

Reader Group of Colleges

Outline: -

- The OSI model
- Layered Architecture
- TCP/IP
- Internet-based Applications

Protocol: -

Protocol is a set of rules that determines how the data transmitted over the internet.

OR

A standard used by networks for communication between different devices connected to a network is called Protocol

Protocol Types: -

- **IP (internet protocol)**

Internet Protocol, or **IP**, is the method that governs how computers share data across the **Internet**. When one computer sends data, such as an email or a web form, **its** message gets parsed into small packets that contain the sending computer's **Internet** address, the receiving computer's address, and part of the message.

- **FTP (file transfer protocol)**

The **File Transfer Protocol (FTP)** is a standard network protocol used for the transfer of computer files from a server to a client on a computer network.

- **SMTP (simple mail transfer protocol)**

SMTP (Simple Mail Transfer Protocol) is a TCP/IP protocol used in sending and receiving e-mail. However, since it is limited in its ability to queue messages at the receiving end, it is usually used with one of two other protocols, POP3 (Post Office Protocol) or IMAP (Internet Message Access Protocol), that let the user save messages in a server mailbox and download them periodically from the server. In other words, users typically use a program that uses SMTP for sending e-mail and either POP3 or IMAP for receiving e-mail.

- **HTTP (Hypertext transfer protocol)**

HTTP is the foundation of data communication for the World Wide Web, where hypertext documents include hyperlinks to other resources that the user can easily access, for example by a mouse click or by tapping the screen in a web browser.

- **Telnet**

Telnet is a **protocol** that allows you to connect to remote computers (called hosts) over a TCP/IP network (such as the internet). Using **telnet** client software on your computer, you can make a connection to a **telnet** server (that is, the remote host).

Functions of protocol: -

The main functions of protocols: -

1. Data sequencing
2. Data routing
3. Data flow
4. Error control

Key Elements of protocol: -

- Syntax
- Semantics
- Timing

❖ The OSI model: -

OSI stand for open system interconnection. An open system is a set of protocols that allows any two systems to communicate even if their architecture is different. It covers all aspects of network communications.it was developed by the International Standards Organization (ISO) in 1983.

❖ Advantages of OSI model

Some advantages of OSI model are as follows: -

- It divides the network communication process into smaller and simpler components
- It allows multiple-vendor development via standardization of network components
- It encourages industry standardization to define what function occurs at each layer
- It allows various types of network hardware and software to communicate.

❖ Layers of OSI model

7. Application layer
6. Presentation layer
5. Session layer
4. Transport Layer
3. Network layer
2. Data link layer
1. Physical Layer

1. Physical layer: -

Physical layer is the bottom layer of OSI model. It transmits stream of bits and defines how the data is transmitted over the network and what control signals are used

Main Function: -

Its main function is to control how a stream of bits is sent and received over the physical medium

Physical layer must decide the following: -

- ✓ Characteristics of Media
- ✓ Representation of Bits
- ✓ Data rate
- ✓ Synchronization
- ✓ Line Configuration
- ✓ Transmission mode

Data Link Layer: -

The data link layer is responsible for the reliability of the physical link established at layer 1.

Data link layer must decide the following: -

- ✓ Framing
- ✓ Flow control
- ✓ Error control
- ✓ Access control

Network Layer: -

The network layer is responsible for establishing, maintaining and terminating network connections. It manages the delivery of data from source to destination

Some responsibilities of network layer are as follows: -

- ✓ Logical addressing
- ✓ Routing

Transport Layer: -

The transport layer controls the flow of data. It ensures that messages are delivered error free. It divides large messages into small packets for efficient transmission. These packets are reassembled, checked for errors and acknowledged at receiving side.

Some responsibilities of transport layer

- ✓ Service-point addressing
- ✓ Segmentation & Reassembly
- ✓ Connection control
- ✓ Flow control
- ✓ Error control

Session Layer: -

The session layer establishes, manages and terminates user connections. A session is an exchange of messages between computers.

Presentation layer: -

The presentation layer performs data reformatting, data compression and encryption

- ✓ Data Reformatting
- ✓ Encryption
- ✓ Compression

Application layer: -

The application layer is the top most layer of OSI model. It provides services directly to user applications. It enables the user to access the network.

- ✓ File transfer
- ✓ Mail services
- ✓ Directory services

❖ TCP/IP Protocol suite: -

Transmission control protocol/ internet protocol is the protocol suite used for communications between hosts in most local networks and on the internet.

Use: -

It can be used to enable network communications in local area networks and wide area networks as long as the hosts support the protocol

Supported: -

TCP/IP is widely supported and is included in operating systems such as Windows 7, XP, Vista, Mac OS, Linux, Unix

Developed: -

TCP/IP protocol suite was developed before the OSI model. Its layers are not same as OSI model

Four Layers: -

The original TCP/IP protocol suite was defined with four layers

- Host-to-network
- Internet
- Transport
- Application

1. Host-to-network: -

The host-to network layer is equivalent to the combination of **physical** and **data link layers** of OSI models. At the physical and data link layers, TCP/IP does not define any specific protocol. It supports all the standard and proprietary protocols.

2. Internet: -

The internet layer is equivalent to the **network layer**.

❖ Uses Four supporting protocols: -

✓ **IP (Internet protocol):**

Internet Protocol (IP) – a set of rules that dictate how data should be delivered over the public network (**Internet**). Often works in conjunction with the transmission control **protocol** (TCP), which divides traffic into packets for efficient transport through the **Internet**; together they are referred to as **TCP/IP**.

✓ **ARP (Address resolution protocol):**

The ARP stands for **Address Resolution Protocol** which is one of the most important protocols of the Network layer in the OSI model.

Note: ARP finds the hardware address, also known as Media Access Control (MAC) address, of a host from its known IP address.

✓ **RARP (Reverse address resolution protocol)**

✓ **ICMP (Internet control message protocol)**

The Internet Control Message Protocol (ICMP) is a network layer protocol used by network devices to diagnose network communication issues. ICMP is mainly used to determine whether or not data is reaching its intended destination in a timely manner. Commonly, the ICMP protocol is used on network devices, such as routers. ICMP is crucial for error reporting and testing,

3. Transport Layer: -

The transport layer in TCP/IP takes care of part of the duties of the **session layer**

The transport layer was represented in TCP/IP by two protocols called:

- ✓ **TCP (Transmission Control protocol)**
- ✓ **UDP (User datagram protocol)**

4. Application Layer: -

The application layer performs the tasks similar to the tasks of **session, presentation** and **application layers** of OSI model.

Traditional Internet Based Applications: -

- SMTP
- FTP
- TELNET