CprE 489
Lecture 4

Fall Semester 1997

Open Systems Interconnection

- **The OSI standard was developed by ISO, the International Standards Organization around 1980. It consists of 7 layers:**

1. **Physical Layer - transmission of a raw sequence of bits**
2. **Data Link Layer - transmission of frames of data correctly on a "wire", concerned with data loss, data corruption, and flow control**
3. **Network Layer - transmission of packets over many hops, concerned with routing and congestion. Classic protocol is IP = Internet Protocol**
4. **Transport Layer - end-to-end layer, the network should be transparent at this layer, concerned with potential data loss and out of order packets. TCP = Transmission Control Protocol**
5. **Session Layer - establishes of sessions between "users". An example of a session is an RPC = remote procedure call**
6. **Presentation Layer - Concerned with the form of the data being transmitted. Encryption, compression, representation of the data, preparation of the data**
7. **Application Layer - The particular application, netscape, lynx, FTP, telnet.**

TCP/IP

- TCP = Transport Control Protocol

  - Transport layer
  - Provides a reliable connection oriented service (virtual circuit)
- IP = Internet Protocol

  - Network layer
  - Provides an unreliable connectionless service (datagram service)

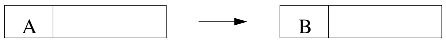
Protocol Standards

- OSI model - Open Systems Interconnection - from ISO, International Standard Organization
- TCP/IP - the internet standard
- X.25 and others - ITU (International Telecommunications Union) formally the CCITT
- IEEE 802.3 - Ethernet

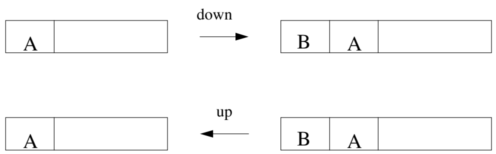
Addresses

- Different layers use different addresses. One role of a layer is to translate one address to another to enable the layer to operate.

  - within a layer such as the network layer it can replace one address with another in a packet



  - a layer can append or remove an address to move packet down or up a layer



Examples of Addresses

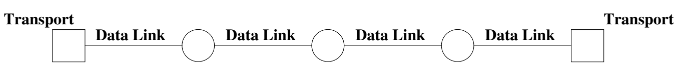
- arun@cs.washington.edu - Internet address used at the application layer in the domain naming system. Logical name.
- june.cs.washington.edu - Internet address used at the application layer. Less logical name.
- 128.95.1.4 - IP address which is the name of June
- 8:0:26:1C:83:58 - ethernet address of June

Address tables, which may be on "name servers", are used to translate from one address to another. A new address may be needed to pass to a lower layer or to transfer to a different network.

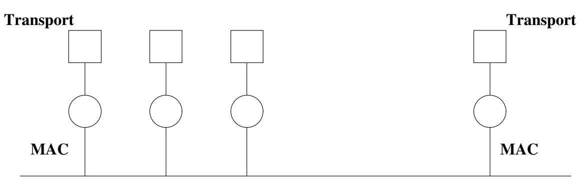
Routing tables use the ultimate destination address to calculate the immediate next address to send a datum.

Circuit tables use the current circuit number to calculate the circuit number of the next hop in a circuit.

Data Link vs. Medium Access Control



Point to Point Network



Broadcast Network

Repeater, Bridge, Router, Gateway

- **Repeater** - Passes a signal or sequence of bit from one subnet to another of the same type

  Physical Layer, buffer a bit
- **Bridge** - passes a data link or MAC packet from one subnet to another of perhaps a different type.

  Data Link or MAC Layer, buffer a frame
- **Router** - Passes a network packet from one subnet to another. Packets are IP type packets. Packets may actually go up in a hierarchical network.

  Network Layer, buffer a packet

  Gateway - Passes transport packet from one network to another. Network may be competely different like Bitnet and Arpanet.

  Transport Layer, buffer a message