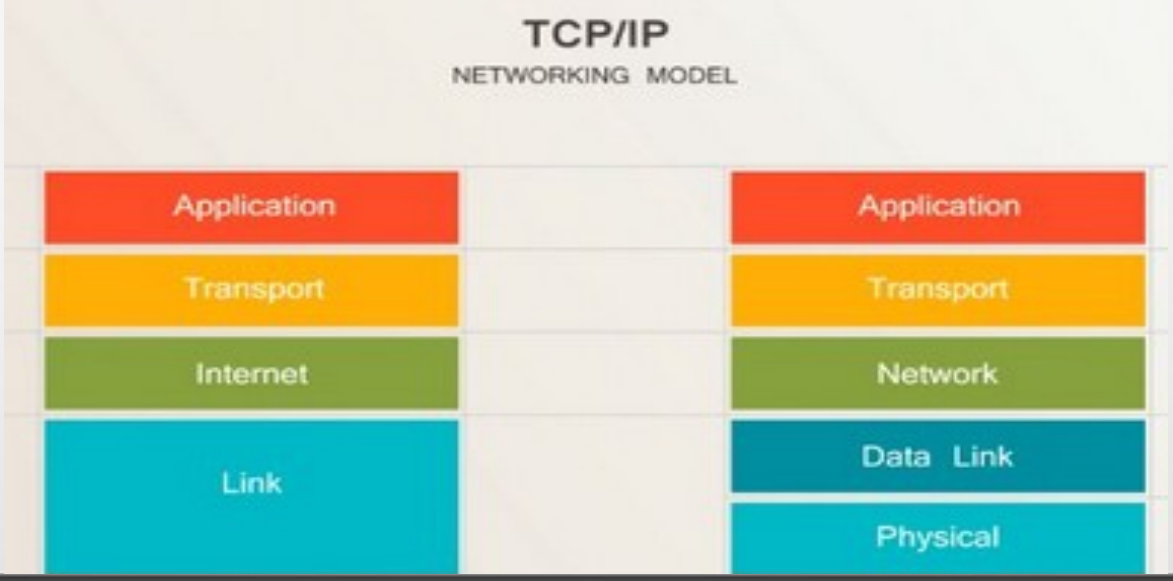
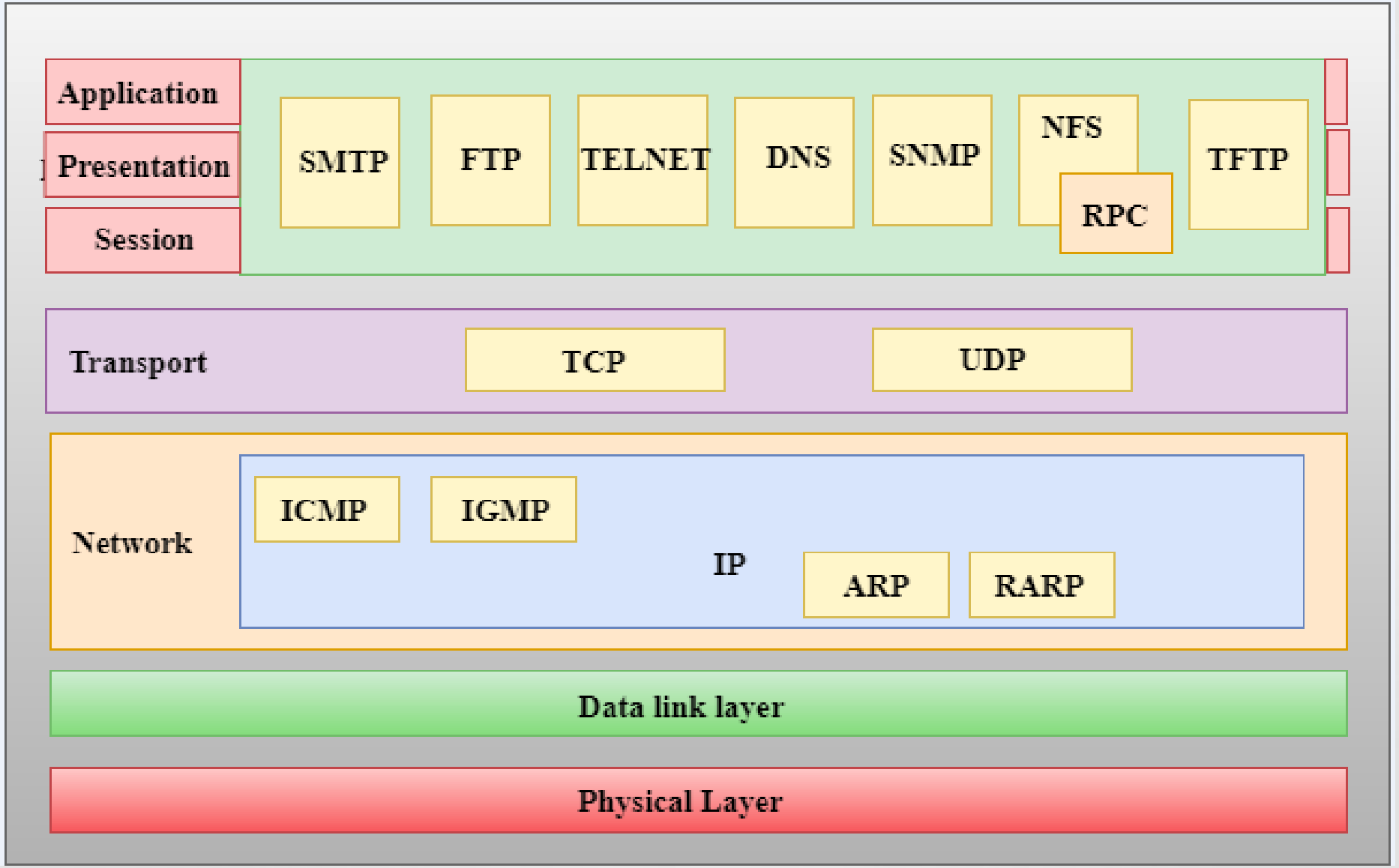
TCP/IP

- Designed and developed by Department of Defense (DoD) in 1960s and is based on standard protocols.
- **Transmission Control Protocol/Internet Protocol.**
- The TCP/IP model was developed prior to the OSI model.
- The TCP/IP model is not exactly similar to the OSI model.
- The TCP/IP model consists of five layers: **the application layer, transport layer, network layer, link layer(data link layer and physical layer).**



TCP/IP


Application
Presentation
Session
SMTP
FTP
TELNET
DNS
SNMP
NFS
RPC
TFTP
Transport
TCP
UDP
Network
ICMP
IGMP
IP
ARP
RARP
Data link layer
Physical Layer

Application Layer

Application Layer protocol:-

1. TELNET:

- Telnet stands for the TELecomunications NETwork.
- It helps in terminal emulation.
- It allows Telnet client to access the resources of the Telnet server.
- It is used for managing the files on the internet.
- It is used for initial set up of devices like switches.
- The telnet command is a command that uses the Telnet protocol to communicate with a remote device or system.
- Port number of telnet is 23.

Application Layer

Application Layer protocol:-

2. SMTP

- It stands for Simple Mail Transfer Protocol.
- It is a part of the TCP/IP protocol.
- Using a process called “store and forward,” SMTP moves your email on and across networks.
- It works closely with something called the Mail Transfer Agent (MTA) to send your communication to the right computer and email inbox.
- Port number for SMTP is 25.

Application Layer

Application Layer protocol:-

3. FTP

- FTP stands for file transfer protocol.
- It is the protocol that actually lets us transfer files.
- It can facilitate this between any two machines using it.
- But FTP is not just a protocol but it is also a program.
- FTP promotes sharing of files via remote computers with reliable and efficient data transfer.
- Port number for FTP is 20 for data and 21 for control.

Application Layer

- Application Layer protocol:-

4. HTTP

- HTTP is a protocol used mainly to access data on the www.
- The Hypertext Transfer Protocol (HTTP) the Web's main application-layer protocol although current browsers can access other types of servers
- A respository of information spread all over the world and linked together.
- The HTIP protocol transfer data in the form of plain text, hyper text, audio, video and so on.
- HTTP utilizes TCP connections to send client requests and server replies.
- it is a synchronous protocol which works by making both persistent and non persistent connections.

Application Layer

- Application Layer protocol:-

5. TFTP

- The Trivial File Transfer Protocol (TFTP) is the stripped-down, stock version of FTP, but it’s the protocol of choice if you know exactly what you want and where to find it.
- It’s a technology for transferring files between network devices and is a simplified version of FTP

Application Layer

- Application Layer protocol:-

6. IP-RTP

- The Real-time Transport Protocol is a network protocol for delivering audio and video over IP networks.
- RTP is used in communication and entertainment systems that involve streaming media, such as telephony, video teleconference applications including WebRTC, television services and web-based push-to-talk features

Transport Layer

- Layer 3 or the Network layer uses IP or Internet Protocol which being a connection less protocol treats every packet individually and separately leading to lack of reliability during a transmission.
- For example, when data is sent from one host to another, each packet may take a different path even if it belongs to the same session.
- This means the packets may/may not arrive in the right order.
- Therefore, IP relies on the higher layer protocols to provide reliability.

Transport Layer

- Transport Layer Protocols :

1) TCP (Transmission Control Protocol):

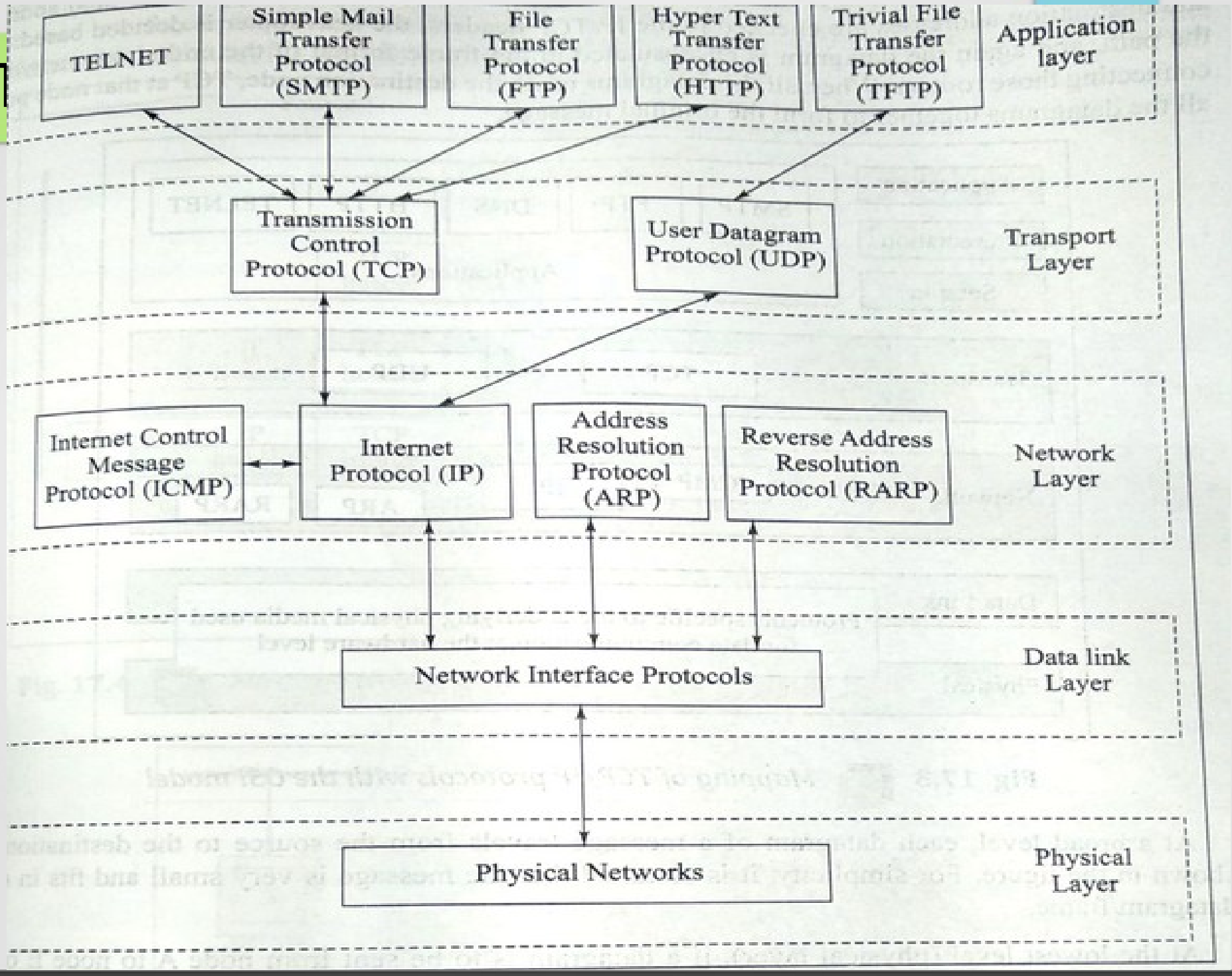
- TCP is a layer 4 protocol which provides acknowledgement of the received packets and is also reliable as it resends the lost packets.
- It is better than UDP but due to these features it has an additional overhead. It is used by application protocols like HTTP and FTP.

2) UDP (User Datagram Protocol):

- UDP is also a layer 4 protocol but unlike TCP it doesn’t provide acknowledgement of the sent packets.
- Therefore, it isn’t reliable and depends on the higher layer protocols for the same.
- But on the other hand it is simple, scalable and comes with lesser overhead as compared to TCP.
- It is used in video and voice streaming.

TCP/IP – Network / Internet layer

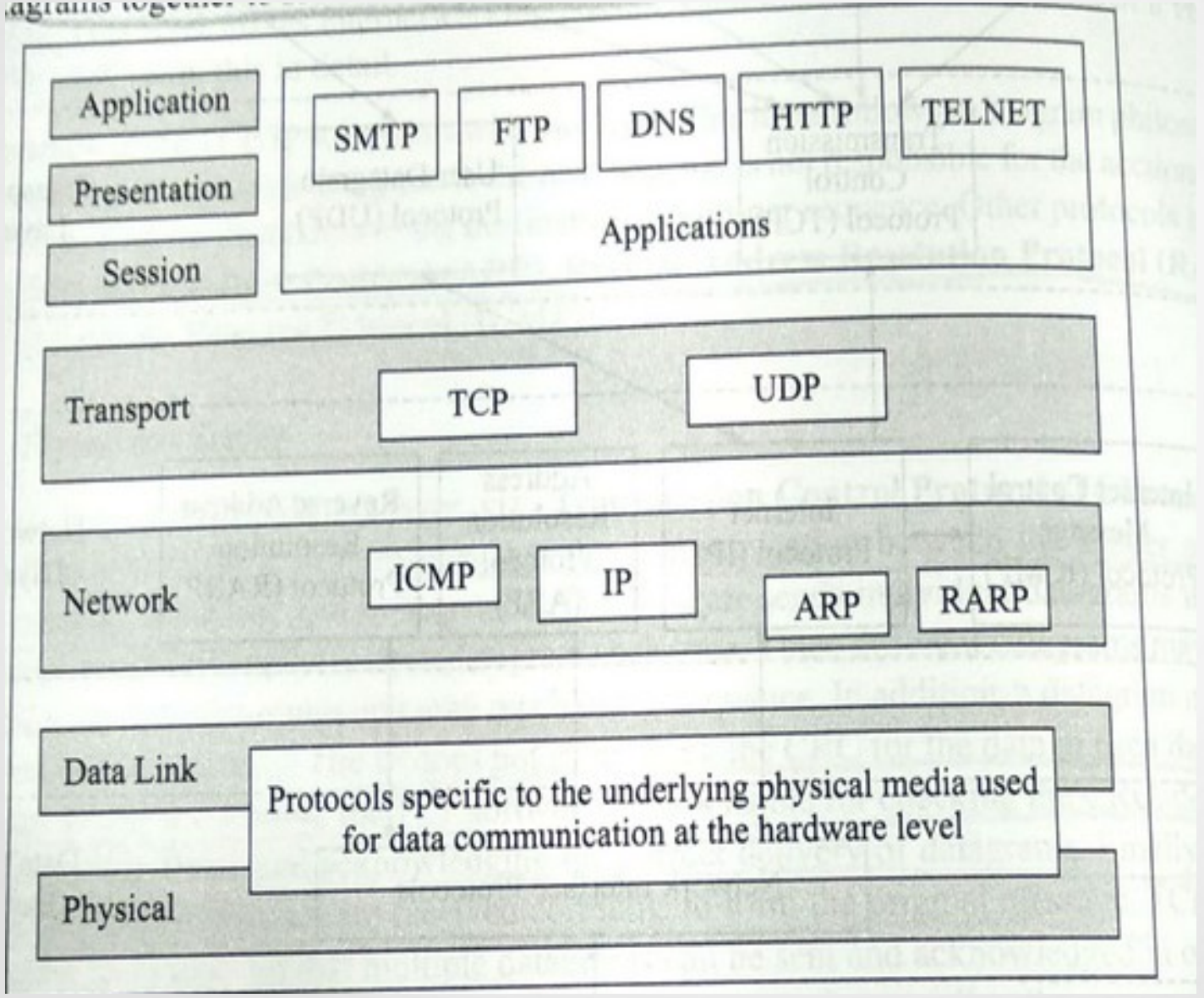
- **Network/Internet Layer:**
- The main responsibility of the internet layer is to send the packets from any network, and they arrive at the destination irrespective of the route they take.
- This layer is concerned with the format of datagrams as defined in the **Internet Protocol(IP).**
- **This layer is responsible for actual routing of datagrams.**
- The **IP** portion of the **TCP/IP suite** deals with this layer.
- It routes and forward a datagrams to the next node but it is not resposible for the accurate and timely delivery of all the datagrams to the destination in a proper sequence.
- Some other protocols in this layer **ARP(Address Resolution Protocol), RARP(Reverse Address Resolution Protocol) and ICMP(Internet Control Message Protocol).**


TELNET
Simple Mail Transfer Protocol (SMTP)
File Transfer Protocol (FTP)
Hyper Text Transfer Protocol (HTTP)
Trivial File Transfer Protocol (TFTP)
Application layer
Transmission Control Protocol (TCP)
User Datagram Protocol (UDP)
Transport Layer
Internet Control Message Protocol (ICMP)
Internet Protocol (IP)
Address Resolution Protocol (ARP)
Reverse Address Resolution Protocol (RARP)
Network Layer
Network Interface Protocols
Data link Layer
Physical Networks
Physical Layer

TCP/IP – Protocol Suite

- **Internetworking Protocol (IP)**
  - The Internetworking Protocol (IP) is the transmission mechanism used by the TCP/IP protocols.
  - It is an unreliable and connectionless protocol-a best-effort delivery service.
  - IP transports data in packets called datagrams.
- **Address Resolution Protocol**
  - The Address Resolution Protocol (ARP) is used to associate a logical address with a physical address
- **Reverse Address Resolution Protocol**
  - The Reverse Address Resolution Protocol (RARP) allows a host to discover its Internet address when it knows only its physical address
- **Internet Control Message Protocol**
  - The Internet Control Message Protocol (ICMP) is a mechanism used by hosts and gateways to send notification of datagram problems back to the sender.
  - ICMP sends query and error reporting messages.

TCP/IP – Protocol Suite



TCP/IP – Link layer

- **Link Layer:(Physical layer/ Datalink layer)**
  - A network layer is the lowest layer of the TCP/IP model.
  - A network 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.
  - It covers MAC(Media Access Control) i.e. who can send data and when, etc.
  - The protocols used by this layer are ethernet, token ring, FDDI, X.25, frame relay.