كلية المنصور الجامعة
قسم نظم المعلومات و الحاسبات
شبكات/المرحلة الثالثه
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Lecture No.: 1 BASICS CONCEPTS

Data communication

is a process of **exchanging data or information** in case of computer networks this exchange is done between two devices over a transmission medium.
this process involves a communication system which is made up of **hardware and software.**

The hardware part involves the sender and receiver devices and the intermediate devices through which the data passes.

The software part involves certain rules which specify what is to be communicated, how it is to be communicated and when. It is also called as a **Protocol.**

Network Components

A Data Communication system has five components :

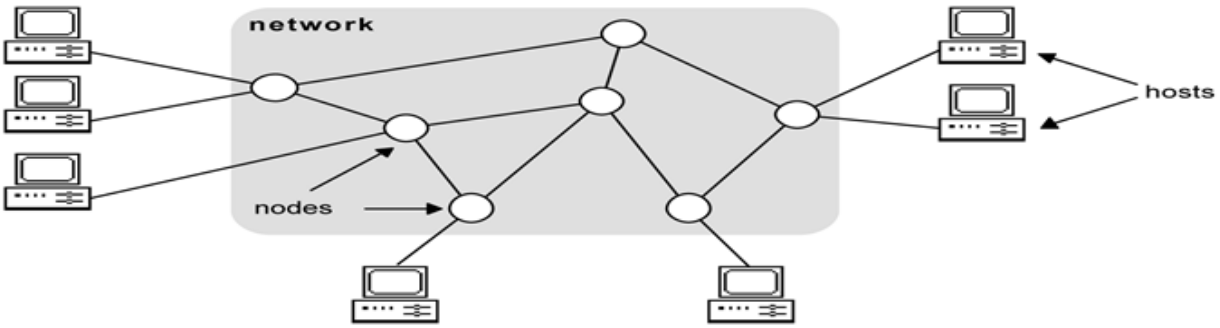
1. **Message:** Message is the information to be communicated by the sender to the receiver.
2. **Sender**: The sender is any device that is capable of sending the data (message).
3. **Receiver**: The receiver is a device that the sender wants to communicate the data (message).
4. **Transmission Medium:** It is the path by which the message travels from sender to receiver. It can be wired or wireless ..
5. **Protocol:** It is set of rules used by the sender and receiver to communicate data.

The network is made up of two types of components: **nodes and communication lines**.

The **nodes** typically handle the network protocols and provide switching capabilities. A node is usually or a computer (general or special) which runs specific network software.

The communication lines may take many different shapes and forms, even in the same network. Examples include: copper wire cables, optical fiber, radio channels, and telephone lines.

A host is connected to the network by a separate communication line which connects it to one of the nodes.



Elements of a Protocol

There are three key elements of a protocol:
A. **Syntax:**
- It means the structure or format of the data.
- It is the arrangement of data in a particular order.

B. **Semantics** :
- It tells the meaning of each section of bits and indicates the interpretation of each section.
- It also tells what action/decision is to be taken based on the interpretation.

C. **Timing**
- It tells the sender about the readiness of the receiver to receive the data
- It tells the sender at what rate the data should be sent to the receiver to avoid overwhelming the receiver.

Network Criteria:

A network must be able to meet a certain number of criteria. The most important of these are **performance, reliability, and security.**

Performance

Performance can be measured in many ways, including **transit time and response time.**

Transit time is the amount of time required for a message to travel from one device to another.

Response time is the elapsed time between an inquiry and a response.

The performance of a network ***depends on a number of factors***, including the number of users, the type of transmission medium, the capabilities of the connected hardware, and the efficiency of the software.

Reliability

In addition to accuracy of delivery, network reliability is measured by the ***frequency of failure***, ***the time it takes a link to recover from a failure, and the network's robustness in a catastrophe***.

Security

Network security issues include ***protecting data from unauthorized access***, ***protecting data from damage and development, and implementing policies and procedures for recovery from breaches and data losses.***

Network Criteria

Performance	Reliability	Security
• Number of users •Type of transmission_medium • Hardware & Software	•Frequency of failure •Recovery time •Catastrophe	• Unauthorized access • Viruses

A Compute network should ensure

- ✓ **reliability** of the data communication process
- ✓ **security** of the data
- ✓ **performance** by achieving higher throughput and smaller delay times

Transmission Speed

Narrow band Channel	Voice band channel	Broadband Channel
• Bandwidth less than 3000 hertz. • Transmission rate between 5 and 30 character per second. • Too slow to be used for modern data communication (suitable for news service).	Bandwidth of about 3000 hertz. Transmission rate up to about 960 characters per second. (telephone lines, video displaying terminal, slow printers) .	Bandwidth greater than 3000 hertz. Transmission rate up to several million characters per second. Coaxial microwave, Optical Fiber cable.Used for high speed, high volume data transmission.

1.5 Transmission Modes

The term transmission mode is used to define the direction of signal flow between two linked devices. There are three types of transmission modes:

- ❖ ***Simplex.***
- ❖ ***Half duplex.***
- ❖ ***Full duplex***