

# OSI Seven Layer Model

OSI Model	TCP/IP	Netware	DoD	Protocols	Exchange Unit	Equipment	What Happens At Each Layer
<b>Application</b> (Application Layers)	<b>Application Layer</b>	<b>SAP, NCP</b>	<b>Application / Process</b>	<b>Telnet</b> <b>HTTP</b>	<b>Alpha / Numeric (APDU)</b> (DataStream)	<b>GATEWAYS</b>  (Gateways work at all seven layers of the OSI Model)	Provides user interface for File, Print, Database, E-Mail, Spreadsheets and Web Browsers (WWW). Provides network services and management. Synchronization, Error recovery, correction, and Control of data integrity.
<b>Presentation</b> (Application Layers)				<b>ASCII</b> <b>EBCDIC</b> <b>Jpeg</b>	<b>PPDU</b> (DataStream)		Encoding - Data Encryption, Decryption, Compression and Translation. Common data format. Code formatting - Conversion and negotiating data transfer syntax. JPEG, TIFF, PICT, MIDI, MPEG, Quick Time.
<b>Session</b> (Application Layers)				<b>Operating System / Application Access Scheduling</b>	<b>SPDU</b> (DataStream)		Dialog Control. Coordination of data communication between two Presentation layers. Offers simplex, half-duplex, and full-duplex modes for communication. Establishes, manages, and terminates provisions for efficient data transfer, class of service and exception reporting. NFS, SQL, RPC, X Window
<b>Transport</b> (Data Flow Layers)	<b>Transport Layer</b>  <b>Host to Host</b>  (TCP) (UDP) (Protocols)		<b>Host to Host</b>	<b>(TCP)</b> <b>(SPX)</b> <b>(UDP)</b>	<b>SEGMENTS</b> (TPDU)		Segments and reassembles data. End-to-End data transport service and Connection that shields upper layers. Reliable delivery of data. Provides maintenance and termination (tear down) of virtual circuits. Transport error detection-and-recovery. Maintains data flow control to avoid congestion, overloading and loss of data. Supports connection oriented and connectionless communication session between systems. Logical port numbers are used at this layer. Windowing and sequencing supported at this layer. PAR – Positive acknowledgment and retransmission.
<b>Network</b> (Data Flow Layers)	<b>Internet Layer</b> (IP) (ARP) (RARP) (RIP) (ICMP) (Network)	<b>IPX</b>	<b>Internet</b>	<b>(IP)</b> <b>(IPX)</b>	<b>PACKETS</b>	<b>ROUTERS</b>	Routing. Provides connectivity and path selection between two host located on geographically separate networks. Designates all paths of its media connection. Creates a composite “network map”. Logical addressing is used at this layer. Ensures that information arrives at the correct destination. Layer 3 devices operate at this layer. ARP- Address resolution protocol. Static and dynamic addressing.

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<b>Data Link</b> (Data Flow Layer)	<b>Network Access Layer</b> (Network)	<b>MAC Protocols</b>	<b>Network Access</b>	<b>HDLC</b>	<b>FRAMES</b>	<b>SWITCHES / BRIDGES</b>	Framing. Provides for the transit of data across a physical link. Ensures messages are delivered to the proper device. Concerned with physical addressing, network media access, and error checking (error detection). Translates messages from the network layer into bits for the physical layer. Validates the Integrity of the flow of data. Addressing and checksumming of Ethernet packets.
<b>LLC</b>				<b>IEEE 802.2 FDDI Token Ring</b>			<b>Logical Link Control (LLC):</b> Supports both connectionless and connection-oriented services. Establishes and terminates links. Controls frame traffic. Uses service access points. Sequencing and Acknowledgement of frames. IEEE 802.2 (FDDI, Token Ring, Ethernet II). Can provide error correction.
<b>MAC</b>				<b>IEEE 802.3 Ethernet (CSMA/CD)</b>			<b>Media Access Control (MAC):</b> Responsible for the physical hardware addressing, media access and error detection of frames. Defines how packets are placed on the media. Handles network topology and line discipline. IEEE 802.3 (Ethernet – CSMA/CD)
<b>Physical</b> (Data Flow Layers)				<b>(Ethernet) (Token-Ring) (Fast Ethernet) (FDDI)</b>	<b>EIA/TIA-232 , V.35</b>	<b>BITS</b>	<b>REPEATERS / HUBS / NIC's</b>

## Advantages of the Reference Models:

- Divides complex network operations into more manageable layers.
- Breaks network communication into smaller, simpler parts that are easier to develop and understand.
- Facilitates standardization of network components to allow multiple vendor development and support.
- Allows changing of one layer without having to change all layers, Application developers can specialize in design and development.
- Defines the standard interface for the “Plug-and-Play” multivendor integration.
- Allows different types network hardware and software to communicate with each other.

**Remember: “Physical Data-Link Networks, Transport Sessions for the Presentation and Application Layers.”**