# CHAPTER 8 : COMMUNICATION & NETWORKS


JACK LEE (A19EC0057)

NG PEI WEN (A19EC0117)

AMEENUDDIN BIN ISMAIL (A19EC0016)

NUR AZIZAH BT MOHAMMAD MOKHTAR (A17KM0351)

# INTRODUCTION

We live in a truly connected society.

Increased connectivity

increased productivity

concept of connectivity and the impact of the wireless revolution

# COMMUNICATION

process of sharing data, programs, and information between two or more computers

E-mail

Texting

Video conferencing

Electronic commerce

# CONNECTIVITY

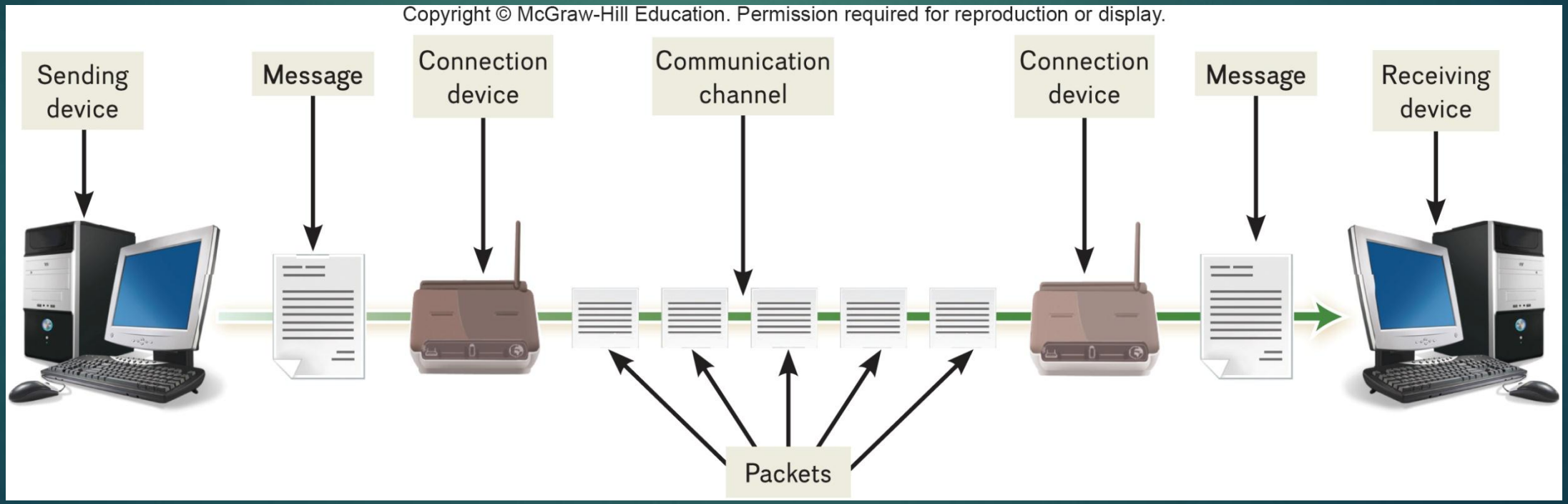
uses computer networks to link people and resources

Connects your personal computer to other computers and resources on a network and the Internet

# Communication Systems

Electronic systems that transmit data from one location to another





Sending and receiving devices
-Computer or a specialized communication device

Connection devices
-Interface between sending and receiving device

**BASIC ELEMENTS OF COMMUNICATION**

Data transmission specifications
-Rules and procedures that coordinate the devices

Communication channel
-Carries the message

# COMMUNICATION CHANNELS

## Physical Connections

Twisted pair cable: two pairs of copper wire twisted together
- -Telephone lines
- -Ethernet cables

Coaxial cable: single solid copper core
- -Cable TV


Fiber-optic cable: tiny glass tubes
- -Faster and more reliable than coax
- -Rapidly twisted pair


## Wireless Connections

Wireless connections do not use a solid substance to connect; uses the air itself. Most use radio waves to communicate

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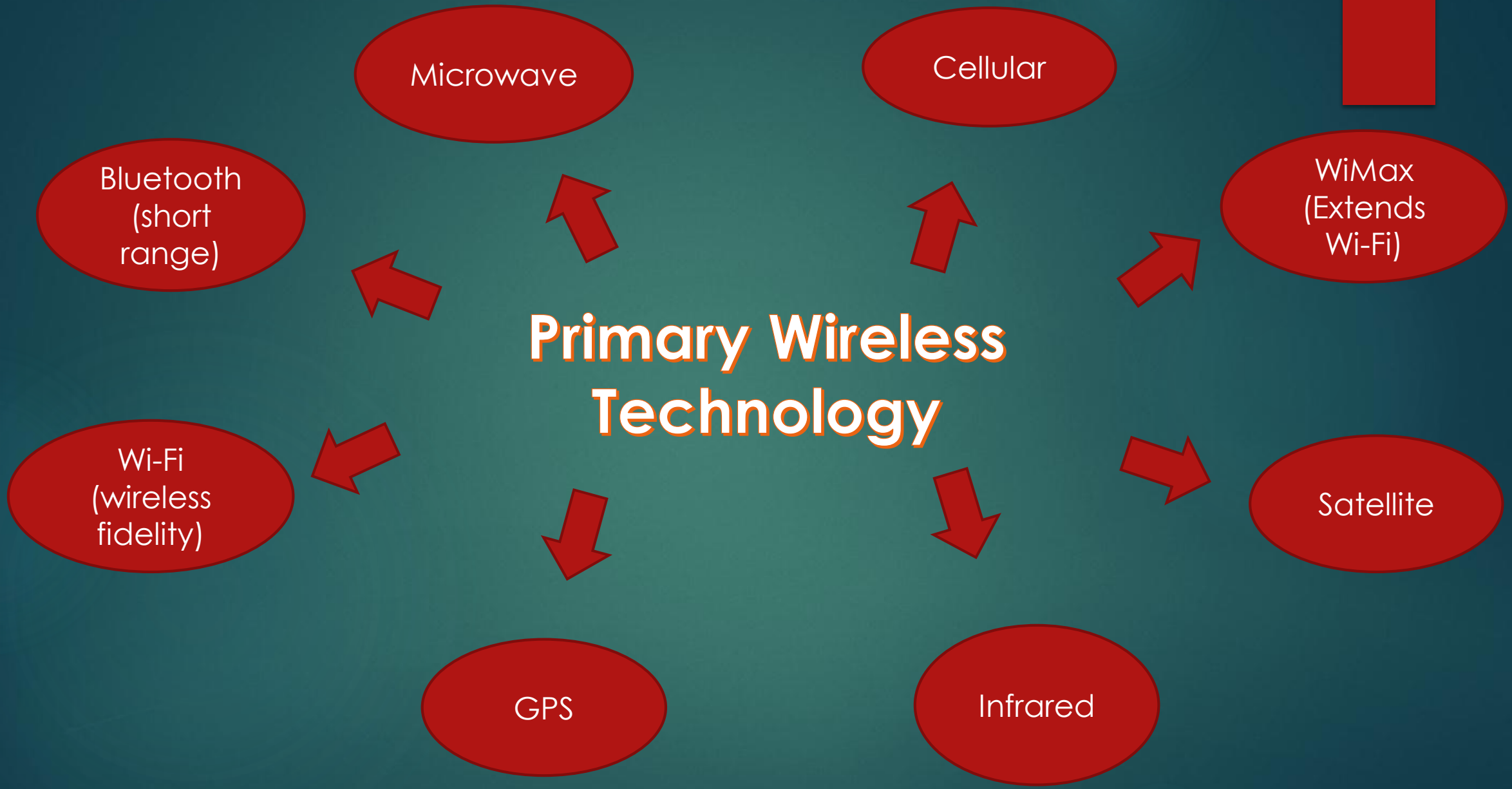
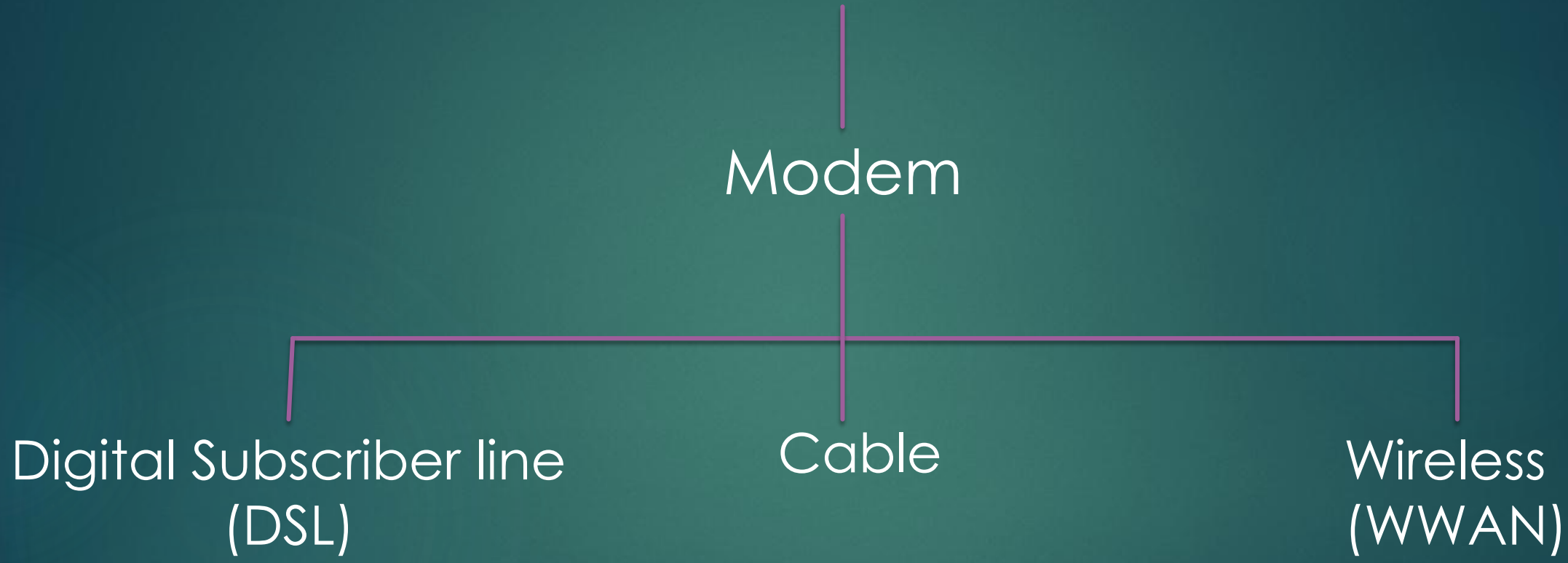
| Standard | Maximum speed |
|---|---|
| 802.11g | 54 Mbps |
| 802.11n | 600 Mbps |
| 802.11ac | 2.6 Gbps |
| 802.11ax | 10.5 Gbps |

# Primary Wireless Technology



# Connection Devices

- (convert digital to analog)



# Connection Services

## Corporation

- Leased lines
- have been replaced by optical carrier line
- Higher capacity which is not affordable for individuals

## Individual

- Digital Subscriber Line (DSL)
- Cable (faster than DSL)
- Satellite (slower than DSL)
- Cellular Services (3G & 4G)
- Fiber Optic Service (FiOS)

# Data Transmission (Factor)

- Bandwidth – information that can move across communication channels in a given time.

- Categories of bandwidth

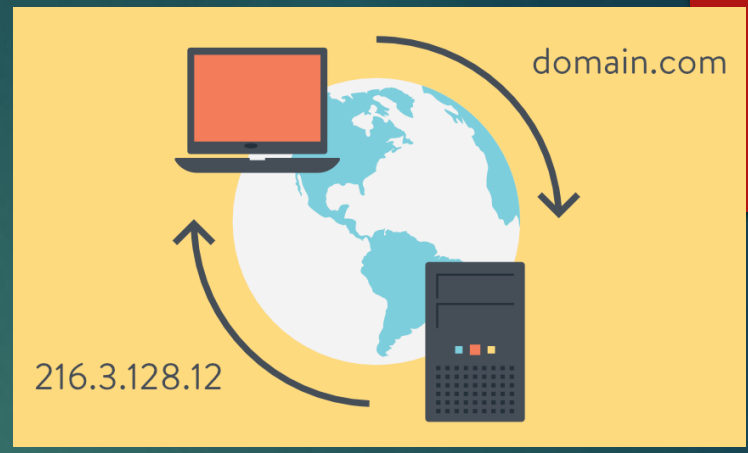
- Voiceband [low bandwidth] (standard telephone)

- Medium band (Mid-range computer and mainframes)

- Broadband (DSL, cable, satellite connections to internet)

# PROTOCOL

A SET OF RULES OR PROCEDURES FOR TRANSMITTING DATA BETWEEN ELECTRONIC DEVICES




**TCP/IP**

**Transmission Control Protocol/Internet Protocol**

*__TCP/IP__ specifies how data is exchanged over the internet.

*__TCP:__ divides a file into packets that are transmitted over the internet and then reassembled when they reach their destination.

*__IP:__ responsible for the address of each packet.

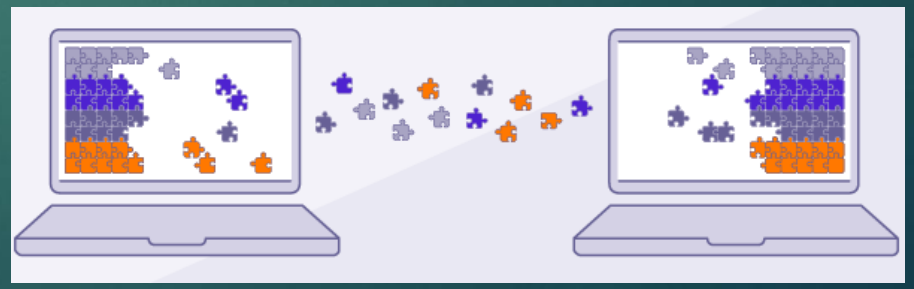
*__DNS:__ domain name service reolves IP addresses to names

**HTTPS**

**Hypertext Transfer Protocol Secure**

*The set of rules for transferring files, such as text and images

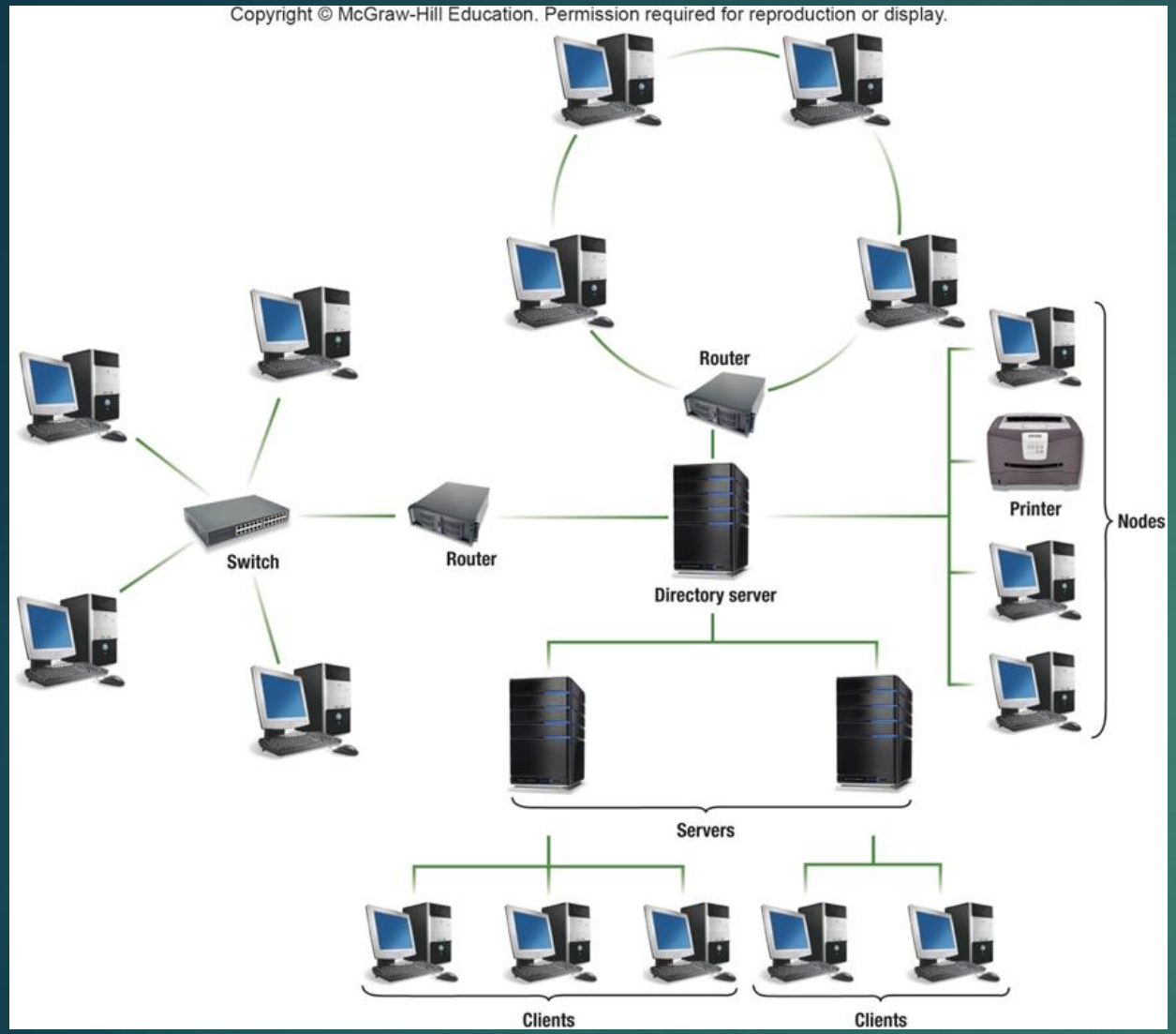
*HTTPS made the web.



PACKETIZATION

# NETWORKS

A communication system that **connects two or more computers** so they ***can exchange information and share resources***




- **NODES**: *any device* connected to a network
- **CLIENT**: a node *that requests and uses resources* from other nodes
- **SERVER**: a node that *share resources with other nodes*
- **DIRECTORY SERVER** : specialized server that manages resources
- **HOST**: computer system that *can be accessed over a network*
- **ROUTER**: node that forwards or routes data packets
- **SWITCH**: central node *that coordinates the flow of data*. These tasks used to be performed by a hub (key term)
- **NETWORK INTERFACE CARDS** (NIC): expansion card that connects a computer to a network
- **NETWORK OPERATING SYSTEM** (NOS): control activities of all computers on the network
- **NETWORK ADMINISTRATOR** : computer specialists responsible for network operations

# NETWORK TYPES



| Type | Description |
|---|---|
| LAN | Local area network; located within close proximity |
| Home | Local area network for home and apartment use; typically wireless |
| WLAN | Wireless local area network; all communication passes through access point |
| PAN | Personal area network; connects digital devices, such as PDAs |
| MAN | Metropolitan area network; typically spans cities with coverage up to 100 miles |
| WAN | Wide area network for countrywide or worldwide coverage |

# Network Architecture

Describes *how a network is arranged* and *how resources are coordinated and shared*

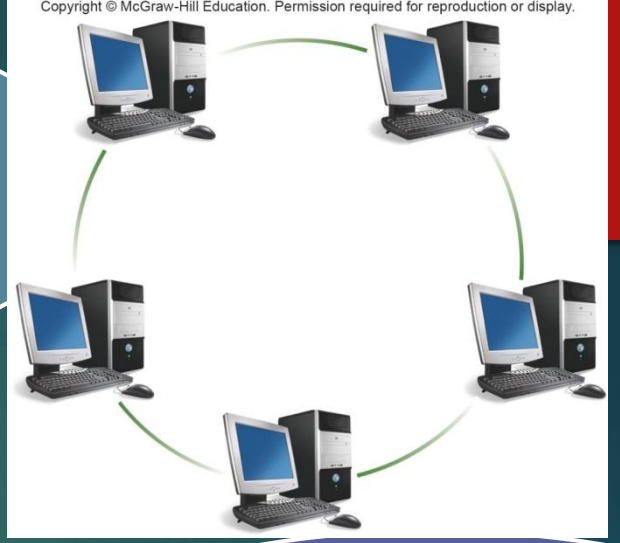
- **Network Topology**
  - Physical arrangement of the network
- **Network Strategy**
  - How the information and resources are shared

The most commonly used today are the star, tree and mesh.

# TYPE OF NETWORK TOPOLOGY

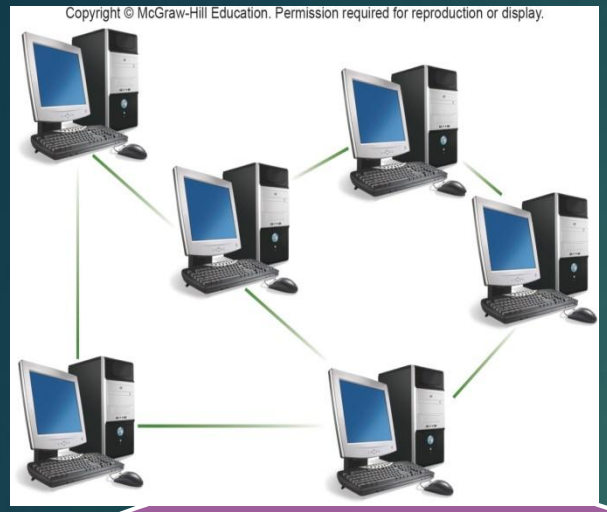
## RING NETWORK

Each device is connected to two other devices forming a ring.



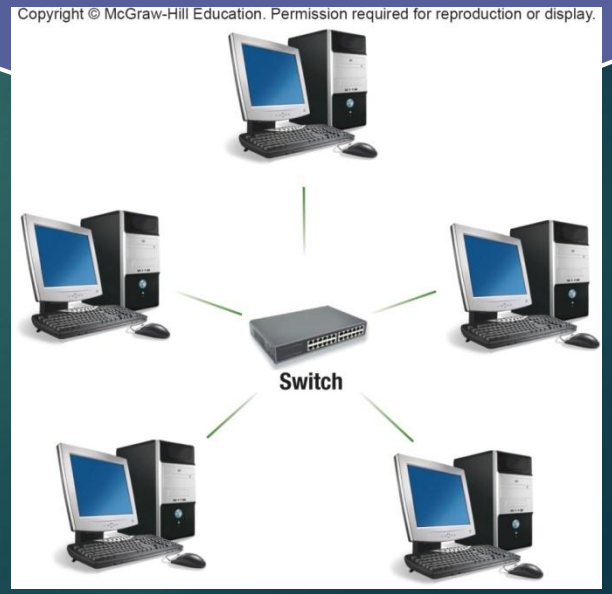

## MESH NETWORK

Each node must have more than one connection to other nodes




## STAR NETWORK

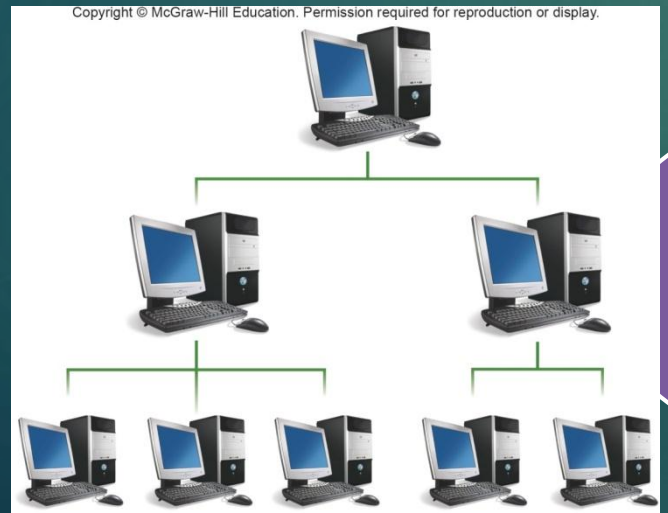
All communications pass through the switch





## TREE NETWORK

Each device connected to a central node (directly or through subordinate nodes)



# NETWORK STRATEGIES

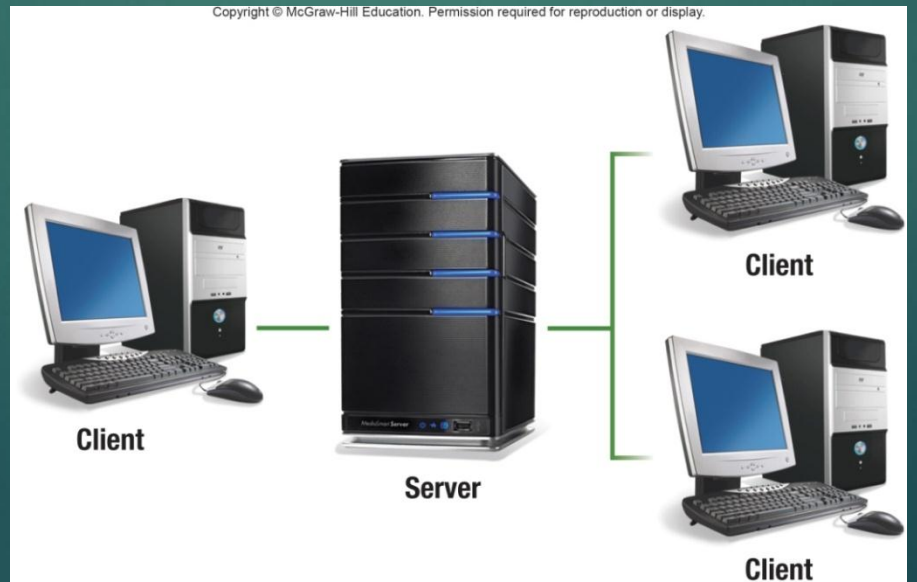
## Client / Server Network

❖ Central computers coordinate and supply services to other nodes on the network.
❖Server provides access.

## Peer-to-Peer (P2P) Network

❖All nodes have equal authority

❖Can act as both client and server



# Organizational Networks

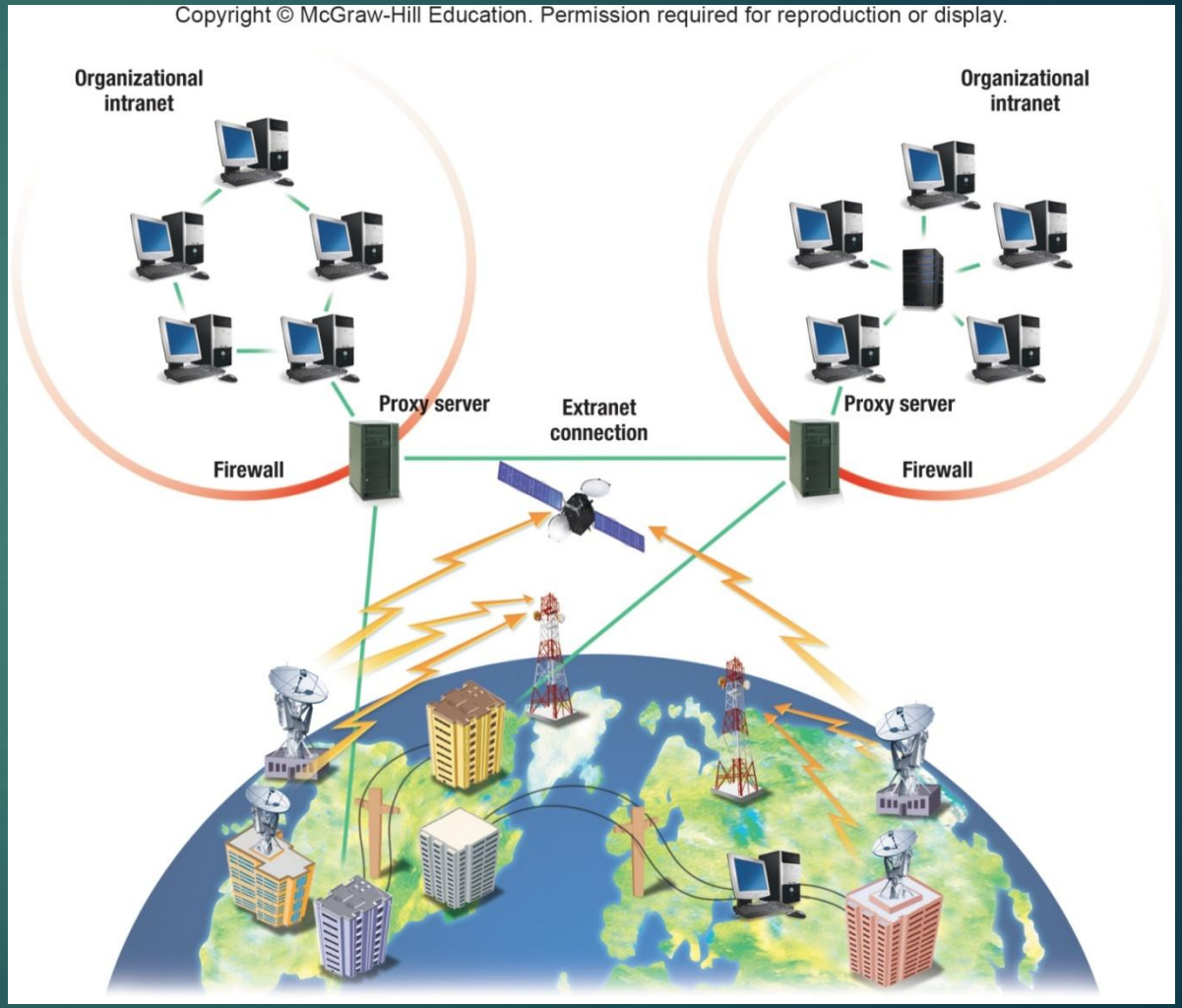
: support effective communication within and between organizations

Intranet

- Private network within an organization.
- Works like the Internet.

Extranet

- Private network that connects more than one organization.
- Works like the Internet, but provides suppliers and other trusted partners with limited access to the organization's networks.



# Network Security

## FIREWALL

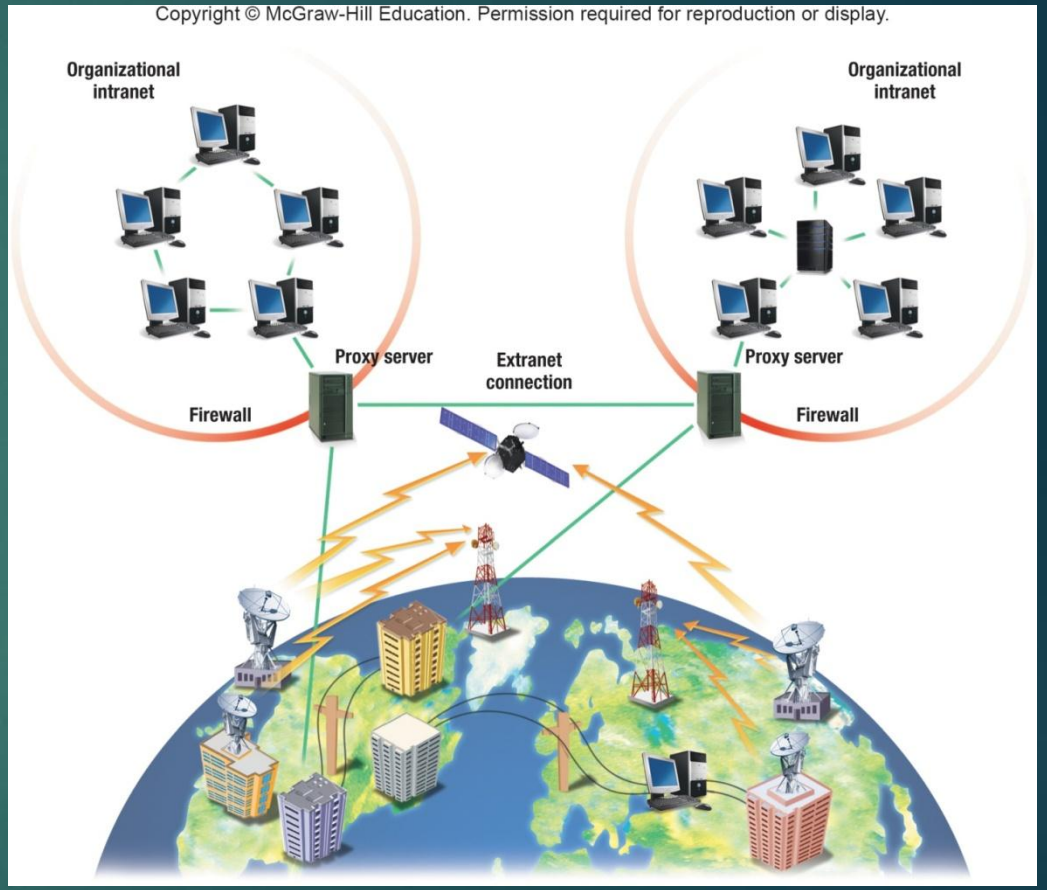
- Protects against external threats
- Hardware and software control access to network

## VIRTUAL PRIVATE NETWORK (VPN)

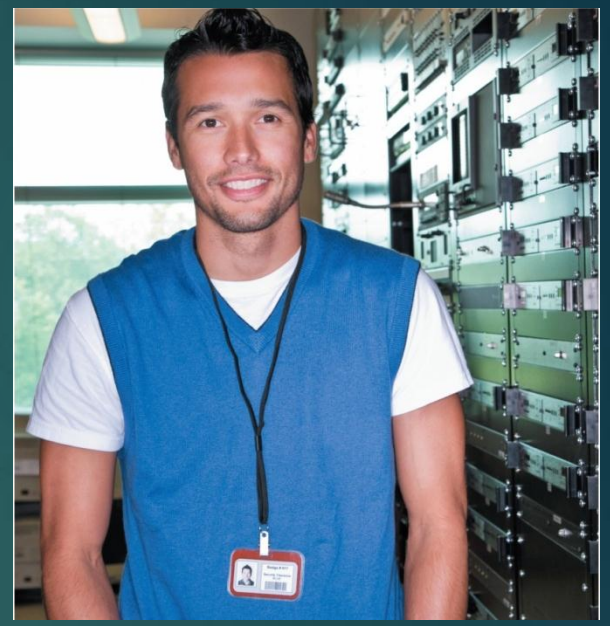
- Creates a secure private network connection between computer and the organization

## INTRUSION DETECTION SYSTEM (IDS)

- Works with firewall (protect organization's network)
- Analyzes all incoming and outgoing network traffic



# Careers In IT



Network Administrator

- Manages a company's LAN and WAN networks
- Maintains networking hardware and software, diagnosing and repairing problems that arise
- Have bachelor's or associate's degree in computer science, computer technology or information systems
- Practical networking experience
- Annual salary is typically between $47,000 and $64,000

# THANK YOU