

# Overview of the Syllabus for Computer Networks

- Motivation: goals of networking, well-known applications such as web, e-mail and ftp => need for a layered architecture, OSI and Internet.
- Host-to-host communication: RS-232 over serial line; handshaking and error handling; packet switching; reliable transmission - stop-and-wait, sliding window; logical connections.

# Overview of the Syllabus for Computer Networks

- Multiple co-located hosts: addressing, LAN access methods; CSMA/CD, Ethernet, Token passing, Token Ring, FDDI, wireless LANs; Simple performance models; WAN access methods - PPP.
- Remotely located hosts: addressing, interconnection of LANs; repeaters, bridges, routers; ATM cell-switching

# Overview of the Syllabus for Computer Networks

- IP: routing protocols (distance vector, link state packet routing); congestion control concepts and mechanisms (choke packets, leaky bucket, token bucket); IPv4, CIDR (Classless Interdomain routing)
- End-to-end reliability: the end-to-end argument; protocols - TCP, UDP, RPC; connection establishment, flow control.

# Overview of the Syllabus for Computer Networks

- Application protocols for email, ftp, web, DNS.

Advanced topics (any 2 of the following):

Wireless networks and mobile computing;  
network management systems; security threats and  
solutions; IPv6; ATM; Multimedia applications  
and its impact on networking.

# References

- 1. Peterson & Davie, "Computer Networks, A Systems Approach", 3rd ed, Harcourt, 2005
- 2. Andrew S. Tanenbaum, "Computer Networks", 4th ed., Prentice Hall, 2003.
- 3. Bertsekas and Gallager "Data Networks, PHI, 2000
- 4. William Stallings, "Data and Computer Communications," 5<sup>th</sup> edition, PHI, 2005

# Assignments

- Configuration of networking in Linux using ifconfig, route, bind, etc; configuration of firewall and masquerading in Linux; network trouble-shooting and performance monitoring using netstat, ping, tcpdump, etc.

Configuration and performance measurement of commonly-used Linux servers such as E-Mail (sendmail, pop3/imap) and Web (Apache).

# Assignments

- Socket programming - TCP and UDP, peer-to-peer applications; reliable communications using unreliable datagrams; client-server using RPC; concurrent servers using threads or processes.

## References:

1. "Linux Network Administrators Guide",  
<http://tldp.org/LDP/nag2/index.html>
2. W.R. Stevens, "Unix Network Programming, Vol 1", 2nd ed.,  
Prentice-Hall Inc., 1998

# Course Schedule

- Week 1: Goals of Networking, physical media, RS232 based communication
- Week 2-3: host-to-host communication, packet switching, framing, CRC, stop and wait protocol, sliding window protocol
- Week 4-6: Multiple colocated hosts: addressing, ethernet (CSMA/CD), Token Ring (FDDI), MACAW (wireless LANs), bridges
- Week 7-8: Internetworking, addressing, ATM cell switching, LANE
- Week 9: IP routing algorithms, RIP, OSPF, BGP
- Week 10: end-to-end communication: UDP, TCP, RPC
- Week 11: Congestion control (Router based, process based)
- Week 12: Applications: DNS, HTTP
- Week 13: Advanced Topics: Network Intrusion Detection, SNMP
- Week 14: Sign Off



# Computer Networks

- Heterogeneous systems need to talk to each other:
  - Media to connect
    - wired – twisted pair, coaxial cable, fibre
    - wireless – radio
  - Topology of the Network
  - Protocols and software.

# Computer Networks and Distributed Systems

- Distributed systems and Computer Networks:
  - Closely related
  - Distributed system – transparent
  - Computer Network - not transparent

# Purpose of a Computer Network

- Primary objective of Computer Networks:
  - Transfer data from machine A to machine B
  - Facilitate access to remote information
  - Facilitate sharing of data
  - Facilitates person to person communication
  - Facilitate Interactive Entertainment
  - Not every machine is connected to every other machine
    - Establish connection between a pair of machines
      - Transfer data
    - Enable machines of different speeds to communicate with each other