

Telecommunication OSI

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❖ Introduction

- **Layered architecture**
 - **Is a conceptual blueprint of how communications should take place.**
 - **It divides communication processes into logical groups called layers**
 - **In layered architecture the data pass downward**
- **Reason for using layered architecture:**
 - **To clarify the general functions of a communications processes**
 - **To break down complex networking processes into more manageable sub layers**
 - **Using industry standard interfaces enables interoperability**
 - **To change the features of one layer without changing every layer**
 - **Easier troubleshooting**
- **In the US teleco system are regulated by the FCC**
- **OSI / ISO**
 - **ISO was created in 1980 by International Standards Organization**
 - **The reason to help vendors create interoperable network devices**
 - **Allows dissimilar networks to communicate**
 - **Defines 7 protocol layers (a.k.a. protocol stack)**
 - **A protocol - is a set of rules that dictate how computers will communicate**
 - **The ISO describes how data and network information is communicated**
 - **The ISO breaks this approach into seven layer**
 - **Data is encapsulated as it travel down the OSI**
 - **OSI Security Services**
 - Authentication
 - Access Control
 - Data Confidentiality
 - Data Integrity
 - Non Repudiation
 - Logging & Monitoring
 - **OSI Security Mechanisms**
 - Traffic Padding
 - Authentication
 - Access Control
 - Digital Signature
 - Encipherment
 - Routing Control
 - Notarization (PKI)
 - **Mnemonics**
 - **Please Do Not Throw Sausage Pizza Away (bottom to top layer)**

- All People Seem To Need Data Processing (top to bottom layer)

❖ 1-Physical Layer

- Transmits bit stream on physical medium
- Convert bits into electrical signals and controls physical aspects of the data
- Physical link characteristics
 - Include voltage levels
 - Data rates
 - Maximum transmission distances
 - Physical connectors LAN Topologies
- Supported Protocols
 - HSSI - High Speed Serial Interface
 - X.21, X.24
 - V.35
 - EIA/TIA-232 and EIA/TIA 449
- IS THE ONLY LAYER THAT DOES NOT HANDLE ENCRYPTION

❖ 2-Data Link Layer

- Provides transfer of information to other end of physical link
- Prepares data for the network wire by framing it
- LAN WAN technologies live at this layer
- Convert into LAN or WAN frames for transmission
- Define how computers access the network
- Converts the data into bits for the physical layer
- Handle Physical addressing
- Handle Network topology
- Line discipline
- Handle Error notification
- Handle Orderly delivery of frames
- Handle Optional flow control
- Supported Protocols
 - ARP - Address Resolution Protocol
 - RARP - Reverse Address Resolution Protocol
 - PPP - Point To Point Protocol
 - SLIP - Serial Line Internet Protocol
 - CSLIP
 - HDLC - High-Level Data Link Control
- Supported Devices
 - Frame Relay operates at layer 1 and 2
 - Switches operate at this layer
 - Bridges operate at this layer

❖ 3-Network Layer (Internet Layer)

- Provides

- Internetworking service
- Routing
- Addressing
- Segmenting
- Relaying
- Handles dead-lock
- **Switches and routes information units**
- **Determines the best way to transfer data**
- **Can determine alternate routes to avoid network congestion**
- **It manages device addressing and tracks the location of devices**
- **Supported Protocols**
 - IP - Internet Protocol
 - ICMP - Internet Control Message Protocol
 - ARP - Address Resolution Protocol
 - RIP - Routing Information Protocol
 - IPX - Internetwork Packet Exchange
 - OSPF - Open Shortest Path First
 - X25
- **Supported Devices**
 - Routers
 - X.25

❖ 4-Transport Layer

- **The handshake between two computers happened at this layer**
- **Provides**
 - Error Detection and Correction
 - Flow control
 - End-to-end transmission integrity
 - Sequencing and virtual circuits
 - Transparent data transfers between session entities
- **Supported Protocols**
 - TCP - Transmission Control Protocol
 - UDP - User Datagram Protocol

❖ 5-Session Layer

- **The purpose of session layer is Dialog Control**
- **Establishes, maintains, & manages sessions**
- **Sets up the connection, maintain it, and tears it down once done**
- **Provides synchronization of the data flow**
- **Works in 3 phases**
 - Connection establishment
 - Data Transfer
 - Connection release
- **3 Modes of communications**
 - Simplex

- Half-Duplex
- Full-Duplex
- **Supported Protocols**
 - NFS - Network File System
 - RPC - Remote Procedure Call
 - SQL - Structured Query Language
 - SSL - Secure Socket Layer
 - SPX - Sequenced Packet Exchange
 - X Window
 - AppleTalk

❖ **6-Presentation Layer**

- **Provides Data syntax and formatting**
- **Provides data representation between systems**
- **Provide data Compression and Encryption**
- **Provides code formatting and conversion.**
- **Translates between differing text and data character**
- **Supported Protocols**
 - ASCII - American Standard Code for Information Interchange
 - EBCDIC - Extended Binary Coded Decimal Interchange Code
 - TIFF - Tagged Image File Format
 - JPEG - Joint Photographic Experts Group
 - GIF
 - MPEG - Motion Picture Experts Group
 - MIDI - Musical Instrument Digital Interface

❖ **7-Applications Layer**

- **Provides specific services for applications**
- **Works closest to the user**
- **Processes and properly formats the data and passes it down to the next layer**
- **Supported Protocols**
 - FTP - File transfer Protocol
 - TFTP - Trivial File Transfer Protocol
 - WWW - World Wide Web
 - SMTP - Simple Mail Transfer Protocol
 - SNMP - Simple Network Management Protocol