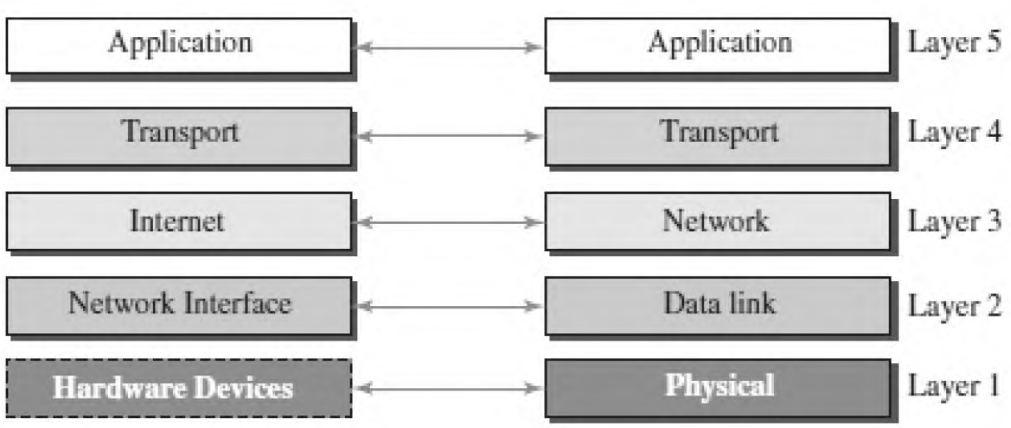
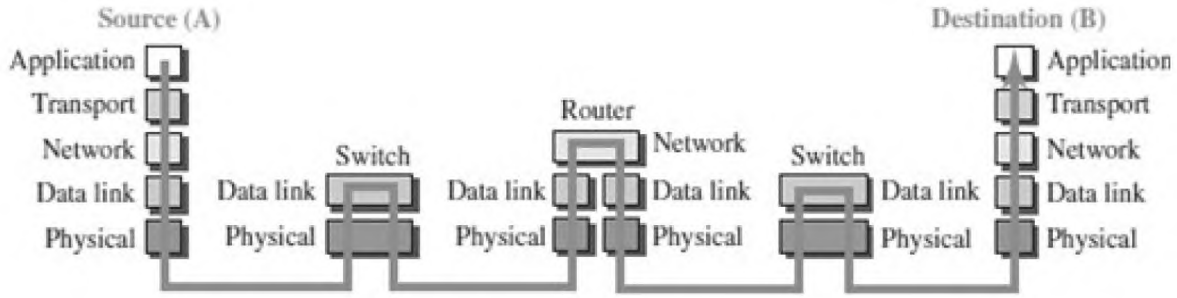
1.6 TCP / IP PROTOCOL SUITE

The TCP/IP architecture is also called as Internet architecture

It is a 4-layer model. The layers of TCP/IP are

1. Application layer
2. Transport Layer (TCP/UDP)
3. Internet Layer
4. Network Interface Layer





APPLICATION LAYER

- An application layer incorporates the function of top three OSI layers. An application layer is the topmost layer in the TCP/IP model.
- It is responsible for handling high-level protocols, issues of representation.
- This layer allows the user to interact with the application.
- When one application layer protocol wants to communicate with another application layer, it forwards its data to the transport layer.
- Protocols such as FTP, HTTP, SMTP, POP3, etc running in the application layer provides service to other program running on top of application layer

TRANSPORT LAYER

- The transport layer is responsible for the reliability, flow control, and correction of data which is being sent over the network.
- The two protocols used in the transport layer are User Datagram protocol and Transmission control protocol.
    - UDP – UDP provides connectionless service and end-to-end delivery of transmission. It is an unreliable protocol as it discovers the errors but not specify the error.
    - TCP – TCP provides a full transport layer services to applications. TCP is a reliable protocol as it detects the error and retransmits the damaged frames.

INTERNET LAYER

- The internet layer is the second layer of the TCP/IP model.
- An internet layer is also known as the network layer.
- The main responsibility of the internet layer is to send the packets from any network, and they arrive at the destination irrespective of the route they take.
- Internet layer handle the transfer of information across multiple networks through router and gateway .
- IP protocol is used in this layer, and it is the most significant part of the entire TCP/IP suite.

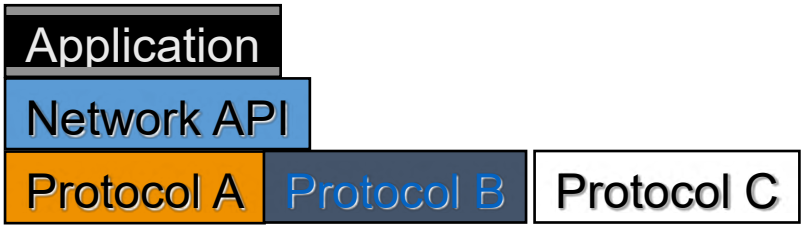
NETWORK INTERFACE LAYER

- The network interface layer is the lowest layer of the TCP/IP model.
- This layer is the combination of the Physical layer and Data Link layer defined in the OSI reference model.
- It defines how the data should be sent physically through the network.
- This layer is mainly responsible for the transmission of the data between two devices on the same network.
- The functions carried out by this layer are encapsulating the IP datagram into frames transmitted by the network and mapping of IP addresses into physical addresses.
- The protocols used by this layer are Ethernet, token ring, FDDI, X.25, frame relay.

S.No	OSI MODEL	TCP/IP MODEL
1	Defined before advent of internet	Defined after the advent of Internet.
2	Service interface and protocols are clearly distinguished before	Service interface and protocols were not clearly distinguished before
3	Internetworking not supported	TCP/IP supports Internet working
4	Strict layering	Loosely layered
5	Protocol independent standard	Protocol Dependant standard
6	Less Credible	More Credible
7	All packets are reliably delivered	TCP reliably delivers packets, IP does not reliably deliver packets

1.7 Introduction to Sockets

The services provided (often by the operating system) that provide the interface between application and protocol software.



Types of Sockets

Two different types of sockets :

stream vs. datagram

Stream socket :(a. k. a. connection- oriented socket)

It provides reliable, connected networking service

Error free; no out- of- order packets (uses TCP)

applications: telnet/ ssh, http, …

Datagram socket :(a. k. a. connectionless socket)

It provides unreliable, best- effort networking service

Packets may be lost; may arrive out of order (uses UDP)

applications: streaming audio/ video (realplayer), …

1.8 Application Layer protocols

- ✓ The application layer is the highest layer in the protocol suite.
- ✓ The application layer provides services to the user.
- ✓ Communication is provided using a logical connection, which means that the two application layers assume that there is an imaginary direct connection through which they can send and receive messages.
- ✓ The application layer is the only layer that provides services to the Internet user

Types of Application Protocols:

Standard and Nonstandard Protocols

Standard Application-Layer Protocols

There are several application-layer protocols that have been standardized and documented by the Internet authority.

Two very widely-used standardized application protocols:

SMTP : Simple Mail Transfer Protocol is used to exchange electronic mail.

HTTP : Hyper Text Transport Protocol is used to communicate between Web browsers and Web servers.

Nonstandard Application-Layer Protocols

A programmer can create a nonstandard application-layer program if they can write two programs that provide service to the user by interacting with the transport layer.