**Assignment 1**

**SEMISTER 3rd**

fall-2024

**SUBJECT**

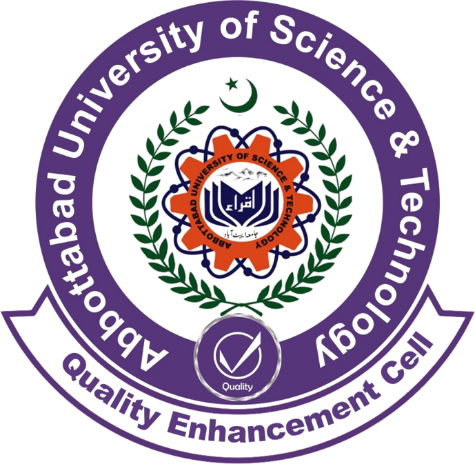
Computer Networks

**COURSE CODE**

CC210

**PROGRAMME**

BS (4 year)



**ABBOTTABAD UNIVERSITY OF SCIENCE AND TECHNOLOGY ISLAMABAD**

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**Assignment 1**

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

**Answer:**

**Difference between TCP/IP And OSI Refrence Model:**

**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.