TCP/IP

IP address = network number host number

The network number part of the IP address is centrally administered by the Internet Network Information Center (the InterNIC) and is unique throughout the Internet.

128.2.7.9 is an IP address with 128.2 being the network number and 7.9 being the host number.

The binary format of the IP address is 10000000 00000010 00000111 00001001.

It is used to uniquely identify a host on the Internet.

What is the size of today's standard (IPv4) IP address?

An IP address contains 4 bytes (32 bits). IP address usually written in dotted-decimal notation.

An IPv6 address contains 16 bytes (128 bits), and are written in a hexadecimal format. The eight, two byte segments are separated by colons.

The Open Systems Interconnection (OSI) layer model

Put this in black book.

7 – Application layer – consists of application programs that use the network

6 – Presentation layer – standardizes data presentation to the application

5 – Session layer – manages sessions between applications

4 – Transport layer – provides end-to-end error detection and correction

3 – Network layer – manages connections across the network for the upper layers

2 – Data link layer – provides reliable data delivery across the physical link

1 – Physical layer – defines the physical characteristics of the network media

IP belongs to the network layer.

MPEG works very closely like the IP. There are lots in common with the two.

Standard layered framework for network design

The OSI reference model since 1984. An abstract model (actual network implementations need not adhere to it strictly). Also a standards effort, a product of ISO. **OSI Model Stack**.

Divides host-to-host networking (internetworking) into layers, ordered from lowest to highest in a stack. OSI model contains seven layers in two groups.

OSI Model Upper Layers

OSI designates the **application, presentation, and session layers** as **upper** layers. Software in these

layers performs application specific functions (data formatting, encryption, connection management). Examples of upper layer technologies in the OSI model are HTTP, SSL, and NFS.

OSI Model Lower Layers

Remaining lower layers provide more primitive network-specific functions like routing, addressing, and flow control.

Examples of lower layer technologies are TCP, IP, and Ethernet.

OSI Model Benefits

By separating design, vendors can more easily solve network design problems. Products from different vendors more likely to interoperate if both vendors follow the OSI model. Makes network designs more extensible. Easier to add new protocols and other network services to a layered architecture than to a monolithic one.

Application Layer

Level of protocol hierarchy where user-accessed network processes reside. A TCP/IP application is any network process that occurs above the Transport Layer. This includes all processes that users directly interact with, as well as other processes at this level that users are not necessarily aware of.

Presentation Layer

For cooperating applications to exchange data they most agree about how data is represented. In OSI, this layer provides standard data presentation routines. This function is frequently handled within the applications in TCP/IP, though increasingly TCP/IP protocols such as XDR and MIME perform this function.

Session Layer

Not identifiable as a separate layer in the TCP/IP protocol hierarchy. Manages sessions (connections) between cooperating applications. In TCP/IP this function occurs in the Transport Layer and the term *session* is not used. For TCP/IP, the terms *socket* and *port* are used to describe the path over which cooperating applications communicate.

Transport Layer

Guarantees that the receiver gets the data exactly as it was sent. In TCP/IP function performed by **Transmission Control Protocol** (**TCP**). TCP/IP also offers a second transport layer service, **User Datagram Protocol** (**UDP**), that does not perform the end-to-end reliability checks.

Network Layer

Manages connections across the network and isolates the upper layer protocols from the details of the

underlying network. Internet Protocol (IP) which isolates the upper layers from the underlying network and handles the addressing and delivery of data, is usually described as TCP/IP's Network Layer.

Data Link Layer

Reliable delivery of data across underlying physical network is handled at this layer. TCP/IP rarely crease protocols in the Data Link Layer.

Physical Layer

Defines characteristics of the hardware needed to carry the data transmission signal. Features such as voltage levels, and the number and location of interface pins, are defined here. Examples of standards are RS232C and V.35 (interface connectors), IEEE 802.3 (LAN wiring).

Quiz on Thursday

By this Thursday, March 8th, research the **OSI seven layer model** and be ready for a quiz this Thursday. Look at chapter 12 in Jerry Whitaker's book; 12-1 talks about the OSI model layers.

Data Encapsulation

Diagram 1.

Data Structures

Diagram 2. Not much here; everybody move along.