Computer Network

Lecture-1

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Syllabus

Syllabus

Unit-1:

Introductory Concepts: Goals and applications of networks, Categories of networks, Organization of the Internet, ISP, Network structure and architecture (layering principles, services, protocols and standards), The OSI reference model, TCP/IP protocol suite, Network devices and components.

Physical Layer: Network topology design, Types of connections, Transmission media, Signal transmission and encoding, Network performance and transmission impairments, Switching techniques and multiplexing.

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Unit-2:

Data Link Layer: Framing, Error Detection and Correction, Flow control (Elementary Data Link Protocols, Sliding Window protocols). Medium Access Control and Local Area Networks: Channel allocation, Multiple access protocols, LAN standards, Link layer switches & bridges (learning bridge and spanning tree algorithms)

Unit-3:

Network Layer: Point-to-point networks, Logical addressing, Basic internetworking (IP, CIDR, ARP, RARP, DHCP, ICMP), Routing, forwarding and delivery, Static and dynamic routing, Routing algorithms and protocols, Congestion control algorithms, IPv6.

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Unit-4:

Transport Layer: Process-to-process delivery, Transport layer protocols (UDP and TCP), Multiplexing, Connection management, Flow control and retransmission, Window management, TCP Congestion control, Quality of service.

Unit-5:

Application Layer: Domain Name System, World Wide Web and Hyper Text Transfer Protocol, Electronic mail, File Transfer Protocol, Remote login, Network management, Data compression, Cryptography – basic concepts.

Books

1. Behrouz Forouzan, "Data Communication and Networking", McGraw Hill

2. Andrew Tanenbaum "Computer Networks", Prentice Hall.

3. William Stallings, "Data and Computer Communication", Pearson.

4. Kurose and Ross, "Computer Networking-A Top-Down Approach", Pearson.

Course Outcome (CO's)

CO1	Explain basic concepts, OSI reference model, services and role of each layer of OSI model and TCP/IP, networks devices and transmission media, Analog and digital data transmission
CO2	Apply channel allocation, framing, error and flow control techniques.
CO3	Describe the functions of Network Layer i.e. Logical addressing, subnetting & Routing Mechanism.
CO4	Explain the different Transport Layer function i.e. Port addressing, Connection Management, Error control and Flow control mechanism.
CO5	Explain the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, TELNET and VPN.

Unit-1

Computer Network

❖ A computer 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.

❖ "Computer network'' to mean a collection of autonomous computers interconnected by a single technology. Two computers are said to be interconnected if they are able to exchange information.

Computer Network
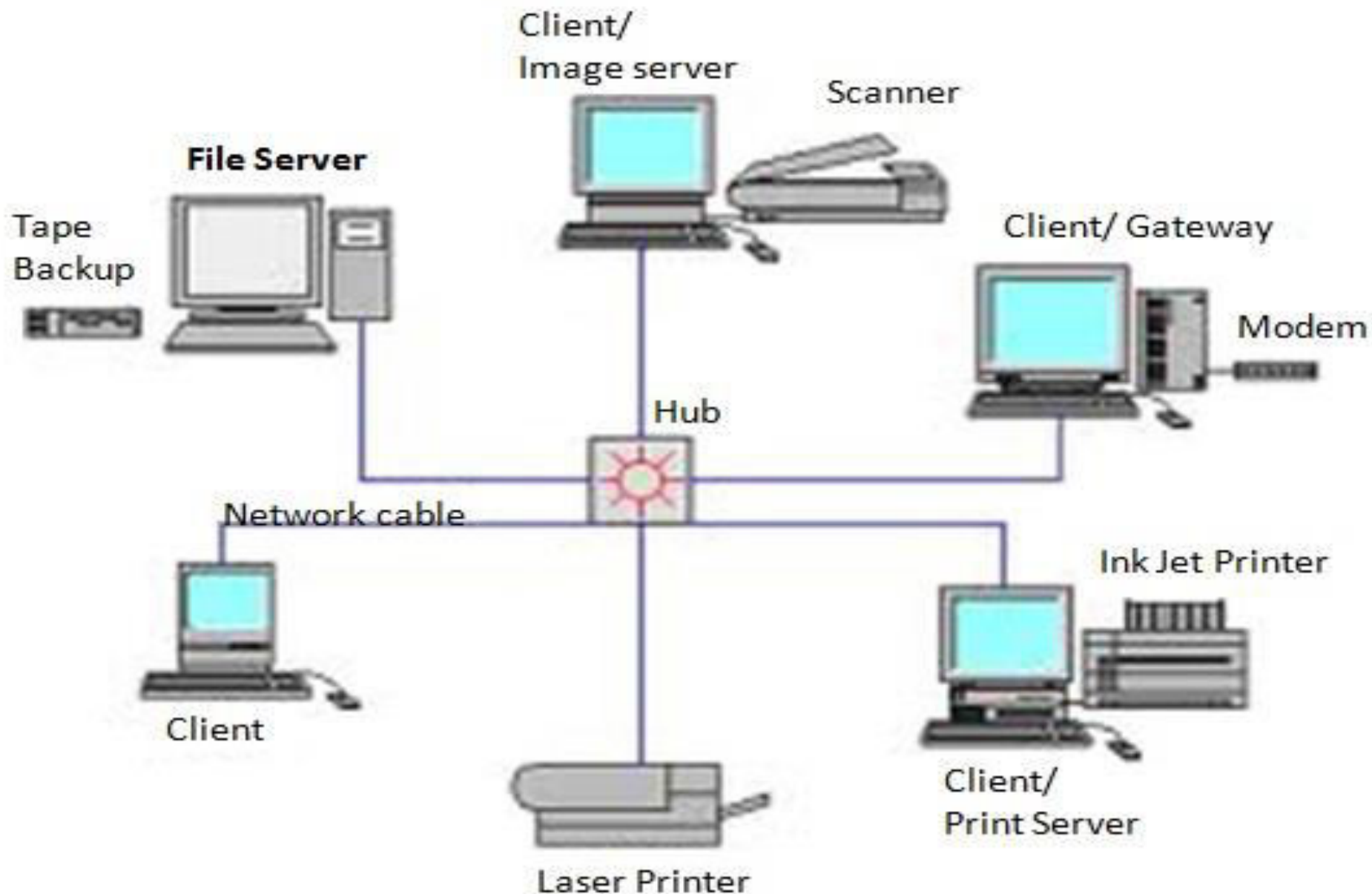
Computer Network

❖ Networks come in many sizes, shapes and forms. They are usually connected together to make larger networks.

❖ Internet being the most well-known example of a network of networks.

Uses of Computer Network

1. **Business Applications**

❖ Information sharing: To distribute information throughout the company

❖ Resource sharing: Sharing physical resources such as printers, and tape backup systems

❖ Client-Server model: It is widely used and forms the basis of much network usage.

❖ E-mail: Employees generally use for a great deal of daily communication.

❖ Voice over IP (VoIP): Telephone calls between employees may be carried by the computer network instead of by the phone company. This technology is called IP telephony or Voice over IP (VoIP) when Internet technology is used.

❖ Desktop sharing: Remote workers see and interact with a graphical computer screen

❖ E-commerce: Doing business electronically, especially with customers and suppliers. It has grown rapidly in recent years.

Uses of Computer Network

2. Home Applications

❖ Person-to-Person communication

❖ Electronic commerce

❖ Entertainment (game playing)

3. Mobile Users

❖ Text messaging or texting

❖ Smart phones,

❖ GPS (Global Positioning System)

❖ M-commerce

❖ NFC (Near Field Communication)

4. Social Issues

Social networks, message boards, content sharing sites, and a host of other applications allow people to share their views with like-minded individuals.

Data Communication System

A data communication system has five components:-

1. **Message:** The message is the information (data) to be communicated. Popular forms of information include text, numbers, pictures, audio, and video.

2. **Sender:** The sender is the device that sends the data message. It can be a computer, workstation, telephone handset, video camera, and so on.

3. **Receiver:** The receiver is the device that receives the message. It can be a computer, workstation, telephone handset, television, and so on.

4. **Transmission medium:** The transmission medium is the physical path by which a message travels from sender to receiver. Some examples of transmission media include twisted-pair wire, coaxial cable, fiber-optic cable, and radio waves.

5. **Protocol:** A protocol is a set of rules that govern data communications. It represents an agreement between the communicating devices. Without a protocol, two devices may be connected but not communicating, just as a person speaking French cannot be understood by a person who speaks only Japanese.

Data Communication System
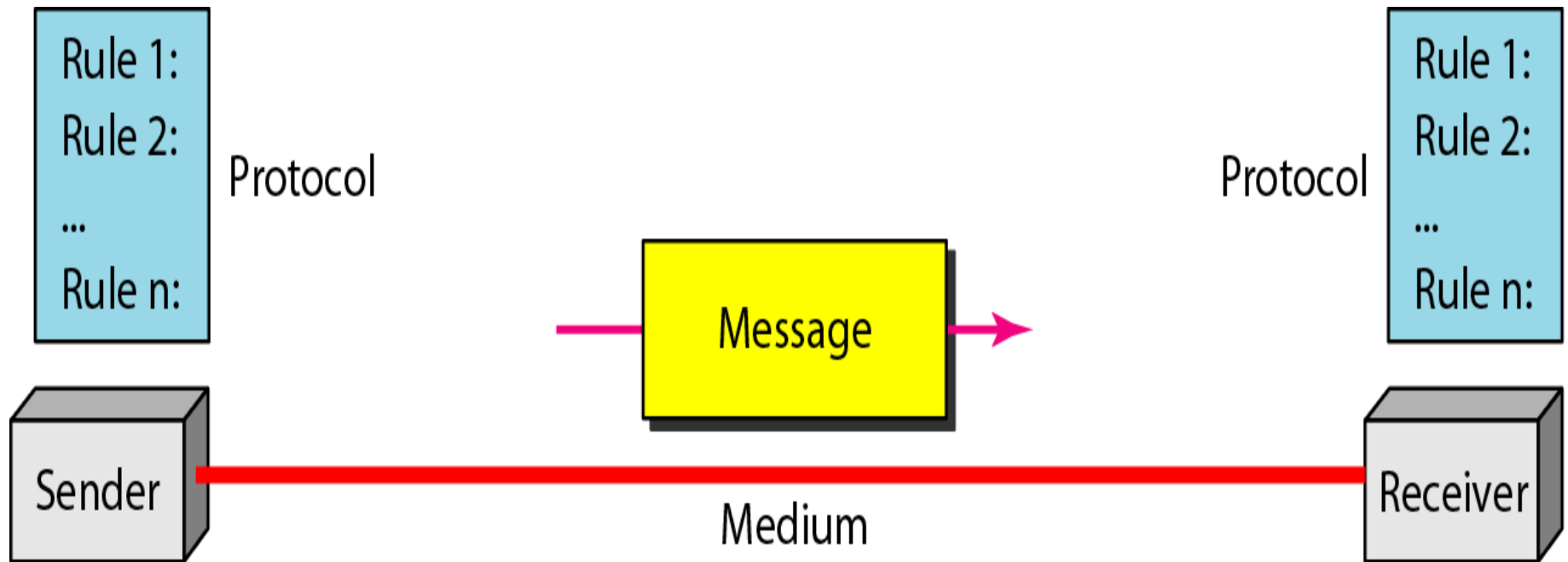
Data Representation

- ❖ Text
- ❖ Numbers
- ❖ Images
- ❖ Audio
- ❖ Video