A Survey of Networking: *Standards, Specifications, and Protocols*

OSI Networking Model

Layer 7: Application

- Generate network requests
- Process network responses

Layer 6: Presentation

- Format data
- Encryption/decryption
- Data compression

Layer 5: Session

- Establish, maintain, and tear down session

Layer 4: Transport

- Decompose data into network-size messages
- Reassemble received data
- Connectionless (unreliable) communication
- Connection-oriented (reliable) communication

Layer 3: Network

- Routes packets based on protocol
- Uses logical (IP) addressing

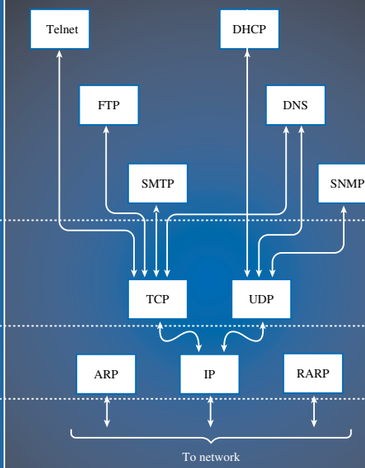
Layer 2: Data Link

- Logic Link Control sublayer
- Media Access Control sublayer
- Transmit and receive frame
- Uses physical (MAC) addressing

Layer 1: Physical

- Transmit and receive bits
- Encode/decode data
- Interface with different media

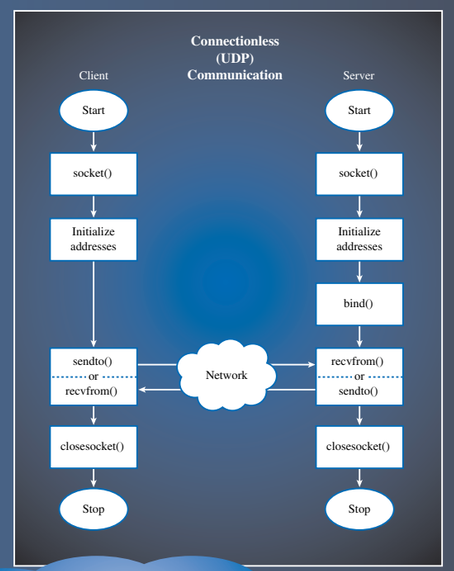
TCP/IP Protocol Suite



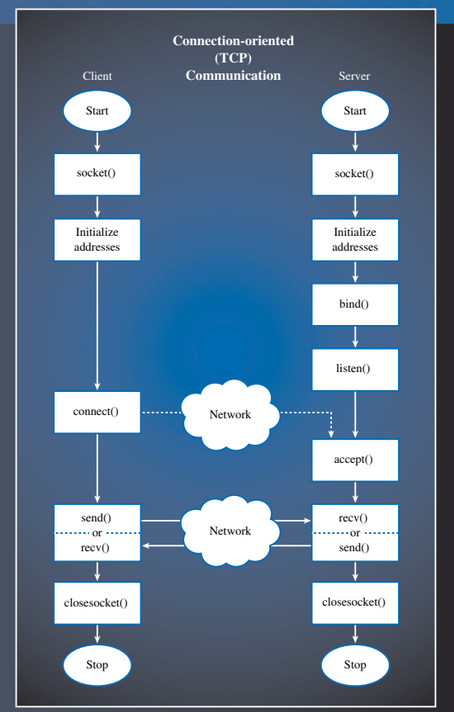
Encoding Methods

Ethernet Speed (Mbps)	Encoding Method
10	Manchester
100	4B5B, 8B6T, PAM5x5
1000	8B10B, PAM5x5

Connectionless (UDP) Communication



Connection-oriented (TCP) Communication



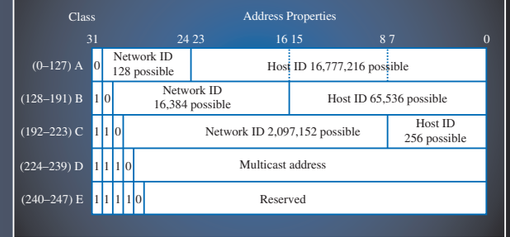
Ethernet Technology	Segment Length
10base5	500m
10base2	185m
10baseT	100m
10baseFL	2000m
100baseT4	100m
100baseTX	100m
100baseFX	2000m
100baseT2	100m
1000baseT	100m
1000baseCX	25m
1000baseSX	275m, 316m/550m
1000baseLX	316m/550m, 316m/5000m

Some Well-known Ports

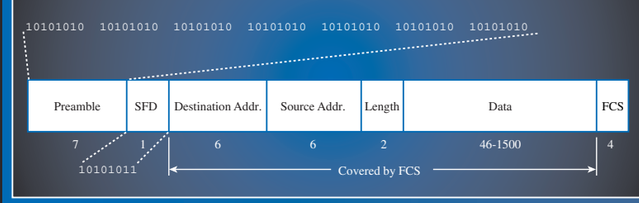
Port	Protocol
21	FTP
23	Telnet
25	SMTP
53	DNS
67	BOOTP/DHCP Server
68	BOOTP/DHCP Client
69	TFTP
80	HTTP
110	POP3
139	NetBIOS
161	SNMP

IEEE Standard	Topic
802.1	LAN/MAN Bridging and Management
802.2	Logical Link Control
802.3	CSMA/CD Access Method
802.4	Token-Passing Bus Access Method
802.5	Token-Ring Access Method
802.6	DQDB Access Method
802.7	Broadband LAN
802.8	LAN/MAN Fiber Optics
802.9	Integrated Services
802.10	LAN/MAN Security
802.11	Wireless
802.12	Demand Priority Access Method

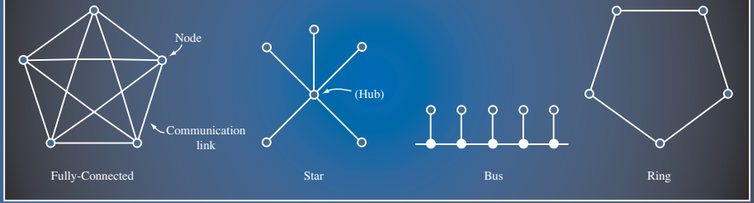
IP Address Classes



IEEE 802.3 Ethernet Frame



Network Topologies



Internet Domains

Domain Type	Organization Type
edu	Educational institution
com	Commercial organization
gov	Government
mil	Military
net	Network providers and support
org	Other organizations not listed above
country code	A country code, for example, .us for United States, .ca for Canada, .jp for Japan, etc.

Glossary

HARDWARE

Collision
Two or more stations transmitting at the same time within the same collision domain.

CSMA/CD
Carrier Sense Multiple Access with Collision Detection. An access method used to share bandwidth among a maximum of 1024 stations. Two or more stations transmitting at a time will cause a collision, forcing random waiting periods before retransmission is attempted.

Ethernet
LAN technology employing CSMA/CD to share access to the available bandwidth.

Frame
Structure used to transport data over a network. Contains source and destination addresses, data, and a 32-bit Frame Check Sequence.

Hub
A multiport device that broadcasts frames received on one port to all other ports. All ports are in the same collision domain.

MAC Address
A 48-bit physical address associated with every network interface. An example MAC address is 00-C0-F0-27-64-E2.

Router
A multiport device that forwards packets between ports based on their IP address. Each port connects to a different LAN, and possibly even different LAN technologies.

Switch
A multiport device that forwards frames to a specific port based on their destination MAC address. Each port is in its own collision domain.

SOFTWARE

DHCP
Dynamic Host Configuration Protocol. A protocol used to allocate IP addresses dynamically.

DNS
Domain Name System. Protocol used to resolve a domain name, such as www.rwasoftware.com, into an IP address.

IP
Internet Protocol. This is the base protocol for TCP/IP. It is used to carry TCP, UDP, and many other higher-level protocols.

IP Address
A 32-bit logical address of a station (host) on the network. An example IP address is 192.168.1.105.

Port
A 16-bit number associated with a TCP or UDP application. Used to demultiplex the incoming packet stream.

SMTP
Simple Mail Transport Protocol. Method used to reliably exchange electronic mail between networks.

TCP
Transmission Control Protocol. Connection (session or stream) oriented communication. Reliable exchange of data.

UDP
User Datagram Protocol. Connectionless communication. Unreliable exchange of data.

Window Sockets
Networking API for the Windows operating system.