Overview of Computer Networks

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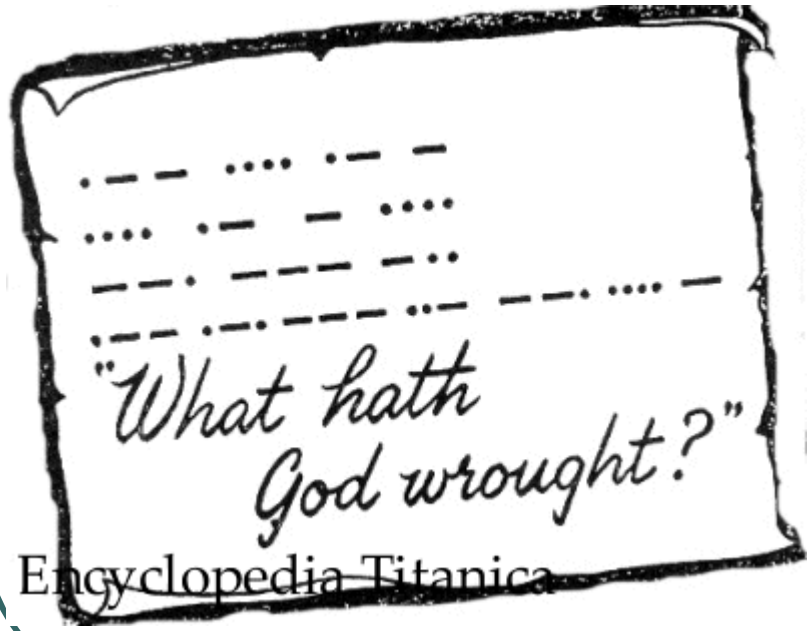
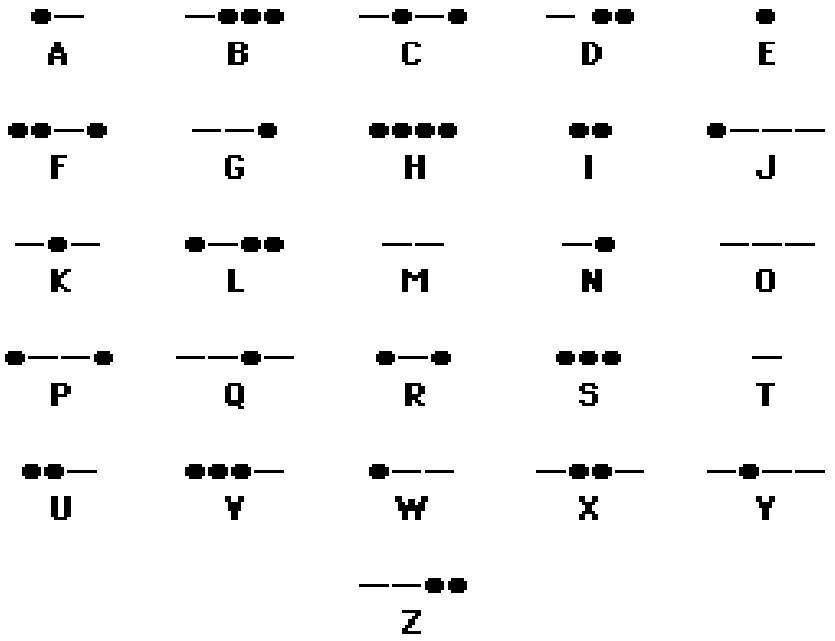
Overview of computer networks

- Data transmission networks
- Computer network architecture
- Types of services
- Benefits of computer network

Electrical Telegraph

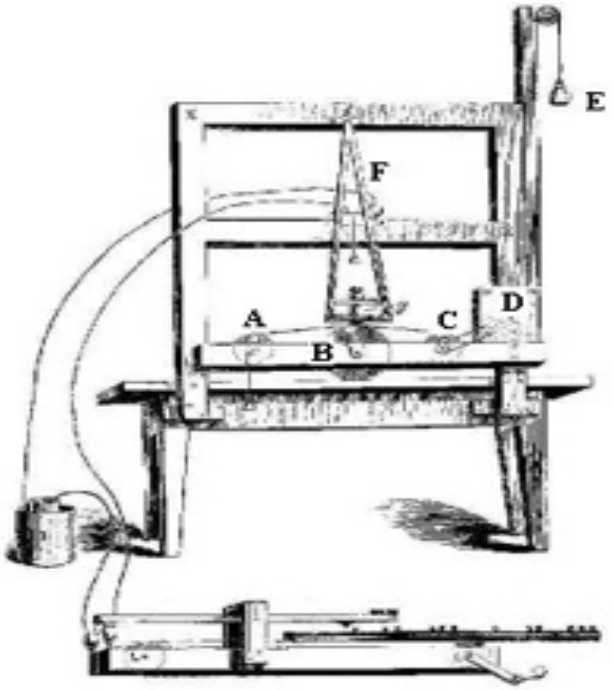
- Using Morse code to transmit data

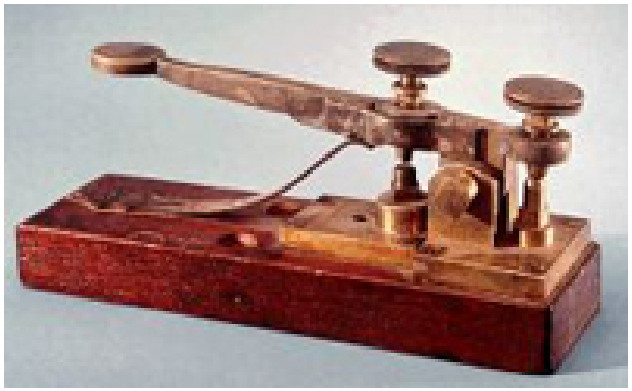


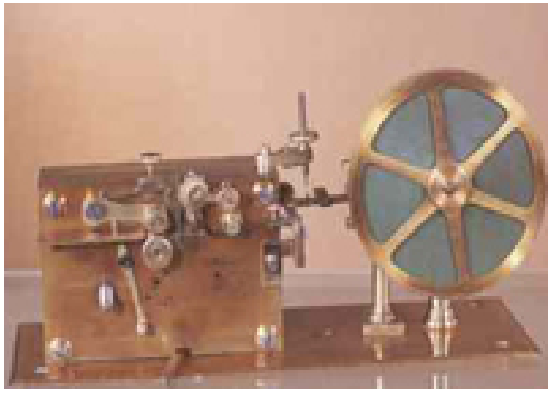


Invented by Samuel Morse 1835

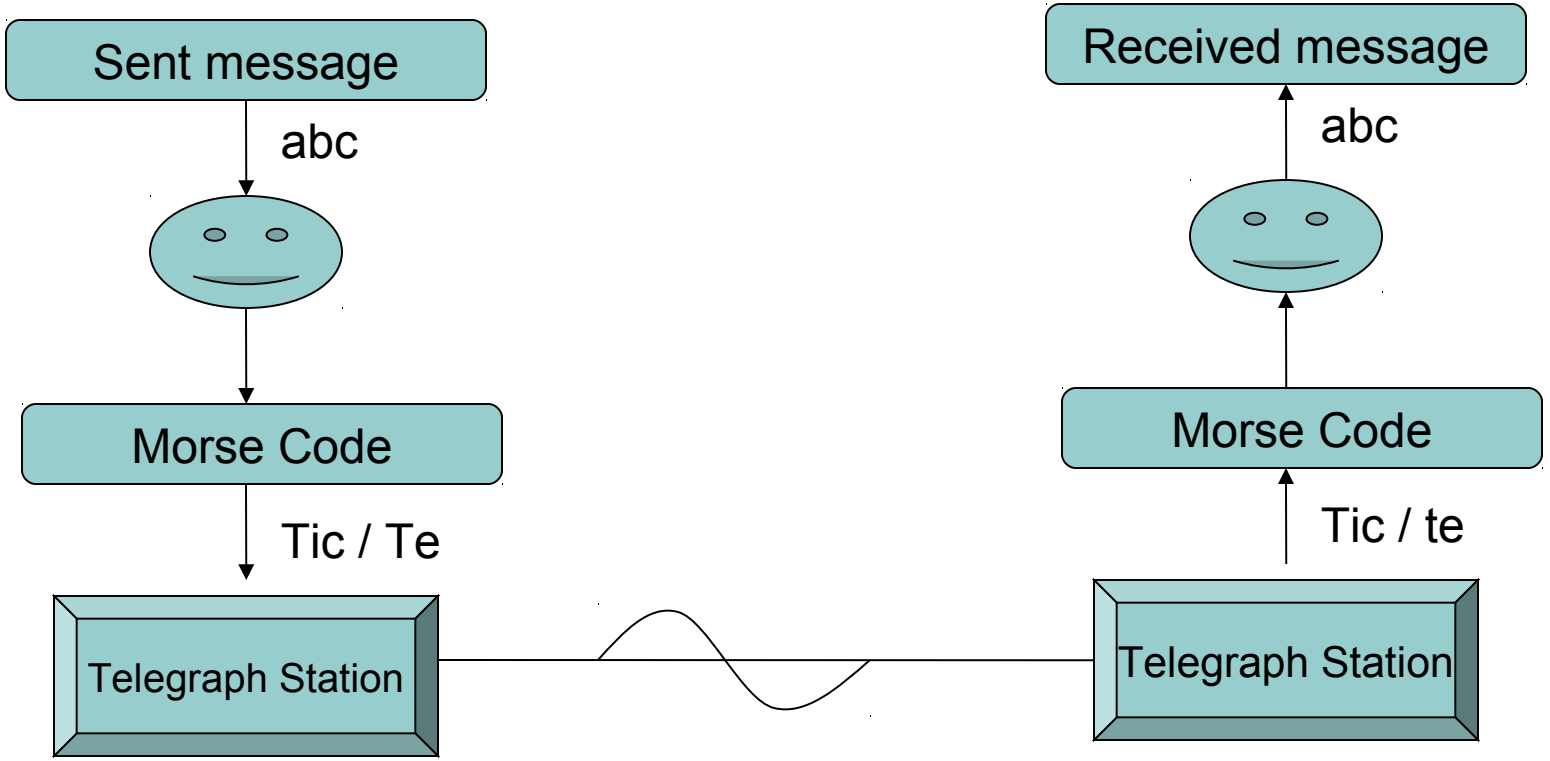
Electrical Telegraph



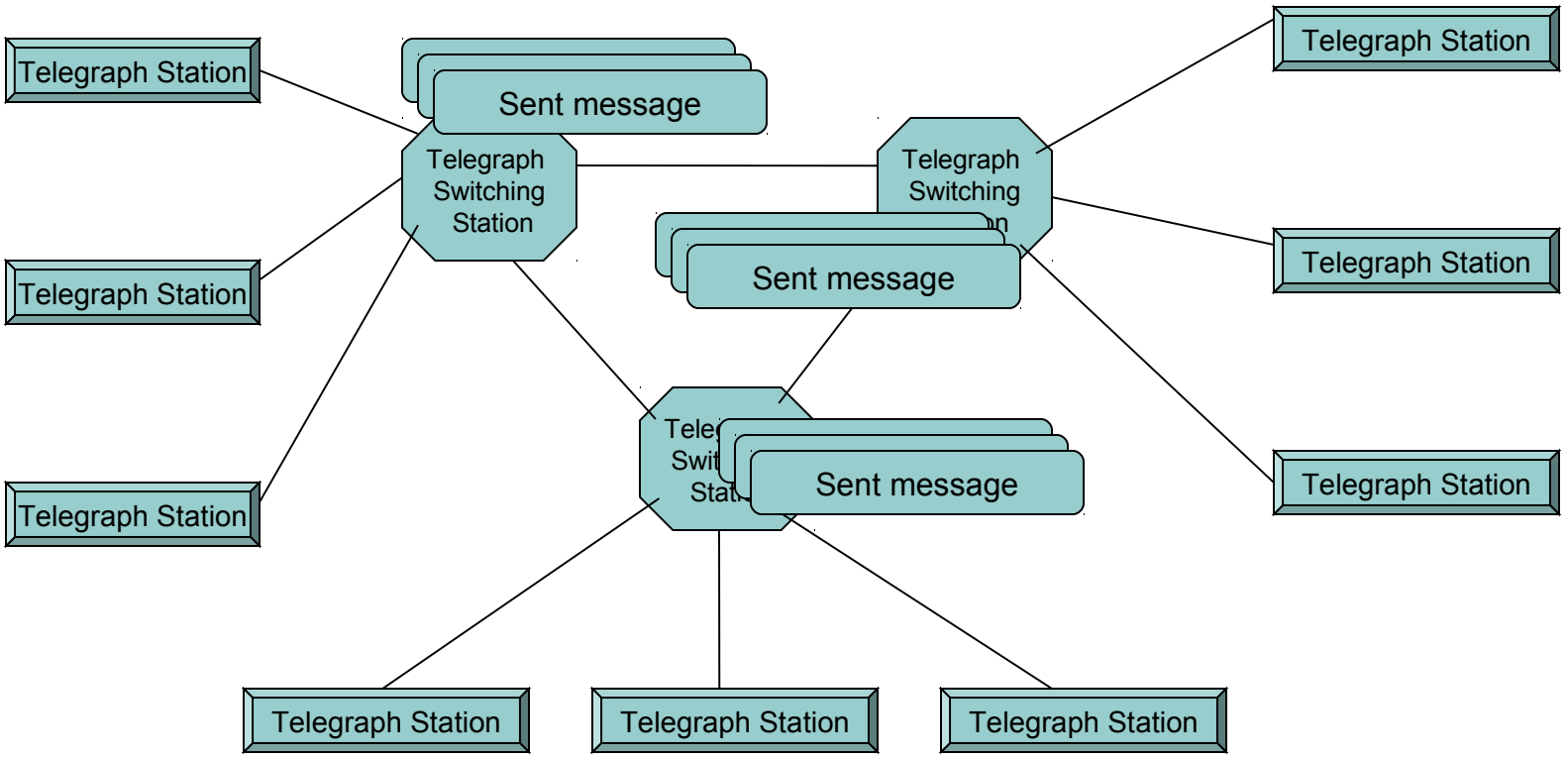




Electrical Telegraph

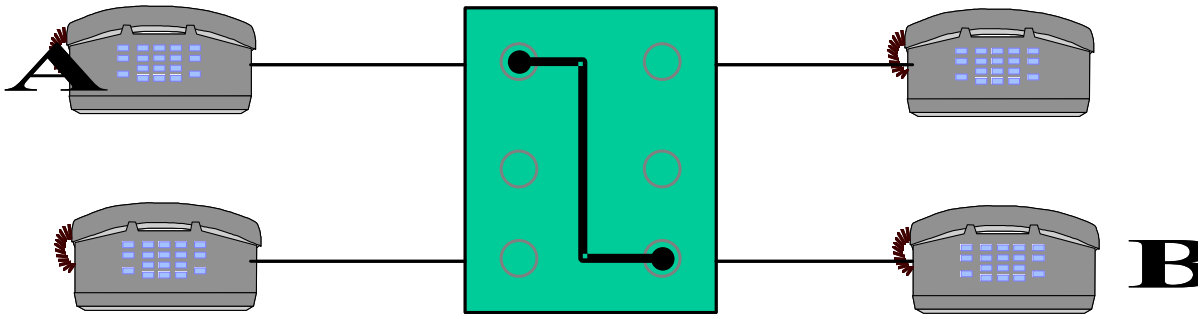


Electric Telegraph



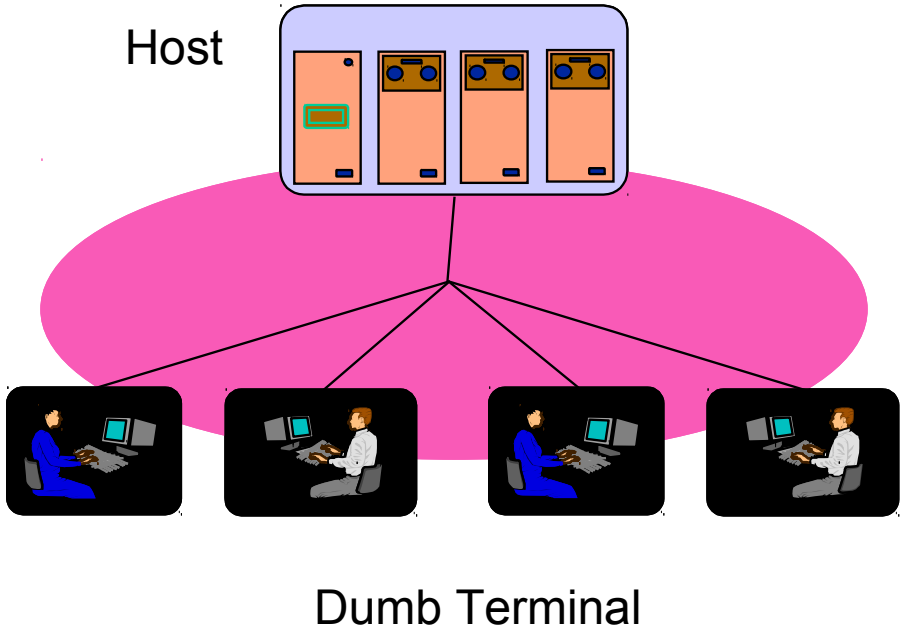
Telephone Network

- Circuit switching / connection oriented network
- Establish a dedicated communication channel



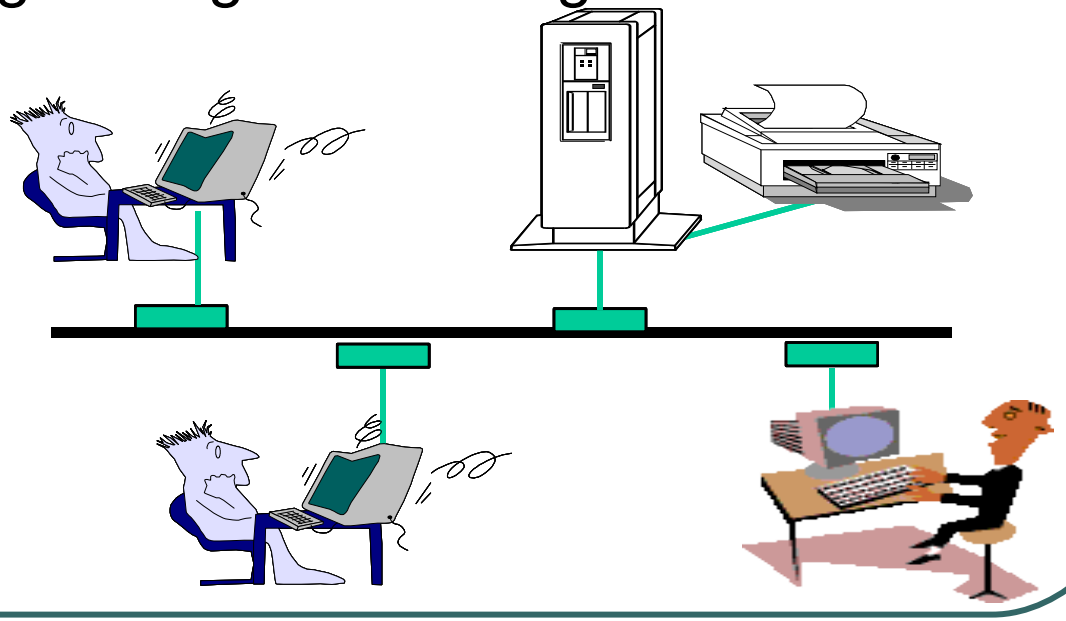
Terminal oriented communication network

- Mainframe network



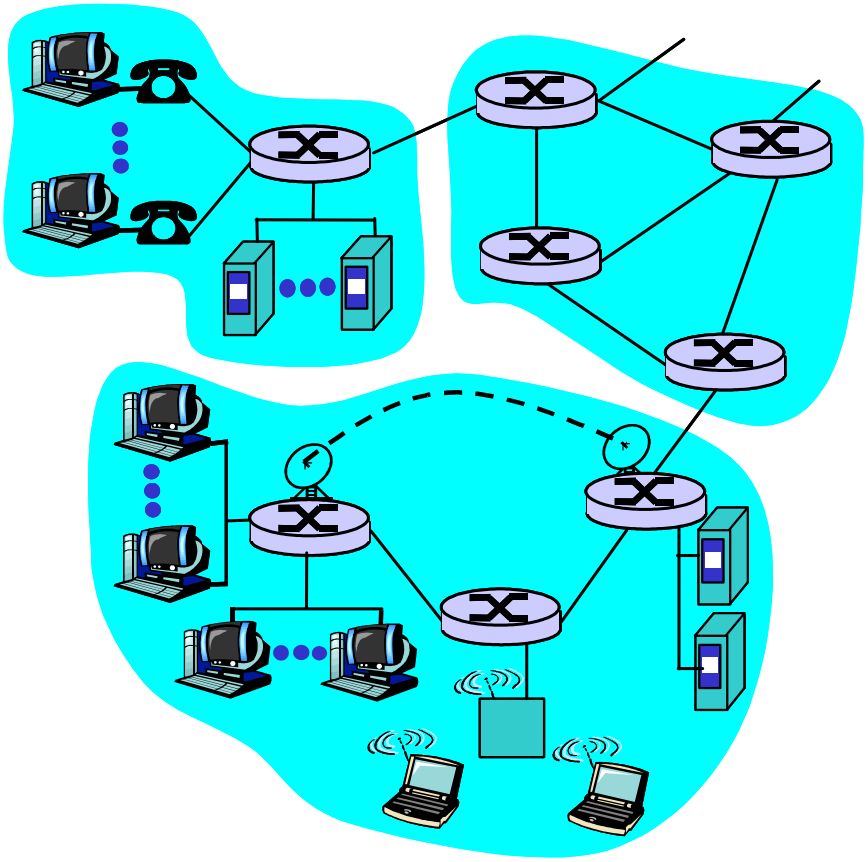
Computer networks

A group of two or more computer systems that are linked together through communication channels, according to a prototype, to facilitate communication and resource-sharing among a wide range of users.



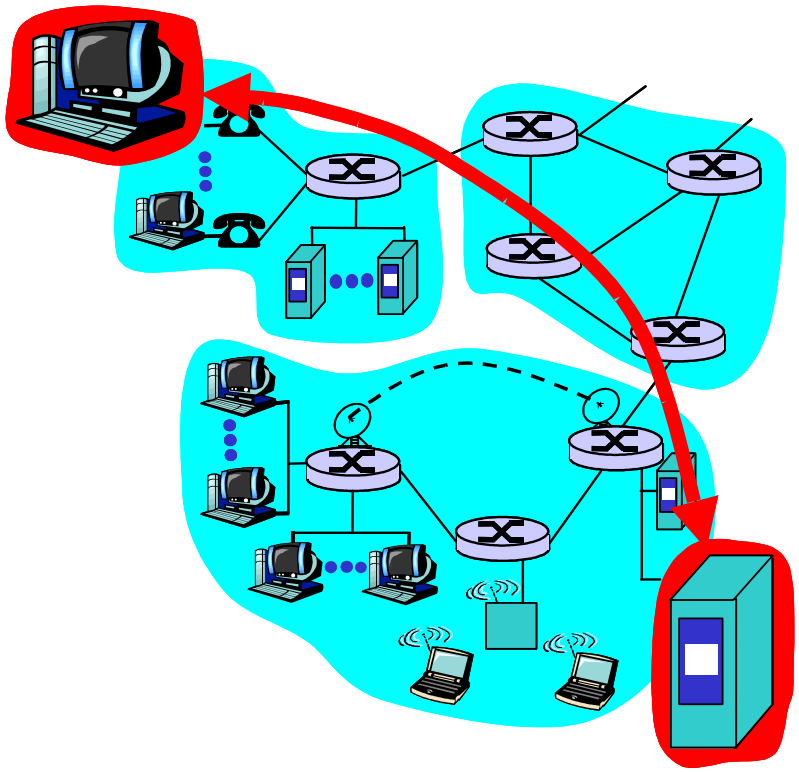
Computer network components

- Three components:
  - Network Edge
  - Network Core
  - Access Network

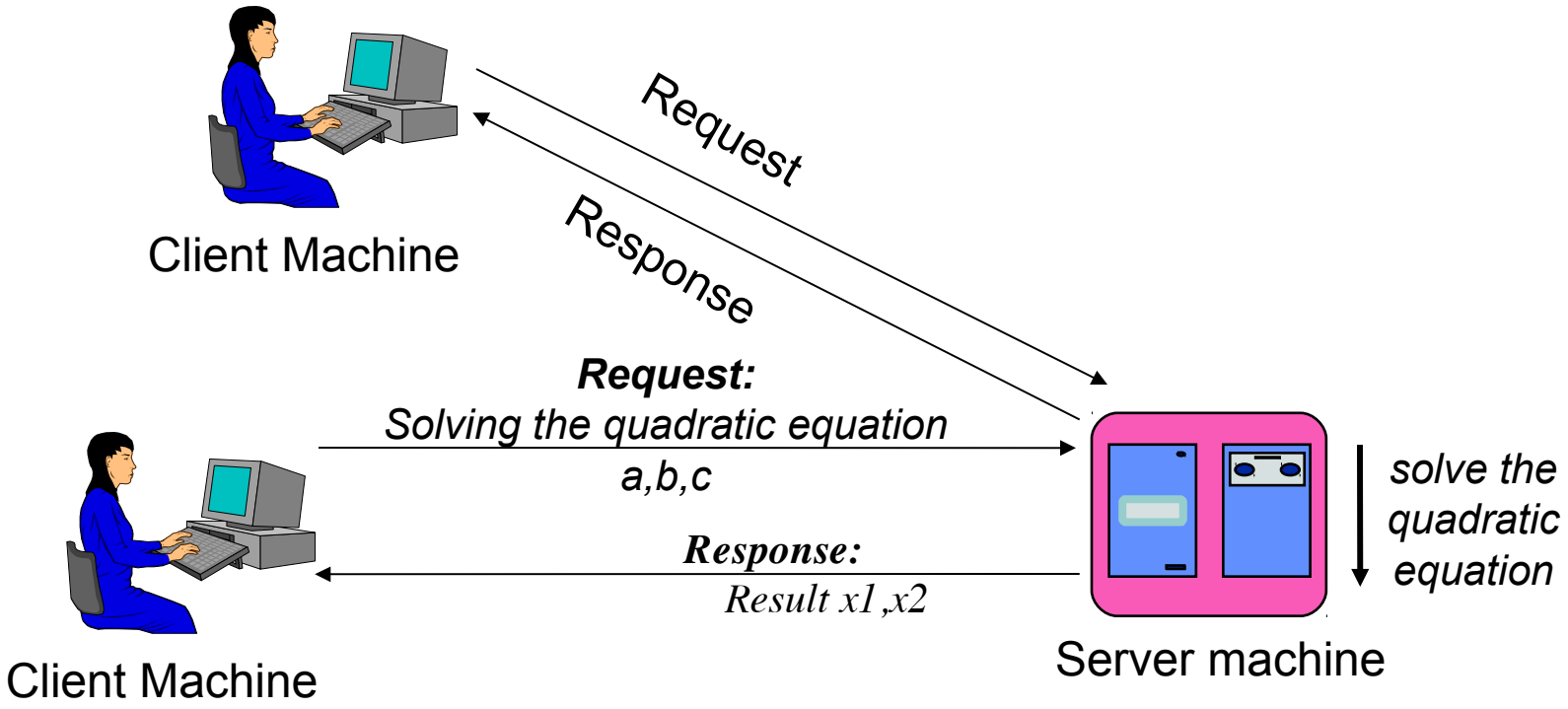


Network edge

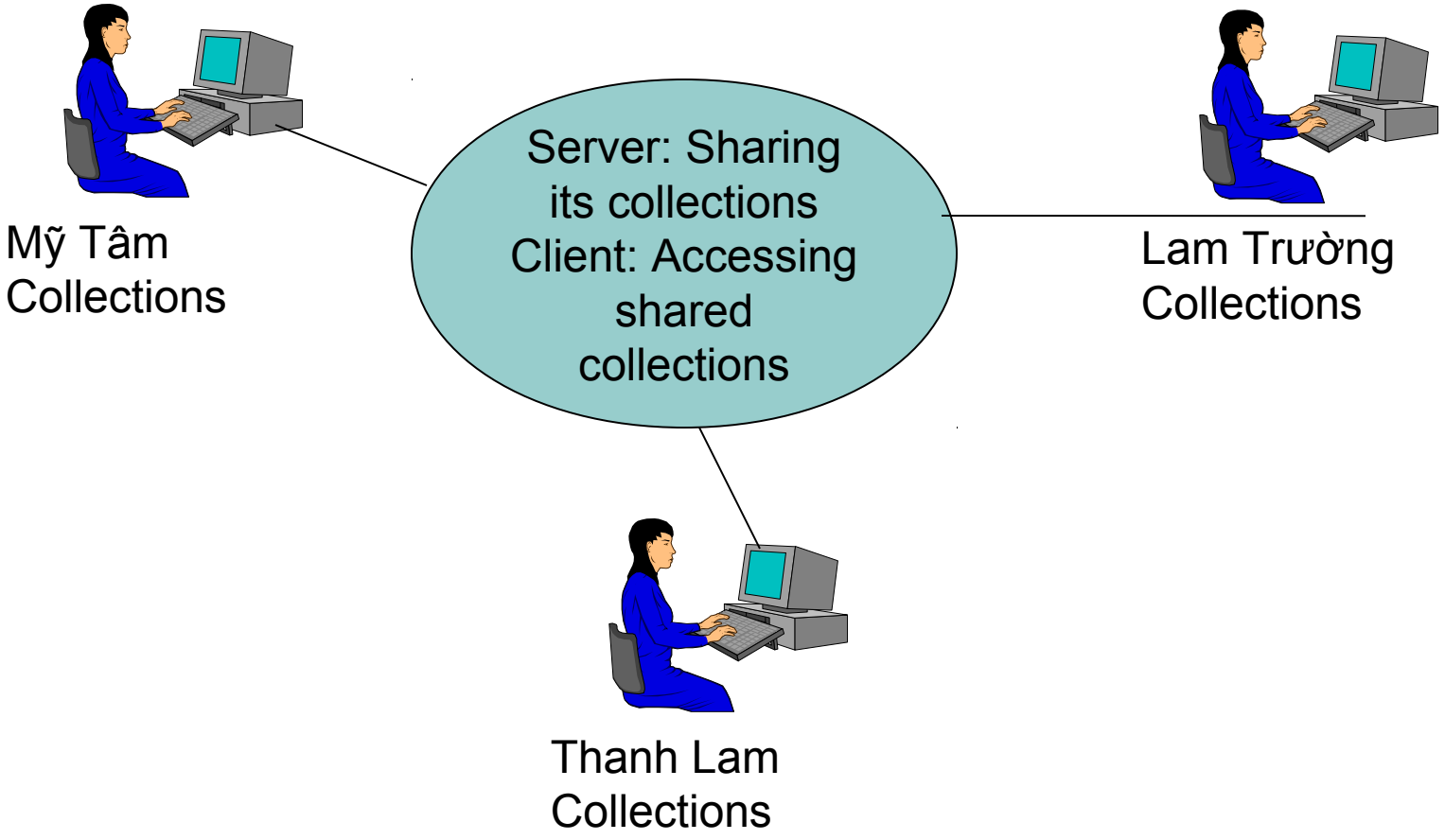
- Host & Application
- End Systems
- Employing Client-Server or Peer2Peer models



Client – Server model

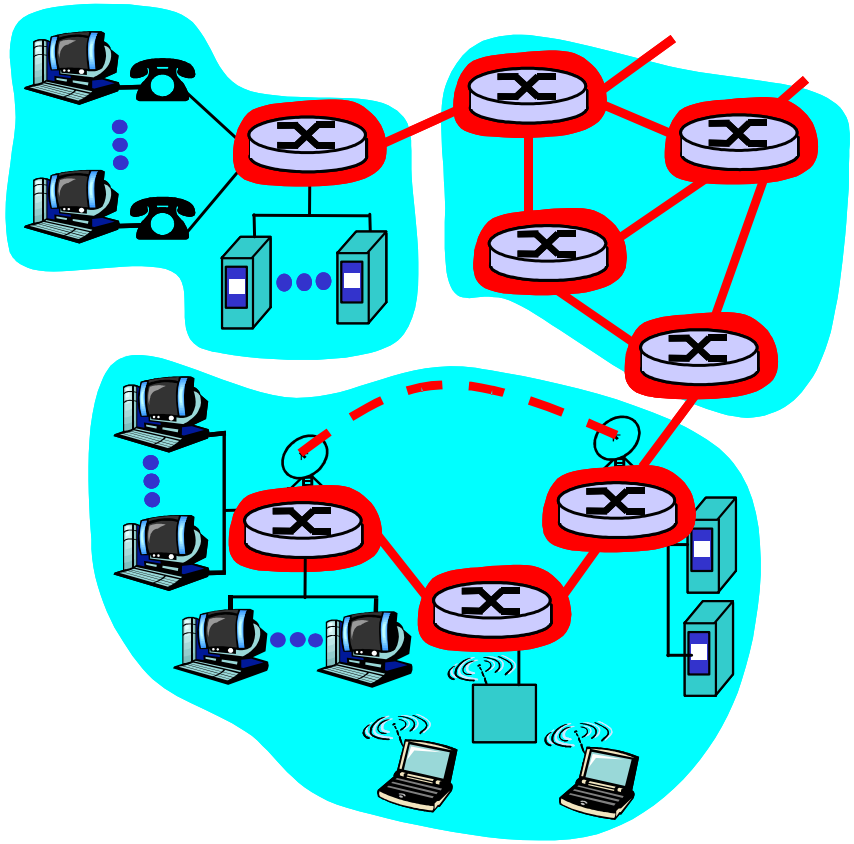


Peer2Peer Model



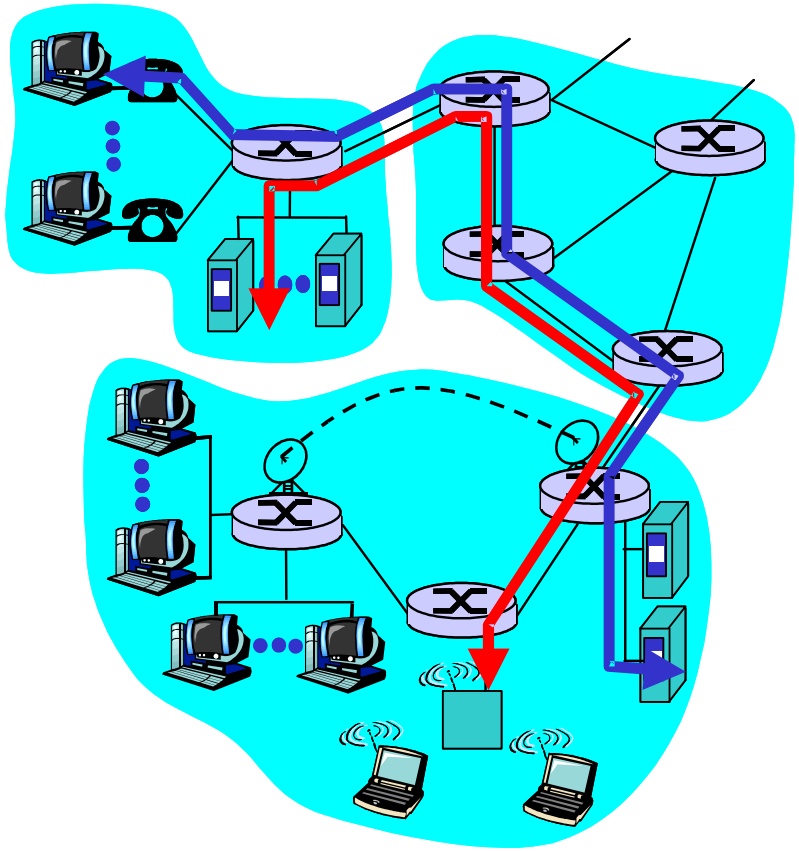
Network core

- Network of Routers
- Ensuring the exchange data between remote hosts
- Two switching techniques:
  - Circuit switching
  - Packet switching



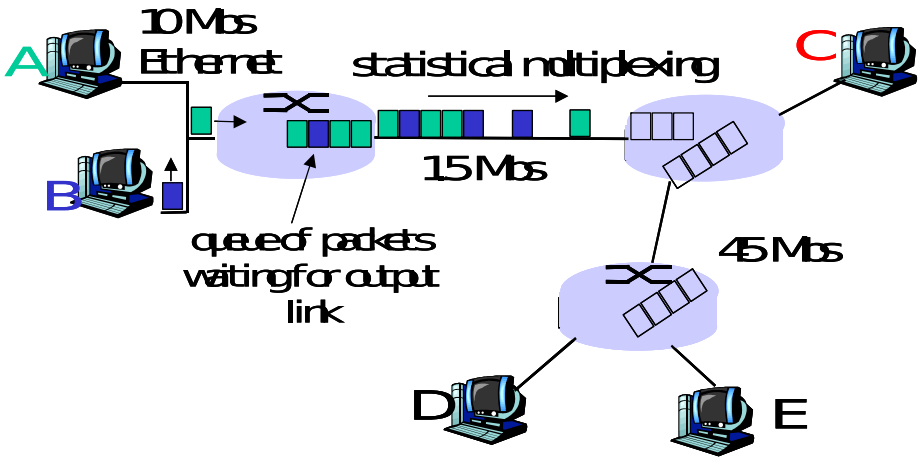
Circuit switching network

- Need to set up an end-to-end path before any data being sent
- Popular techniques:
  - FDMA-Frequency Division Multiple Access
  - TDMA- Time Division Multiple Access



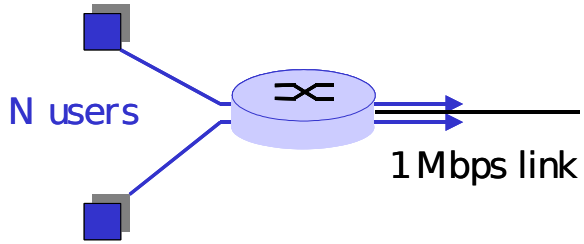
Packet Passing Network

- Data send in Packets – unit of data transmission



- Using store and forward technique

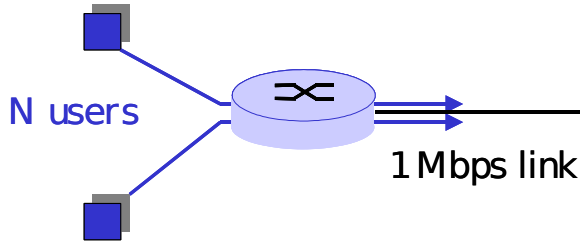
Circuit switching vs Packet Switching



- Link: 1 Mbits
- Assign 100Kbps channel for each “active” user
- User “active time”: 10%.

- Then:
  - circuit-switching: maximum of 10 users
  - packet switching: maximum of 35 users, (Possibility of having more than 10 “active” concurrently is less than 0.004)

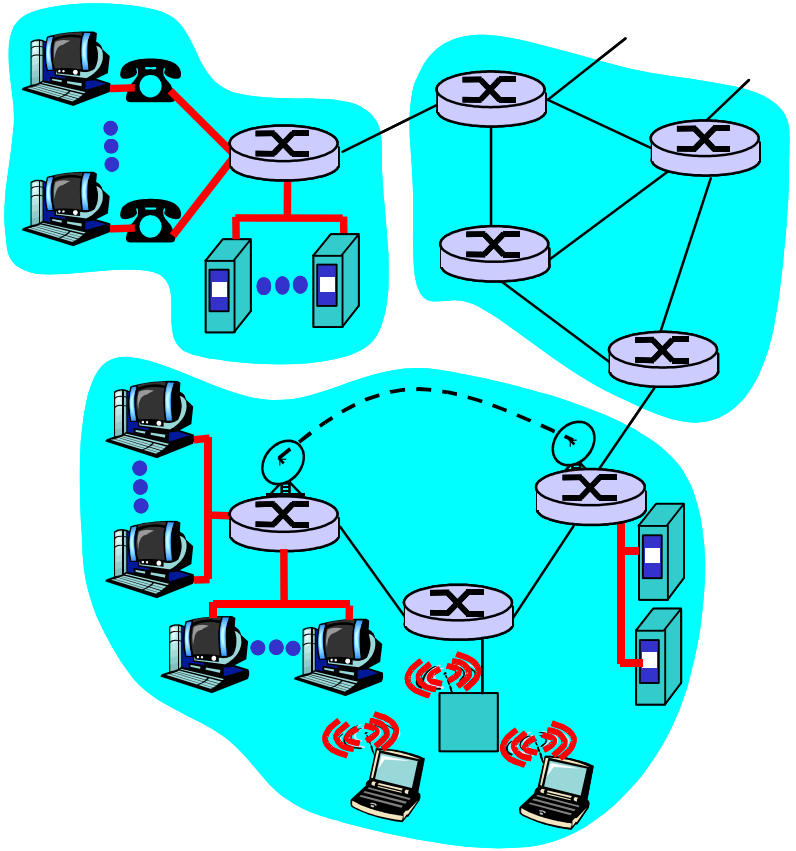
Circuit switching vs Packet Switching



- Packet switching networks:
  - Suitable for high traffic network thank to a mechanism of sharing resources
  - Need a mechanism for congestion control and data loss
  - Lack of quality assurance mechanism for certain kinds of application: videos, audio, ..

Access Network

- Link hosts to a router
- Example:
  - Telephone network
  - ADSL network
  - Local area networks.
  - Wireless LAN



Benefits of computer networks

- Sharing resources such as hardware, softwares and data
- Enhance reliability of computer systems
- Enhance working efficiency
- Reduce investment cost
- Enhance security for data
- Facilitate new methods of working: remote working, group-ware, virtual offices, ...