Communication & Net work Concepts

Abbreviations :

ARPANET : Advanced Research Project Agency Network

TCP/IP : Transmission Control Protocol/Internet Protocol

NIU : Network Interface Unit

NIC : Network Interface Card

TAP : terminal Access Point

UTP Cable : Unshielded Twisted Pair Cable

STP Cable : shielded twisted pair cable

Modem : Modulator Demodulator

RJ -45 : Registered Jack - 45

HTTP : Hypertext Transfer protocol

FTP : File Transfer Protocol

SLIP : Serial In Line Protocol

PPP : point to Point Protocol

LCP : Link Control protocol

NCP : network control Protocols

IPCP : IP Control Protocol

ISP : Internet Service Provider

GSM : Global Service for Mobile

SIM : Subscriber Module Identification

TDMA : Time Division Multiple Access

CDMA : Code DivisionMultiple Access

IDEN : Integrated Digital Enhanced Network

WLL : Wireless in Local Loop

EDGE : Enhanced Data Rates for Global Evolution

SMS : Short Message Service

WWW : World Wide Web

URL : Uniform Resource Locator

DNS : Domain Name System

XML : Extensible Mark Up Language

DHTML : Dynamic Hypertext Mark Up Language

OSS : Open Source Software

FLOSS : Free Libre and Open Source Software

GNU : GNU's Not Unix

FSF : Free Software Foundation

W3C : World Wide Web Consortium

Definitions

1. Internet : Worldwide network of computers
2. Gateway : A device that connects dissimilar networks. It establishes an intelligent connection between a LAN and external networks with completely different structures.
3. Backbone : A central interconnecting structure that connects one or more networks.
4. TCP – divides messages into packets on the source computer and reassembles the packets on the recipient's computer.
5. IP – responsible for handling the address of the destination computer so that each packet is sent to the proper destination.
6. Interspace : A client/server software program that allows multiple users to communicate online with real time audio, video and text chat in dynamic 3 D environments.
7. Server : A computer that facilitates the sharing of data ,software and hardware resources on the network.

8. Node : A computer becomes a workstation or node of the network as soon as it is attached to the network.
9. MAC Address : refers to the physical address assigned to each NIC card by the NIC manufacturer.
10. Crosstalk : The form of signal interference in which there is bleeding of signal from one wire to another .It may corrupt the signal and cause network errors.
11. Data Channel : A medium used to carry information or data from one point to another.
12. Baud : Unit of measurement for the information carrying capacity of a communication channel. This unit is synonymous with bps.
13. Bandwidth : The difference between the highest and the lowest frequencies of a transmission channel. It is the amount of information travelling through a single channel at any one point of time. Measured in bps,kbps,mbps etc.
14. Topology : Pattern of interconnection of nodes in a network
15. Modem : A computer peripheral that allows you to connect and communicate with other computers via telephone lines.
16. RJ -45 An eight wired connector which is commonly used to connect computers on a LAN especially Ethernets.
17. Ethernet : a LAN architecture that uses either bus or star topology and supports data transfer rates of upto 10 Mbps. The computers who are part of Ethernet have to install a special card called Ethernet card.
18. Hub : A hardware device used to connect several computers together. It contains multiple independent but connect modules of network and inter networked equipment.
19. Concentrator : A device that provides a central connection point for cables from workstations ,servers and peripherals.
20. Switch : A device used to segment networks into different subnetworks called subnets or LAN segments. It prevents traffic overloading on the network.
21. Repeater : A device that amplifies and restores signal being transmitted on the network for long distance transmission.
22. Bridge : A network device that establishes an intelligent connection between two LANs with the same standards but with different types of cables.
23. Router : A network device that is used to separate different segments in a network to improve performance and reliability. It works like a bridge but can handle different protocols.
24. Protocol : Rules that are applicable for a network. It is the formal description of message formats and the rules that two or more machines must follow to exchange those messages.
25. Datagram : a collection of data that is sent as a single message.
26. FTP – The protocol mainly concerned with transfer of files
27. SLIP – First protocol for relaying IP packets over dial up lines
28. PPP – Internet Standard for transmission of IP packets over serial lines
29. Wireless : Data Communication without the use of landlines eg ; Wireless LANs, PDAs , Smart Phones
30. Mobile Computing : The computing device is not continuously connected to the base or Central Computer. Eg – Notebook,PDAs,Smart Phones

31. TDMA : Dividing a radio frequency into time slots and then allocating slots to multiple calls. So a single frequency can support multiple , simultaneous data channels.
32. CDMA : It uses a Spread Spectrum technique where data is sent in small pieces over a number of discrete frequencies available for use.
33. SIM Card : A tiny computer chip that gives a cellular device its unique phone number. It has memory, a processor and the ability to interact with the user.
34. WLL : A system which connects subscribers to the public switched telephone network (PSTN) using radio signals as a substitute for other connecting media
35. 3G : It is a mobile communications technology that is broadband ,uses packet based transmission of text ,digitized voice ,video and multimedia at data rates up to and possibly higher than 2 megabits per second (Mbps), offering a consistent set of services to mobile computer and phone users no matter where they are located in the world.
36. SMS : transmission of short text messages to and from mobile phone , fax machines and/or IP address
37. E Mail : Sending and receiving messages by computer
38. Voice Mail : Email systems that support audio
39. Chat : Online textual talk in real time
40. Video Conferencing : A two way videophone conversation among multiple participants
41. WWW : A set of protocols that allows you to access any document on the net
42. Telnet : An internet utility that lets you to log on to the remote computer.
43. Web Browser : A WWW client that navigates through the world wide web and displays web pages.
44. Web Server : A WWW server that responds to the requests made by the web browser.
45. URL : specifies the distinct address in special format for each resource on the internet.
46. DNS : The character based naming system by which servers are identified.
47. Web Site : A location on a net server
48. Web Page : A document that uses HTTP
49. Web Hosting : Means of hosting web server application on the computer system through which electronic content on the internet is readily available to any web browser client
50. Free Software : The software that is freely accessible and can be freely used, changed, improved , copied and distributed by all who wish to do so. No payments to be made.
51. Open Source Software : It can be freely used but it does not have to be free of charge. The source code is freely available to the customer.
52. FLOSS : Free as well as Open Source software
53. Proprietary Software : neither open nor freely available
54. Freeware : A software which permits redistribution but not modification as their source codes are not available.
55. Shareware : A software that is available with the right to redistribute copies , but it is stipulated that if one intends to use the software , often after certain period of time then a license fee should be paid. The source code is not available and the modification to the software is not allowed.
56. Firewall : A system designed to prevent unauthorized access to or from a private network

57. Cookies : Messages that a web server transmits to a web browser so that the web server can keep track of the user's activity on a specific website.
58. Crackers : Malicious programmers who break into security systems
59. Hackers : Interested in gaining knowledge about computer systems and doing playful pranks
60. Cyber Law : A generic term which refers to all the legal and regulatory aspects of internet and the WWW.
61. Intellectual property : A product of intellectual that has commercial value , including copyrighted property such as literary or artistic works , and ideational property.
62. Virus : a malicious program that requires a host and is designed to infect the system
63. Trojan Horse : a code hidden in a program such as a game or spreadsheet that looks safe to run but has hidden side effects.. It is a program on its own and does not require a host program to embed itself in.
64. Worm : a program designed to replicate
65. Spam : Electronic junk mail . It is unsolicited , usually commercial email sent to a large number of addresses

Switching Techniques

1. Circuit Switching :

   First the complete physical connection between the computers is established and then the transmission takes place. Hence an end to end path between the source and the destination computer has to be set up before data is send.

   Eg : Public Switched Telephone Network uses circuit switching

2. Message Switching

   The source computer sends data to the switching office first , which stores data in its buffer, looks for a free link to another switching office and then sends the data to that office , This process is continued till the data reaches the destination. So this method is also known as Store and Forward

3. Packet Switching:

   Basic technology same as Message switching but with following differences:

   1. In message switching , no limit to size of data block is there but in this method , there is a tight upper limit to the block size.

2. Data packets are stored on a disc in message switching , but in packet switching all the packets of same size are stored in the main memory. This reduces the access time and hence improves the performance of the network.

Transmission Media

Twisted pair cables

Advantages:

1. It is simple.
2. It is physically flexible.
3. It can be easily connected.

Disadvantages:

1. Because of high attenuation, it is incapable of carrying signal over long distances without the use of repeaters.
2. Its low bandwidth capabilities make it unsuitable for broadband applications.
3. It supports the maximum data rates 1 Mbps without conditioning the and Mbps with conditioning.

Coaxial cables:

Advantages:

1. Coaxial cables can be used as the basis for a shared cable network.
2. The coaxial cables can be used for broadband transmission(several channels can be transmitted simultaneously)
3. Offer high bandwidths upto400 Mbps.

Disadvantages:

1. Expensive as compared to twisted pair of cables.
2. The coaxial cables are not compatible with twisted pair cables.

Optical fibers

Advantages:

1. Highly suitable for harsh industrial environments.
2. Guarantees secured transmission and have very high transmission capacity.
3. It is immune to electrical and magnetic interferences(noise in any form because the info. Is travelling on a modulated light beam

Disadvantages:

1. Light can reach the receiver out of phase.
2. Connection losses are common problems.
3. Fiber optic cables are most difficult to solder.

Micro waves

Advantages:

1. Offers freedom from land acquisition rights that are required for laying and repairing the cables.
2. Offers ease of communication over difficult terrain.
3. Microwaves have the ability to communicate over oceans.

Disadvantages:

1. Microwave communication is an insecure communication.
2. Microwave propagation is susceptible to weather effects like rains, thunder storms etc;
3. Band width allocation is limited in case of microwaves.

Radio wave

Advantages:

1. Radio wave transmission offers mobility.
2. Offers freedom from land acquisition rights that are required for laying ,repairing the cables.
3. It offers ease of communication over difficult terrains.

Disadvantages:

1. This Communication is an Insecure communication.
2. Propagation is susceptible to weather effects like rains, thunder storms etc.

   Used by taxi, repair, courier and delivery services.

Satellite

Advantages:

1. Area coverage is quite large.
2. Heavy usage of intercontinental traffic makes the satellite commercial attractive.
3. Laying & maintenance of cables is difficult and expensive, so here this communication provides the best alternative.

Disadvantages:

1. Over crowing of available bandwidths due to low antenna gains.

2. High atmospheric losses above 30 GHz limit carrier frequencies.
3. High investment costs and insurance cost associated with significant probability of failure.

Infrared :

Advantage :

1. Secure

Disadvantage :

1. Not able to penetrate walls and buildings

Laser

Advantage

1. Has higher speed than microwaves

Disadvantage

1. Is adversely affected by weather

Topologies (Also do the basic layout diagrams from the book)

1. **Star Topology**

   Advantages :

   1. Ease of service
   2. Simple access protocols
   3. Failure of single node does not affect the entire network.
   4. Faults are easily diagnosed and isolated

   Disadvantages :

   1. Long cable length
   2. Difficult to expand
   3. Central node dependency - if central node fails , the entire network fails

2. **Linear or Bus Topology**

   Advantages :

   1. Short cable length and simple wiring layout
   2. Simple architecture , so reliable from hardware point of view
   3. Easy to extend

   Disadvantages

   1. Fault diagnosis and isolation is difficult
   2. Repeater Configuration may be necessary
   3. Should have intelligent nodes capable of deciding in some way who can use the network a one point of time

3. **Ring or Circular Topology**

   Advantages :

   1. Short cable length
   2. No wiring closet space required

3. Suitable for optical fibers

Disadvantages:

1. Node failure causes network failure
2. Difficult to diagnose and isolate faults
3. Network reconfiguration is difficult

80-20 rule of Network design

80% of the traffic on the given network is local i.e destined for a target in the same workgroup and not more than 20% of the network traffic should need to move across the workgroup or backbone.

Other important questions with page nos. (ref – Sumita Arora)

1.	Difference between LAN & WAN	Pg.# 748
2.	Types of servers – Dedicated & Non Dedicated	Pg.# 736
3.	Working of Modem and Types of Modem	Pg#754
4.	Types of Web Hosting	Pg#789
5.	Difference between Client side and Server side scripting	Pg#791
6.	Protection Methods to reduce security threats on the network	Pg#797
7.	Classification of Cyber Crimes	Pg#801
8.	Difference between a Trojan Horse and a Worm	Pg# 803