

KARACHI EDU • PROFESSIONAL COACHING CENTER NOTES

Chapter 4: Data Communication & Networks

Grade 9 Computer Science • Sindh Textbook Board (STBB) Comprehensive
Lecture Deck



Fundamentals of Data Communication

The exchange of digital or analog data between two or more devices via a communication medium.



Core Definition

Transmission of information from a sender to a receiver using wired or wireless transmission channels.



Key Effectiveness Criteria

Delivery (correct destination), Accuracy (unaltered data), and Timeliness (delivered without erratic delays).

Components of Data Communication

The five fundamental elements making data transmission possible.

1. Message

Data or information to be communicated (text, number, picture).

2. Sender

Device that generates and sends data (computer, workstation).

3. Receiver

Device that receives the transmitted data message.

4. Medium & 5. Protocol

Physical path (cable) and set of rules governing communication.

Data Transmission Modes

Direction of signal flow between two connected devices.

Simplex Mode

Unidirectional communication
(e.g., Keyboard to computer,
Television broadcast).

Half-Duplex Mode

Bidirectional, but one direction at a
time (e.g., Walkie-talkie).

Full-Duplex Mode

Simultaneous bidirectional
communication in both directions
(e.g., Telephone call).

Introduction to Computer Networks

Interconnection of two or more autonomous computing devices to share hardware resources and data.

Key Objectives

Resource sharing (printers, hard drives), file exchange, improved communication, and centralized database backup.

Hardware Elements

Network Interface Cards (NIC), Hubs, Switches, Routers, Modems, and transmission cables.

Types of Computer Networks

Classified according to their geographical scale and coverage area.

Local Area Network (LAN)

Connects computers within a limited area like a room, school, or office building.

Metropolitan Area Network (MAN)

Spans across an entire city or town, larger than a LAN but smaller than a WAN.

Wide Area Network (WAN)

Connects computers across countries and continents (e.g., The Internet).

Physical Network Topologies

The geometric arrangement of devices and communication channels in a network.

Bus Topology

All devices connected to a single central cable called the backbone.

Star Topology

All computers connected to a central hub or switch.

Ring Topology

Devices connected in a circular loop where data travels one direction.

Mesh Topology

Every device is connected to every other device for maximum redundancy.

Transmission Media (Guided & Unguided)

The physical or wireless pathways used to carry information signals.

Guided (Wired) Media

Physical wires guiding signals along a solid path (Twisted-pair cable, Coaxial cable, and Fiber-optic cable).

Unguided (Wireless) Media

Transmits data through air using electromagnetic waves (Radio waves, Microwaves, and Infrared signals).

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End of Chapter 4 Lecture

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