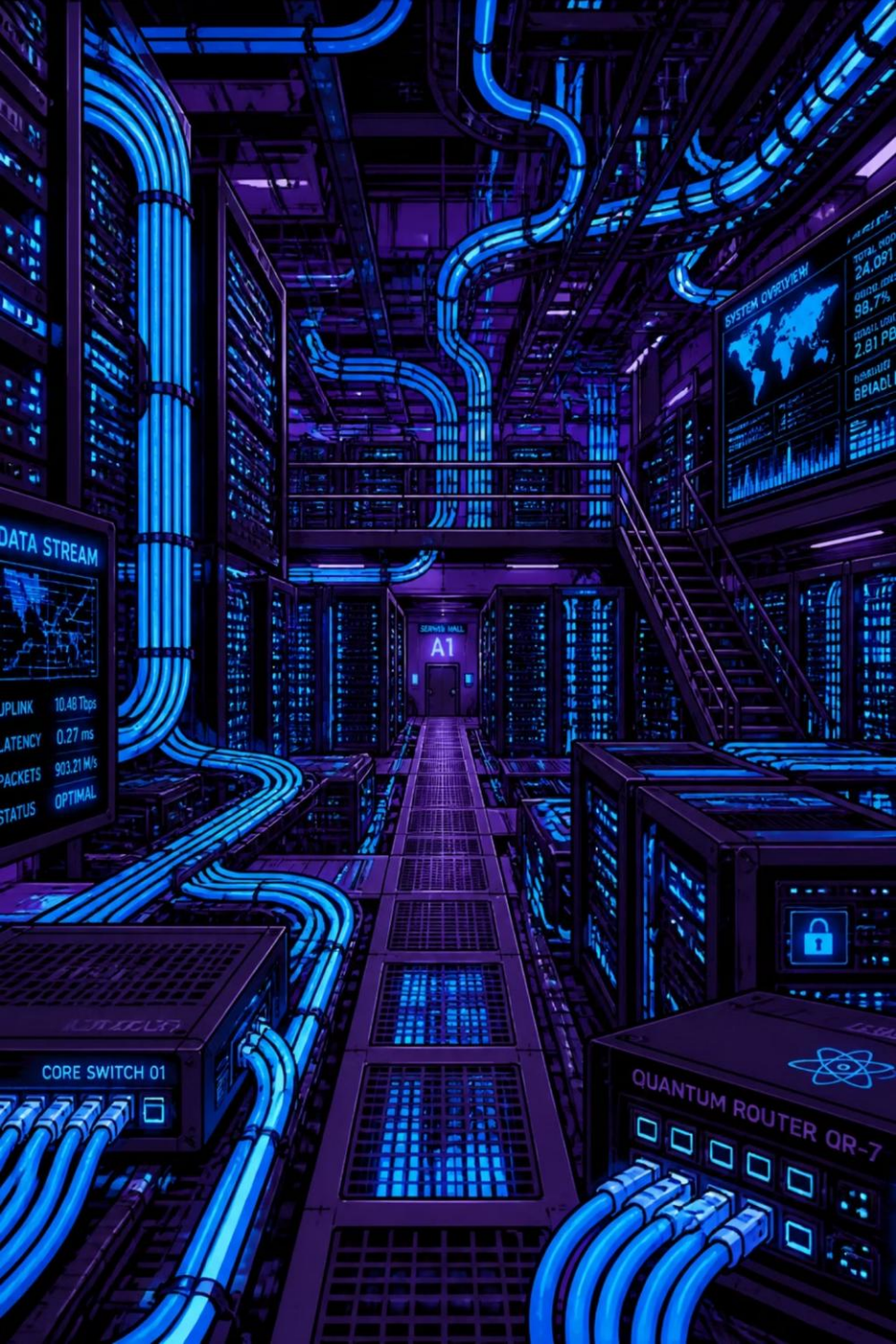




Introduction to Computer Networking

Week 1 · BS Information Systems / BS Information Technology / CSS NC II · 3
Hours (Lecture: 2 hrs | Lab: 1 hr)

COMPUTER NETWORKING PROGRAM

Learning Outcomes & Objectives

By the End of This Lesson

Students should be able to:

- Define computer networking
- Explain the importance of networks in everyday life and business
- Identify different types of computer networks
- Differentiate network topologies
- Identify basic components of a computer network
- Demonstrate proper handling of networking equipment

Knowledge, Skills & Attitude

Knowledge

Define networking terminologies. Describe how data travels across a network.

Skills

Identify networking devices and cables. Draw simple network topologies.

Attitude

Appreciate the role of networking in communication. Observe safety practices when handling networking equipment.

Motivation: "Connected or Not?"

Before diving into definitions, consider these everyday questions that reveal how deeply networking is woven into our lives:

Wi-Fi

What happens when your phone connects to Wi-Fi?

Online Gaming

How do online games communicate with other players?

Messaging

How does Facebook or Messenger send messages instantly?

Shared Printing

Why can multiple computers print using one printer?

 **Key Insight:** Networking makes communication and resource sharing possible — it is the invisible infrastructure behind everything digital.



What Is Computer Networking?

Definition

Computer networking is the interconnection of two or more computers or devices that communicate and share resources through communication channels.

Purpose of Networking

- Share files, printers, and internet access
- Communication and resource sharing
- Centralized management and cloud computing
- Remote access

Advantages of Networking

- Faster communication and file sharing
- Hardware and internet sharing
- Data backup and collaboration
- Cost savings and centralized security

Types of Networks

Networks are classified by their geographic coverage — from personal devices to the entire globe.

PAN Personal Area Network Bluetooth, mobile hotspot, smartwatch	LAN Local Area Network Computer lab, school office, internet café
CAN Campus Area Network Entire school campus or university	MAN Metropolitan Area Network Whole city, government offices
WAN Wide Area Network Different countries, company branches	Internet Global Network The world's largest WAN

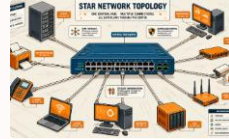
Network Topologies

A network topology defines how devices are physically or logically connected. Each has distinct characteristics, advantages, and trade-offs.



Bus

Single backbone cable. Easy and low-cost to install, but a backbone failure affects the entire network.



Star

Central switch. Most common today. One cable failure does not affect others — easy troubleshooting.



Ring

Circular connection. Data travels around the ring from device to device.



Mesh

Every device connects to every other. Highly reliable but expensive to implement.



Hybrid

Combination of two or more topologies, used in complex real-world networks.

Network Components & Devices

End Devices

- Desktop, Laptop, Smartphone
- Server, Printer

Intermediate Devices

- **Router** — Connects different networks; routes data packets; connects LAN to the Internet
- **Switch** — Connects devices within a LAN; learns MAC addresses; more efficient than a hub
- **Hub** — Broadcasts data to all devices; older technology
- **Modem** — Converts digital and analog signals; connects ISP to home network
- **Access Point** — Provides wireless connectivity
- **Firewall** — Security device

Transmission Media

Wired

UTP Cable (Cat5e/Cat6),
Fiber Optic, Coaxial

Wireless

Wi-Fi, Bluetooth, Microwave,
Infrared

Key Networking Terms

- **Node** — Connected device
- **Packet** — Unit of transmitted data
- **IP Address** — Logical address
- **MAC Address** — Physical address
- **Bandwidth** — Data transfer capacity
- **Latency** — Transmission delay
- **Protocol** — Communication rules

Networking Standards & OSI Model

IEEE 802 Standards

802.3

Ethernet

802.11

Wi-Fi

802.15

Bluetooth

These standards ensure interoperability across devices and vendors worldwide.

OSI Model – 7 Layers

The Open Systems Interconnection model provides a framework for understanding how data travels across a network. (Detailed discussion in future lessons.)

01

Physical

02

Data Link

03

Network

04

Transport

05

Session

06

Presentation

07

Application

Safety Practices & Classroom Activities

Networking Safety Practices

- Turn off equipment before connecting cables
- Avoid stepping on cables; use proper cable management
- Label network cables clearly
- Avoid liquids near equipment
- Wear an anti-static wrist strap when handling sensitive devices
- Follow electrical safety procedures

Activity 1: Identify the Device

Show pictures of a router, switch, hub, modem, access point, and Ethernet cable. Students identify each device and describe its function.

Activity 2: Draw Your School Network

Students draw a simple network connecting: Internet → Router → Switch → 5 Computers + Printer + Wireless Access Point.

Lab Activity: Cisco Packet Tracer

Create a simple LAN with 1 Router, 1 Switch, and 4 PCs. Connect devices using appropriate cables, assign IP addresses (optional), and verify connectivity using Simple PDU or the ping command.

Assessment, Assignment & Summary

Assessment

Identification (10 items) — e.g., largest computer network, device that connects different networks, physical address, most common LAN topology, wireless networking standard.

Multiple Choice (10 items) — e.g., which device connects different networks (Router), which topology uses a central switch (Star), which IEEE standard is used for Wi-Fi (802.11).

Home Assignment

Observe your home or school network: count connected computers, identify if wired or wireless, list devices used, draw a simple network diagram, and identify the topology type.

Lesson Summary

In this lesson, students learned that computer networking enables devices to communicate and share resources efficiently. Key topics covered:

- Types of networks: PAN, LAN, CAN, MAN, WAN, Internet
- Common topologies: Bus, Star, Ring, Mesh, Hybrid
- Essential devices: Routers, Switches, Access Points
- Basic networking terms and IEEE standards
- OSI model overview (7 layers)
- Proper safety practices with networking equipment