

Cover Page

Course Title: Networking – Connecting Systems, Sharing Data

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Introduction

Computer Networking allows devices to share resources and communicate over wired or wireless channels.

Basics of Computer Networks

- Definition of Network
 - Goals: Resource sharing, Communication, Efficiency
 - Components: Node, Link, Protocol
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Network Types

- PAN (Personal Area Network)
 - LAN (Local Area Network)
 - MAN (Metropolitan Area Network)
 - WAN (Wide Area Network)
 - Internet vs Intranet
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Network Topologies

- Star, Ring, Bus, Mesh, Hybrid
 - Diagram, Advantages, Disadvantages
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OSI Model (7 Layers)

1. Physical
2. Data Link
3. Network
4. Transport
5. Session
6. Presentation
7. Application

Each layer handles specific responsibilities.



TCP/IP Model (4 Layers)

- Link
- Internet
- Transport
- Application

TCP/IP governs real-world internet communication.



IP Addressing

- IPv4: 32-bit (e.g., 192.168.1.1)
 - IPv6: 128-bit
 - Public vs Private
 - Static vs Dynamic
-

9 Subnetting

- Dividing networks into sub-networks
 - CIDR notation: `/24`, `/16`
 - Benefits: security, efficiency
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! ? MAC Address & ARP

- MAC: Hardware address (e.g., 00:1A:2B:3C:4D:5E)
 - ARP: Resolves IP to MAC
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DNS & DHCP

- DNS: Converts domain names to IP addresses
 - DHCP: Assigns IP addresses dynamically
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Routing & Switching

- Routers: Connect different networks
 - Switches: Connect within same network
 - Routing tables and protocols (RIP, OSPF, BGP)
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HTTP/HTTPS, FTP, SMTP

- HTTP: Web communication (insecure)
 - HTTPS: Secured via SSL/TLS
 - FTP: File transfers
 - SMTP: Email sending
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Network Devices

- Hub, Switch, Router, Modem, Repeater, Bridge, Access Point
 - Function of each
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Wireless Networks

- Wi-Fi standards (802.11 a/b/g/n/ac/ax)
 - Encryption: WEP, WPA2, WPA3
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Network Security Basics

- Firewalls, Antivirus, Encryption
 - Common threats: Phishing, DDoS, Man-in-the-middle
 - VPNs & Secure Tunnels
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Summary

Networking is the backbone of digital communication. Understanding how devices connect, communicate, and remain secure is key.

Next: Dive into low-level architecture with Microprocessors.

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