

Lesson 0: Networking Basics

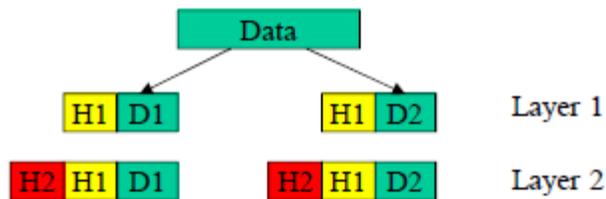
What the Internet really is:

The architecture of the Internet is broken up into many layers, this was brought about for two main reasons: the need for standards and the many different software and hardware pieces that play a role in making the Internet function.

These layer-N services need a way to talk to other devices layer-N services, which brought about protocols for each layer.

Protocol – defines format and rules for how each layer talks to other layers, the protocol information created by each layer is called a header.

Each layer adds its own header to the data packet as follows:



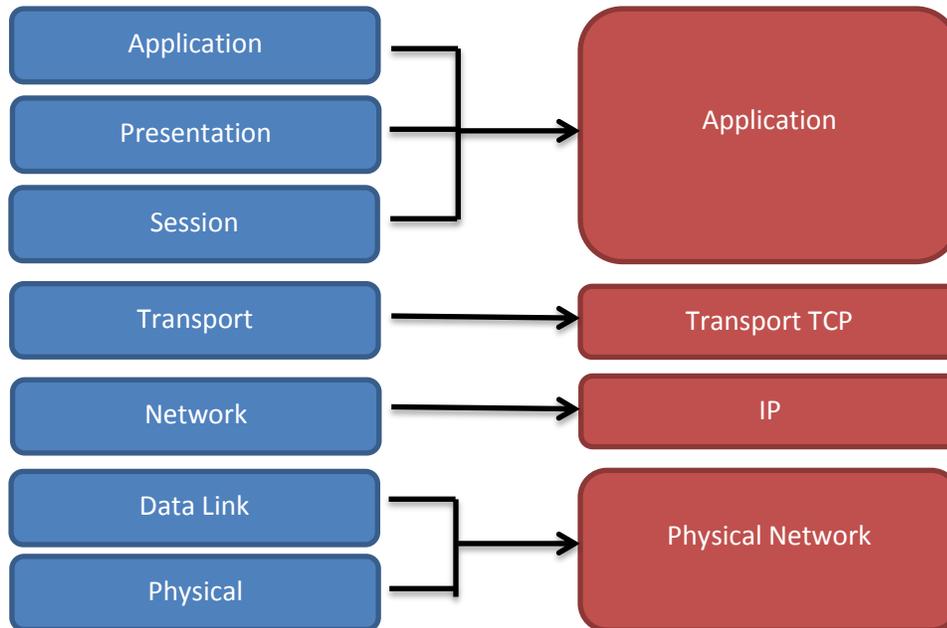
There are 4 basic functions of a protocol:

- 1) Segmentation and reassembly – break up larger data into smaller packets to transmit and then being able to put them back together at the receiving end
- 2) Encapsulation – the addition of information to the data element in the form of a header
- 3) Connection Control – can be one of two types
 - a. Connection oriented – connection is established before data sent, example is FTP
 - b. Connectionless oriented – no connection made before data is sent, example is IP
- 4) Ordered Delivery – packets of data might arrive out of order, need a way to be put back in order
- 5) Flow Control – technique to ensure receiver does not get overwhelmed with data from the transmitter
- 6) Error Control – how to recover from lost or damaged packets
- 7) Multiplexing – going from many connections to one or from one connection to many

There are two layer models that are in use today, the OSI Model and the TCP/IP Model

OSI Model:

TCP/IP Model:



The chart above shows the two different models and how the layers correspond to the opposing side. I will go through the OSI model because I used that more in school but the same information is true about the TCP/IP model.

Physical Layer – is the actual lines used to transmit data be it CAT-5, CAT-6, or fiber optic

Data Link Layer – is a layer of abstraction to the higher layers, allows high layers to use the physical layer without knowing all the details of the transfer

Network Layer – handles all the routing of data packets, implements the IP protocol

Transport Layer – responsible for reliably transferring session layer entities while optimizing resources, implements TCP protocol if it is being used

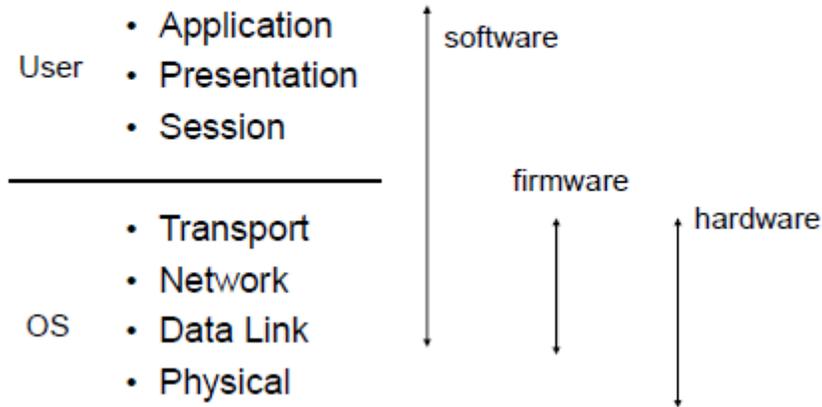
Session Layer – its only purpose is to facilitate the dialog between presentation layers

Presentation Layer – provides services to the application layer and to translate data into a common format

Application Layer – any services that utilizes the OSI stack, examples would be telnet, ftp, and the web

This is a breakdown of the different OSI layers

Layered Network Model



An example network where one user is sending a packet of information to another user using a TCP connection from the OSI model from above:

