

OSI Model

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OSI Model



- ISO Standard 7489
- Composed of seven layers
- Each layer can be viewed as a protocol
 - Protocol: a set of rules that govern communications between hardware and/or software components
- OSI model is both hardware & software

OSI Layers



Application Network (not user) applications Ensures that information sent from one system will **Presentation** be readable by another system. Manages, communication sessions (program to Session program logical link) End to end network reliability **Transport** Network Network to network link. Uses logical addresses **Datalink** Provides transport of data across a local physical network link. Uses physical addresses Specifications for the physical link between systems **Physical**

Physical Layer



- The physical layer is concerned with:
 - The electrical, mechanical and procedural specifications for a point-to-point data transmission.
 - Many type of media can be used as long as it follows the specifications:

Coax Optical

Fiber Other

Data-Link Layer



- Provides a protocol that delivers reliability to upper layers for the point-to-point connections established by the physical layer.
- Builds upon the capabilities of the lower layer.

Data-Link Layer



- Note the Data-Link layer is split
 - MAC layer. This is hardware dependent
 - LLC layer. This is hardware independent

Logical Link Control

Media Access Control

Specified by 802.X protocols

Assures reliability of point-to-point data links

Is This always true?

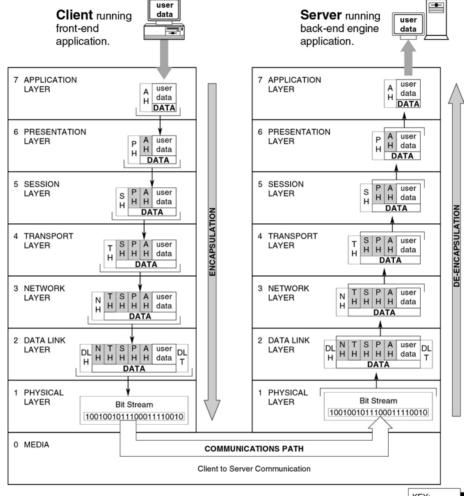
Network Layer



- The protocol responsible for the establishment, maintenance and termination of end-to-end network links.
- In the TCP/IP stack, provides the IP to IP communications
- This layer is protocol STACK dependent.
 - IP to IP
 - IPX to IPX



Layer to Layer Communications



Network Layer Transport

MAC Layer Transport

Physical Transport

Connection Media

KEY: H header T trailer

GOLDMAN & RAWLES: LAN 2e FIG: 02-02

Transport Layer



- Responsible for providing reliability for the end-to-end network layer connections
 - Error Recovery
 - Flow Control
 - Sequence Control
- Protocol stack dependent
 - SPX for Netware
 - TCP for TCP/IP

Session Layer



- Responsible for establishing, maintaining, and terminating sessions between user applications programs
- Application programs are referred to as Middleware
 - Low level links through the Web, to database programs, etc.

Presentation Layer



- Provides an interface between user application and various presentation-related services. (Not user interface related)
- Provides encoding transparency.
 - ASCII can_talk to an EBCDIC
 - FYI, uses a common intermediate code

Application Layer



- Network applications such as:
 - Mail (SMTP)
 - FTP

Not to be confused with user applications



Network Utilities

user **= Client** running Server running data user front-end back-end engine data application. application. 7 APPLICATION 7 APPLICATION user LAYER user LAYER data data DATA **Encapsulation** DATA 6 PRESENTATION 6 PRESENTATION P A user H data P A user LAYER LAYER H H data DATA DATA 5 SESSION 5 SESSION P A user H H data S P A user data LAYER LAYER Н DATA DE-ENCAPSULATION DATA ENCAPSULATION 4 TRANSPORT 4 TRANSPORT T S P A user H H H H data T S P A user H H H H data LAYER LAYER DATA DATA 3 NETWORK 3 NETWORK T S P A user H H H H data N T S P A user H H H H H data LAYER LAYER DATA DATA 2 DATA LINK 2 DATA LINK DL N T S P A user DL H H H H H H data T DL N T S P A user DL H H H H H H data T LAYER LAYER DATA 1 PHYSICAL 1 PHYSICAL Bit Stream LAYER LAYER Bit Stream 1001001011100011110010 1001001011100011110010 0 MEDIA COMMUNICATIONS PATH Client to Server Communication KEY: H header

De-Encapsulation

T trailer

GOLDMAN & RAWLES: LAN 2e FIG: 02-02

OSI Layers



- IP Protocol Supported Layers
 - Layers 1 & 2 match
 - Layers 3, & 4 are functionally present
 - No layers 5 & 6
 - Layer 7 is present
- IP predates the OSI model
 - more on this when we look at IP