CS321: Computer Networks

Course Overview

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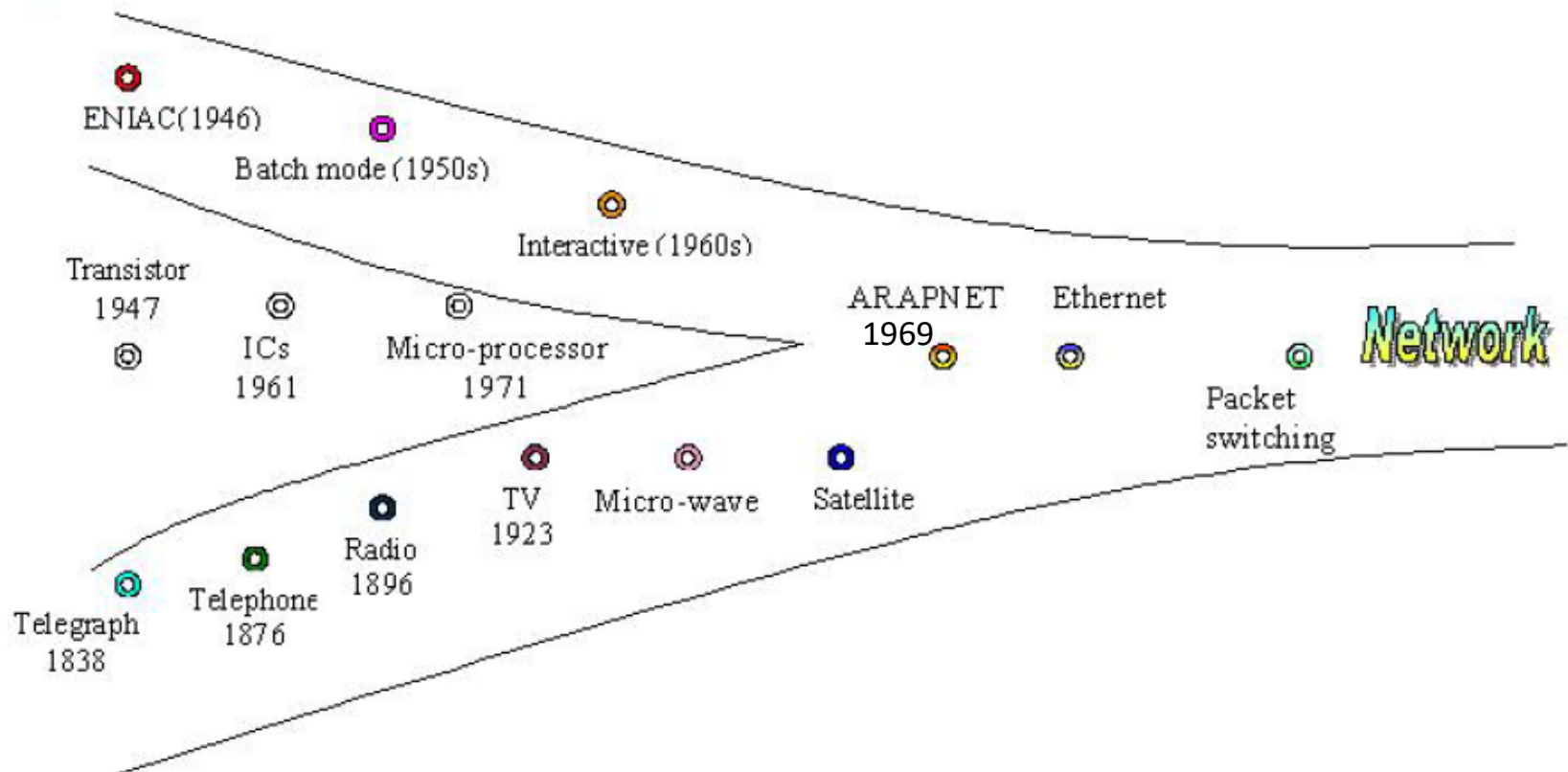
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What is a computer network?

- Network: In simple terms it means an interconnected set of some objects.
  - E.g., Radio, Television, railway, Highway, Bank, etc.

- Computer Network: an interconnected set of autonomous computers.
- These computers can exchange information with each other through the communication network system.

- It is basically the convergence of two technologies of this century - Computer and Communication.

Evolution of Computer Network

Computer

- ENIAC(1946)
- Batch mode (1950s)
- Interactive (1960s)
- Transistor 1947
- ICs 1961
- Micro-processor 1971
- ARAPNET 1969
- Ethernet
- Packet switching

Network

Communication

- Telegraph 1838
- Telephone 1876
- Radio 1896
- TV 1923
- Micro-wave
- Satellite

Purpose of a Computer Network

- Transfer data from machine A to machine B

- Facilitate access to remote information

- Facilitate sharing of data

- Facilitates person to person communication

- Facilitate Interactive Environment

- Enable machines of different speeds to communicate with each other

Objective of the Course

To understand the
- organization of computer networks
- factors influencing the performances
- Internet structure
- various protocols of the Internet
- how these protocols address the standard problems of networking and the Internet
- basics of network security

Hands-on experience
- networking fundamentals through practical sessions

Lecture Sequence

- **Basics**: Layer approach, Packet switching techniques, Performance metrics: delay, loss, throughput, bandwidth delay product, latency

- **Data link layer**: framing, medium access mechanism

- **Network Layer**: Internetworking, Tunnelling, Encapsulation, Fragmentation, IP and its operation;
  Routing algorithms: distance vector and link state
  Routing protocols and related protocols
       : ICMP, ARP, RARP, DHCP, IPv6, RIP, OSPF

Lecture Sequence

- *Transport Layer:* TCP, flow control, error control, congestion control, header, services, connection management, timers, UDP

- Applications: Network programming, socket abstraction, client server architecture, naming and addressing, E-mail, FTP, remote login, WWW, DNS

- Network security: Public key and private key cryptography, digital signature, firewalls

Lecture Sequence

- **Advanced Internetworking**, Multicast routing, Queuing disciplines and buffer management techniques

- **Advanced topics**, SDN and Open flow Architectures

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Lab Experiments

- Understanding Network Hardware

- Practice different commands related to networking

- Develop networking applications using socket programming

- Set up LANs and internetworking between networks

- Analyze the performance of a large network

- Implement few protocols in network simulator and observe protocol performance

Evaluation Process

- Theory : 70%
  - Sem. Exam: 55%
  - Attendance: 5%
  - Quiz yourselves / Spot evaluation: 10%

- Lab Experiment: 30%
  - Sem. Exam: 25%
  - Attendance: 5%

Reference Books

1. Stallings, W., (2010), *Data and Computer Communications*, Prentice Hall
2. Peterson, L. L. & Davie, B. S., (2008), *Computer Networks: A Systems Approach*, Morgan Kaufmann
3. Ross, K. W. & Kurose, J. F., (2010), *Computer Networks: A Top Down Approach*, Pearson Education
4. Forouzan, B. A., (2012), Data Communications and Networking, McGraw-Hill

Thanks!