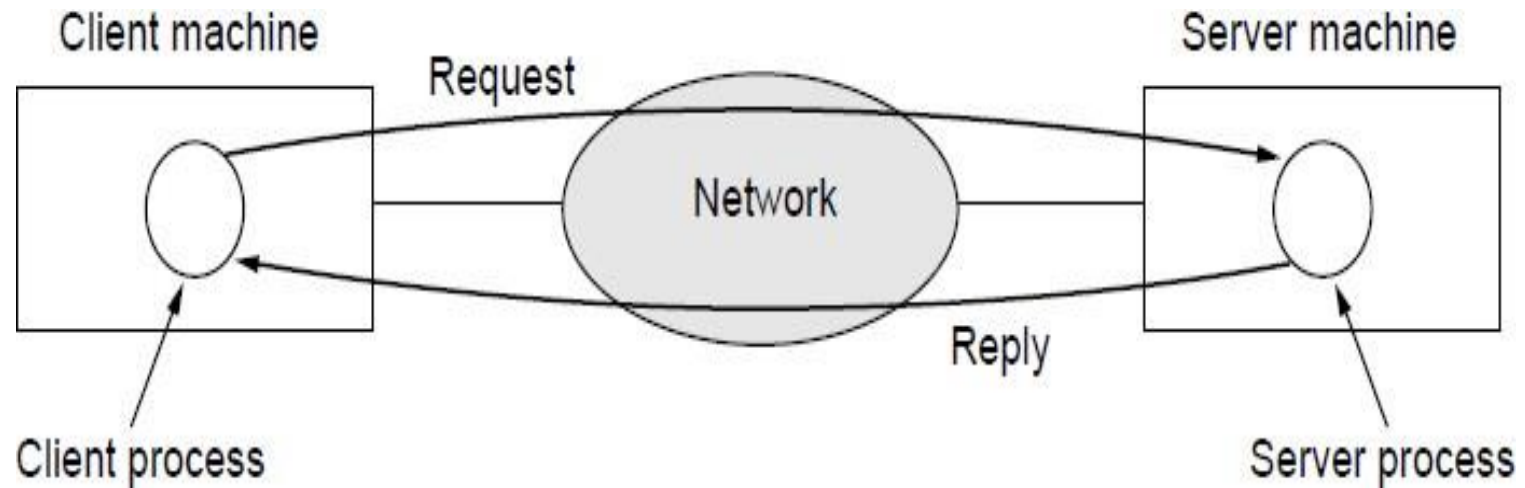
- Resource sharing such as printers and storage devices
- Exchange of information by means of e-Mails and FTP

Business Applications (1)



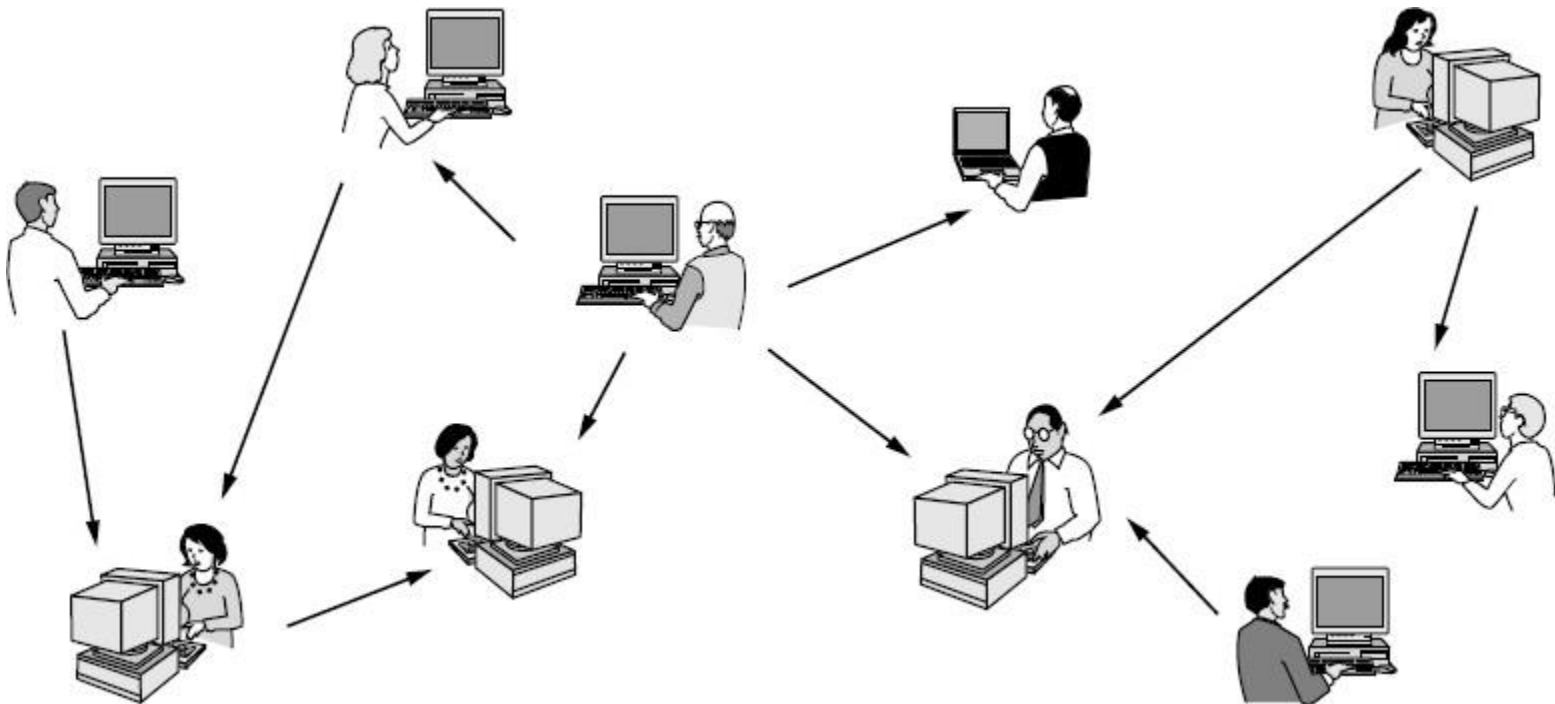
A network with two clients and one server

Business Applications (2)



The client-server model involves requests and replies

Home Applications (1)



In a peer-to-peer system there are no fixed clients and servers.

Home Applications (2)

Some forms of e-commerce

| Tag | Full name | Example |
|-----|------------------------|--------------------------------------------------|
| B2C | Business-to-consumer | Ordering books online |
| B2B | Business-to-business | Car manufacturer ordering tires from supplier |
| G2C | Government-to-consumer | Government distributing tax forms electronically |
| C2C | Consumer-to-consumer | Auctioning second-hand products online |
| P2P | Peer-to-peer | Music sharing |

Mobile Users

Combinations of wireless networks and mobile

| Wireless | Mobile | Typical applications |
|----------|--------|------------------------------------------|
| No | No | Desktop computers in offices |
| No | Yes | A notebook computer used in a hotel room |
| Yes | No | Networks in unwired buildings |
| Yes | Yes | Store inventory with a handheld computer |

Social Issues

- Network neutrality
- Digital Millennium Copyright Act
- Profiling users
- Phishing

PROTOCOLS

- A protocol is synonymous with rule. It consists of a set of rules that govern data communications. It determines what is communicated, how it is communicated and when it is communicated.
- The key elements of a protocol are
 - Syntax
 - Semantics
 - Timing

Elements of a Protocol

- Syntax
 - Structure or format of the data
 - Indicates how to read the bits - field delineation
- Semantics
 - Interprets the meaning of the bits
 - Knows which fields define what action
- Timing
 - When data should be sent and what
 - Speed at which data should be sent or speed at which it is being received.

Types of Network

- **Wired Networks**

- high bandwidth
- low bandwidth variability
- can listen on wire
- high power machines
- high resource machines
- low delay
- connected operation

-No Mobility.

- **Mobile Networks**

- low bandwidth
- high bandwidth variability
- hidden terminal problem
- low power machines
- low resource machines
- higher delay
- disconnected operation

Mobility.

The End

