ACIT 2620

Principles of Enterprise Networking

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Objectives

- Overview of networking concepts and terminologies

- Layered networking model

- Project introduction

- Packet capture

What is the internet

- What is it made of?

- what is its purpuse?

- How does it work?

Network

Collection of `nodes` connected by some type of transmission media or `link`, for the purpose of sharing services, devices or data (i.e. networked `resources`)
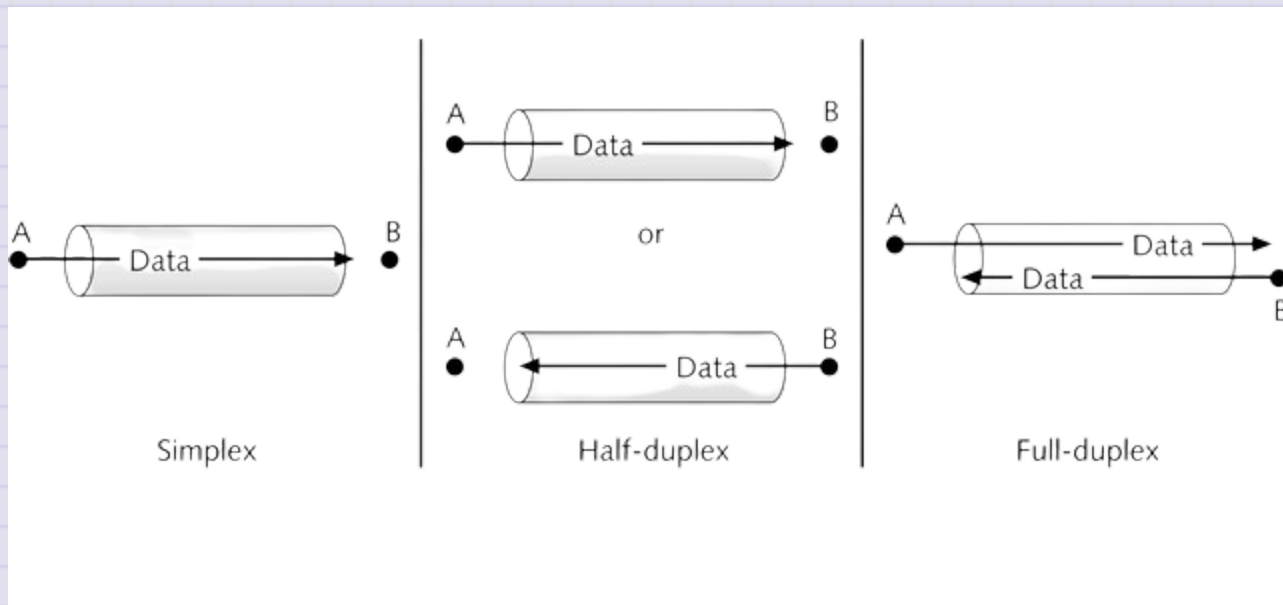
Node

Any device that can communicate over the network and is identified by a unique identifying number, known as its `network address`.
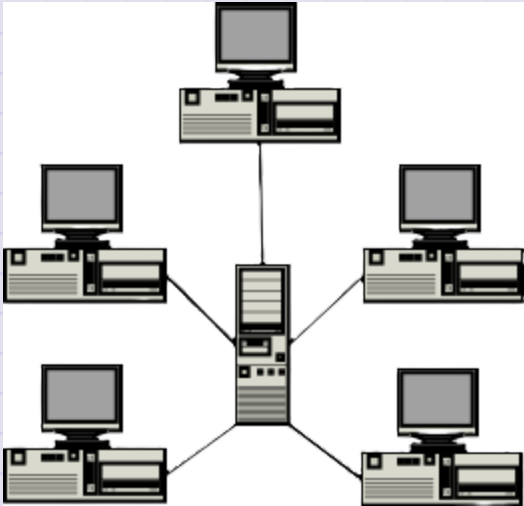
Link

Coaxial cable

Shielded twisted-pair cable

Fiber-optic cable

Infrared

Microwave
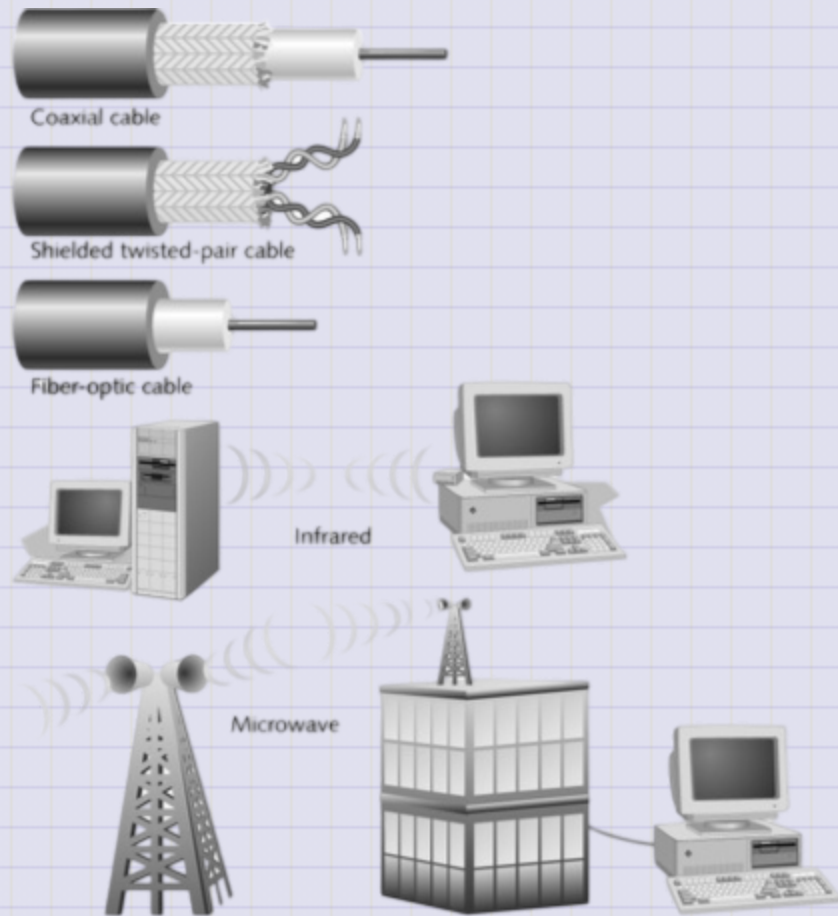
Media concurrency and direction

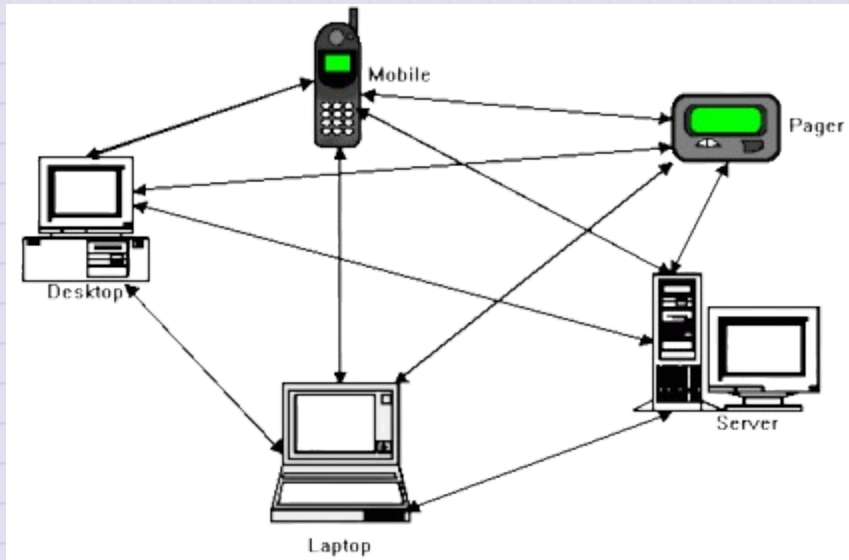Simplex   Half-duplex   Full-duplex

Resource Control

Client-server Networks

Peer-to-peer Networks
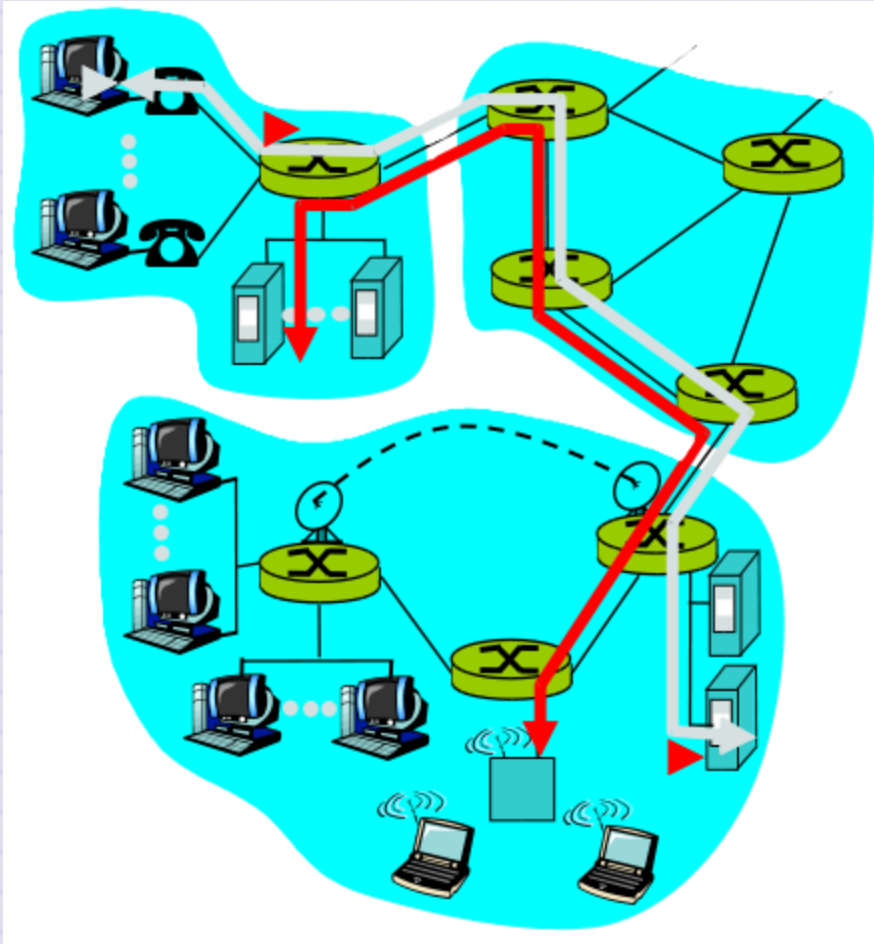
Types of Networks

- LAN
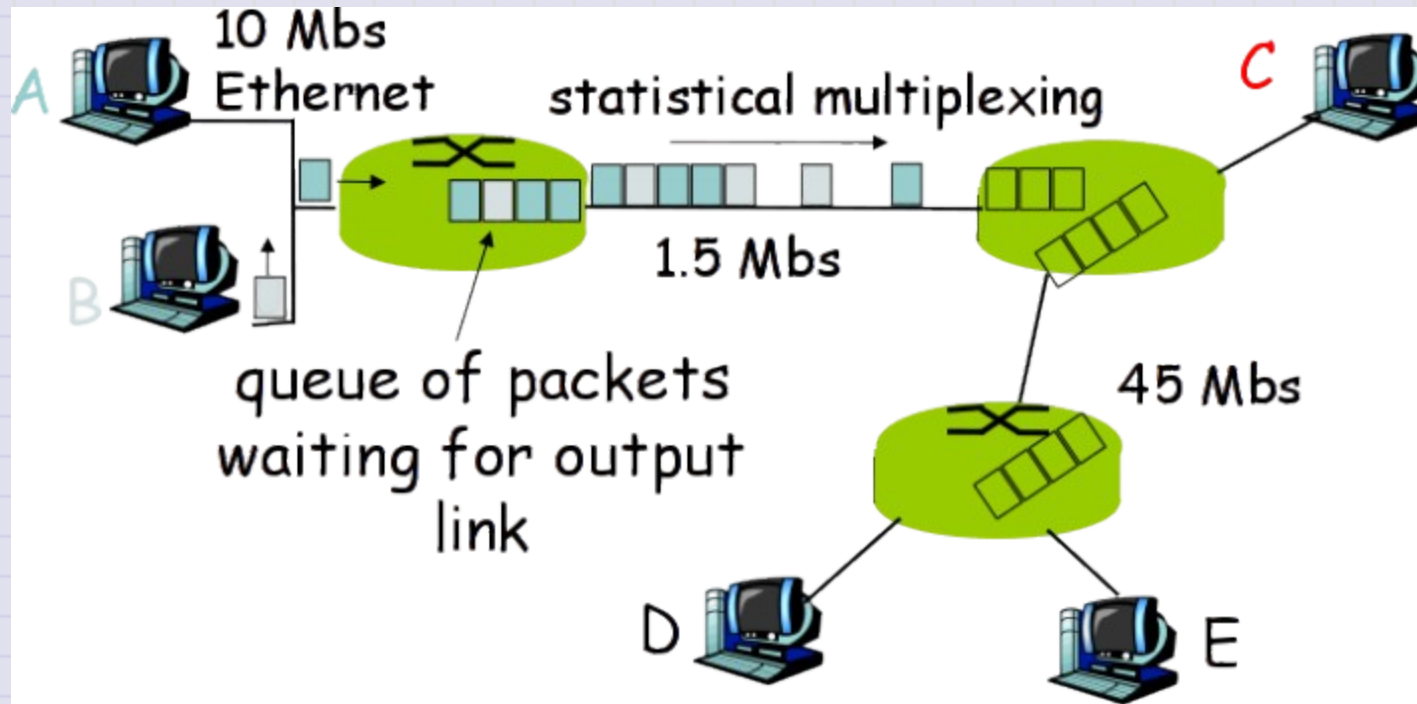
- WLAN

- PAN

- CAN

- MAN

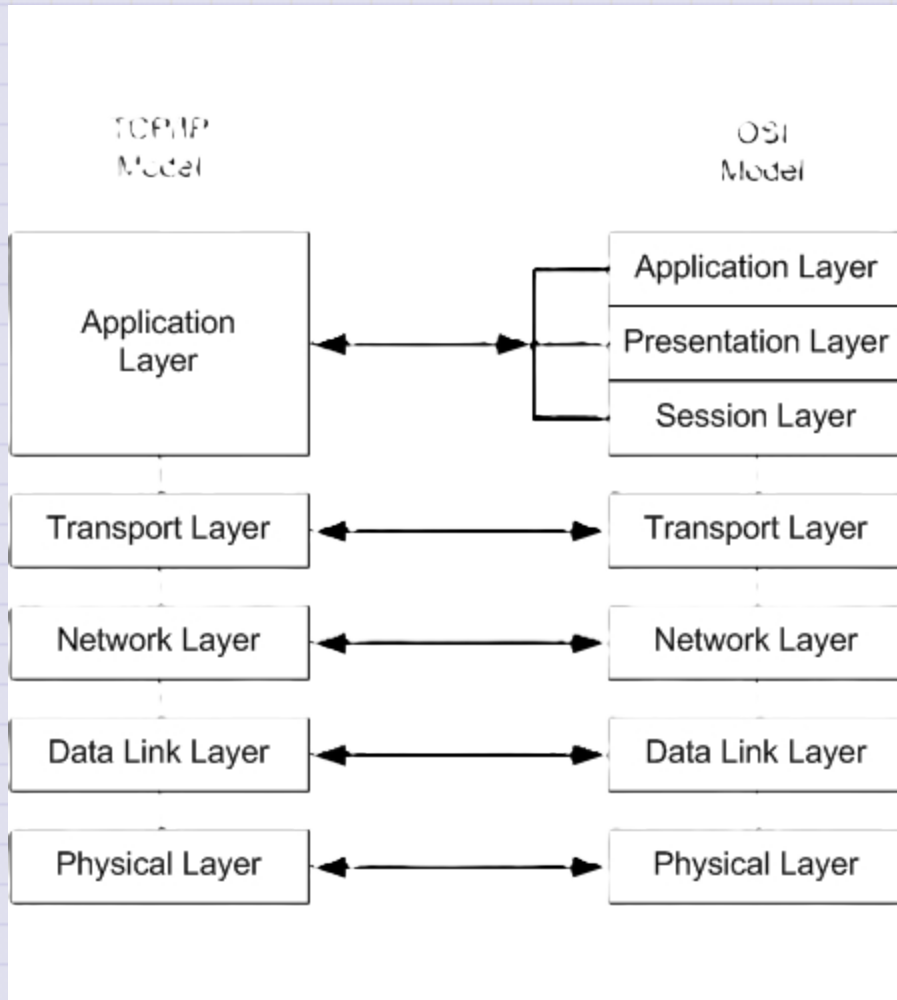- WAN

- SAN

- EPN

- VPN

Learn more

Switching Methods
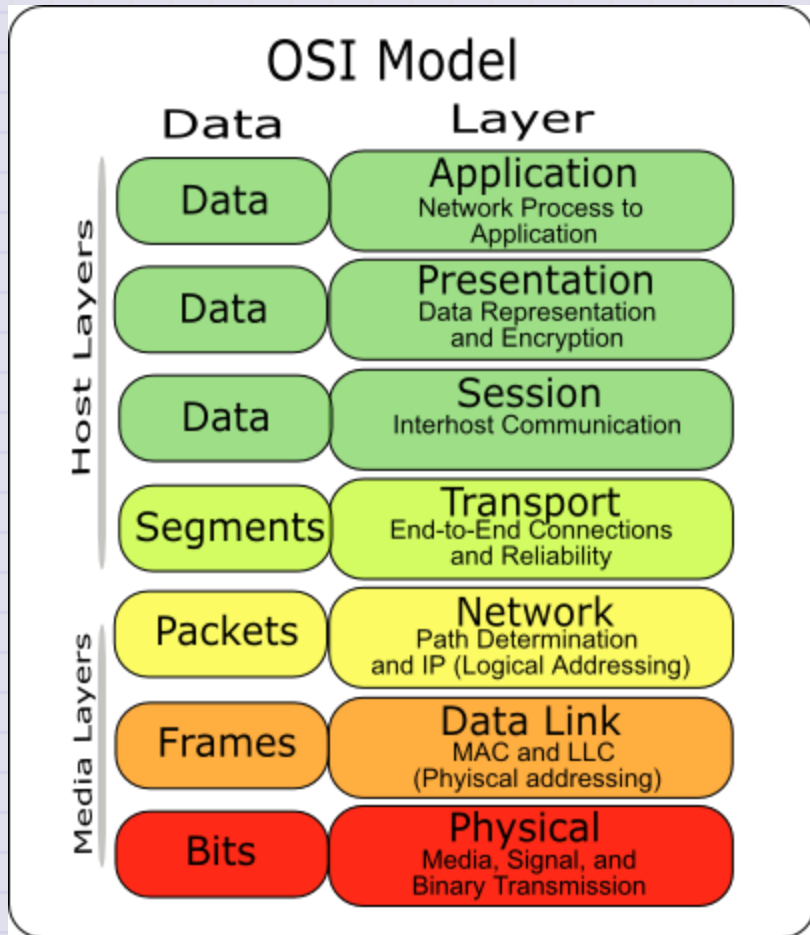
Circuit Switching
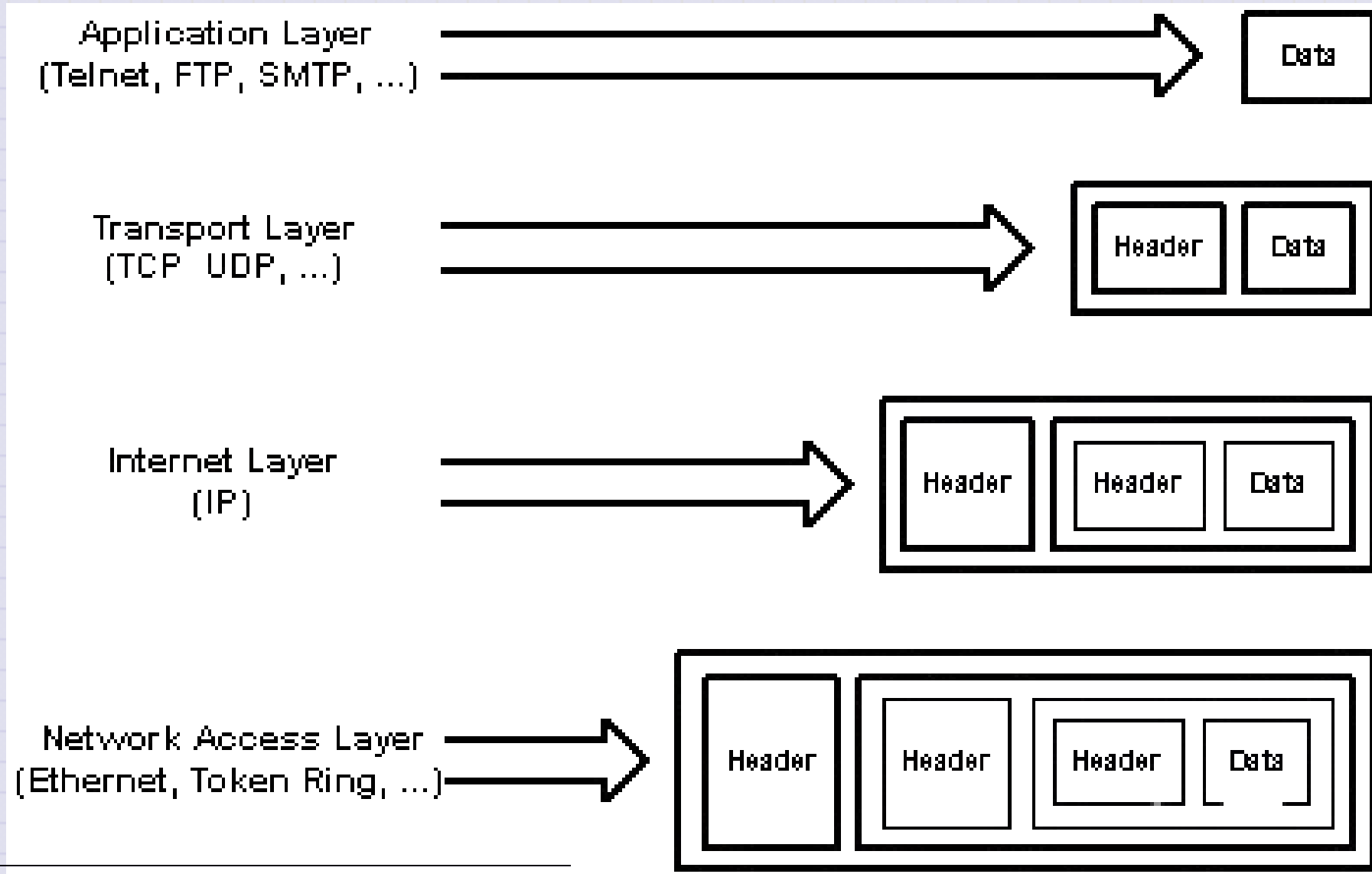
Packet Switching

Layered networking model

Layered why?

- Managing complexity: explicit structure allows identification and makes explicit the relationship of complex system's pieces

- Modularization: changing of an implementation of a specific layer's service is hidden from the rest of the system

Protocol Data Units (PDU)

Encapsulation

Application Layer
(Telnet, FTP, SMTP, …) ⟹ | Data |

Transport Layer
(TCP UDP, …) ⟹ | Header | Data |

Internet Layer
(IP) ⟹ | Header | Header | Data |
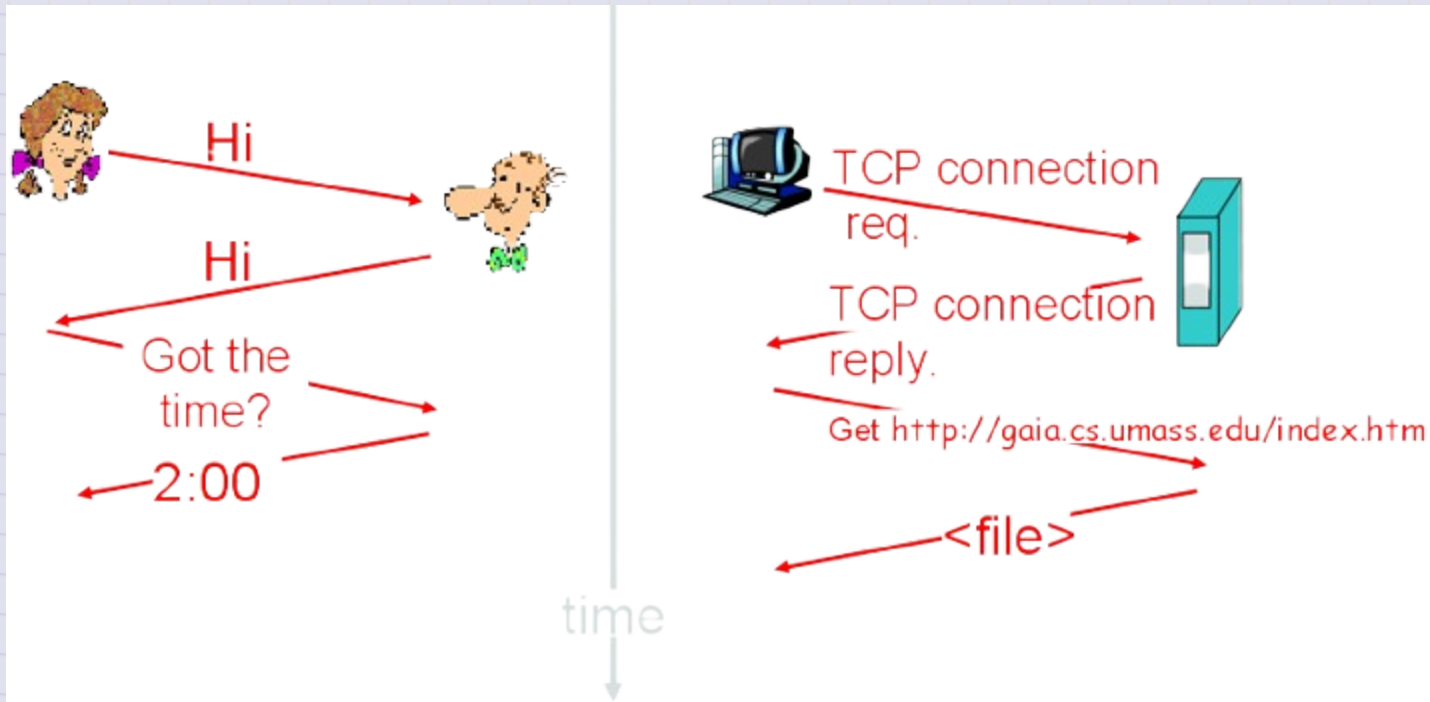
Network Access Layer
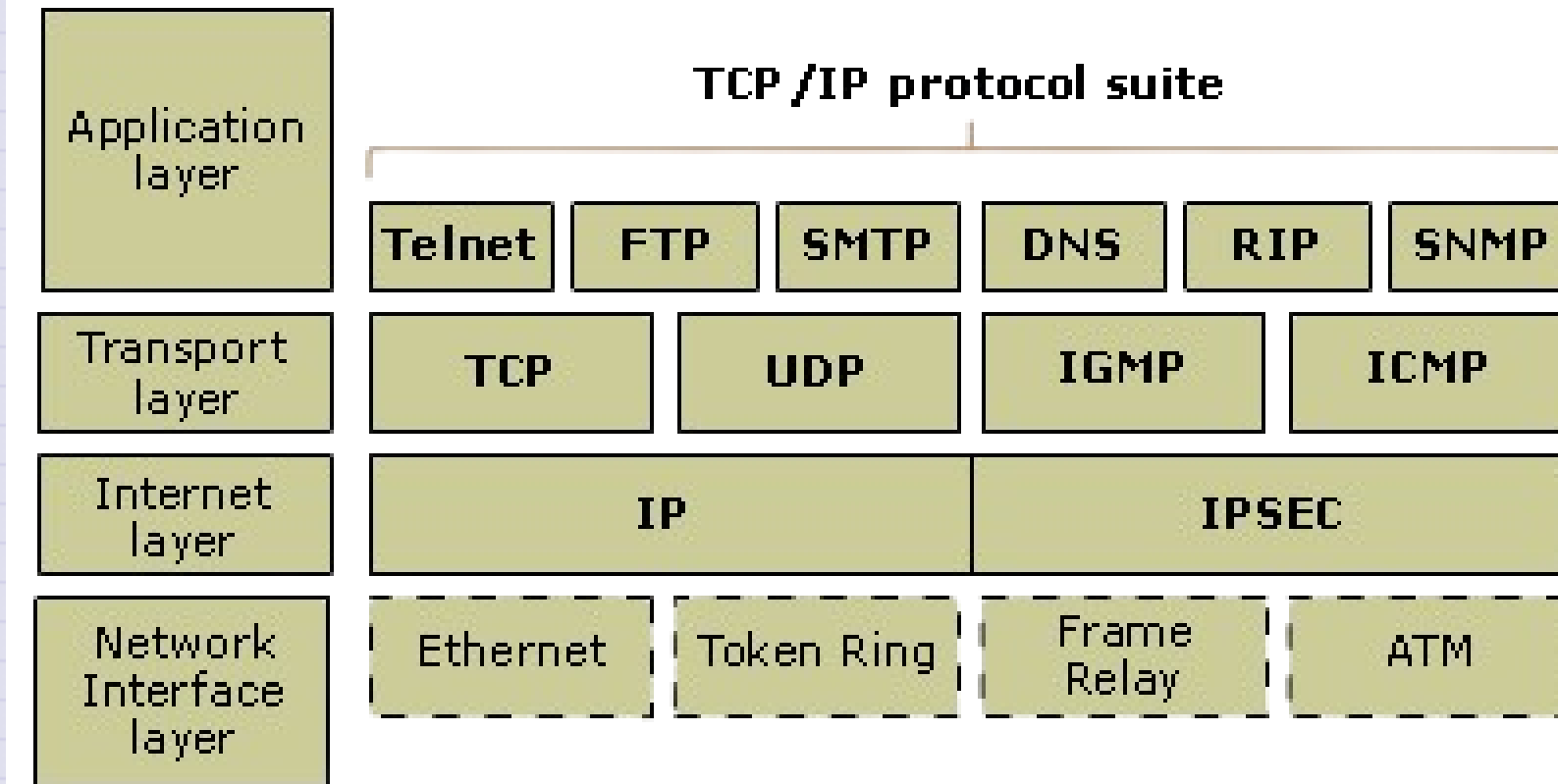(Ethernet, Token Ring, …) ⟹ | Header | Header | Header | Data |

Protocols

- Mutually agreed upon rules for communication

- Define the format, order of messages sent and received among network entities, and actions taken upon transmission, receipt, and timeout

- Govern all communication activity on the internet

TCP/IP protocol suite

TCP/IP model

TCP/IP protocol suite

Application layer	Telnet	FTP	SMTP	DNS	RIP	SNMP
Transport layer	TCP	UDP	IGMP	ICMP		
Internet layer	IP		IPSEC			
Network Interface layer	Ethernet	Token Ring	Frame Relay	ATM		

Wireshark

- A tool for capturing network traffic for analysis

- Grab the installer and install it on your system

Reading list

- This week
  - OSI Model

  - Optional reading:
    - Wireshark: filtering while capturing

    - Capture filters

    - Display filters

- Week Two (read/watch these before next class)
  - Common Network Infrastructure devices
  - Network devices
  - Network Topologies
  - Overview of networks
  - Optional (but highly recommended):
    - Linux command line (recommended for beginners)