Introduction to the osi reference model

Introduction to the OSI Reference Model The International Organization for Standardization (ISO) defined the Open Systems Interconnection (OSI) reference model to standardize networking of devices from different vendors. The OSI reference model is mostly an architecture blueprint that networking and computer device manufacturers implement. The OSI model has never been implemented exactly as defined. The TCP/IP protocol stack is the closest implementation available today. Application Layer (7) This layer represents the various network applications such as e-mail reader, Web browser, Hypertext Transfer Protocol (HTTP), File Transfer Protocol (FTP), and Network File System (NFS). âœ¦ The application layer provides a user interface and processes network data. âœ¦ The application layer on the sending host produces the network data to be transmitted from the sender host. âœ¦ The application layer on the receiving host consumes the network data produced and transmitted by the sender host. Presentation Layer (6) This layer is mostly concerned with data format. It converts the data between different formats so that both the sender and the receiver can use heterogeneous data. For example, mail messages contain various data formats: text, application attachments, video, audio, and graphical signature. âœ¦ The presentation layer on the sending host receives the data payload from the application layer. âœ¦ The presentation layer on the sending host converts the data into a format that is easily transportable over the network. âœ¦ The presentation layer on the receiving host converts the data from the network format back to its native format that can be easily interpreted, used, and displayed by the application layer above. Session Layer (5) Some applications need to open logical communication channels between the computer hosts. Logical communication channels (sessions) maintain data

about the communication established between the network application running on the sending host and the network application running on the receiving host. The session layer does the following: âœ¦ Opens and maintains logical communication channels between network applications running on the sending host and network applications running on the receiving host. âœ¦ Handles authentication: Some network applications use authentication mechanisms before they open a logical communication channel (session) with a remote host. Transport Layer (4) The transport layer manages the transport of data between two hosts over a network. In a nutshell, the transport layer does the following: âœ¦ Slices the data to be transmitted into small chunks called data segments that can be easily sent over the network medium. âœ¦ Reassembles the data in order on the receiving host: Data segments are not guaranteed to arrive in order at destination since they may use different routes to reach the destination host. The transport layer is responsible to reassemble the data in order on the receiving host. Network Layer (3) The network layer routes data packets across networks that link the sending and the receiving host. In a nutshell, the network layer does the following: âœ¦ Chooses the best route to send packets between hosts. âœ¦ Assigns logical addresses to all devices in the network to be able to identify each source host and each destination host, as well as each network through which packets need to be routed. Logical addresses are assigned at the network protocol level. Physical addresses are assigned on a physical device, such as a network card. âœ¦ Receives each data segment from the transport layer on the sending host and wraps it in a data packet along with routing data. The packet is sent down to the data link layer to send it over the network physical medium. âœ¦ On the receiving

host, the network layer unwraps the packet received to extract the data segment and sends it up to the transport layer. Several protocols operate at the network layer, such as IP, IPX, AppleTalk, and SNA. The Internet Protocol (IP) is the TCP/IP implementation of the network layer. IP addresses are logical addresses provided by the IP in TCP/IP. Cisco routers are Layer 3 (network layer) devices. Data Link Layer (2) The data link layer does the following: âœ¦ Transmits the data on the physical medium. âœ¦ Routes the data locally on the physical network medium. The data link layer uses physical addresses assigned to each physical network device in the local network to route data from one physical device to another. âœ¦ The data link layer receives each packet from the network layer on the sending host and wraps it in a data frame along with local routing data. âœ¦ The data link layer sends each data frame down to the physical layer to code an electrical or optical signal to transmit the data frame over a wire or over the air (wireless transmission). âœ¦ On the receiving host, the data link layer unwraps the data frame received to extract the packet and sends it to the network layer. Cisco switches are Layer 2 (data link layer) devices. Physical Layer (1) The physical layer provides the electrical, optical, or over-the-air connection between the sending host device and the receiving host device. This typically involves copper or fiber-optic cabling, or wireless radio connections, patch panels, signal repeaters, submarine cables, or satellites. Data is always converted into bits that can be transmitted over a medium using electrical current or optical signals that simulate a 1 (signal) or a 0 (no signal). In a nutshell, the physical layer defines mechanical, electrical, optical, radio, procedural, and functional standards to enable the transmission of data-link (Layer 2) frames over a certain transmission

medium. These standards define how a physical link is built, activated, maintained, and deactivated to enable transmissions between DTE (data terminal equipment) and DCE (data communications equipment). DTEs are host devices. DCEs are network devices, that is, any device that stands between two host devices. Most hubs amplify the electrical signal; therefore, they are really repeaters with several ports. Hubs and repeaters are Layer 1 (physical layer) devices.