

5

UNIT

Application Layer

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PART-1**Application Layer : File Transfer.****Questions-Answers****Long Answer Type and Medium Answer Type Questions**

Que 5.1. Explain application layer with its services.

Answer

Refer Q. 1.3, Page 1-4A, Unit-1.

Que 5.2. Write a short note on file transfer protocol.

AKTU 2013-14, Marks 2.5

AKTU 2015-16, 2017-18; Marks 05

Answer

1. FTP (File Transfer Protocol) is the simplest and most secure way to exchange files over the internet. The most common use for FTP is to download files from the internet.
2. FTP exists primarily for the transfer of data between two end points.
3. FTP creates both a control and a data connection in order to transfer files.
4. Within an active FTP session, the control connection is established from the client to the server, with the data connection established from the server to the client.

Que 5.3. How does FTP work? Differentiate between passive and active FTP.

AKTU 2016-17, Marks 10

Answer**Working of FTP :**

1. The client FTP application opens a control connection to the server on destination port 21, and specifies a source port as the source to which the FTP server should respond (using TCP).
2. The FTP server responds on port 21.
3. The FTP server and client negotiate the data transfer parameters.

4. The FTP server opens a second connection for data on port 20 to the original client.
5. The client responds on the data port, completing a TCP connection.
6. Data transfer begins.
7. The server indicates the end of the data transfer.
8. Client closes the connection once the data is received.
9. The data connection is closed.
10. The FTP connection is closed.

Difference between passive and active FTP :

S. No.	Passive FTP	Active FTP
1.	Passive FTP does not provide security to the FTP server.	Active FTP provides more security to the FTP server.
2.	Passive FTP does not have connection issues from firewalls.	Active FTP may cause problems because of firewalls.
3.	In passive FTP, the command channel and the data channel are established by the client.	In active FTP, client establishes the command channel and the server establishes the data channel.
4.	Passive mode is used as a default mode of a browser.	Active mode is not used as a default mode of a browser.

Que 5.4. Write a short note on :

- i. MIME
- ii. TFTP

AKTU 2013-14, Marks 05

Answer

- i. MIME :

1. The Multipurpose Internet Mail Extension (MIME) protocol was developed to define a method of moving multimedia files through existing email gateways.
2. It offers a simple standardized way to represent and encode a wide variety of media types, including textual data in non-ASCII character sets, for transmission via internet mail.
3. MIME defines extensions to SMTP to support binary attachments of arbitrary format.

5. The original internet mail message protocol was designed with the text mail messages in mind.
6. MIME provides an extensible format for including multimedia components within a mail message.

ii. **TFTP :**

1. The TFTP stand for Trivial File Transfer Protocol.
2. It makes UDP (User Datagram Protocol) connections.
3. Its default port number is 69.
4. It is connectionless.
5. It is not reliable.
6. It has no acknowledgement policy.

PART-2

Access and Management.

Questions-Answers

Long Answer Type and Medium Answer Type Questions

Que 5.5. Write a short note on DNS in the internet.

AKTU 2013-14, 2015-16, 2017-18; Marks 05

Answer

1. The Domain Namespace (DNS) is a hierarchical decentralized naming system for computers, services, or other resources connected to the internet or a private network.
2. Domain Namespace is a system that can map a name to an address and conversely an address to a name.
3. To identify an entity, TCP/IP protocol uses the IP address, which uniquely identifies the connection of a host to the internet. However, people prefer to use names instead of addresses.
4. Therefore, in TCP/IP, this is the Domain Namespace (DNS).
5. DNS is a protocol that can be used in different platforms.
6. In the internet, the domain namespace (tree) is divided into three different sections : generic domains, country domains and inverse domain.

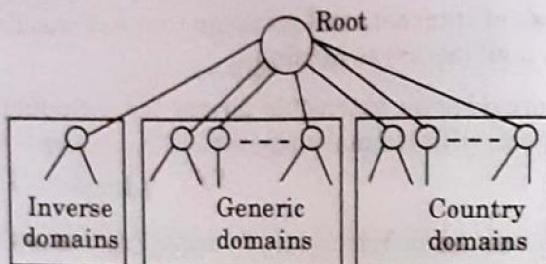


Fig. 5.5.1.

Que 5.6. How does DNS perform data name resolution ? What are the different types of name servers ? Mention the DNS message format for query and reply messages.

AKTU 2015-16, Marks 10

OR

Discuss the message format of DNS.

Answer

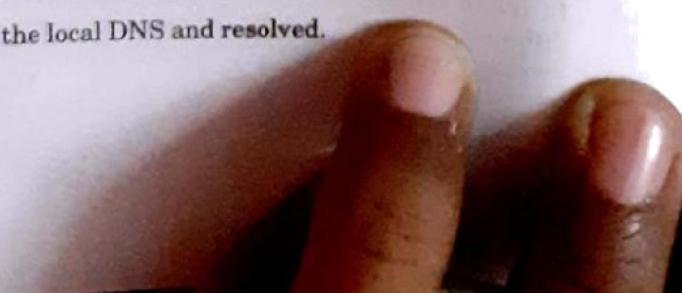
DNS name resolution process : The process of mapping a name to an address or vice-versa is called as name address resolution.

Mapping names to addresses :

1. In this, the resolver gives a domain name to the server and requests for the corresponding IP address. The server checks the generic or country domains to get the corresponding address.
2. If the domain name is from the generic domain section the resolver receives a domain name such as xxx.yyy.zzz.edu.
3. The query is sent to the local DNS server for resolution by the resolver.
4. If the local server does not get the answer then, it will refer the resolver to other servers or asks them directly.
5. The same procedure is followed for a name country domain.

Mapping addresses to names :

1. In this, a client sends an IP address to a server and requests for its name. This type of query is called as PTR query.
2. To answer the PTR query, the DNS uses the inverse domain.
3. If the IP address is 142.36.48.118 then the resolver first inverts the address and adds two labels "in_addr" and "arpa" to it. So, the domain name sent is 118.48.36.142 in_addr.arpa.
4. This is received by the local DNS and resolved.



Different types of name server:

j. Primary server :

1. It is a server which stores a file about its zone.
 2. It is authorized to create, maintain and update the zone file. It stores the zone file on a local disk.

ii. Secondary server :

1. This server transfers complete information about a zone from another server which may be primary or secondary server.
 2. The secondary server is not authorized to create or update a zone file. If its zone file is to be updated, then it is to be done by the primary server.

DNS message format :

1. DNS has two types of messages and both of them have the same format.
 - a. Query
 - b. Response or reply
 2. The formats of the two DNS messages are shown in Fig. 5.6.1.

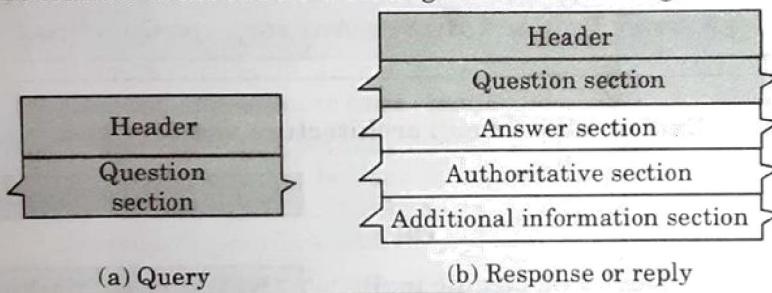


Fig. 5.6.1.

- Both query and reply messages have the same header format with some fields set to zero for query messages. The header is 12 byte long.
 - The header format for both the types of message is shown by shaded portions in Fig. 5.6.1.

Que 5.7. Define DNS and its requirement. Explain the specific features of it.

Answer

DNS : Refer Q. 5.5, Page 5-4A, Unit-5.

Requirements of DNS:

1. It should have unique name.
 2. It should uniquely identify the corporate / company.

Features of DNS :

1. It associates various information with domain names assigned to each of the participating entities.

2. The Domain Namespace delegates the responsibility of assigning domain names and mapping those names to internet resources by designating authoritative name servers for each domain.
3. The Domain Namespace also specifies the technical functionality of the database service that is at its core.
4. It defines the DNS protocol, a detailed specification of the data structures and data communication exchanges used in the DNS, as part of the Internet Protocol Suite.
5. The Domain Namespace maintains the domain name hierarchy and provides translation services between it and the address spaces.

PART-3*Electronic Mail.***Questions-Answers****Long Answer Type and Medium Answer Type Questions****Que 5.8.** Explain about email architecture and services.**AKTU 2013-14, Marks 10****OR****Write a short note on electronic mail.****AKTU 2015-16, Marks 05****Answer**

1. Electronic mail (or email) can be defined as the exchange of computer stored messages by telecommunications.
2. These messages, usually in text form, are sent from one computer to another via a telephone line. When we send a message, it is usually stored on a remote computer until the receiver goes online and checks the mail.
3. Email addresses often have three parts :
 - i. The username
 - ii. The host or domain name
 - iii. The type of domain
4. **For example :** pagequantum@gmail.com, the first part, pagequantum is the username which identifies the recipient, next part gmail is the host or domain name of the mail server where the recipient's mailbox is located. The final part .com identifies the type of domain (For example,

: .com for commercial sites, .edu for educational institutions, .org for non-profit groups etc).

An email system consists of three subsystems :

1. **Mail transfer agent** : A Mail Transfer Agent (MTA) transfers email messages between hosts using SMTP.
 - a. A message may involve several MTAs as it moves to its intended destination. Most users are totally unaware of the presence of MTA's, even though every email message is sent through at least one MTA.
 - b. While the delivery of messages between machines may seem rather straightforward, the entire process of deciding if a particular MTA can or should accept a message for delivery is quite complicated.
2. **Mail delivery agent** : A Mail Delivery Agent (MDA) is utilized by the MTA to deliver email to a particular user's mailbox.
 - a. In many cases, MDA is actually a Logical Delivery Agent (LDA), such as bin / mail or Procmail. However, sendmail can also play the role of an MDA, such as when it accepts a message for a local user and appends it to their email spool file.
 - b. Any program that actually handles a message for delivery to the point where it can be read by Mail User Agent (MUA) can be considered as MDA. MDAs do not transport messages between systems or interface with the end user.
 - c. Many users do not directly utilize MDAs, because only MTAs and MUAs are necessary to send and receive email. However, some MDAs may be used to sort messages before they are read by a user.
3. **Mail user agent** : A Mail User Agent (MUA) is a synonymous with an email client application.
 - a. An MUA is a program that, at the very least, allows a user to read and compose email messages.
 - b. Many MUAs are capable of retrieving messages via the POP or IMAP protocols, setting up mail boxes to store messages, and sending outbound messages to an MTA.

Que 5.9. What are the basic functions of email system ?

Answer

Email systems support five basic functions which are as follows :

1. **Composition** :
 - a. The process of creating messages and to answer them is known as composition.

- b. The system can also provide assistance with addressing and a number of header fields attached to each message.
- 2. Transfer :**
- a. It is the process of moving messages from the sender to the recipient.
 - b. This includes establishment of a connection from sender to destination or some intermediate machine, transferring the message, and breaking the connection.
- 3. Reporting :** The reporting system is designed to tell the sender whether the message was delivered or rejected or lost.
- 4. Displaying :**
- a. It is the process of displaying the incoming messages so that it can be read by the user.
 - b. For this purpose simple conversions and formatting are required to be done.
- 5. Disposition :**
- a. This is concerned with what the recipient does with the received message. Disposition is the final step in email system.
 - b. Some of the possibilities are as follows :
 - i. Throw after reading
 - ii. Throw before reading
 - iii. Save messages
 - iv. Forward messages
 - v. Process messages in some other way

Que 5.10. Explain the functioning of email gateway.

Answer

1. The email using SMTP can work properly if both the sender and the receiver are connected to the internet and can support TCP connections between them.
2. There can be many machines which are not on the internet but still want to send and receive email. This is made possible by using the application layer email gateways as shown in Fig. 5.10.1.
3. In Fig. 5.10.1, host A speaks only TCP/IP and RFC 822 whereas host B speaks only OSI TP4 and X.400. So, without the email gateway they cannot exchange email gateway. But email gateway allows them to exchange emails.
4. Host A first establishes a TCP connection to the gateway. Then it uses SMTP and transfer message (1) to the gateway message buffer.

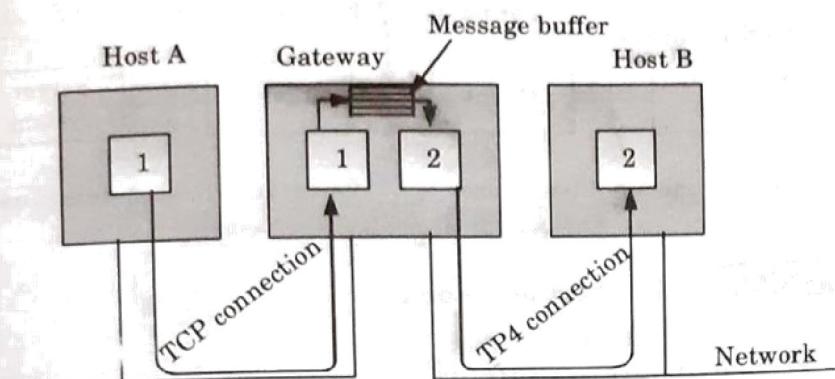


Fig. 5.10.1. Email gateway.

5. Then the gateway daemon establishes a TP4 connection (OSI equivalent of TCP) with the destination host *B*, and message (2) is transferred using the OSI equivalent of SMTP.
6. A gateway process is supposed to extract incoming messages from one queue and deposit them in the other.

PART-4*Virtual Terminals, Other Applications.***Questions-Answers****Long Answer Type and Medium Answer Type Questions****Que 5.11.** Write a short note on virtual terminal.**Answer**

1. NVT (Network Virtual Terminal) is a bi-directional device. It has a keyboard and a printer. The keyboard produces outgoing data and the printer responds to the incoming one. The outgoing data goes out over the Telnet connection.
2. NVT uses the client server architecture and it is treated as a half duplex device.
3. Fig. 5.11.1, illustrates the use of NVT by Telnet.
4. The character set for NVT is defined by the Telnet protocol. It is fairly easy to define the NVT format.
5. NVT uses the standard 7-bit ASCII representation for data. It includes 95 printable characters (letters, punctuation marks, digits etc.) and three control codes.

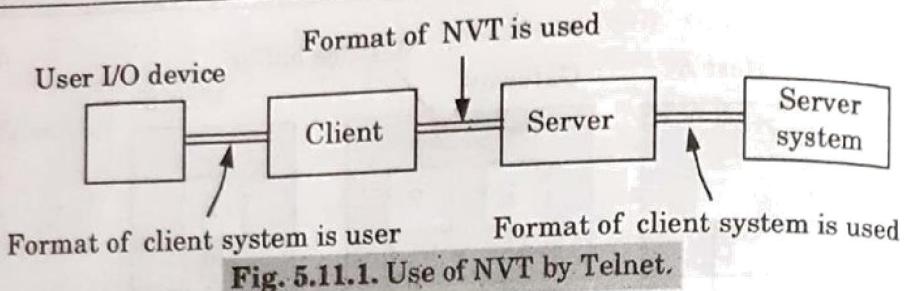


Fig. 5.11.1. Use of NVT by Telnet.

Que 5.12. Write short notes on :

- Telnet and Rlogin**
- Virtual private networking**
- Firewall**

Answer**i. Telnet and Rlogin :**

1. Rlogin is an alternative remote login application program for host that runs the Unix operating system. Rlogin takes advantage of the fact that both the client and server run a similar operating system, and for this reason, is simpler than Telnet.
2. Telnet is a remote login protocol for executing command on a remote host. The Telnet protocol runs in a client-server mode and uses the TCP protocol for data transmission.

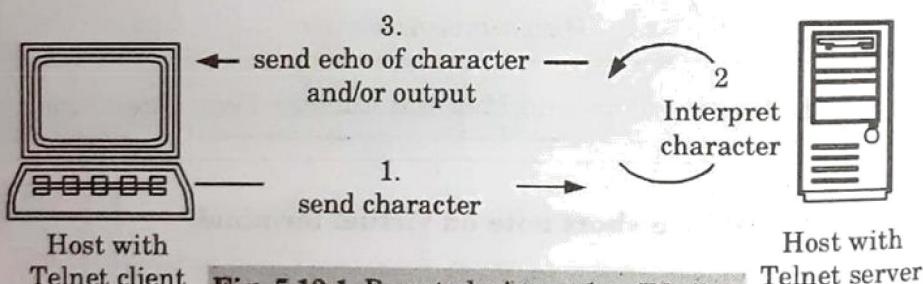


Fig. 5.12.1. Remote login session (Rlogin).

3. The mode of operation in a Telnet session is illustrated in Fig. 5.12.1. At the Telnet client, a character that is typed on the keyboard is not displayed on the monitor, but, instead, is encoded as an ASCII character and transmitted to a remote Telnet server.
4. At the server, the ASCII character is interpreted as if a user had typed the character on the keyboard of the remote machine. If the keystroke results in any output, this output is encoded as (ASCII) text and sent to the Telnet client, which displays it on its monitor.
5. The output can be just the (echo of the) typed character or it can be the output of a command that was executed at the remote Telnet server.

ii. Virtual private network :

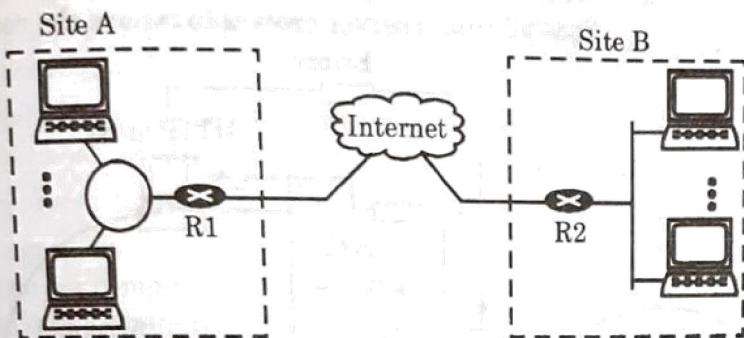


Fig. 5.12.2.

1. VPN creates a network that is private but virtual.
2. It is private because it guarantees privacy inside the organization.
3. It is virtual because it does not use real private WANs.
4. The network is physically public but virtually private.
5. Fig. 5.12.2 shows the idea of a virtual private network. Routers R1 and R2 use VPN technology to guarantee privacy for the organization.

iii. Firewall :

1. A firewall is a device (usually a router or a computer) installed between the internal network of an organization and the rest of the internet.
2. It is designed to forward some packets and filter others.

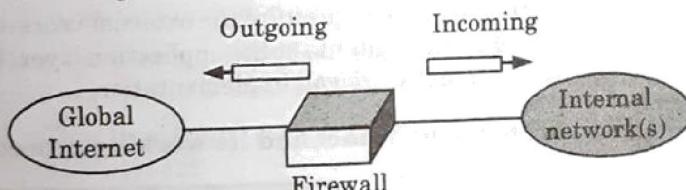


Fig. 5.12.3.

3. A firewall can be used to deny access to a specific host or a specific service in the organization.
4. A firewall is usually classified as a packet-filter or a proxy-based firewall.
 - a. **Packet-filter firewall :** A firewall can be used as a packet filter, it can forward or block packets based on the information in the network layer and transport layer headers : source and destination IP addresses, source and destination port addresses, and type of protocol (TCP or UDP).
 - b. **Proxy-based firewall :**
 - i. Firewall stands between the customer (user client) computer and the corporation computer shown in Fig. 5.12.4.

- ii. When the client process sends a message, the proxy firewall runs a server process to receive the request.

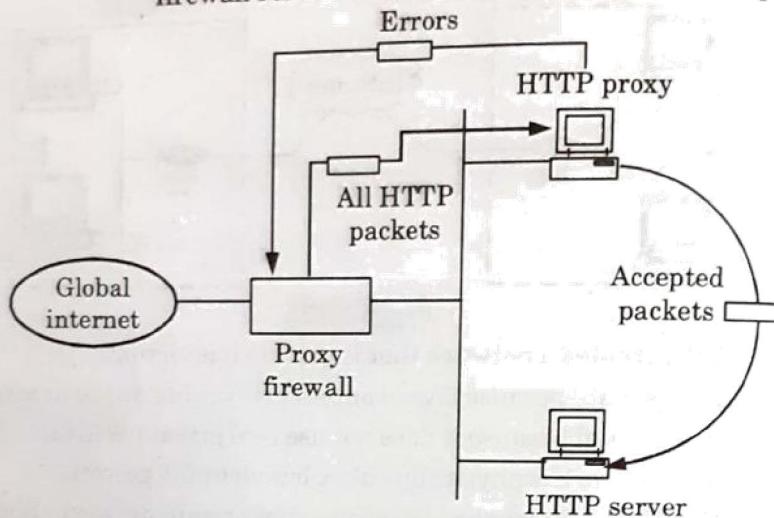


Fig. 5.12.4. Proxy firewall.

- iii. The server opens the packet at the application level and finds out if the request is legitimate.
- iv. If it is, the server acts as a client process and sends the message to the real server in the corporation.
- v. If it is not, the message is dropped and an error message is sent to the external user.
- vi. In this way, the requests of the external users are filtered based on the contents at the application layer. Fig. 5.12.4 shows a proxy firewall implementation.

Que 5.13. Elaborate about Telnet and its working procedure.

AKTU 2016-17, 2017-18; Marks 10

Answer

1. Telnet is a program to login into remote systems.
2. It uses TCP/IP protocol and underlying communication can take place through satellites.
3. Telnet allows us to login in system for any operation and FTP is used only for file transfer use.
4. Telnet is an application used on the internet to connect to a remote computer, which enables an access to the computer and its resources.
5. Telnet is used for a number of activities such as telnetting to a site, or checking email at another account, other online services.
6. Telnet is an example of cyberspace extension or cybertravel. The user can travel all across the internet to access machines or databases that may offer different services or information.

Working procedure :

1. Telnet uses software, installed on our computer, to create a connection with the remote host.
2. The Telnet client (software), will send a request to the Telnet server (remote host) when command is given.
3. The server will reply asking for a username and password.
4. If accepted, the Telnet client will establish a connection to the host, thus making our computer a virtual terminal and provide a complete access to the host's computer.
5. Telnet requires the use of a username and password, which means we need to have previously set up an account on the remote computer.

Que 5.14. Explain the two mail access protocols in brief :

- i. POP3
- ii. IMAP
- iii. SMTP

AKTU 2013-14, Marks 10

Answer**i. POP3:**

1. The POP3 consists of client POP3 software and server POP3 software. Out of these, the client POP3 software is installed on the receiving computer whereas the mail server gets the server POP3 software installed on it.
2. When the user wants to download email from the mailbox on the email server, the events take place in the following sequence :
 - a. The client (user) establishes a connection with the server on TCP port 110.
 - b. The client then sends its username and password to the server in order to access the server mailbox.
 - c. The user is then allowed to list and get the mail messages one by one.
 - d. This is called as downloading.

ii. IMAP (Internet Message Access Protocol) :

1. IMAP was designed as a superset of POP3 and enhances both message retrieval and management.
2. IMAP protocol will not automatically download all emails, each time email program connects to email server.
3. The IMAP protocol allows us to see through email messages at the email server before we download them.
4. With IMAP we can choose to download our messages or just delete them.

5. IMAP is perfect if we need to connect to our email server from different locations, but only want to download our messages when we are back in office.
 6. When using an IMAP mail server, email messages remain on the server where users can read or delete them.
 7. IMAP also allows client applications to create, rename or delete mail directories on the server to organize and store email.
 8. IMAP client applications are capable of caching copies of messages locally, so the user can browse previously read messages when not directly connected to the IMAP server.
 9. IMAP is fully compatible with the important internet messaging standards, such as MIME, which allow for email attachments.
 10. We can delete messages, search for text in messages, store messages in different folders, or even create and delete folders on the server system.
- iii. SMTP (Simple Mail Transfer Protocol) :**
1. The main function of text based SMTP protocol is to send emails.
 2. It is used for sending message to a mail server for relaying.
 3. It uses TCP (Transmission Control Protocol) to transfer message from client to server.
 4. SMTP uses port 25 for message transmission.
 5. SMTP messages are read by humans. These messages are first stored and then forwarded.

Que 5.15. Explain the SMTP can handle transfer of videos and images ? Also explain the advantages of IMAP4 over POP3 mail access protocols.

AKTU 2014-15, Marks 10

Answer

SMTP cannot handle transfer of videos and images.

Advantages of IMAP4 over POP3 :

1. In IMAP4, we can access our email from anywhere but in POP3 it is not possible.
2. In IMAP4 multiple users can connect to single mail box but POP3 can connect only single user to mail box.
3. In IMAP4 an email does not need to be deleted multiple times, which can be a problem in POP3.

Que 5.16. Write a short note on SNMP.

AKTU 2015-16, Marks 05

OR

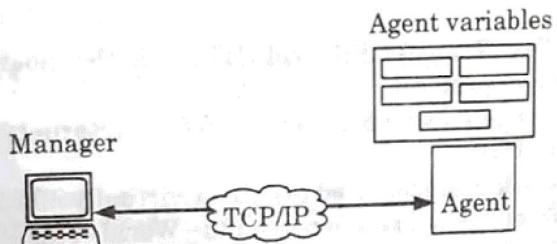
Explain the SNMP protocols in detail.

AKTU 2016-17, Marks 15

AKTU 2017-18, Marks 10

Answer

1. The Simple Network Management Protocol (SNMP) is a framework for managing devices in an internet using the TCP/IP protocol suite.
2. It provides a set of fundamental operations for monitoring and maintaining an internet. SNMP uses the concept of manager and agent.

**Fig. 5.16.1.**

3. A manager is a host that controls and monitors a set of agents, usually routers.
4. The protocol is designed at the application level so that it can monitor devices made by different manufacturers and installed on different physical networks.
5. SNMP frees management tasks from both the physical characteristics of the managed devices and the underlying networking technology.
6. It can be used in a heterogeneous internet made of different LANs and WANs connected by routers or gateways made by different manufacturers.

Que 5.17. What is the difference between an active web document and dynamic web page ? Also explain the role of CGI.

AKTU 2014-15, Marks 10

Answer

S. No.	Active web document	Dynamic web page
1.	An active web document is a document where the browser performs the logic instead of the server.	Dynamic web page is a page where server performs the logic instead of the browser.
2.	Active web document are downloaded in client environment and then run.	Dynamic web page runs on the server and then the result is sent to the user.
3.	It uses PHP as scripting language.	It uses AJAX with JavaScript.

Role of CGI :

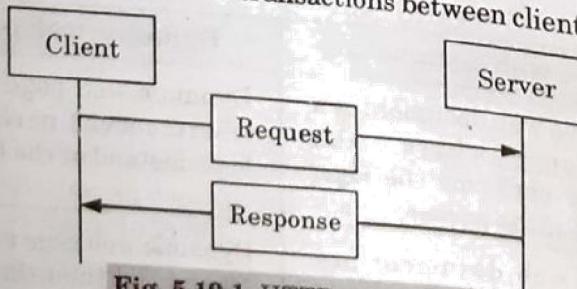
1. It helps to create and handle dynamic document.
2. It provides sets of standards for web document.
3. It acts as a gateway for accessing other resources such as database.

Que 5.18. What do you mean by HTTP ?**Answer**

1. The Hyper Text Transfer Protocol (HTTP) is the most widely used application layer protocol.
2. Each time we open a web browser to surf the internet, we are using HTTP over TCP/IP.
3. It is the network protocol, used to deliver virtually all files and other data (collectively called resources) on the World Wide Web, whether they are HTML files, image files, query results, or anything else. Usually, HTTP takes place through TCP/IP sockets.
4. A browser is an HTTP client because it sends requests to an HTTP server (web server), which then sends responses back to the client. The standard (and default) port for HTTP servers to listen on is 80, though they can use any port.
5. HTTP is used to transmit resources, not just files. A resource is some chunk of information that can be identified by a URL.
6. The most common kind of resource is a file, but a resource may also be a dynamically generated query result, the output of a CGI script, a document that is available in several languages, or something else.

Que 5.19. Explain the principle of HTTP operation. Why it is called stateless protocol.**Answer**

1. The principle of HTTP is simple. A client sends a request. The server sends a response. The request and response messages carry data in the form of a letter with a MIME like format.
2. Fig. 5.19.1 shows the HTTP transactions between client and server.

**Fig. 5.19.1. HTTP transaction.**

3. The client initializes the transaction by sending a request message and the server responds by sending a response.

Statelessness :

1. In HTTP, the server sends the files requested to the client without storing any state information about the client.
2. So, it may happen that the same client may ask the same information repeatedly to the server and the server would not even understand it. So, it will keep resending those files. As the HTTP server does not maintain any information about the state of client it is called as a stateless protocol.

Que 5.20. Compare and contrast SMTP and HTTP.

Answer

S. No.	SMTP	HTTP
1.	Message is transferred from client to server.	Message transfer is from client to server or the other way round.
2.	It uses TCP.	It uses TCP.
3.	It uses port 25 for transmission.	It uses port 80 for transmission.
4.	SMTP messages are to be read by humans.	HTTP messages are to be read and understood by the HTTP servers and HTTP clients.
5.	These messages are first stored and then forwarded.	These messages are immediately delivered.

PART-5

Example Networks-Internet and Public Network.

Questions-Answers

Long Answer Type and Medium Answer Type Questions

Que 5.21. Write a note on ARPANET.

Answer

1. ARPANET is a WAN which was designed to service in an event like nuclear attack.
2. ARPANET used the concept of packet switching network which is made of subnet and host computers.

3. The subnet was a datagram subnet and each subnet consists of minicomputers called IMPs (Interface Message Processors).
4. Each node of the network used to have an IMP and a host connected by a short wire as shown in Fig. 5.21.1.
5. The host could send messages of upto 8063 bits to its IMP. The IMP breaks them into packets and forwards them independently towards the destination.
6. The subnet was the first electronic store and forward type packet switched network. So, each packet was stored before it was forwarded by the IMP.
7. The original ARPANET design is as shown in Fig. 5.21.1.

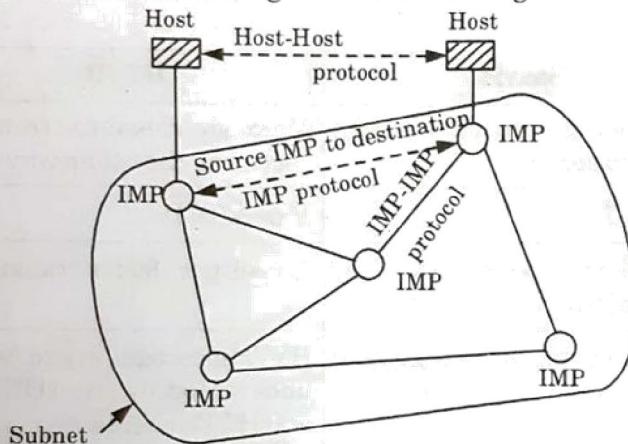


Fig. 5.21.1. ARPANET.

Que 5.22. Describe internet. What are the applications of internet ?

Answer

Internet :

1. The internet is a globally existing network of networks consisting of a huge number of computers located in all the parts of the world.
2. All the computers connected to the internet are part of this huge network.
3. Networking is interconnection of computers. Generally the networking topologies used for networking are star, bus, ring, loop etc.
4. When a limited number of computers are to be interconnected, the local area network (LAN) is used. But in the internet the interconnection is achieved even via satellites.

Applications of internet :

1. **Electronic mail (Email) :** Refer Q. 5.8, Page 5-7A, Unit-5.
2. **News :**
 - a. Newsgroups are specialized forums in which users with a common interest can exchange messages.
 - b. A large number of newsgroups can technical or non-technical topics.
3. **Remote login :** Refer Q. 5.12, Page 5-11A, Unit-5.
4. **File transfer :** Refer Q. 5.2, Page 5-2A, Unit-5.

5. World Wide Web (www) :

- The www is analogous to a bulletin board or a notice board.
- A “website” is a publically accessible notice board on the “server” or “host computer” connected to the internet.
- Any user can view or read the contents of this area. The available information may be in the form of text, pictures, photographs, images or graphics. It can be on any subject or topic.
- Each document on the “website” is called as “web page” or simply a “page”. WWW has become the most popular application on the internet and the large amount of data that it contains is growing continuously.

Que 5.23. Write a note on public network. Discuss any one of its services.

Answer

The telephone companies started offering networking services to the organizations which were interested in subscribing the services. Such systems are called as public network. Services provided by public network are :

- SMDS
- Frame relay
- X.25
- ATM and broadband ISDN

SMDS-Switched Multimegabit Data Service :

- The SMDS as shown in Fig. 5.23.1(b) is designed to connect the multiple LANs together. This is the first high speed broadband service offered to the public.
- The SMDS network is in the telephone company's office. SMDS is designed to handle bursty service.
- The type of traffic in interconnected LANs is not continuous but bursty type i.e., once in a while a packet will be transferred from one LAN to other but otherwise there is no LAN to LAN traffic.
- SMDS are supposed to be sufficiently fast. Standard speed is 45 Mbps.

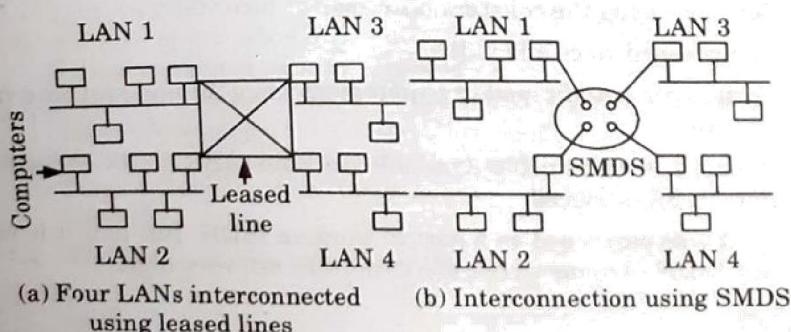


Fig. 5.23.1.

Que 5.24. Differentiate between X.25 and frame relay.

Answer

S. No.	X.25	Frame relay
1.	X.25 networks work at speed upto 64 kbps.	Frame relay operates at higher speed of 1.5 Mbps.
2.	Frames are delivered more reliably than frame relay.	Frames are delivered unreliably than X.25.
3.	Frames are delivered in order.	Frames delivered are not in proper order.
4.	Bad frames can be received back by sending acknowledgement signal.	Bad frames are discarded by frame relay.
5.	X.25 provides flow control.	Frame relay does not provide flow control.

Que 5.25. Write a short note on ATM.

Answer

1. ATM (Asynchronous Transfer Mode) is a streamlined packet transfer interface. ATM is a connection-oriented network.
2. ATM uses packets of fixed size for the communication of data. These packets are called as ATM cells.
3. ATM is used for efficient data transfer over high speed data networks.
4. ATM provides real time and non-real time services.

Services provided by ATM are :

1. Services using the constant bit rates.
2. Compressed voice and video.
3. Traffic with specific quality requirement using the non-real time variable bit rate.
4. IP based services using Available Bit Rate (ABR) and Unspecified Bit Rate (UBR) services.
5. ATM was developed as a part of work on ISDN. But now it is used in non-ISDN systems where the data rates are very high.

