BIT 2204

NETWORK SYSTEMS AND ADMINISTRATION

ASSIGNMENT 1

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In 300 words, write a write-up on the difference between the 7-layer OSI reference model and the TCP/IP model.

The OSI (Open System Interconnection) model is a logical and conceptual model that defines network communication used by systems open to interconnection and communication with other systems; it also defines a logical network and effectively describes computer packet transfer by using various layers of protocols. It was developed by ISO (International Standard Organization).

The TCP/IP (Transmission Control Protocol/Internet Protocol) model helps you determine how a specific computer should be connected to the internet and how you can transmit data between them; it helps you create a virtual network when multiple computer networks are connected together. It is specifically designed as a model to offer highly reliable and end to end byte stream over an unreliable inter-network. It was developed by ARPANET (Advanced Research Project Agency Network).

The OSI model has seven layers while the TCP/IP model has four layers. The layers of the OSI model are as follows :

1. **Application layer -** provides a window for application services to access the network and display information to the user.
2. **Presentation layer -** responsible for converting binary to human readable format, compression, decompression, and encryption of the data.
3. **Session layer -** opens communication channels and ensures they remain open during communication, and closes them when communication is done. Creates checkpoints to allow resume capability.
4. **Transport layer -** responsible for end to end delivery of complete messages and acknowledgement of successful data transmission or retransmission if errors are found.
5. **Network layer -** handles host to host delivery of messages in different networks, packet routing, and manages sub-net traffic.
6. **Data link layer -** responsible for node to node delivery of the message, error correction and, physical addressing and flow control.
7. **Physical layer -** responsible for the actual physical connection. It transmits individual bits from one node to the next.

The layers of the TCP/IP are below :

1) **Application layer -** it is responsible for end to end communication and error free delivery of data, it shields the upper layer applications from the complexities of data.

2) **Transport layer -** exchanges data receipt acknowledgments and re-transmits missing packets to ensure that packets arrive in order and without error.
3) **Internet layer -** it defines the protocols which are responsible for the logical transmission of data over the entire network.
4) **Network access layer -** it handles the physical infrastructure that lets computers communicate with one another over the internet such as network cables.

The OSI model uses the network layer to define routing protocols and standards while the TCP/IP model uses the internet layer.

The TCP/IP model combines the OSI model's application, presentation and session layers into one application layer; and the OSI model's data link and physical layer into one network access layer. This makes it difficult to troubleshoot issues or enhance performance when using the TCP/IP model since you cannot focus on any specific layer.

The TCP/IP model follows a horizontal approach while the OSI model follows a vertical approach.

In TCP/IP, the protocols were developed first , and then the model was developed while in OSI, the model was developed first, then the protocols in each layer were developed.

The transport layer in the TCP/IP model does not guarantee delivery of packets but the OSI model guarantees delivery of packets.

Protocols cannot be easily replaced in the TCP/IP model while in the OSI model, protocols are better covered and are easy to replace with the technology change.

The network layer in the OSI model provides both connection and connection-less oriented services while the network layer in the TCP/IP model only provides connection-less (IP) services with the transport layer providing the connection oriented services.

The OSI model provides a clear distinction between interfaces, services, and protocols but the TCP/IP has no such clear distinguishing points between services, interfaces, and protocols.

The minimum size of the OSI header is 5 bytes while the minimum header for TCP/IP is 20 bytes.

The OSI model was defined after the advent of the internet while the TCP/IP model was defined before the advent of the internet, therefore, TCP/IP has been the foundational protocol suite of the internet while OSI is not as widely implemented in practice and remains mostly a useful model for understanding networking concepts.

The TCP/IP model is more commonly used than the OSI model since it is more reliable.