Introduction to Computer Networks 2021

1. Types of computer networks, topology, point to point and multipoint connections, parallel and serial transmission, synchronous and asynchronous transmission (Start Stop), simplex, duplex and half-duplex transmission, time and frequency multiplexing of data.
2. ISO/OSI model network architecture, TCP/IP stack, IP, ARP, ICMP, BOOTP, DHCP, DNS.
3. Repeaters, switches, bridges, routers, and gateways.
4. Physical layer, types of communication media, transmission channel capacity (Nyquist, Shannon), modulation, encoding (NRZI, Manchester). Channel errors (symetric, binary channel without memory).
5. Link layer and its functions, ARQ methods, parity, cyclic redundancy check.
6. Byte and bit-oriented protocols, Transparency, Stop and Wait protocol, frame numbering, sliding window protocols. Examples of Link layer protocols (BSC, HDLC).
7. Local area networks multiple access methods, decentralized methods, Aloha, CSMA, CSMA/CD, Token ring, priority methods.
8. Examples of local computer networks, Ethernet.
9. Bridges, transparent bridges, STA.
10. Network Layer, Routing and Addressing. Routing algorithms, DVA, LSA, protocol examples RIP, OSPF. IPv4 (IPv6) addressing.
11. Transport layer, ports, TCP (connection establishment, data transfer, close connection, urgent data, window), UDP. Congestion control (Slow start), Silly Syndrom Algorithm.
12. Session layer. Presentation layer. Application layer.
13. Security, symetric and asymetric encryption, hash function, examples.
14. Overview of the most common application protocols in the Internet, Telnet, FTP, HTTP, SMTP, network management protocols, SNMP and RMON.