Assignment 1

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SUBJECT

Computer Networks

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CC210

PROGRAMME

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Assignment 1

1: ELOBRATE the difference between TCP/IP and OSI Refrence Model?

Answer:

<u>Difference between TCP/IP And OSI Refrence Model:</u>

OSI Reference Model:

- Provides useful way to describe and think
- about networking
- Breaks networking down into series of
- related tasks
- Each aspect is conceptualized as a layer
- Each task can be handled separately

Understanding Layers:

- Layering helps clarify process of
- networking
- Groups related tasks and requirements
- OSI model provides theoretical frame of
- reference
- Clarifies what networks are
- Explains how they work

Application Layer

- Layer 7 is top layer of OSI reference model
- Provides general network access
- Includes set of interfaces for applications to access variety of
- networked services such as:
- File transfer
- E-mail message handling
- Database query processing
- May also include error recovery
- PDU at this layer and the next two layers is referred to as data
- Examples of software that resides at this layer include FTP, HTTP
- (the protocol used to transfer Web pages), and components of client
- software such as the Client for Microsoft Networks

Presentation Layer

- Layer 6 handles data formatting and protocol
- conversion
- Converts outgoing data to generic networked format
- Performs data encryption and decryption
- Handles character set issues and graphics commands
- May include data compression
- Includes redirector software that redirects service
- requests across network
- Software components that operate at this layer are
- usually built into the Application layer

Session Layer

- Layer 5 opens and closes sessions
- Performs data and message exchanges
- Monitors session identification and security
- Performs name lookup and user login and logout
- Provides synchronization services on both ends
- Determines which side transmits data, when, and for
- how long
- Transmits keep-alive messages to keep connection open
- during periods of inactivity
- Some of the common network functions handled by this
- layer include name lookup and user login and logout

Transport Layer

- Layer 4 conveys data from sender to receiver
- Breaks long data payloads into chunks called segments
- Includes error checks
- Re-sequences chunks into original data on receipt
- Handles flow control
- PDU at this layer is called a segment
- The components that work at this layer include the TCP
- portion of the TCP/IP protocol suite and the SPX portion
- of the IPX/SPX protocol suite

Network Layer

- Layer 3 addresses messages for delivery
- Translates logical network address into physical MAC
- address
- Decides how to route transmissions
- Handles packet switching, data routing, and congestion
- control
- Through fragmentation or segmentation, breaks data
- segments from Layer 4 into smaller PDUs called packets
- Reassembles data packets on receiving end
- The software components include the IP component of
- TCP/IP and the IPX component of IPX/SPX
- Routers operate at this layer

Data Link Layer

- Layer 2 creates data frames to send to Layer 1
- On receiving side, takes raw data from Layer 1 and
- packages into data frames
- Data frame is basic unit for network traffic on the
- wire
- See Figure 5-3 for contents of typical data frame
- Performs Cyclic Redundancy Check (CRC) to verify data
- integrity
- Detects errors and discards frames containing errors
- PDU at Layer 2 is called a frame
- The software component that operates at this layer is
- the NIC driver; the hardware components that operate
- here include the NIC and switches

Physical Layer

- **Layer 1** converts bits into signals for outgoing messages and signals into bits for incoming messages
- Manages computer's interface to medium
- Instructs driver software and network interface to send data across medium
- Sets timing and interpretation of signals across medium

- ❖ Translates and screens incoming data for delivery to receiving computer
- ❖ The components include all of the cables and connectors used on the medium plus repeaters and hubs

TCP/IP model:

The TCP/IP model, much like the OSI model, breaks down networking into various layers, but it condenses these tasks into four main layers instead of seven. Here's a restructured description of networking tasks using the TCP/IP model:

Understanding the TCP/IP Model:

- **Provides a practical framework for networking**
- **Organizes networking functions into layers that can work independently**
- **Facilitates the design and understanding of how networks operate**
- **Defines protocols for data communication over networks**

Application Layer (TCP/IP):

- **The Application layer is the top layer in the TCP/IP model.**
- **Handles all application-related tasks such as data formatting and network services.**
- **Manages network access for programs such as email, file transfer (FTP), and web services (HTTP).**
- **Includes error recovery, data presentation, and session management in this layer.**
- **Protocols in this layer: HTTP, FTP, SMTP, DNS, etc.**

Transport Layer (TCP/IP):

- **The Transport layer in the TCP/IP model ensures reliable data transmission between sender and receiver.**
- **It breaks large data into smaller segments and ensures they arrive in the correct order.**
- **Handles flow control, retransmissions, and error detection.**

- **Protocols used at this layer include TCP (Transmission Control Protocol) for reliable transmission and UDP (User Datagram Protocol) for faster, but less reliable, communication.**
- **PDU at this layer is referred to as a segment (TCP) or datagram (UDP).**

Internet Layer (TCP/IP):

- **This layer corresponds to the OSI Network layer and is responsible for packet routing and addressing.**
- **It manages logical addressing (IP addressing), packet fragmentation, and reassembly.**
- **Controls how packets travel from source to destination across networks.**
- **The main protocol used here is IP (Internet Protocol), and components like routers function at this layer.**
- **PDU at this layer is called a packet.**

Network Access Layer (TCP/IP):

- **The Network Access layer encompasses both the OSI Data Link and Physical layers.**
- **It manages the hardware aspects of data transmission such as framing, error detection (CRC), and the physical transmission of signals over media.**
- **Responsible for taking packets from the Internet layer and transmitting them across a physical network (e.g., Ethernet, Wi-Fi).**
- **Hardware like NICs (Network Interface Cards), switches, cables, and hubs operate at this layer.**
- **PDU at this layer is known as a frame for wired connections and can be referred to as bits at the lowest level.**

Key Differences Between OSI and TCP/IP Models:

- **Fewer layers:** The TCP/IP model consolidates several functions from the OSI model into fewer layers.

- **Real-world application:** The TCP/IP model is more widely used in modern networking, particularly the Internet.
- **Flexible structure:** Unlike the OSI model, the TCP/IP model layers can function independently, making it more practical for real-world network implementations.