

Unit – V

CHAPTER-14

Communication and Network Concepts

Key Points

- A **network** is a collection of interlinked computers by means of a communication system.
- **Switching techniques** are used for transmitting data across networks.
- A network can have any of these transmission media or connecting media: twisted pair cable, coaxial cable, optical fibre, microwave, radio wave, satellite etc.
- The pattern of interconnection of nodes in a network is called topology.
- Most popular topologies are star, bus, ring, graph and mesh, tree
- RJ 45 (Registered Jack 45) is a eight wire connector, which is commonly used to connect computers on LANs – especially Ethernets.
- **Protocol**:- A protocol means the rules that are applicable for a network. Protocol defines standardized formats for data packets, techniques for detecting and correcting errors and so on.
- Some most common protocols are HTTP, FTP, TCP/IP
- **Wireless communication** is simply data communications without the use of landlines.
- **TDMA**:-Time Division Multiple Access technology divides a radio frequency into time slots and then allocates allots to multiple calls.
- **CDMA**:-Code division Multiple access uses a spread spectrum technique where data is sent in small pieces over a number of discrete frequencies available for use. Each user's signal is spread over the entire bandwidth by unique spreading code. At the receivers end, the same unique code is used to recover the signal.
- **SMS** is the transmission of short text message to and from a mobile phone, fax machine and/or IP address.
- **Email (Electronic Mail)** is sending and receiving message by computer.
- A **web Browser** is a **WWW** client that navigates through the World Wide Web and displays web pages. A web server is a **WWW** server that responds to the request made by web browser.
- A **URL**(Uniform Resource Locator) specifies the distinct address for each resource on the internet. An Internet address, which is character, based is called domain name.
- **Cookies are 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 Web site.

Solved Questions

Q1. What factors affect data transmission?

Ans Several factors affect how data is transmitted. They include the following

- Transmission rate-Frequency and bandwidth
- Line Configurations-Point to point versus multipoint.
- Serial and Parallel transmission
- Direction of transmission-Simplex, Half Duplex, and Full Duplex
- Transmission Mode-Asynchronous and synchronous.
- Circuit switching and Packet switching
- Multiplexing
- Protocols

Q2. What is a Network? What are the benefits of networks?

Ans A network or communications network, is a system of interconnected computers, telephones or other communications devices that can communicate with one another and share applications and data.

The benefit of networks are given below:

- (i) Sharing of peripheral devices.
- (ii) Sharing of programs and data
- (iii) Better communications
- (iv) Security of information
- (v) Access to databases

Q3. Define the following terms:

(i) **Node** (ii) **Hub** (iii) **Backbone** (iv) **Router** (v) **Bridge** (vi) **Gateway**

Ans (i) **Node**:- A node is a piece of hardware on the system that can be addressed by a message from another node, that is , a computer, printer , fax, modem or CD-ROM drive.

(ii) **Hub**:- Node are connected to a hub, also called a concentrator, whose purpose is to simplify wiring of nodes to each other and to route signals between the nodes.

(iii) **Backbone**:-A backbone is a high –capacity link to which many nodes or hub can be connected ,it is design to carry lots of traffic.

(iv) **Router**:-A router is a special computer that direct communicating messages when several networks are connected together.

(v) **Bridge**:-A bridge is an interface used to connect the same type of networks.

(vi) **Gateway**:- A gateway is an interface permitting communication between dissimilar networks-for instance ,between a LAN and a WAN or between two LANs based on different network operating system or different layouts.

Q4. What are the major difference between LAN and WAN?

Ans The major differences between LAN and WAN

LAN	WAN
<ul style="list-style-type: none"> • LAN are small sized networks • Range of LAN may vary from 10m to 1.5 km. • LAN operate between 10Mbps and 2 Gbps • They offer very low delay • Complete ownership by a single organization • Very low error rates 	<ul style="list-style-type: none"> • WAN are geographically spread over wide area. • There is no limitation on the distance it spans. • Typical speed of WAN varies from 56Kbps to 155 Mbps. • They offer very high delay • Owned by multiple organizations • Comparatively higher error rates

Q5. Give two major reasons to have network security.

Ans Two major reasons to have network security are given below:

- (i) **Secrecy**:- Keeping information out of the reach of unauthorized users.
- (ii) **Authentication**:- Determining the authorized users before sharing sensitive information with or entering into a business contract.

Q6. What is the purpose of using a Web Browser? Name any one commonly used Web Browser.

Ans The Web Browser fetches the page requested, interprets the text and formatting commands that it contains and display the page property formatted on the screen.

Q7. Write two advantages and disadvantages for STAR topology.

Ans **Advantages of STAR topology:**

- (i) One device per connection.
- (ii) Easy to access

Disadvantages of STAR topology:

- (i) Central node dependency
- (ii) Long cable length.

Q8. Write one difference between Telnet and FTP.

Ans Telnet-to connect to remote computers. Telnet is a program or command that allows the user to connect to remote computers on the Internet using a user name and password.
FTP(File transfer protocol) is a method whereby the user can connect to a remote computer known as FTP site and transfer files to his/her own microcomputer's hard disk. Some FTP files are open to the public, some are not

Q9. Explain the following terms in short:

- (i) DHTML
- (ii) ISP

Ans **DHTML** is the next generation of HTML.It describes how text and images are displayed on a web page. Dynamic HTML, developed by Netscape and the World Wide Web Consortium (W3C) is based entirely on industry standard HTML and Java. New features in Dynamic HTML, such as absolute positioning and layers , give designers and developers much greater control over the look and feel of web pages.

ISP(Internet Service Provider) is a company that connects your communication line to is servers, or central (host)computer, which connects you to the internet via another company's network access points. ISP's have a wide range of prices and packages for users to choose from

Q10. What are firewalls?

Ans Firewalls are defensive barriers that fence off a private network from the internet.

Q11. What is the difference between Message Switching technique and Packet Switching technique?

Ans Message Switching:-It is better known as store and forward. In this mechanism a node on receiving a message, stores it till the appropriate route is not free, then forwards it on the route when the route is free.

Packet Switching:-It is best for data. In a packet –switched network, data are transmitted in discrete units called packets. A packet is a fixed length block of data for transmission. The maximum length of the packet is established by the network. Longer transmissions are broken up into multiple packets. The packets have headers with priority codes and source and destination addresses along with data to be sent. The packets are sent over the network node to node, kept there for a small time and then routed according to the information in its header

Q12. Write two applications of Cyber –Law

Ans Two applications of Cyber –Law are given below

- (i) Restricting/Penalising unauthorised user
- (ii) Promoting , coordinating and controlling e-Business.

Q13. Write a not on Fast Ethernet Technology.

Ans The growing importance of LANs and the increasing complexity of desktop computing applications are fueling the need for high performance networks. 100BASE-T(Fast Ethernet) provides a cost effective and high-performance for small workgroups. SMBs(Small to Medium Business), and any network supporting bandwidth-intensive applications. Fast Ethernet technology operates at 10 times the speed of traditional Ethernet, offering maximum performance and enhanced capability for existing Ethernet- based networks.

Q14. What is the difference between XML and HTML? Write two differences.

Ans The major differences between XML and HTML

XML	HTML
Does't specify either semantics or tag set. It is a language for documents containing structured information and all semantics are defined by the applications that process them.	The semantics and tag set are fixed. It is a language used to design the layout of a document and to specify the hyperlinks.

Q15. Expand the following terminologies:

- (i) TCP/IP (ii) XML (iii) CDMA (iv) WLL

Ans (i) TCP/IP:-Transmission Control Protocol/Internet Protocol
(ii)XML:-eXtensible Markup Language
(iii)CDMA:-Code division Multiple access
(iv) WLL:-Wireless Local Loop.

Q16. What is a Modem?What is its function?

Ans A modem is a computer peripheral that connects a workstation to other workstation via telephones lines and facilitates communications.It is short form for modulation/Demodulation.

Modem converts digital signals to A/F(Audio Frequency) tones which are in the frequency range that the telephone lines can transmit and also it can convert transmitted tones back to digital information.

Q17. Differentiate between Internet and Intranet.

Ans The internet is world wide network of computer networks around the globe.Internet uses a set of protocols called TCP/IP .

On the other hand Intranet is a network ,which is privately owned. Intranet also uses a set of protocols as internet.

Q18. Define the following :

- (i) **Data channel** (ii) **Baud** (iii)**bps** (iv) **Bps** (v) **Bandwidth**

Ans

- (i) **A data channel** is a medium used to carry information or data from one point to the other.
- (ii) **Baud** is the unit of measurement for the information carrying capacity of a communication channel.It is synonymous with bits per second.
- (iii) **bps:-** bits per second.It refers to a thousand **bits** transmitted per second
- (iv) **Bps:-** bytes per second.It refers to a thousand **bytes** transmitted per second
- (v) **Bandwidth:-**It refers to the difference between the highest and lowest frequencies of a transmission channel.This term is also sometimes used to refer to the amount of information travelling through a single channel at any one point of time.

Q 19) Differentiate between tree and Bus topologies of a network.

A19) **Tree topology** is a network with the shape of an inverted tree with the central root branching and sub-branching to the extremities of the network.

Bus topology:-In this topology , all devices on network are connected to a single continuous cable called a bus.This topology can be used for smaller networks.

Unsolved Questions

Q1) What do you mean by network topology ? What are the most popular topologies.

Q2) What are repeaters and routers?

- Q3) What are protocols
- Q4) Differentiate between GSM and CDMA
- Q5) Write a short note on WLL.
- Q6) Differentiate between downloading and uploading.
- Q7) Give one advantage and one disadvantage of optical fibre cable and coaxial cable used in communication.

High Order Thinking Skills(HOTS)

Q1. What do you mean by a backbone network?

Ans. A backbone network is a network that is used as a backbone to connect the connect several LAN'S together to form a WAN.

FDDI (Fiber Distribute Data Interface) is such a network. FDDI is a high performance fiber optic token ring LAN running at 100 Mbps over distances up to 200 kms with up to 1000 stations connected.

Q2. What are cookies?

Ans. Cookies are 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 web site.

Q3. What is XML? How is it different from HTML?

Ans. XML is a markup language for creating documents containing structured information.

In HTML both tag semantics and tag are fixed but XML specifies neither semantics nor tagset. Rather it provides a facility to define tags and relationships among them.

Q4. What are switched LANs/Switched Ethernet LANS?

Ans. LANs that are segmented through switches are called switched LANs. In case of Ethernet LANs they are called Switched Ethernet LANS.

Q5. What is a communication channel? What choices do u have while choosing a communication channel for a network?

Ans. Communication channels mean the connecting cables that link various workstations. There are three basic types of cables:

- (i) **Twisted Pair Cables:-** These cables consist of two insulated copper wires twisted around each other. These are also used for short and medium range telephone communication.
- (ii) **Coaxial Cables:-** A coaxial cable consist of one or more small cables in protective covering. These are more expensive than twisted pair cable but perform better.
- (iii) **Fiber-optic Cables:-** These cables are made of plastic and glass and are about as thick as human hair. These cables are highly durable and offer excellent performance but are expensive.

Q6 What do you mean by topology? What are the most popular topologies?

Ans. Topology refers to the way which the workstations attached to the network are interconnected. The most popular topologies are:

Bus, Ring ,Star,Tree

Q7. What is firewall? What are different firewall techniques?

Ans. The system designed to prevent unauthorized access to or from a private network is called FIREWALL.

There are several types of firewall techniques:

Packet Filter, Application Gateway, Circuit-level Gateway, Proxy Server

Q8. What is the significance of anonymous user in FTP? What is uploading? Can an anonymous user upload? If yes, how? If no, why?

Ans. In order to use FTP effectively, one needs to be an authorized user. However, anonymous FTP is a method whereby FTP server allows the general public to access files on the FTP.

Uploading of files refers to the transfer of files from one's computer onto FTP server. An anonymous user generally is not allowed to do so and anonymous users have permission to download only.

However, on many UNIX FTP servers, there is a / incoming directory. If this directory is there, then an anonymous users have permissions to upload only in this directory and no where else.

Q9. What is Ethernet? What is Ethernet Card?

Ans. Ethernet is a LAN architecture developed by Xerox Corp in association with DEC and Intel.

Ethernet uses bus or star topologies and can support data transfer rates of up to 10 Mbps.

The computers that are the part of Ethernet have to install a special card called Ethernet Card.

Q10. What is 80-20 rule of network design?

Ans. The 80-20 rule of network says that : 80% of the traffic on a given network segment should be local and not more than 20% of the network traffic should need to move across a backbone i.e. the spine connecting various sub networks.

Q11. What is the general process of designing networks?

Ans. The general process of designing networks is described through following flow chart:

