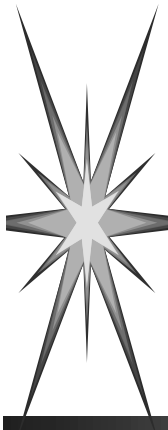


TCP/IP

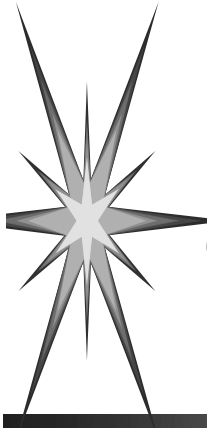
An overview of TCP/IP and
related protocols

Reuven Aviv



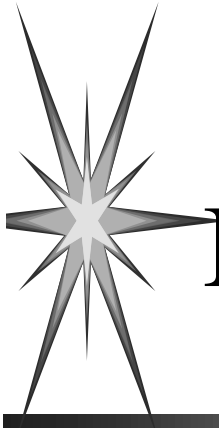
Overview

- Brief history
- Ethernet
- Internet Addressing
- Mapping from IP address to Physical addresses
- The Internet Protocol
- IP Routing
- ICMP



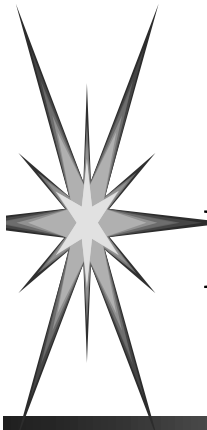
Overview Continued...

- Layering Communication Software
- UDP
- TCP



Brief History

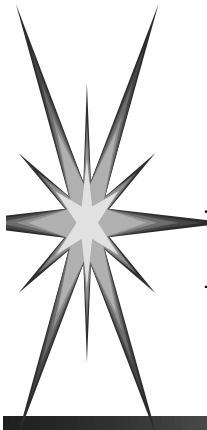
- APRANET
- UNIX
- Internet Activities Board (IAB)
- Network Information Centre (NIC)
- Documentation
 - Request for comments (RFC)
 - Internet Engineering Notes (IEN)



Ethernet

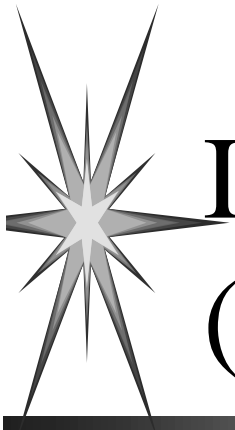
- Carrier Sense Multiple Access Protocol
- Send and forget
- Error checking: Drop frames with errors

Destination address	Source address	type	data	crc
---------------------	----------------	------	------	-----

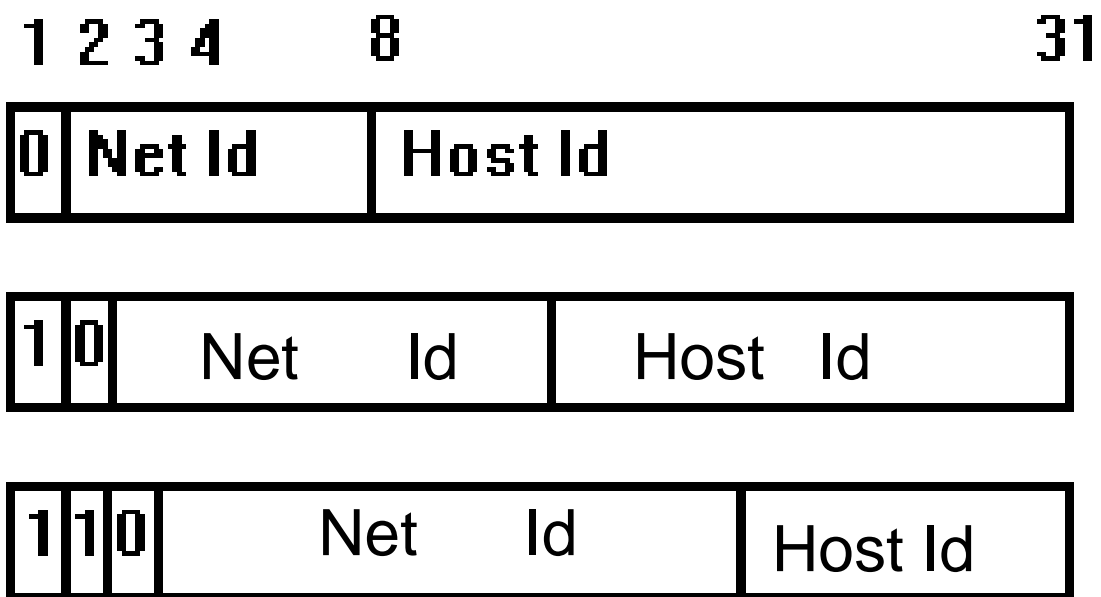


Internet Addresses

- Contain Host and Network Id's
- Each Id is universal and unique
- Assigned to connections to internet
- Different classes
 - Class A
 - Class B
 - Class C
 - See diagram
- Take format like 128.10.2.30



Internet Addresses (cont'd)

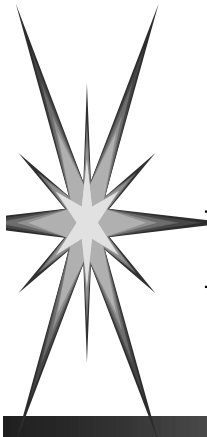




Mapping IP and Physical addresses

- Direct Mapping
- ARP
- RARP

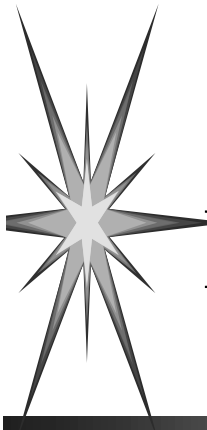
0	8	16	24	31
Hardware Type		Protocol Type		
HLEN	PLEN	Operation		
Sender HA (Octets 0-3)		Sender IP (0-1)		
Sender IP (2-3)		Target HA (0-1)		
Target HA (2-5)				
Target IP (0-3)				



Internet Protocol

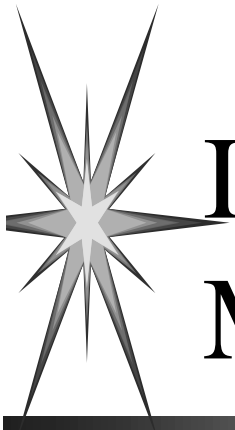
- Provides virtual network
- Unreliable, Connectionless, Best-effort Packet Transmission Protocol

0	4	8	16	19	24	31
Vers	HLEN	Service Type	Total Length			
Identification			Flags	Fragment Offset		
Time To Live		Protocol	Header Checksum			
Source IP address						
Destination IP address						
IP Options					Padding	
Data						
....						



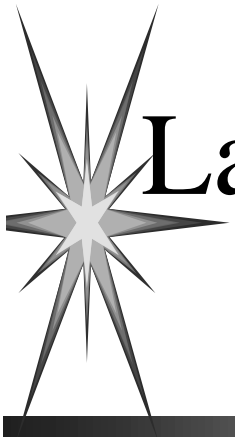
IP Routing

- Direct & Indirect
- Direct delivery
 - Can IP be reached directly
(without going through a router)
 - Efficient
- Indirect delivery
 - Use routers
 - Next-hop routing

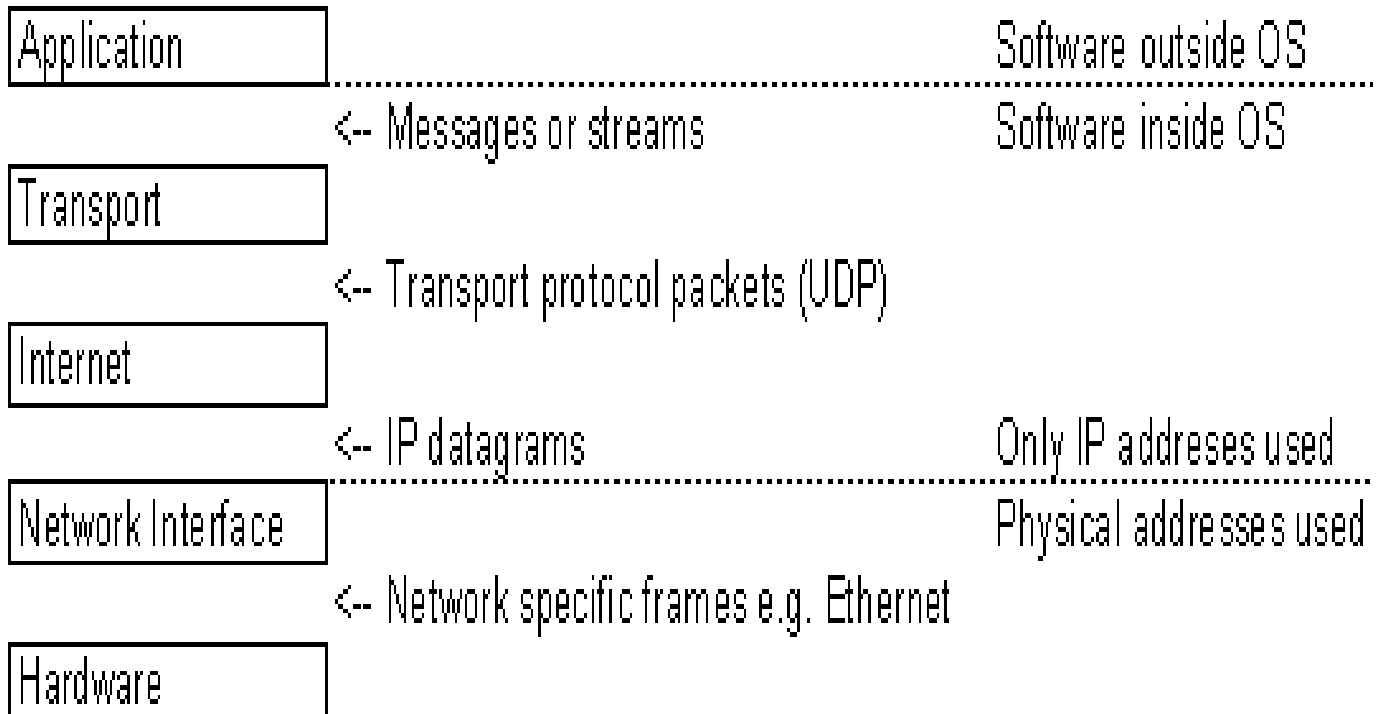


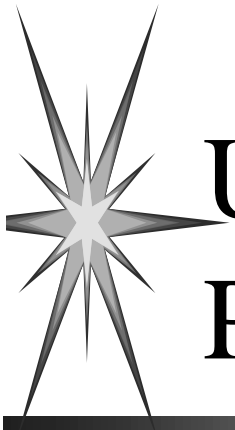
ICMP - Internet Control Message Protocol

- Error reporting mechanism
- Used by Routers and Hosts
- At IP level
- Travels in IP datagram



Layering Communication Software

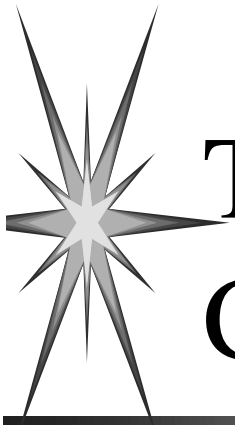




UDP - User Datagram Protocol

- Provides ports and allows applications to communicate
- Unreliable, connectionless service
- Uses IP
- Header:

0	16	31
UDP Source Port	UDP Destination Port	
UDP Message Length	UDP Checksum	
Data		
...		



TCP - Transmission Control Protocol

- Connection Oriented, Reliable Stream Service
- Uses IP

source port			Destination port	
Sequence			number	
Acknowledgment number				
length		flags	window	
checksum			Urgent pointer	
Optional parameters				
Data (payload)				