

VI Semester

Course Title	Computer Networks	Course No.	CS321
Department	Computer Science and Engineering	L-T-P [C]	3-0-3 [4]
Offered for	B. Tech. CSE	Type	Compulsory
Pre-requisite	CS311	To take effect from	July 2014

Objectives

1. To understand the organization of computer networks, factors influencing on the performance of computer networks, and the reasons for having variety of different types of networks
2. To understand the Internet structure, various protocols of the Internet and how these protocols address the standard problems of networking and the Internet
3. Hands-on experience on networking fundamentals through practical sessions

Learning Outcomes

1. Familiarity with the essential protocols of computer networks and their operations
2. Design and implementation of computer networks
3. Identifying various design parameters such as latency, bandwidth, error rate, throughput, and their influence on node/link utilization and performance

Contents

1. Layer approach, Packet switching techniques, Performance metrics delay, loss, throughput, bandwidth delay product, latency
2. *Applications*: Network programming, socket abstraction, client server architecture, naming and addressing, electronic mail, file transfer, remote login, world wide web, domain name service, journey of a packet
3. *Transport Layer*: Transmission Control Protocol flow control, error control, congestion control, header, services, connection management, timers, congestion control; User Datagram Protocol
4. *Network Layer*: Internetworking, Tunneling, Encapsulation, Fragmentation, Internet Protocol and its operation, etc. , Routing algorithms distance vector and link state algorithm and Routing protocols, the related protocols, ICMP, ARP, RARP, DHCP, IPv6, RIP, OSPF
5. Advanced Internetworking, Multicast routing, Queuing disciplines and buffer management techniques
6. *Data link layer*: framing, medium access mechanism
7. *Network security*: Public key and private key cryptography, digital signature, firewalls
8. *Advanced topics, SDN and Open flow Architectures*

Laboratory

1. Networking hardware
 - a. Understanding cables, switches, routers
 - b. Setting up switching network
 - c. Setting up subnets and routing across the subnets
2. Socket programming - Development of client-server application using sockets (possible examples, file transfer, peer-peer applications, chat, network monitor etc.)

3. Networking commands - ifconfig, route, arp, arping, ping, netstat, tcpdump, host, nslookup, dig, ftp, scp, ssh, finger, dhclient, dhcrelay etc. ,
4. Protocol analyzer - closely looking at protocols (HTTP, TCP, UDP, ICMP, 802. 3, DHCP, DNS etc.) headers and analyzing the interactions between client and server of different applications
5. QualNet simulator/Packet Tracer
 - a. Implementation of ARQs - Stop-and-wait, Sliding Window goback N etc.
 - b. Verifying operations of routing protocols
 - c. Verifying influence of congestion on end users performance
 - d. Verifying basic congestion control algorithms Reno, New Reno, Cubic
 - e. Verifying router buffer size on end users performance

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