CENTRE FOR DIFFERENTLY ABLED PERSONS
BHARATHIDASAN UNIVERSITY

III BCA – VI SEMESTER

DATA COMMUNICATION AND NETWORKS
(20UCA6CC8)
UNIT - V

Prepared by
Dr. M. Prabavathy
Ms. M. Hemalatha

OVERVIEW OF TCP / IP

- Transmission Control Protocol/Internet Protocol is a standard Internet- communications protocols and allows computers to communicate over long distances.

- The Internet is a packet-switched network, in which information is broken down into small packets, sent individually over many different routes at the same time, and then reassembled at the receiving end.

- It was developed in the 1970s and adopted as the protocol standard for ARPANET in 1983.

NETWORK LAYER

- The third layer of the OSI model handles the service requests from the transport layer and further forwards the service request to the data link layer.
- The network layer translates the logical addresses into physical addresses
- The main role of the network layer is to move the packets from sending host to the receiving host and also manages the traffic problems such as switching, routing and controls the congestion of data packets

The main functions

o Routing:

o Logical Addressing:

o Internetworking:

Fragmentation:

o The fragmentation is a process of breaking the packets into the smallest individual data units that travel through different networks

ADDRESSING

- Network addresses are always logical, i.e., software-based addresses.
- A host is also known as end system that has one link to the network.
- The boundary between the host and link is known as an interface.
- A router is different from the host in that it has two or more links that connect to it.
- When a router forwards the datagram, then it forwards the packet to one of the links.
- Each IP address is 32 bits long, and they are represented in the form of "dot-decimal notation"
- An IP address would look like 193.32.216.9 where 193 represents the decimal notation of first 8 bits of an address, 32 represents the decimal notation of second 8 bits of an address.

Classful Addressing

- An IP address is 32-bit long.
- An IP address is divided into sub-classes:
  - Class A
  - Class B
  - Class C
  - Class D
  - Class E

- An IP address is divided into two parts:
  - Network ID: It represents the number of networks.
 - Host ID: It represents the number of hosts.
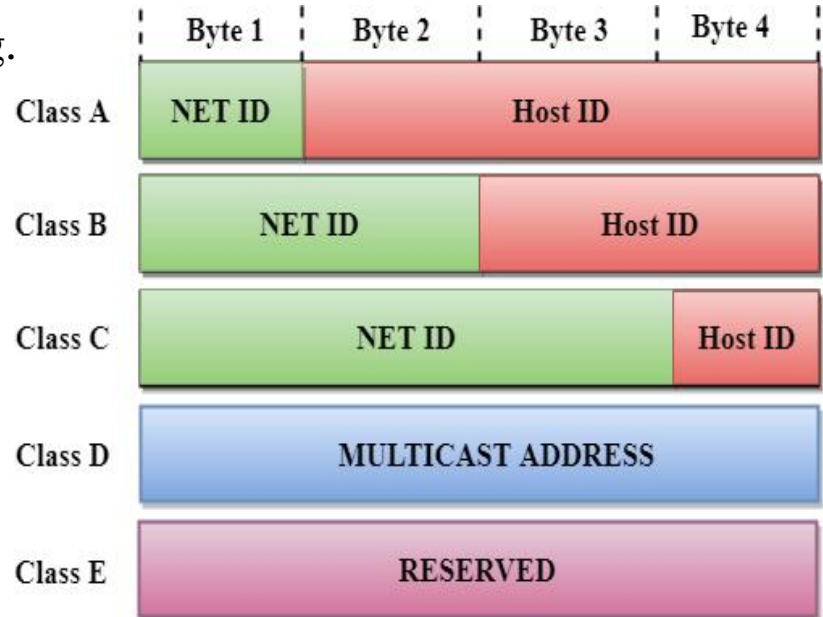
SUBNETTING

- The goal of subnetting is to create a fast, efficient, and resilient computer network.
- As networks become larger and more complex, the traffic traveling through them needs more efficient routes
- If all network traffic was traveling across the system at the same time using the same route, bottlenecks and congestion would occur resulting in sluggish and inefficient backlogs.
- Creating a subnet allows you to limit the number of routers
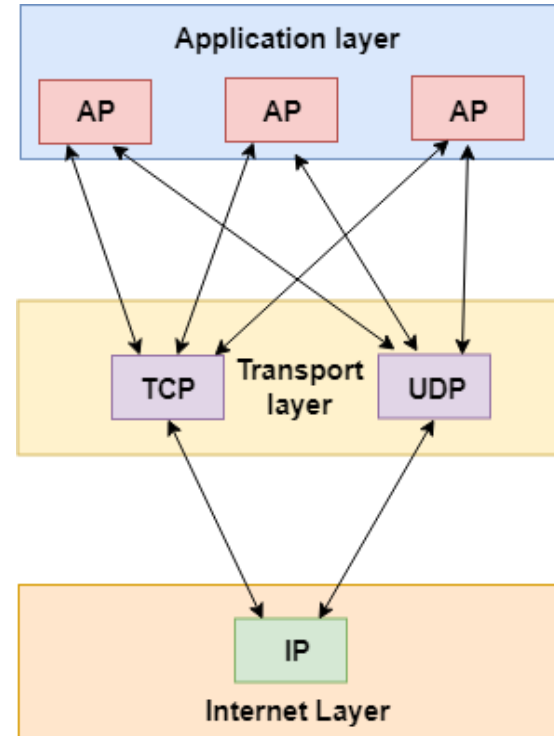
TRANSPORT LAYER

- The transport layer is a 4th layer from the top.
- The main role of the transport layer is to provide the communication services directly to the application processes running on different hosts.

- The transport layer provides a logical communication between application processes running on different hosts.
- The transport layer protocols are implemented in the end systems but not in the network routers.
- A computer network provides more than one protocol to the network applications.
- All transport layer protocols provide multiplexing/demultiplexing service.
- It also provides other services such as reliable data transfer, bandwidth guarantees, and delay guarantees.
- Each of the applications in the application layer has the ability to send a message by using TCP or UDP.

Transport layer services

| End-to-end delivery | Addressing | Reliable delivery | Flow control | Multiplexing |
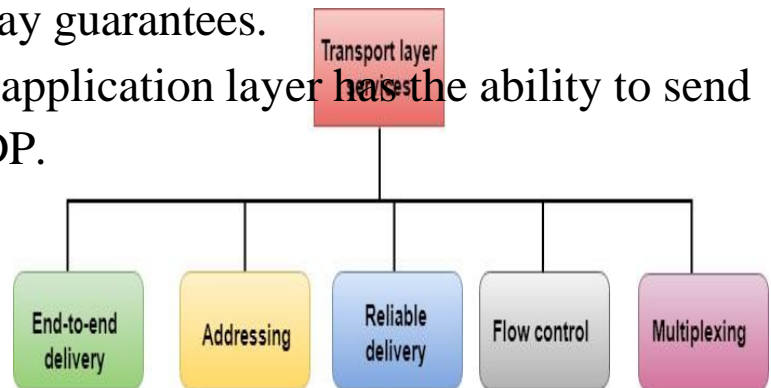
SERVICES PROVIDED BY THE TRANSPORT LAYER

- End-to-end delivery
- Addressing
- Reliable delivery
- Flow control
- Multiplexing

CLIENT AND SERVER MODEL

- A client and server networking model is a model in which computers such as servers provide the network services to the other computers such as clients to perform a user based tasks.
- This model is known as client-server networking model.
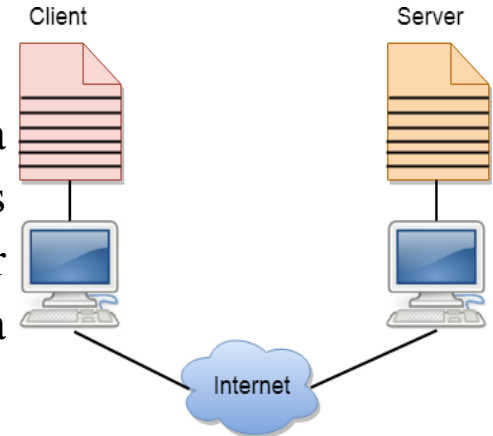
Client

- o A client is a program that runs on the local machine requesting service from the server.
- o A client program is a finite program means that the service started by the user and terminates when the service is completed.

SERVER

- A server is a program that runs on the remote machine providing services to the clients.
- When the client requests for a service, then the server opens the door for the incoming requests, but it never initiates the service.
- A server program is an infinite program means that when it starts, it runs infinitely
- unless the problem arises. The server waits for the incoming requests from the clients.
- When the request arrives at the server, then it responds to the request.

Advantages
- Centralized
- Security

- Performance
- Scalability

Disadvantages
- Traffic

  Congestion
- Very decisive

- It does not have a robustness of a network

DOMAIN NAME SYSTEM (DNS)

- DNS is a directory service that provides a mapping between the name of a host on the network and its numerical address.
- DNS is required for the functioning of the internet.
- Each node in a tree has a domain name, and a full domain name is a sequence of symbols specified by dots.
- DNS is a service that translates the domain name into IP addresses.
- This allows the users of networks to utilize user-friendly names when looking for other hosts instead of remembering the IP addresses.

- DNS is a TCP/IP protocol used on different platforms.
- The domain name space is divided into three different sections
  - o Generic Domains
    - ▪ It defines the registered hosts according to their generic behavior.
    - ▪ Each node in a tree defines the domain name. It uses three-character labels, and these labels describe the organization type.

Inverse domain   Generic domains   Country domains
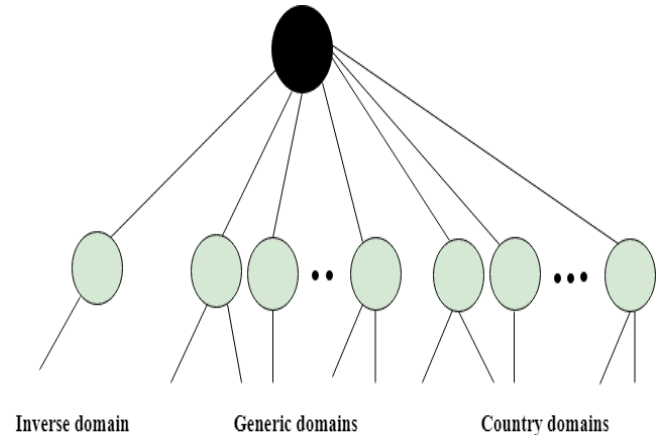
- Country Domain
  - It uses two-character country abbreviations (e.g., us for the United States) in place of three character organizational abbreviations.
- Inverse Domain
  - The inverse domain is used for mapping an address to a name.
  - When the server has received a request from the client, and the server contains the files of only authorized clients.

TELNET

- Terminal Network, the main task of the internet is to provide services to users.
- This requires a client-server program such as FTP, SMTP. But this would not allow us to create a specific program for each demand.
- The better solution is to provide a general client-server program that lets the user access any application program on a remote computer.
- A popular client-server program Telnet is used to meet such demands.
- Telnet provides a connection to the remote computer in such a way that a local terminal appears to be at the remote side.

FTP - FILE TRANSFER PROTOCOL

- FTP stands for File transfer protocol.
- FTP is a standard internet protocol provided by TCP/IP
- Used for transmitting the files from one host to another.
- It is mainly used for transferring the web page files from their creator to the computer that acts as a server for other computers on the internet.
- It is also used for downloading the files to computer from other servers.
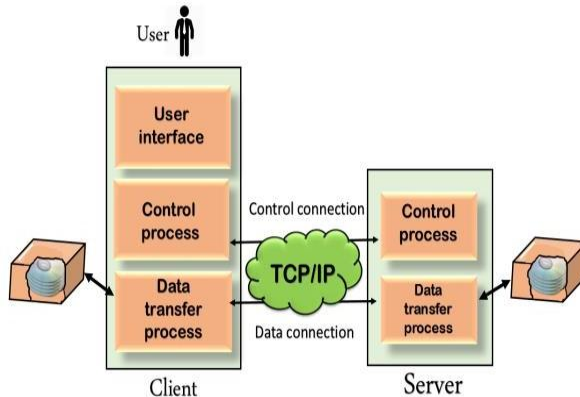
TYPES OF CONNECTIONS IN FTP:

- ○ Control Connection:
    - ▪ Uses very simple rules for communication &transfer a line of command at a time.
    - ▪ Remains connected during the entire interactive FTP session.
- ○ Data Connection:
    - ▪ Uses very complex rules as data types may vary and made between data transfer processes.
    - ▪ Opens when a command comes and closes when the file is transferred.
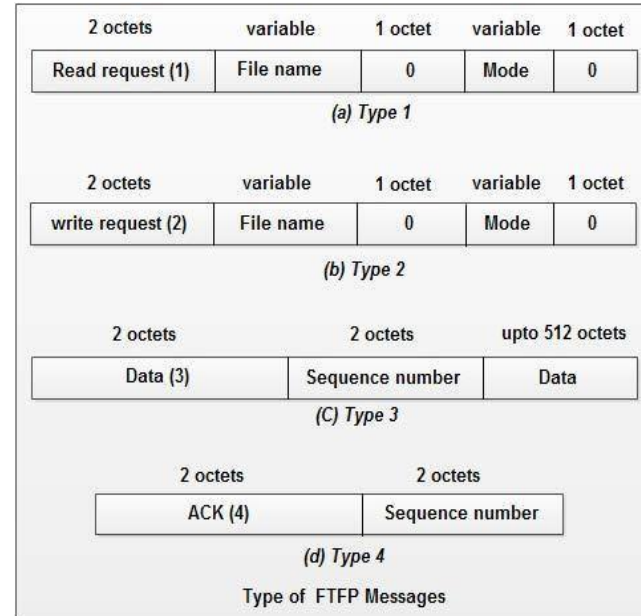
Advantages

- o Speed
- o Efficient

Disadvantages

- o The FTP transmissions should be encrypted.

- o Security
- o Back & forth movement

o Doesn't allow you to run simultaneous transfers to multiple receivers.

TFTP - TRIVIAL FILE TRANSFER PROTOCOL

- Trivial File Transfer Protocol (TFTP) is a simple protocol for exchanging files between two TCP/IP machines.
- TFTP servers allow connections from a TFTP Client for sending and receiving files.
- The TFTP protocol supports only file send and receive operations.

2 octets	variable	1 octet	variable	1 octet
Read request (1)	File name	0	Mode	0

(a) Type 1

2 octets	variable	1 octet	variable	1 octet
write request (2)	File name	0	Mode	0

(b) Type 2

2 octets	2 octets	upto 512 octets
Data (3)	Sequence number	Data

(C) Type 3

2 octets	2 octets
ACK (4)	Sequence number

(d) Type 4

Type of FTFP Messages

- TFTP sends data block-by-block, with block sizes split into 512 bytes each.
- Subsequent blocks are sent only after
- ☉ acknowledgement has been received by the sending device
- There are 4 types of messages are available.
- They are (a) Type 1, (b) Type 2, (c) Type 3 and (d) Type 4

SMTP - SIMPLE MAIL TRANSFER PROTOCOL

- SMTP stands for Simple Mail Transfer Protocol.
- SMTP is a set of communication guidelines that allow software to transmit an electronic mail over the internet.
- It is a program used for sending messages to other computer users based on e-mail addresses.

- It provides a mail exchange between users on the same or different computers, and it also supports:
  - It can send a single message to one or more recipients.
  - Sending message can include text,
  - voice, video or graphics.
  - It can also send the messages on networks outside the internet.

User

SMTP client

User

SMTP server
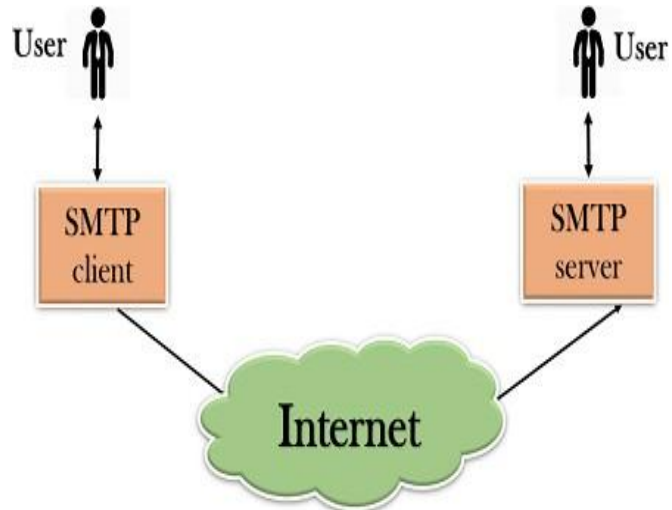
Internet

SNMP - SIMPLE NETWORK MANAGEMENT PROTOCOL

- SNMP stands for SimpleNetwork Management Protocol.
- SNMP is a framework used for managing devices on the internet.
- It provides a set of operations for monitoring and managing the internet.
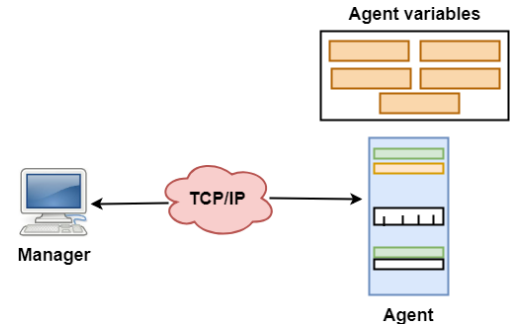
SNMP CONCEPT

- o The manager is a host that controls and monitors a set of agents such as routers.
- o Few manager stations can handle a set of agents.
- o The protocol designed at the application level can monitor the devices made by different manufacturers and installed on different physical networks.
- o It is used in a heterogeneous network made of different LANs and.
- o SNMP defines five types of messages: GetRequest, GetNextRequest, SetRequest, GetResponse, and Trap.

HTTP - HYPERTEXT TRANSFER PROTOCOL

- HTTP stands for HyperText Transfer Protocol.
- It is a protocol used to access the data on the World Wide Web (www).
- The HTTP protocol can be used to transfer the data in the form of plain text, hypertext, audio, video, and so on.
- It that allows us to use in a hypertext environment where there are rapid jumps from one document to another document.
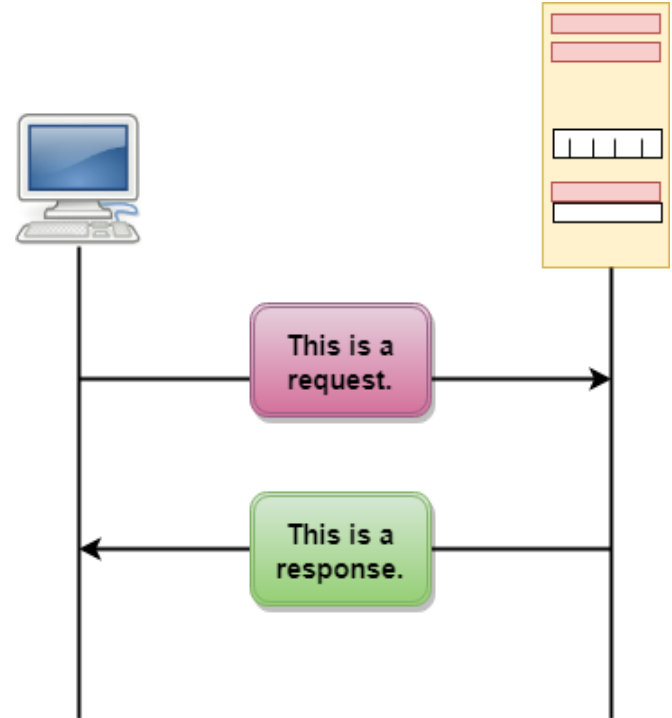
- HTTP is similar to the FTP as it also transfers the files from one host to another host.
- HTTP is used to carry the data in the form of MIME-like format.
- HTTP is similar to SMTP as the data is transferred between client and server

WORLD WIDE WEB (WWW

- World Wide Web (WWW), byname the Web, the leading information retrieval service of the Internet
- The Web gives users access to a vast array of documents that are connected to each other by means of hypertext or hypermedia links.
- Hypertext allows the user to select a word or phrase from text and thereby access other documents that contain additional information pertaining to that word or phrase.
- Hypermedia documents feature links to images, sounds, animations, and movies.
- The Web operates within the Internet's basic client-server format.
- Servers are computer programs that store and transmit documents to other computers on the network. Browser software allows users to view the retrieved documents.

THANK YOU