

Computer Science CSCI 251

Systems and Networks

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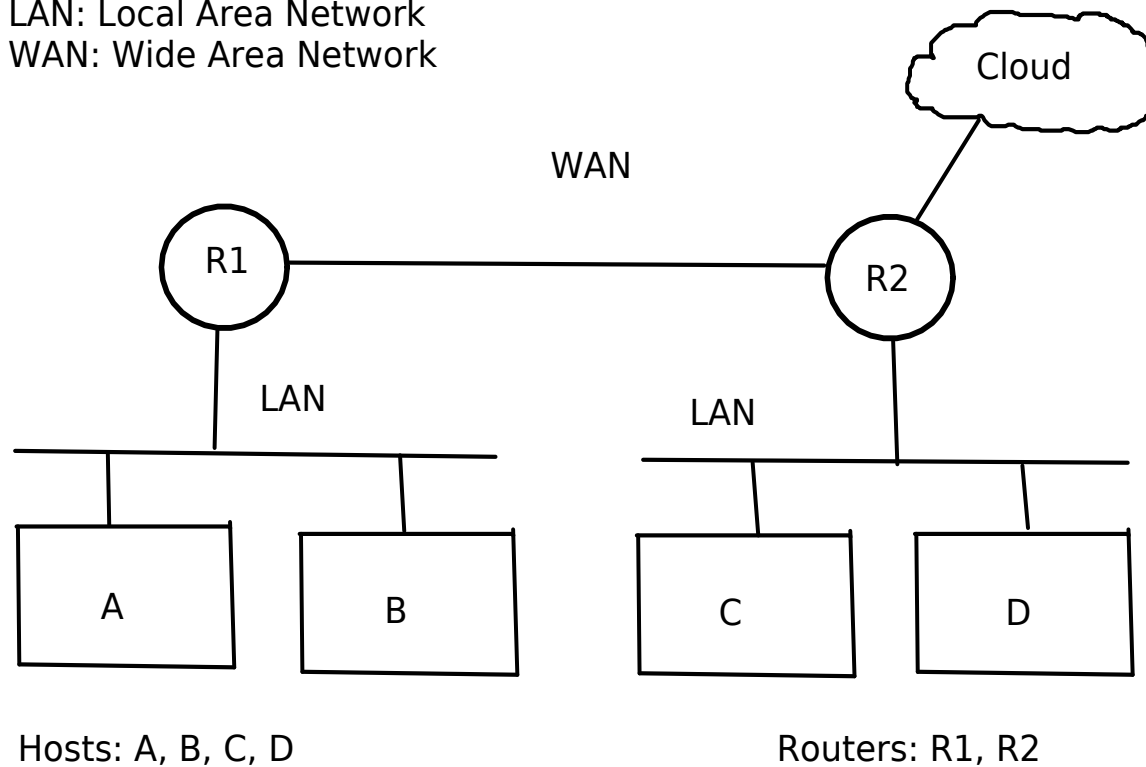
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Internet Architecture Model

- the Internet is a network of networks

LAN: Local Area Network
WAN: Wide Area Network



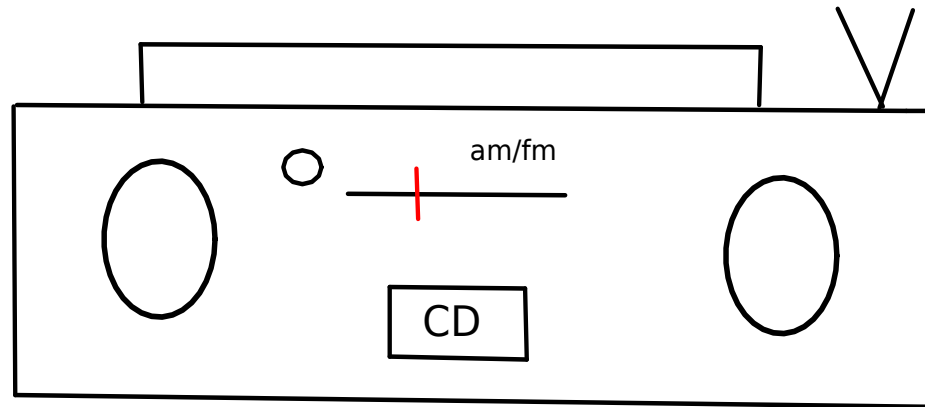
Internet Standard(s)

○ TCP/IP

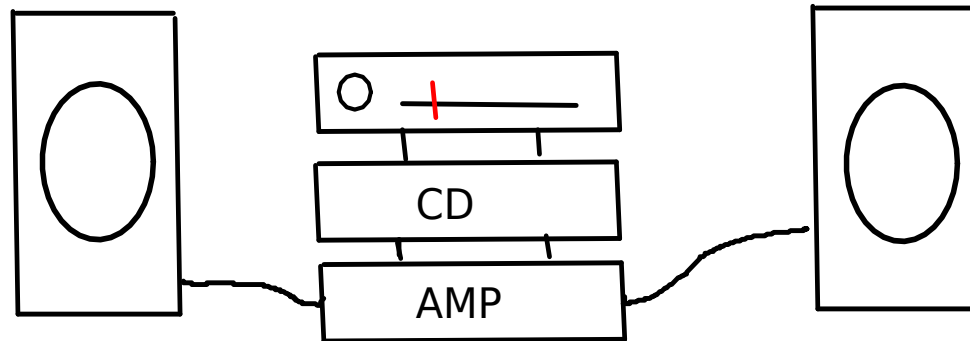
- de facto Internet standard
- contains network-communications and application-support protocols
- components are documented in RFC (Request For Comment) publications from the Internet Society (ISOC)
see <https://tools.ietf.org/html>
e.g., <https://tools.ietf.org/html/rfc1122>

Stereo System Analogy

Boombox



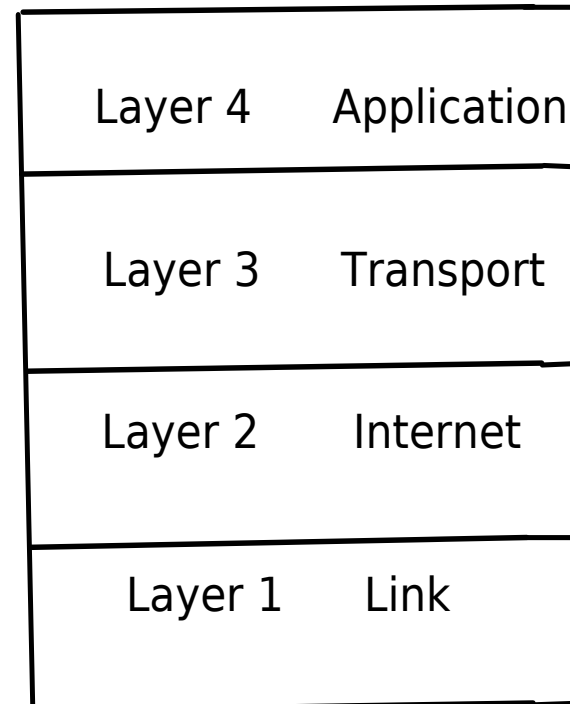
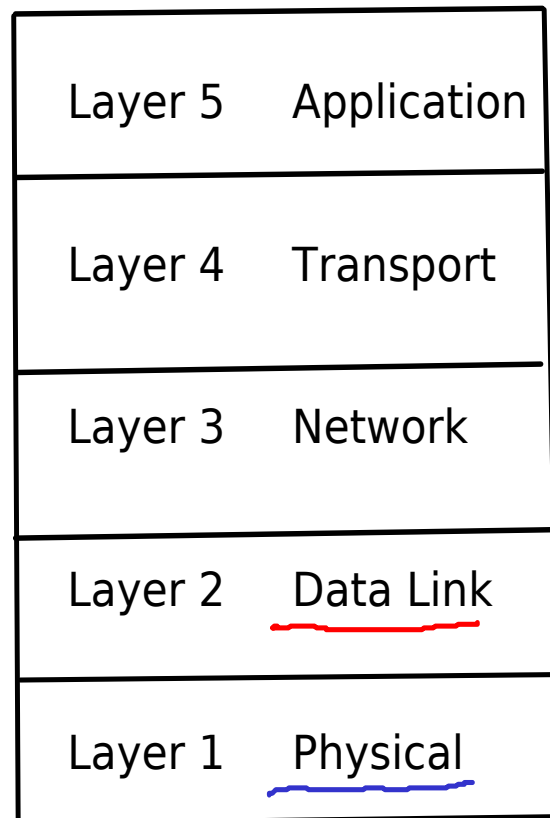
Component System



Internet Protocol Suite (RFC 1122)

- Application Layer
 - example protocol(s): `ssh` and `ftp`
- Transport Layer
 - example protocol(s): `TCP` and `UDP`
- Internet Layer
 - example protocol(s): `IP`
- Link Layer
 - example protocol(s): `ARP`

Alternative Layer Organization



RFC 1122

Network Interface Controller (NIC) Device Driver

Internet Communication Paradigm

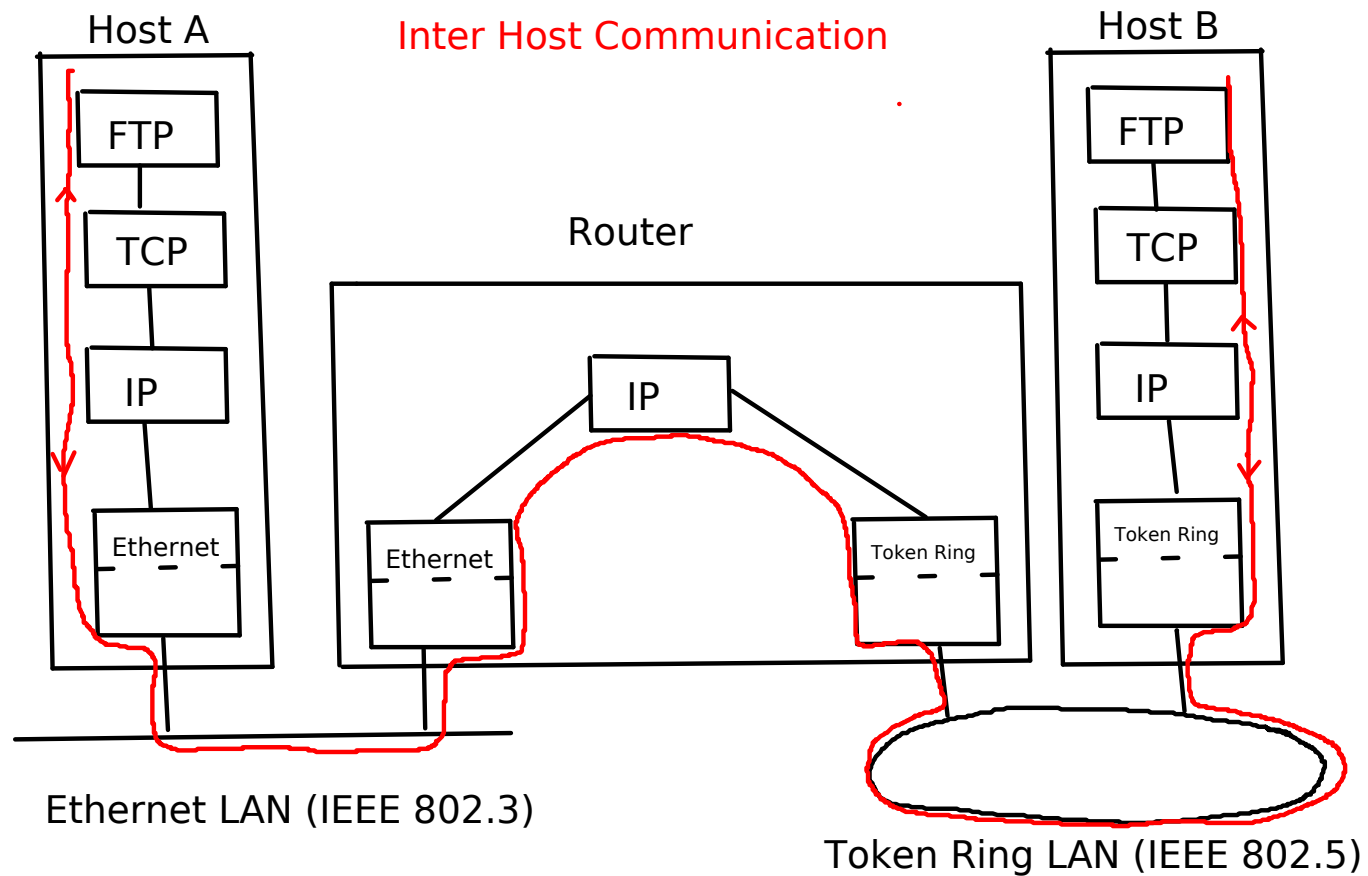
○ TCP

- connection oriented communication
- arbitrary length transfer of a sequence of bytes from a sending application to a receiving application
- messages exchanged between a sending and receiving application will never be lost, duplicated, damaged, or received out of order

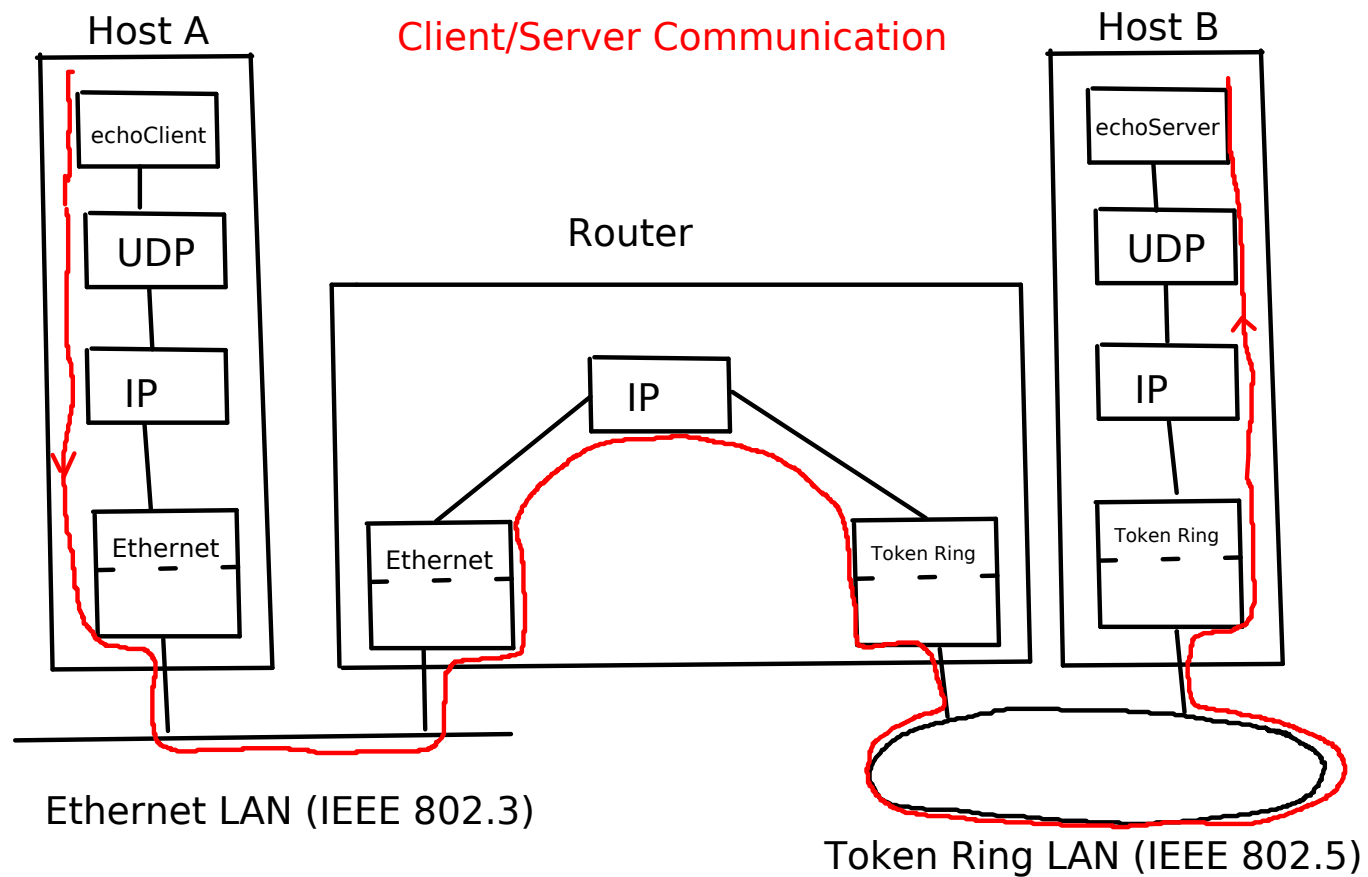
○ UDP

- connectionless best-effort communication
- datagram oriented (fire-and-forget)
- messages exchanged between a sending and receiving application can be lost, duplicated, damaged, and received out of order

FTP-TCP Layer-Navigation



echoClient/Server-UDP Layer-Navigation



Internet Communication Models

- Peer-To-Peer
 - distributed communication

- Client-Server
 - centralized communication
 - server executes and waits for a service request from one or more clients
 - server does not need to know which client(s) will request service
 - client(s) execute and request service from a server
 - client must know which server to contact for service

Server/Service Identification

- Server
 - 32 bit IP (v4) address
 - e.g., otter: 104.128.240.4
- Service
 - 16 bit port number
 - e.g., ssh: port 22

Concurrent Servers

- TCP Applications
 - non-concurrent server would/could see unacceptable delays
- UDP Applications
 - typically affords no advantage