Module 10

Network Fundamentals and Cabling

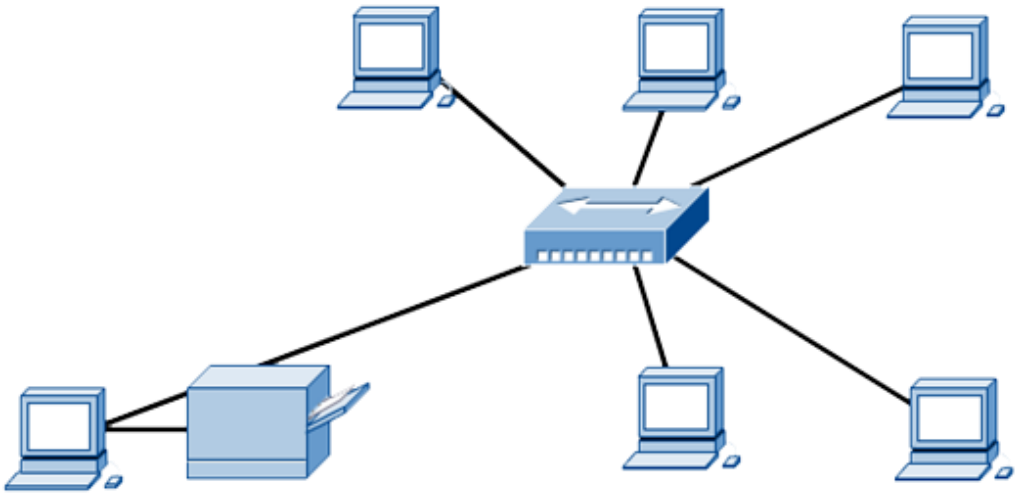
Objectives

1. 2.8 Compare and contrast types of networks
2. 2.1-2 Differentiate network media
3. 2.10 Given a scenario, use appropriate networking tools

NETWORKING FUNDAMENTALS

Computer Networks

Defined as having two or more devices (such as workstations, printers, or servers) that are linked together for the purpose of sharing information, resources, or both



Why Do We Need Networking?

1. Share printers
2. Share Internet connection
3. Access shared files
4. Avoids duplication
5. Allow multiple users
6. Share resources

Network Administration

Responsibilities include:

1. Maintaining and adapting the network to changing conditions
2. Setting up new user accounts and services
3. Monitoring network performance
4. Repairing network failures
5. Evaluate new technologies and requirements

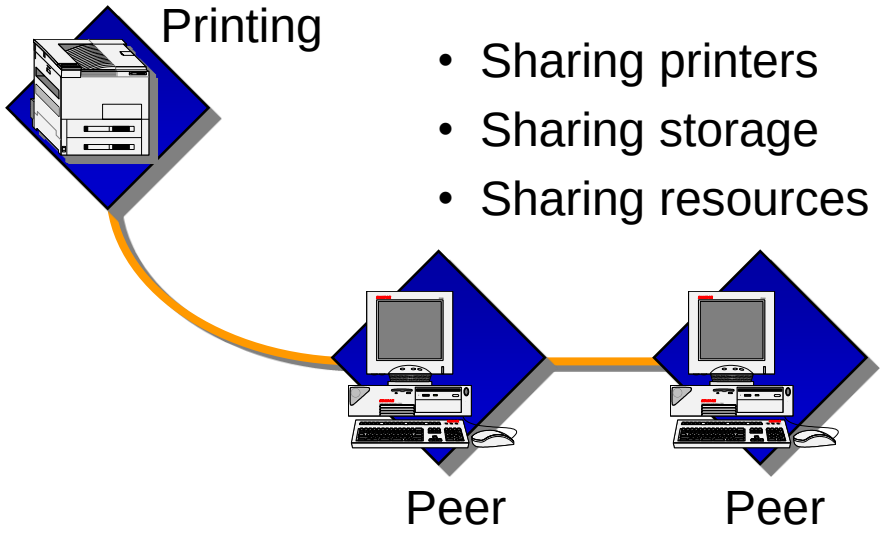
Overview of Networks

Networked computers may take on different roles or functions in relation to each other:

1. Communicate using request/response protocols
2. Role of server:
    A. Manages resources
    B. Shares files
    C. Manages security
    D. Provides services

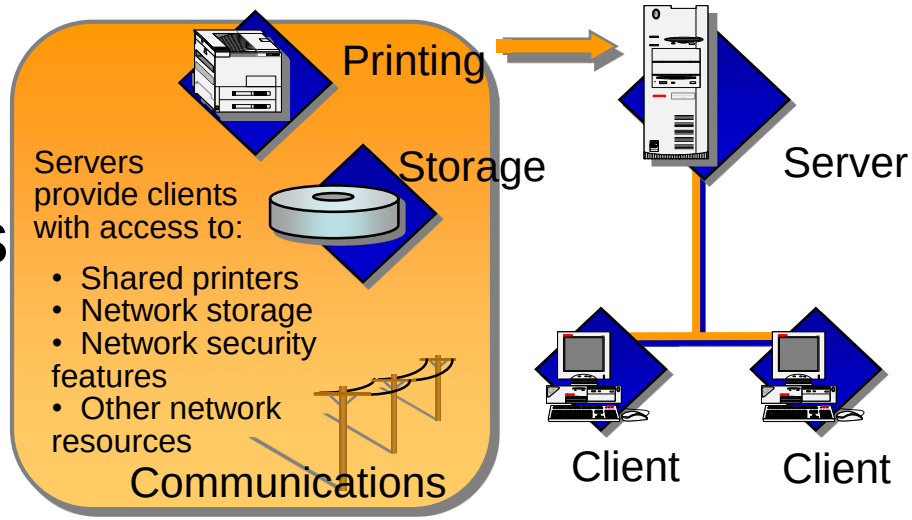
A Peer-to Peer Network

1. Computers act as equal partners
2. Individual users control their own resources
3. Make their own decides
4. Works well in small numbers

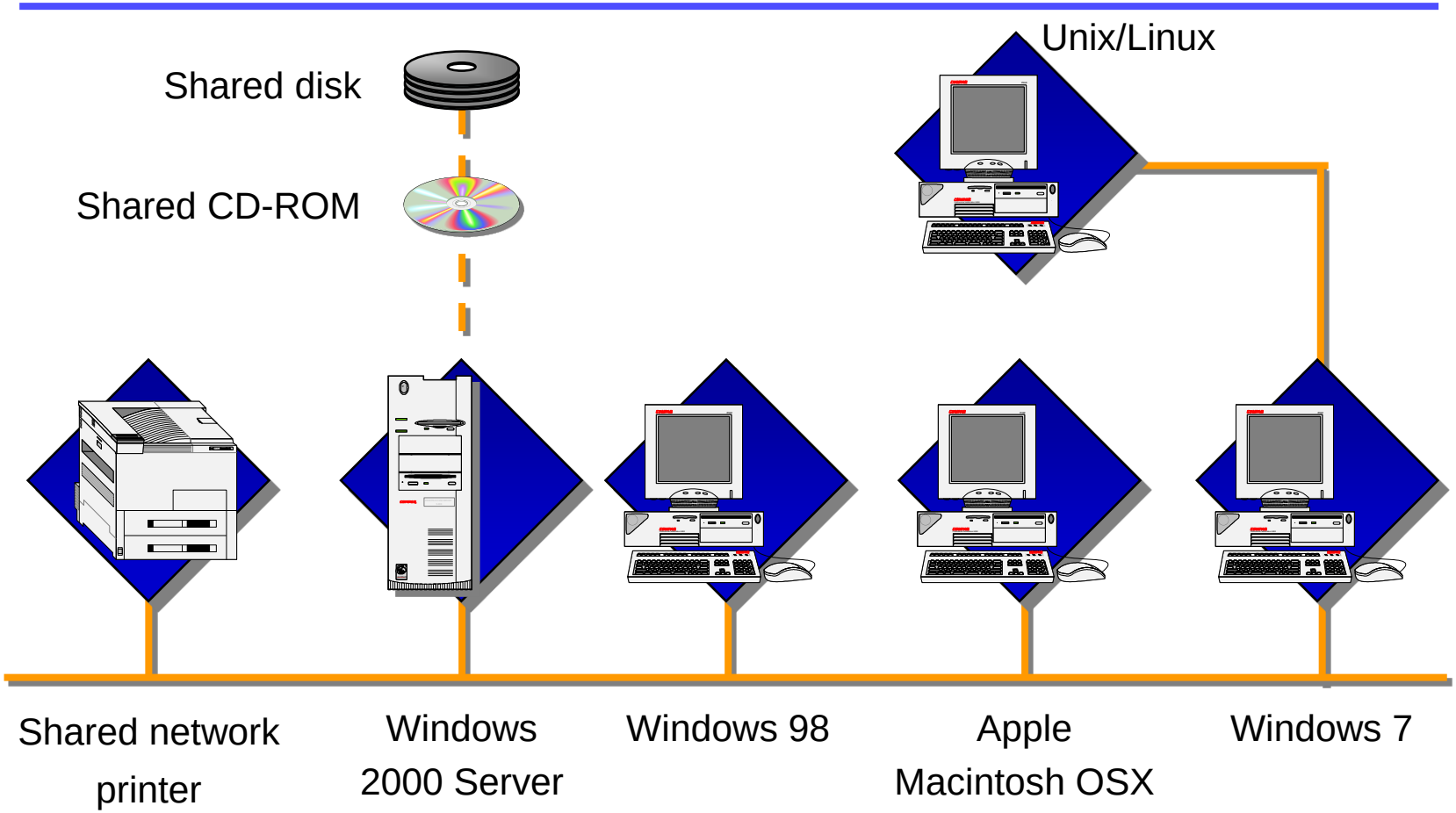


A Client/Server Network

1. Network services are located in a dedicated computer
2. Server may contain:
3. Serves many functions
4. Share applications
5. Server has:
   A. Additional processing power
   B. Additional memory
   C. Specialized software



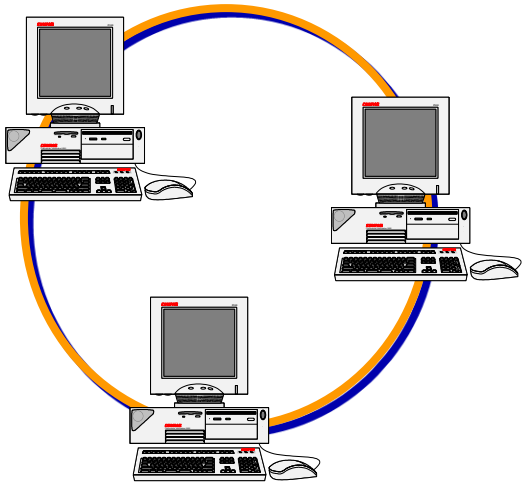
A Typical Network



Networks based on standard protocols, can communicate and share information from any OS

Local-Area Networks

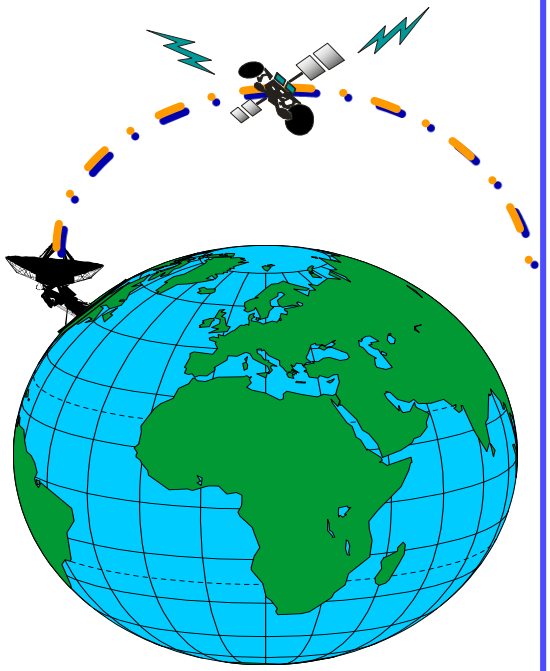
1. **Topology**
   A. Logical
   B. Physical
2. **Local Area Network (LAN)**
   A. Small geographical area
   B. Require shared communications channel
   C. Medium



Local Area Network (LAN)
Small geographical area

Wide-Area Networks

1. Large geographical area
2. Use point-to-point, serial communications lines.
3. Use common carriers
4. Connect fewer computers
5. Operate at lower speeds
6. Interconnect LANs
7. Cover large distances



Wide Area Network (WAN)
Large geographical area

Other Types of Networks

1. **MAN** (Metropolitan Area Network)
2. **PAN** (Personal Area Network)
3. **SAN** (Server Area Network)
4. **NOS** (Network Attached Storage)

Circuit-switched vs. Packet-switched

1. **Circuit-switched network**
   A. Establishes connection
   B. Transmits over that circuit
   C. Modem
   D. POTS
   E. Any dial-up connection
2. **Packet-switched network**
   A. Individual packets can take different paths
   B. Always-on connection
   C. Cable, DSL, T1
   D. Internet traffic

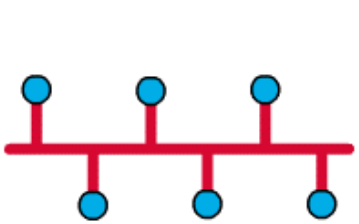
Data Transmission

Signals sent and received can operate in:

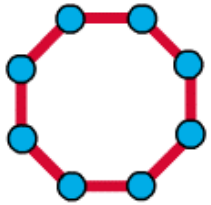
1. **Simplex**
2. **Half-duplex**
3. **Full-duplex**

Physical Topologies

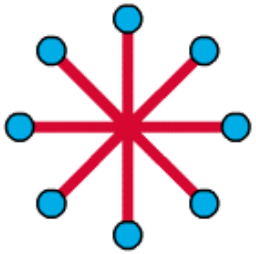
Defines the way devices are connected



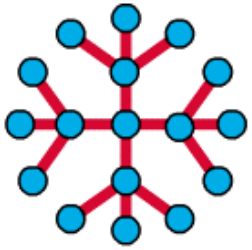
Bus Topology



Ring Topology



Star Topology



Extended Star Topology

Mesh Topology

NETWORK MEDIA

Types of Media

1. Coaxial
2. Unshielded Twisted-Pair
3. Shielded Twisted-Pair
4. Fiber-optic

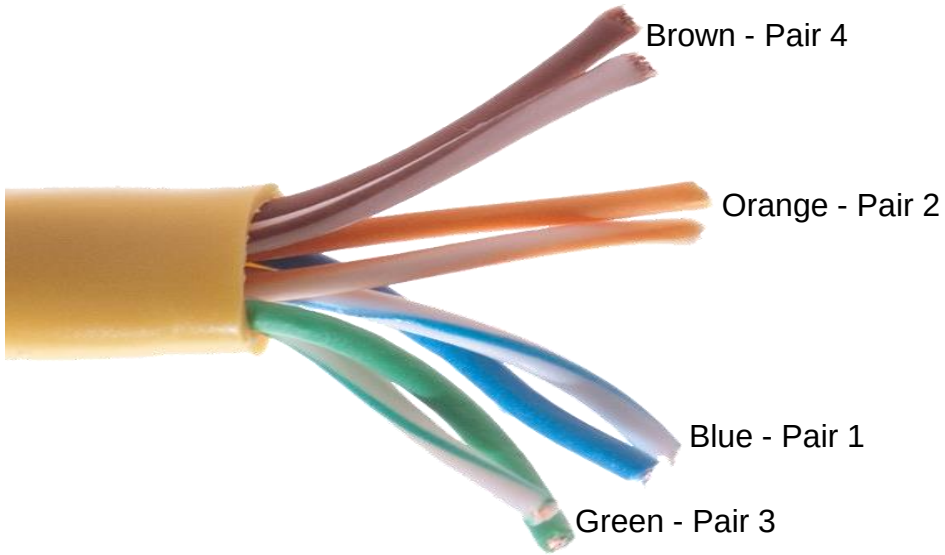
Network Cabling

Cable System	Speed	Cables and Connectors	Maximum Cable Length
10Base2 (ThinNet)	10 Mbps	Coaxial uses a BNC or F connector. RG-6 cable	185 Meters (607 ft)
10Base5 (ThickNet)	10Mbps	Coaxial uses an AUI 15-pin D-shaped connector	500 Meters (1640 ft)
10BaseT (Twisted-Pair)	10 Mbps	UTP uses an RJ-45 connector	100 Meters (328 ft)
100BaseTX (Twisted-Pair)	100 Mbps	UTP uses an RJ-45 connector	100 Meters (328 ft)
10BaseF, 10BaseFL, 100BaseFL, 100BaseFX, or 1000BaseFX (Fiber-Optic)	10 Mbps, 100 Mbps, or 1 Gbps	Fiber-Optic cable uses an ST, SC, LC connector	Multi-Mode up to 2000 Meters (6562 ft) Single-Mode up to 3000 Meters (9842 ft)

Types of Cable Jackets

Cable types:

1. **PVC**
2. **Plenum**



Categories of Cable

1. CAT1
2. CAT3
3. CAT5
4. CAT5e
5. CAT6

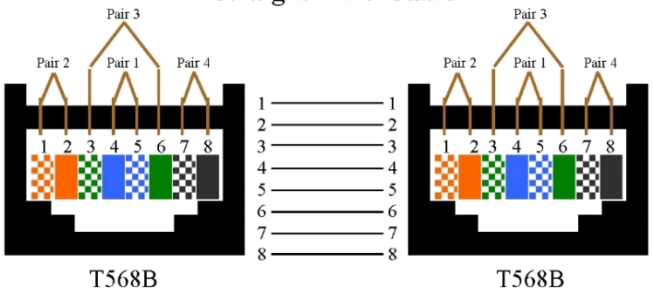
Ethernet UTP with RJ-45 Connectors

RJ45 Pinouts

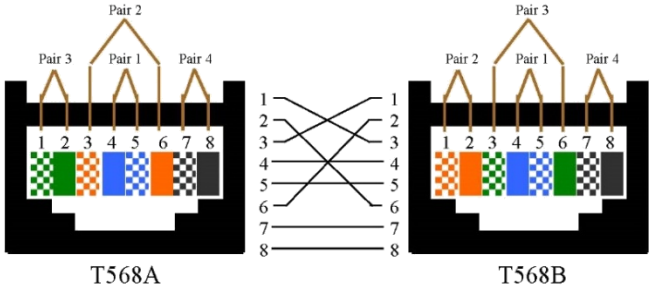
568A Scheme

- G/W
- G
- O/W
- B
- B/W
- O
- Br/W
- Br

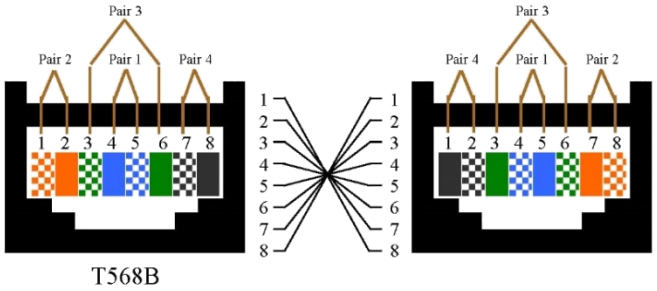
Straight Thru Cable



Cross-Over Cable or Cross Connect Cable



Roll-Over Cable or Console Cable



568B Scheme

- O/W
- O
- G/W
- B
- B/W
- G
- Br/W
- Br

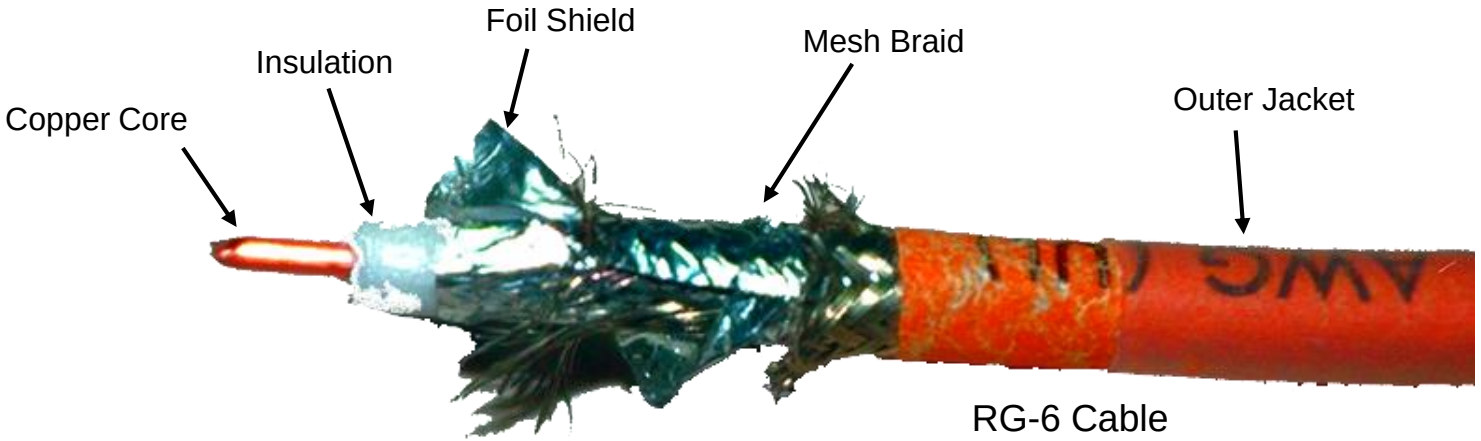
STANDARD

Voice & Dial-up

1. Made of same twisted pair cable
2. Uses RJ-11 connectors
3. Used for:
    A. Phones
    B. Fax machines
    C. Modems

Small than RJ-45

Coaxial Cable and Connectors

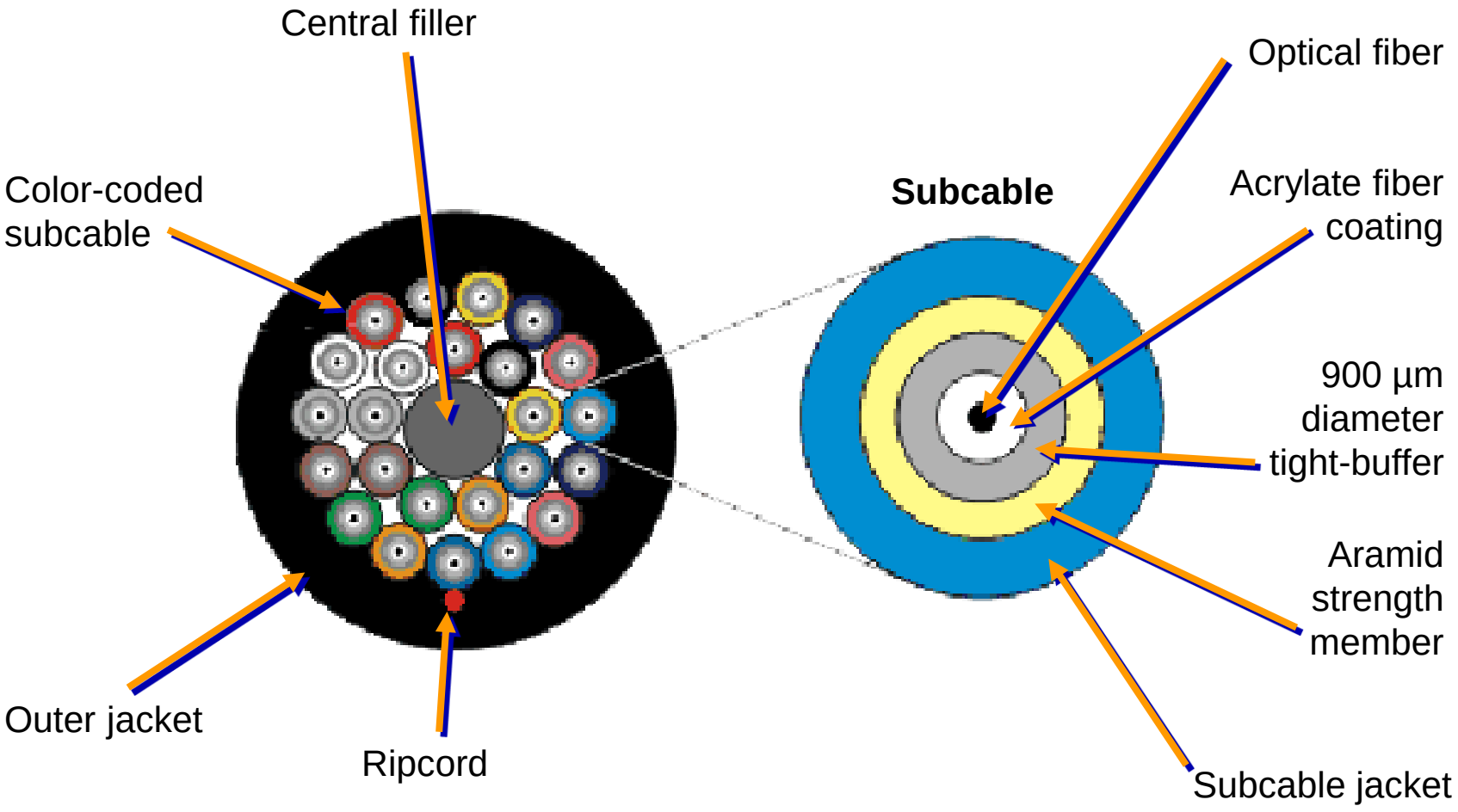


RG-6 Cable

BNC Connectors

F Connector

Fiber-optic Cable



Fiber-optic Cable Connectors

1. Fiber Connectors:
   - **A. ST**

   - **B. SC**

   - **C. LC**

1. **Singlemode**
   2. Uses laser light source
   3. Core is 8-10 microns
   4. Transmission distance of 3000 meters
   5. Commonly used for:
      - A. Interbuilding connectivity
      - B. WANs
2. **Multimode**
   1. Uses LED light source
   2. Core is 50 & 62.5 microns
   3. Transmission distance of 2000 meters
   4. Commonly used for:
      - A. Intrabuilding connectivity
      - B. LAN backbones

NETWORK TOOLS

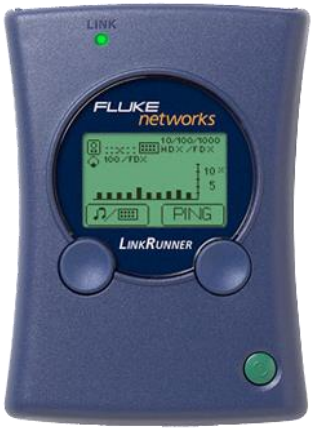
Network Tools

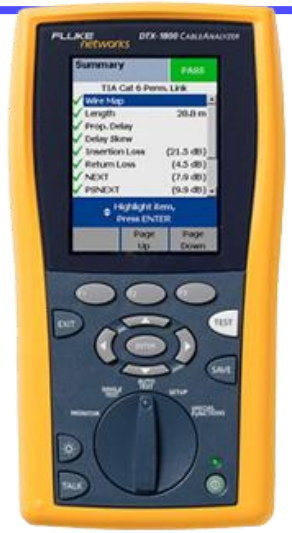
1. Crimper

2. Punchdown Tool

Network Tools

3. Cable Tester





4. Tone and Probe

Network Tools

5. Multimeter

6. Loopback Plug

Summary

In this module we discussed:

1. Definition and need for networking
2. Roles of an administrator
3. Types of network operating systems
4. Types of networks
5. Types of transmissions
6. Types of topologies
7. Types and uses of network media
8. Tools of the trade