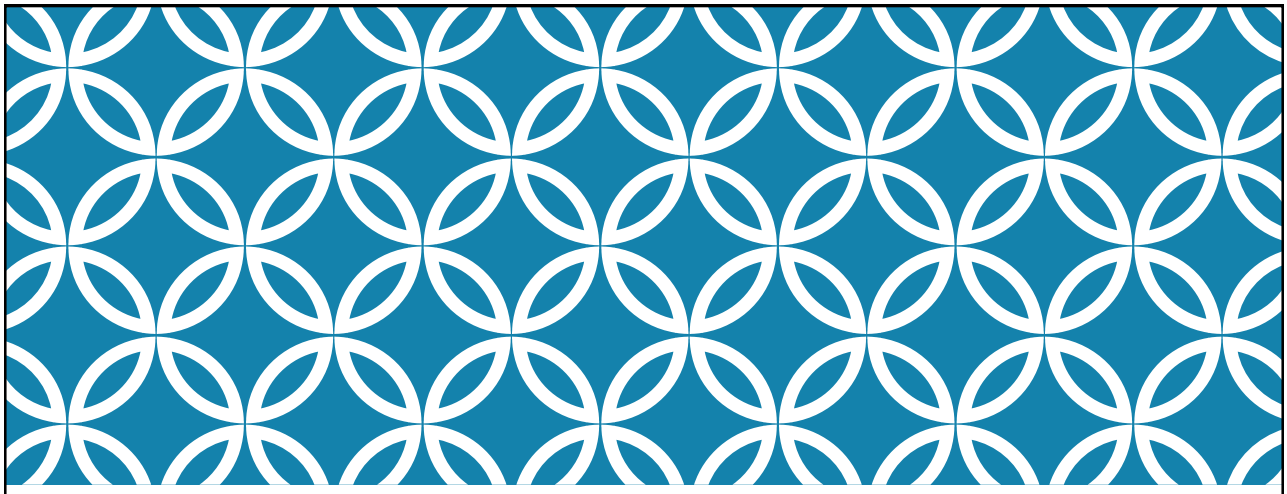

CSCI 4210 OPERATING SYSTEMS

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Spring 2021

INTER-PROCESS COMMUNICATION (IPC)

Inter-process communication (IPC) requires the following:

1. Synchronization
2. Protocol (i.e., how is communication to occur between the endpoints?)
3. Precision
4. Data marshalling (i.e., translating from "host format" to "network format")

OSI REFERENCE MODEL

Open Systems Interconnection (OSI) Reference Model (~1984)

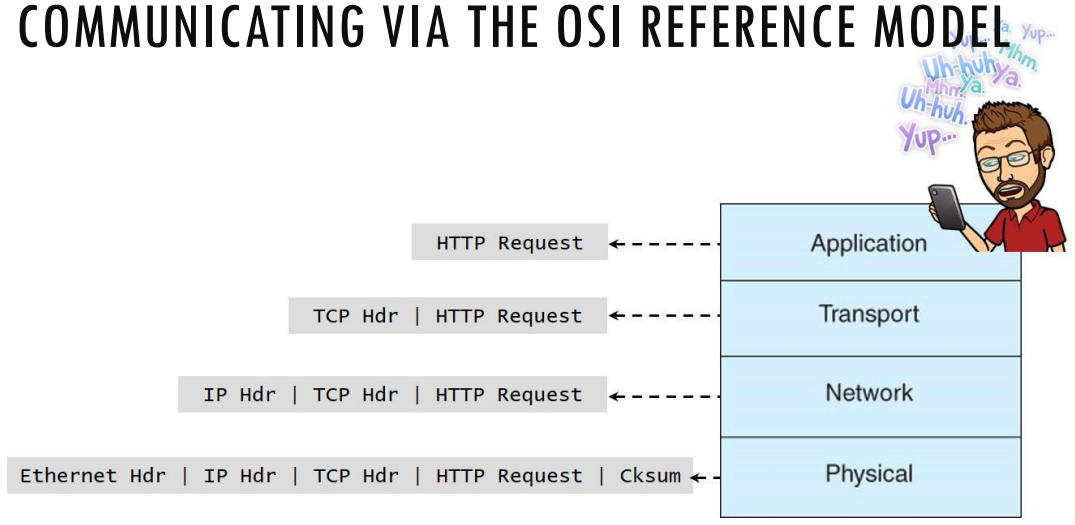
Standardization of how communication should occur across a network, describing where and how network protocols fit together with one another

A seven-layer protocol stack that supports interoperability of networking components:

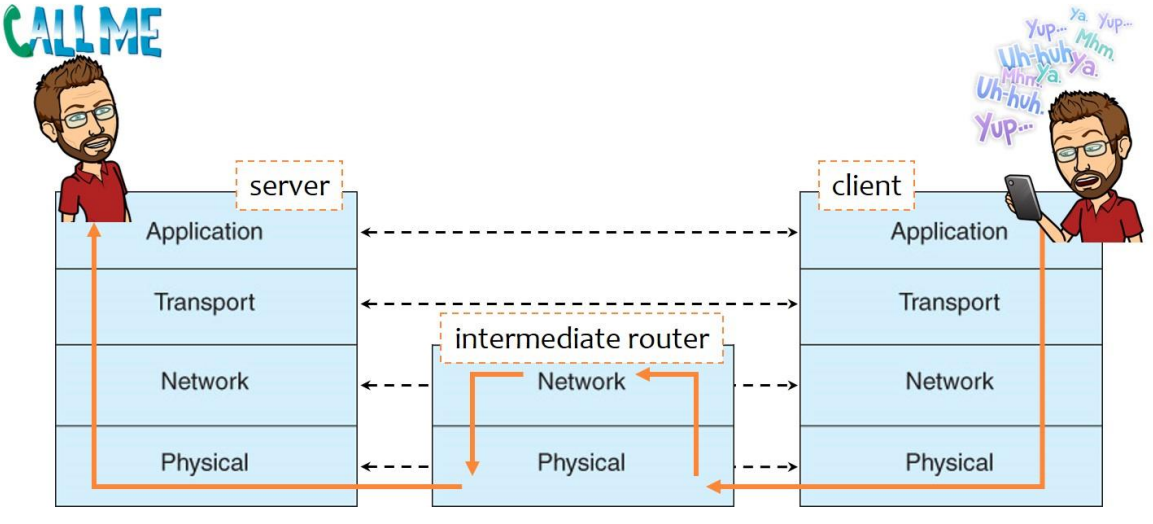
- Layer 7: Application (e.g., HTTP, HTTPS, NFS, SMTP, SNMP, TELNET)
- Layer 6: Presentation (e.g., SSL, FTP, SSH)
- Layer 5: Session (e.g., RPC)
- Layer 4: Transport (e.g., TCP, UDP)
- Layer 3: Network (e.g., IP, ICMP, ARP, OSPF)
- Layer 2: Data Link (e.g., MAC)
- Layer 1: Physical (e.g., Ethernet, Frame Relay, IEEE 802.11)

[HTTP: http://www.ietf.org/rfc/rfc2616.txt]

COMMUNICATING VIA THE OSI REFERENCE MODEL



COMMUNICATING VIA THE OSI REFERENCE MODEL



UDP DATAGRAM STRUCTURE

https://tools.ietf.org/html/rfc768

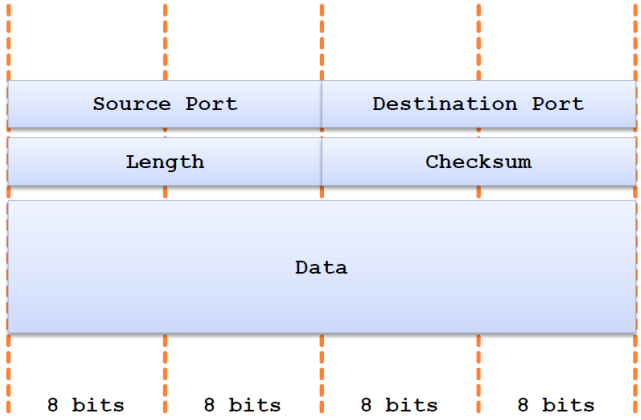
User Datagram Protocol (UDP):

Connection-less

Unreliable (i.e., no re-sending of dropped datagram)

Simple

Low overhead



TCP SEGMENT STRUCTURE

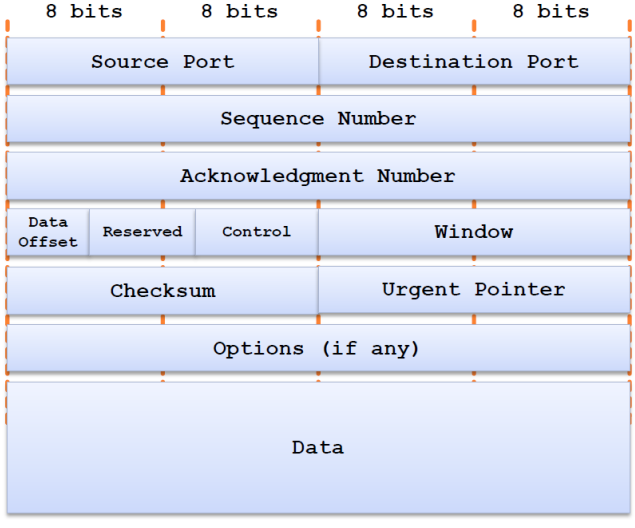
https://tools.ietf.org/html/rfc793

Transmission Control Protocol (TCP):

Connection-oriented

Reliable (i.e., re-sending of dropped packets, sequencing and reordering of packets, general error checking)

Overhead



IP DATAGRAM STRUCTURE

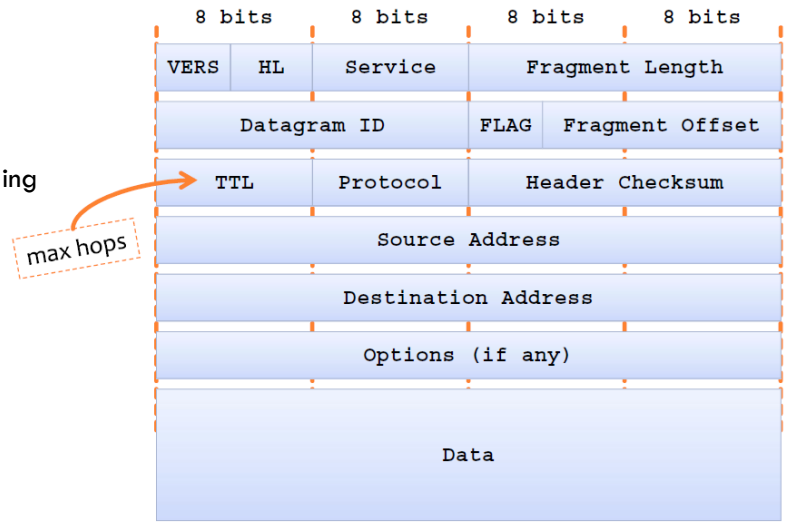
https://tools.ietf.org/html/rfc1122

Internet Protocol (IP):

Connection-less

Unreliable (i.e., no re-sending of dropped datagrams)

Provides host-to-host delivery of datagrams

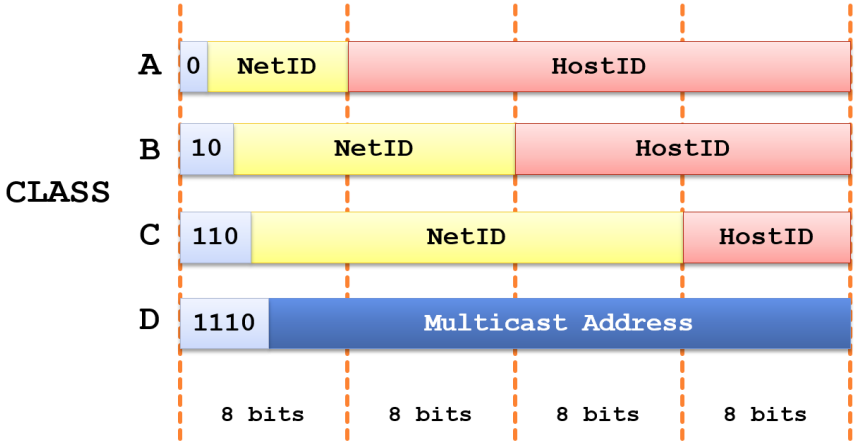


IP ADDRESSES

Each IP address contains information about what network the destination host is on, which enables routing to occur at intermediate "hops" (i.e., routers) along the path from a source endpoint to the destination endpoint

NETWORK CLASS	LEADING BITS	# of NETWORKS	# of HOSTS	NETWORK/HOST BIT FIELDS
CLASS A	0...	128	16,777,214	8 / 24 bits
CLASS B	10...	16,384	65,534	16 / 16 bits
CLASS C	110...	2,097,152	254	24 / 8 bits
CLASS D MULTICAST	1110...	n/a	n/a	n/a

DECODING IP ADDRESSES



SUBDIVIDING INTO SUBNETS