OSI Reference Model

Open Systems Interconnection

7 Layers:

7. Application: intiates a request or accepts a request

6. Presentation: adds formatting, display, and encryption information to the packet

5. Session: establishes, maintains, and coordinates communication

4. Transport: ensures accurate delivery of data

3. Network: determines transport routes and handles the transfer of messages

2. Data Link: codes, addresses, and transmits information

1. Physical: manages hardware connections

All data going in and out of a computer must pass through these 7 layers.

If comp A sends info to comp B. The path would be comp A going from 7 to 1 (with each layer adding a little bit of information to the data being sent) and then comp B from 1 to 7 (with each layer utilizing the bits of information added to check or send the data to the right spot).

Physical Layer (1)

* defines the mechanical and electrical specifications of the network medium and network interface hardware (wires, network cards, physical components)
* responsible for sending bits
* newtork connection types, including multipoint and point-to-point connections
* analog and digital signaling
  + analog is measured in hz
  + digital is binary
* baseband and broadband transmissions
  + baseband: one wire, one signal
  + broadband: one wire, but LOTS of signals
* multiplexing
  + using one wire to do multipe things one at a time based on timing. but it moves so fast, that it feels like it’s doing it simultaneously.
* includes deivces such as
  + network interface card (NIC)
    - provides the connection between the network and the computers’ internal bus
  + attachment unit interface (AUI)
    - allows an external transceiver to be used
    - changes the media types to which the NIC can connect
  + transceiver
    - short for trasnmitter + receiver
    - part of any network interface that transmits and receives info
  + repeaters
    - simplest of all devices
    - used to extend the maximum length of a network segment
    - amplifies the signals it receives (including noise)
  + hubs or concentrator
    - serves as a central connection point for several network devices
    - essentially a multiport repeater
    - repeats what it receives on one port to all other ports
    - can be active
      * powered
      * cleans up the signal
      * doubling the effective segment distance limitation
    - or passive
      * only physical, electrical connections
      * segment distance is shortened
      * takes some power away from the signal strength
  + multistation access unit (MAU)
    - used for token ring networks
    - are chained together in a ring topology up to 33 connections

Data Link Layer (2)

* organizes the physical bits into frames
  + frames are made up of bits and hold information
  + two types of frames:
    - ethernet
    - token ring (not the topology)
  + a generic frame has information in the following order:
    - destination address
    - source address
    - control information
    - data sent by source
    - error checking information
  + a token ring frame has information in the following order:
    - start delimeter (SD)
      * represents the start of the frame
    - access control (AC)
    - frame control (FC)
    - destination address
    - source address
    - data
    - frame check sequence
    - end delimter
      * represents the end of the frame
    - frame status
* where the physical layer only sends one bit at a time and only cares about that one thing, the data link layer waits and collects data until it makes sense and sends that off
* provides for error free transfer of frames from one computer to another
  + these frames can be checked and missing info can be resent
* a cyclic redundancy check (CRC) is added to the data frame
* creates, transmits, and receives frames
* in charge of physical (MAC) addressing
* in charge of logical link control (LLC) processing
* creates logical topologies
* controls media access
* includes bridges, intelligent hubs, and network interface cards
* consists of two sublayers:

Netowrk Layer (3)

* collects frames to build packets
* primary objective is to move information across a network made of multiple segments (segments are separated by routers)
* addressing
* examples of different types of networking: circuit, message, and packet switching
* gateway services allows one *thing* to talk to another.
* routers and gateways oeprate in the network layer

Transport Layer (4)

* ensures packets are delivered error free, in sequence, with no losses or duplications
* information unit is a segment

Session Layer (5)

* manages the dialog between two computers by establishing, synchronizing, and terminating communications
* home of remote procedure calls (RPC)

Presentation Layer (6)

* translates data between the formats the network requries and the formats the computer expects
* basically serves as a middle man or translator
* responsible for data encryption and data compression

Application Layer (7)

* provides services that directly support user applications
* includes things like file transfer, file management, and message handling