1. Networking Concepts

1.1 Compare the layers of the OSI and TCP/IP models

OSI model

Application Layer

1. Application layer is responsible for identifying and establishing the availability of desired communication partner and verifying sufficient resources exist for communication.

2. Some of the important application layer protocols are: WWW, SMTP, FTP, etc.

Presentation Layer

1. This layer is responsible for presenting the data in standard formats.

2. This layer is responsible for data compression, decompression, encryption, and decryption.

3. Some Presentation Layer standards are: JPEG, MPEG, MIDI, PICT, Quick Time, TIFF.

Session Layer

1. Session Layer is responsible for co-coordinating communication between systems/nodes.

2. The Session Layer: The following are some of the session layer protocols and interfaces: a) Network File System (NFS), SQL, RPC (Remote Procedure Call), X-Windows, ASP, DNA SCP.

Transport Layer

1. The Transport Layer is responsible for multiplexing upper-layer applications, session establishment, and tearing-down of virtual circuits.

2. This layer is responsible for flow control, to maintain data integrity.

Network Layer

1. There can be several paths to send a packet from a given source to a destination. The primary responsibility of Network layer is to send packets from the source network to the destination network using a per-determined routing methods.

2. Routers work at Network layer.

Data Link Layer

1. Data Link Layer is layer 2 of OSI reference model. This layer is divided into two sub-layers

    A. Logical Link Control (LLC) sub-layer: It handles error control, flow control, framing, and MAC sub-layer addressing.

B. Media Access Control (MAC) sub-layer: It is the lower of the two sub-layers of the Data Link layer. MAC sub-layer handles access to shared media, such a Token passing or Ethernet.

Physical Layer

1. The actual flow of signals take place through Physical layer. At Physical layer, the interface between the DTE and DCE is determined.

The following are some of the standard interfaces are defined at Physical layer: EIA/TIA-232, EIA/TIA 449,V.24,V.35,X.21,G.703,HSSI (High Speed Serial Interface).

TCP/IP Model

Application Layer

1. Provides user interface for communication.

2. Defines TCP/IP application protocols and how host program interface with

Transport layer .

3. When sending transmit data to Transport Layer.

4. When receiving transmits data to Transport Layer.

5. Protocols included are DNS, HTTP, Telnet, FTP, RDP etc.
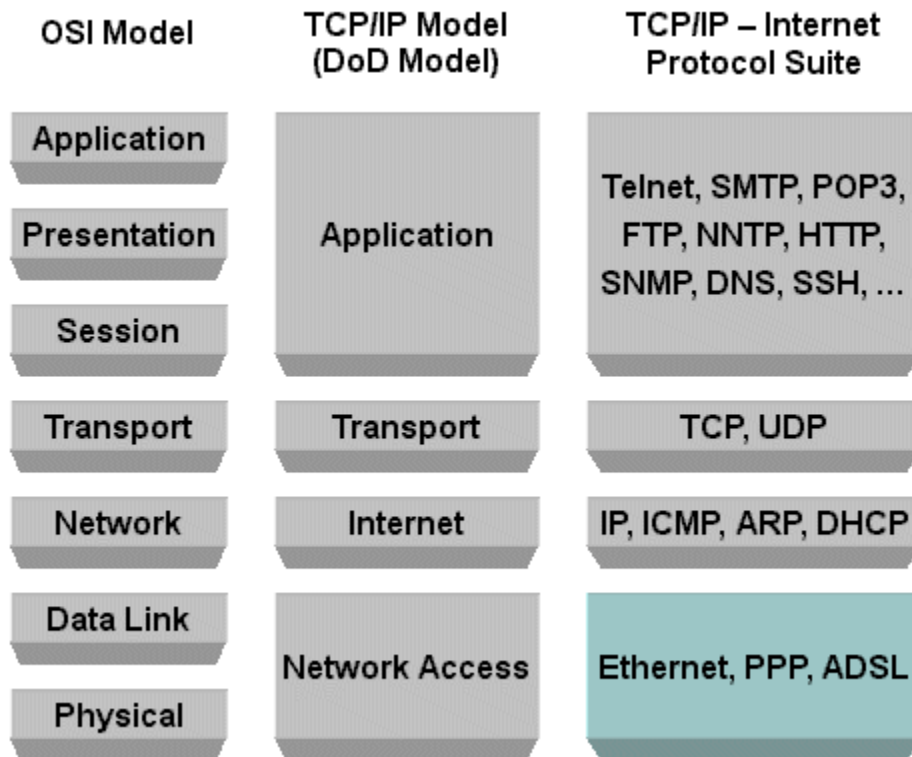
Transport Layer

1. It allows host-host communication. It provides reliable, connection-oriented

transport b/w two sockets on two computers using Internet Protocol to communicate.

2. Defines level of service and status of connection used when transporting data.

3. When sending transmits data to Internet Layer.

4. When receiving transmits data to Application Layer.

5. Protocols include TCP, UDP

Internet Layer

1. It packs data in to data packets called IP datagrams(contains sources and

destination IP address).

2. Also does logical addressing and routing of data on network.

3. When sending it transmit data to Network Access Layer.

4. When receiving transmit data to Transport Layer,

5. Protocols included are IP,ICMP, ARP, RARP and IGMP

Network Access Layer

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1. Defines how data is sent physically through the network.

2. Provides access to physical network that is allow your computer to access wire, wireless or optical network.

3. When sending it transmit data to physical network.

4. When receiving transmit data to Internet layer.

5. Protocols included are Ethernet, Token Ring, FDDI.

OSI Model	TCP/IP Model (DoD Model)	TCP/IP – Internet Protocol Suite
Application		Telnet, SMTP, POP3, FTP, NNTP, HTTP, SNMP, DNS, SSH, …
Presentation	Application	
Session		
Transport	Transport	TCP, UDP
Network	Internet	IP, ICMP, ARP, DHCP
Data Link	Network Access	Ethernet, PPP, ADSL
Physical		

The following diagram provides a mapping of OSI to DoD (TCP/IP) Model:

In the Application layer lies many of network aware programs and services such as:

1. HTTP (80) - HyperText Transport Protocol which is used for transferring webpages.

2. SNMP (161/162) - Simple Network Management Protocol which is used for managing network devices.

3. FTP (20/21) - File Transfer Protocol which is used for transferring files across the network.

4. TFTP (69) - Trivial File Transfer Protocol which is a low overhead fast transfer FTP protocol.

5. SMTP (25) - Simple Mail Tranfer Protocol which is used for transferring email across the Internet.

6. Telnet (23) - An application for remotely logging into a server across the network.

7. NNTP (119) - Network News Transfer Protocol which is used for transferring news.

The numbers, shown in brackets next to the protocols, are called the Well Known Port Numbers,