i341

Networks and Distributed Applications

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How Many of You Own a Cell/Smartphone ??

How/why did you choose the device you did ?

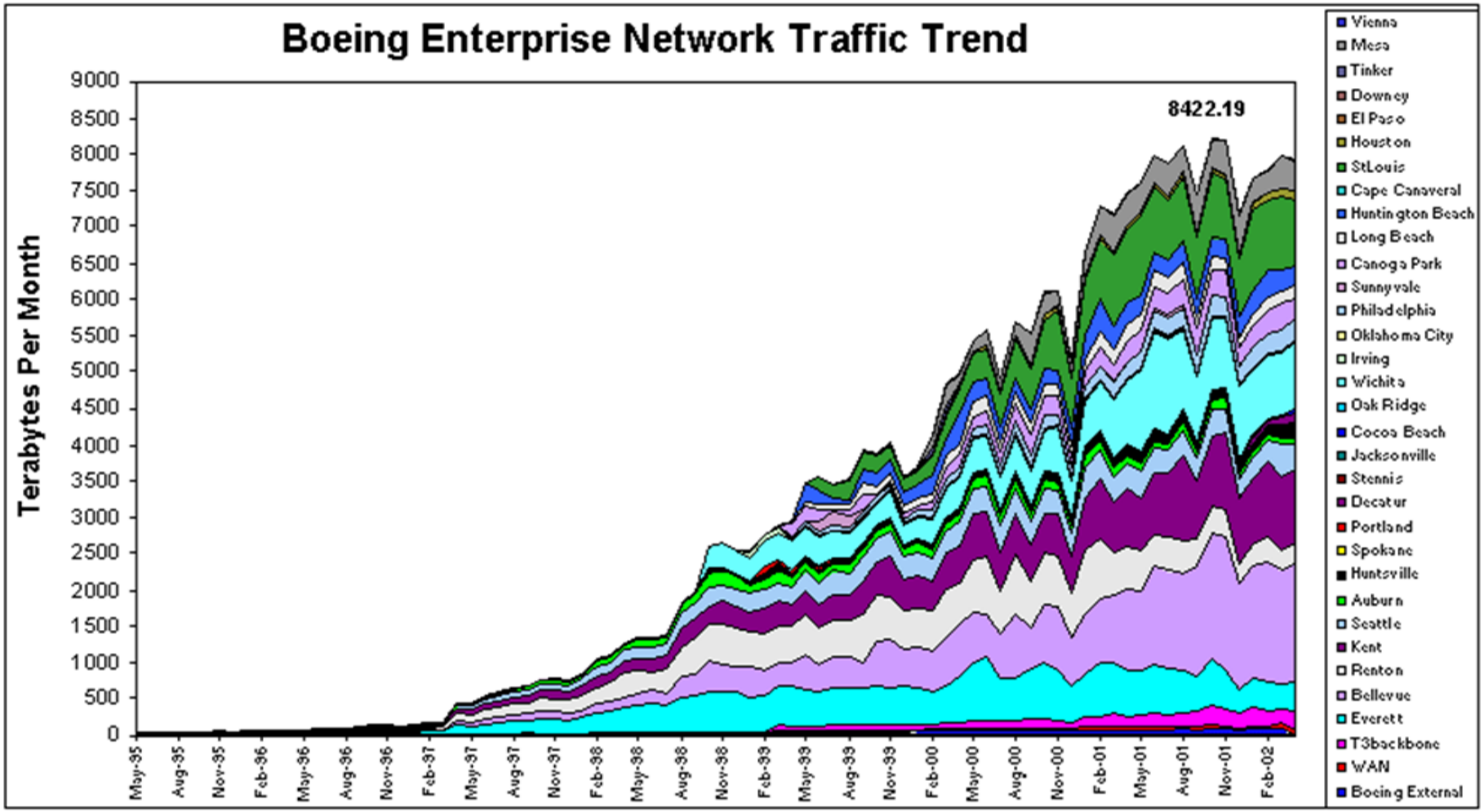
How/why did you choose the carrier (cell co) you did ?

What would you do if your device and/or service were flaky/unreliable ?

Growth of Computer Networks

Why is this important ?

Boeing Intranet Traffic Growth starting 1995



What types of work do Net people do ?

What about a server system administrator ?

What skills are required for Net jobs ?

As an App developer/Dbase Admin/SysAdmin: why would I ever need to understand/apply the technical details of networking ???

NETWORK TYPES

Wide Area Networks (WANs)

SONET & ATM
Dedicated Circuits (T1, fractional T1, T3, OC-n)
Frame Relay
Public Telephone Circuits
VPNs and MPLS

Metropolitan Area Networks (MANs)

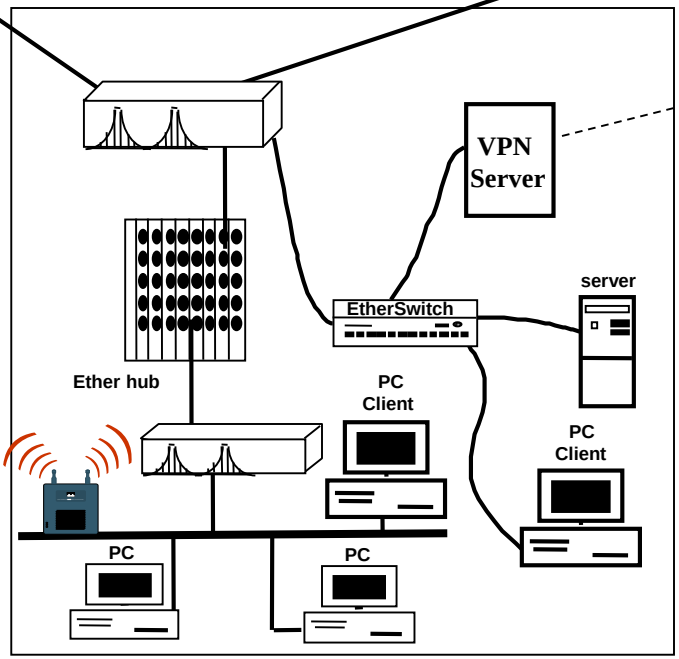
DQDB (Distributed Queue Dual Bus)
SMDS (Switched Multimegabit Data Services)
ATM (Asynchronous Transfer Mode)

Mobile Networks (cellular)

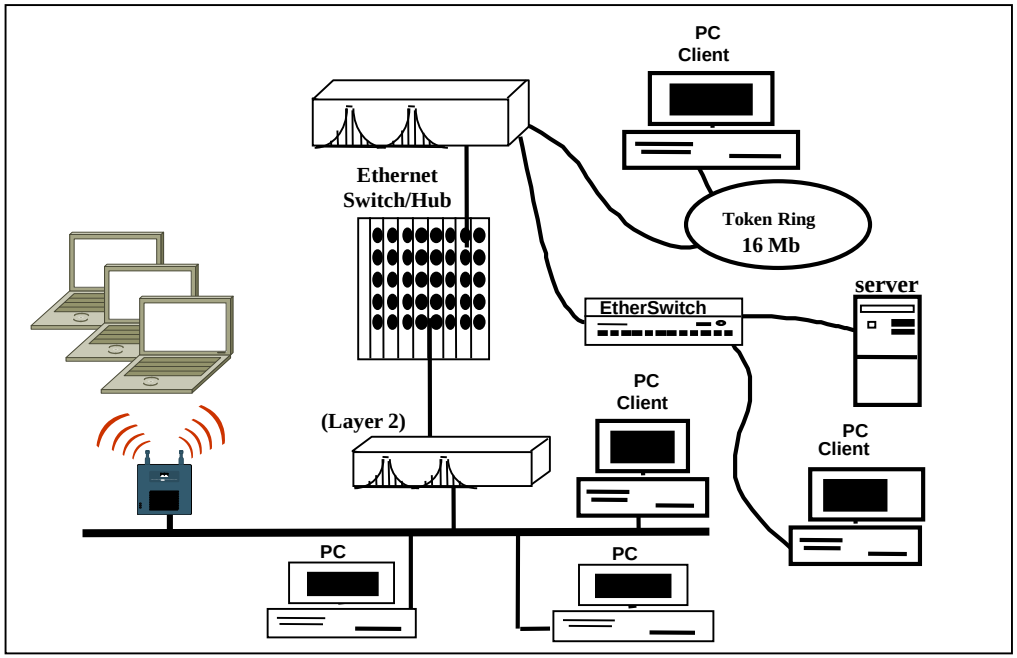
3G/4G

Local Area Networks (LANs)

Ethernet (10/100/1000/10000 Mb)
LocalTalk (AppleTalk)
Token Ring
FDDI
802.11 (Wireless LANs)



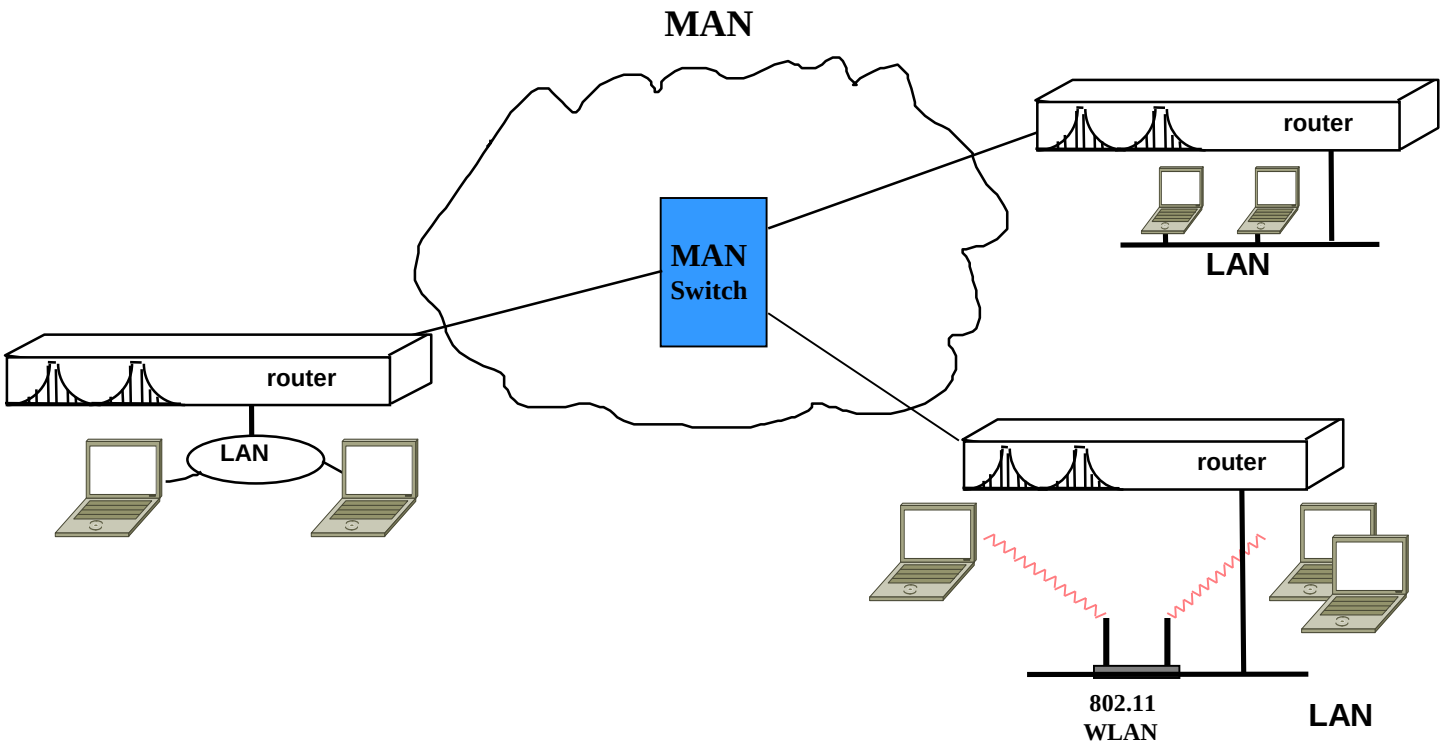
Local Area Networks (LANs):



Basic characteristics of a LAN :

Geographically limited to building or campus
Privately owned
High Speed
Shared Media

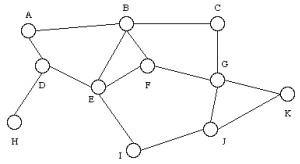
Metropolitan Area Networks (MANs):

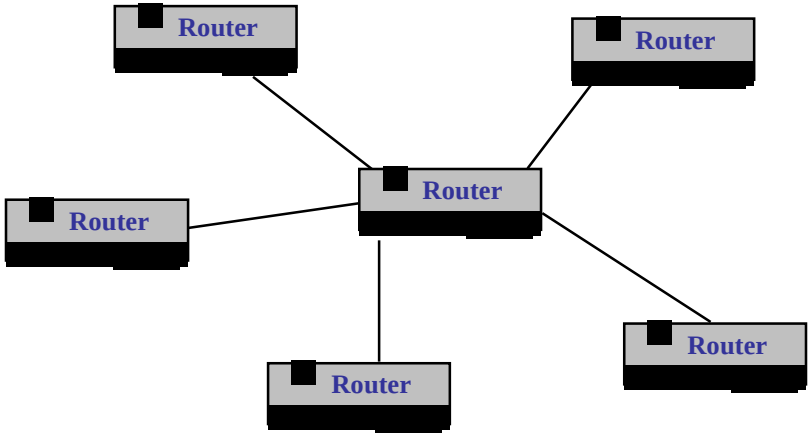


Basic characteristics of a MAN :

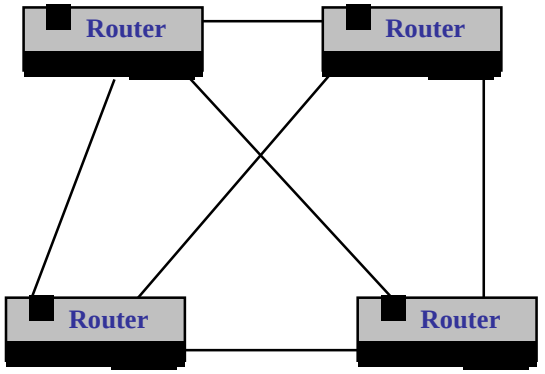
Privately owned or Provided Service (public)
High Speed
Centralized MAN Switch infrastructure

Wide Area Networks (WANs):





Star (WAN)



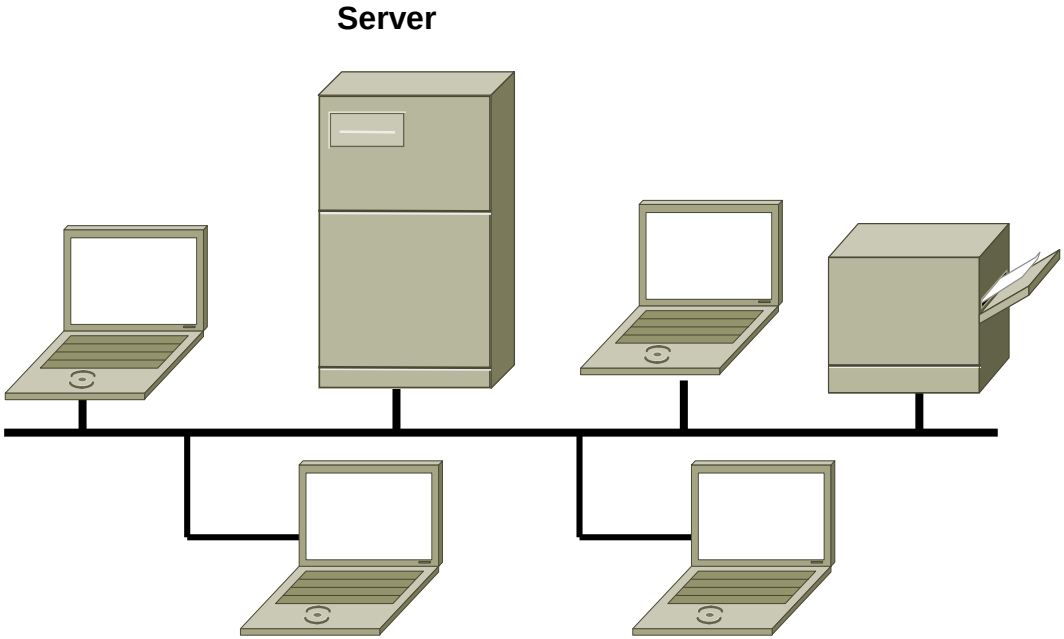
Mesh (WAN)

Basic characteristics of a WAN :

Carrier - Provided Service (public)
Low to High Speed
No distance boundaries
Latency Impact on networked applications

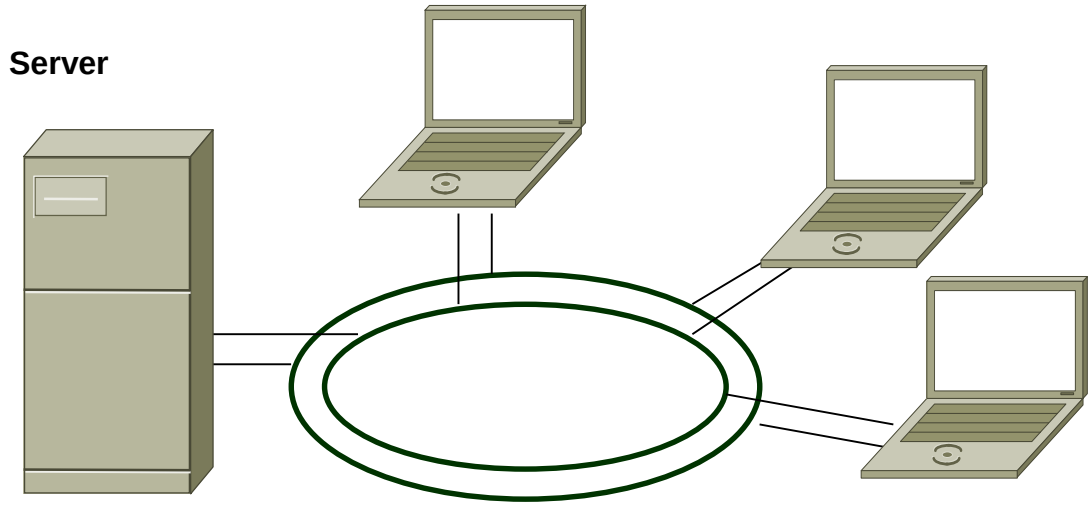
Network Topologies

Bus Topology: (Example – ThickNet Ethernet)



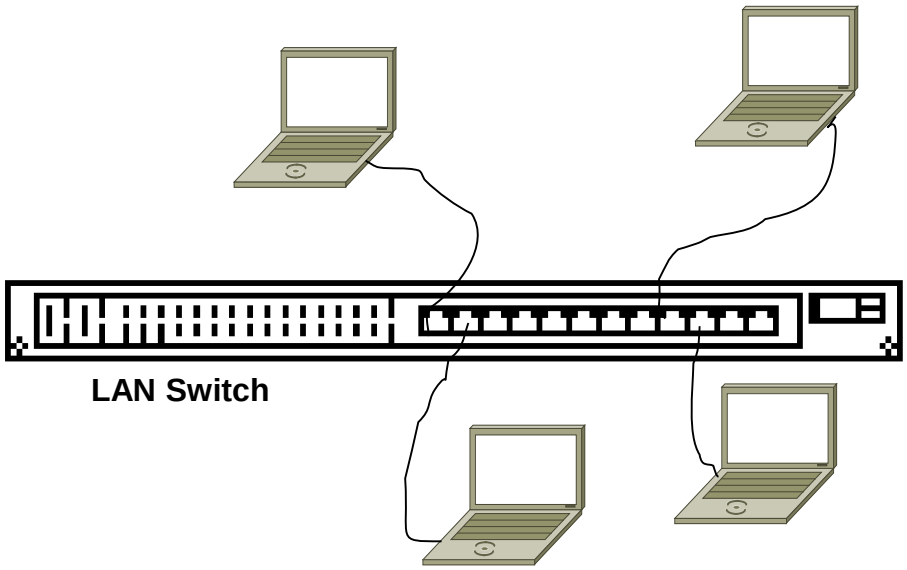
Broadcast-oriented – all transmissions heard by all stations
Multipoint medium
Transmission propagates throughout medium

Ring Topology: (Example – FDDI, 802.5 Token Ring)



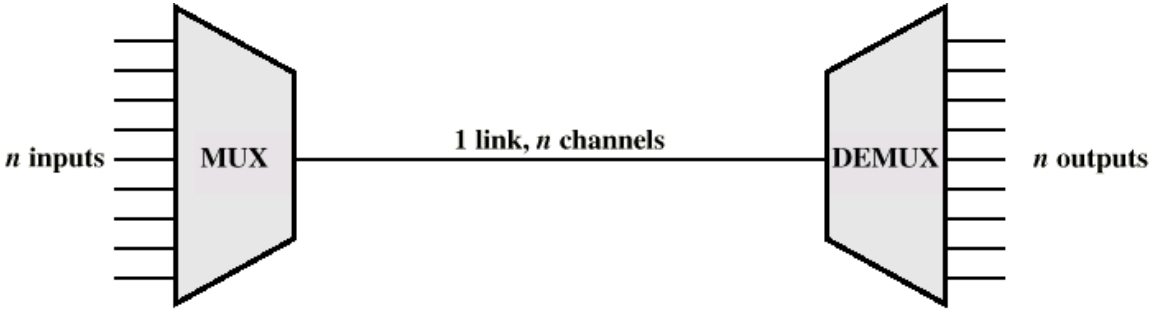
Data in frames
Circulate past all stations
Destination recognizes address and copies frame
Frame circulates back to source where it is removed
Media access control determines when station can insert frame

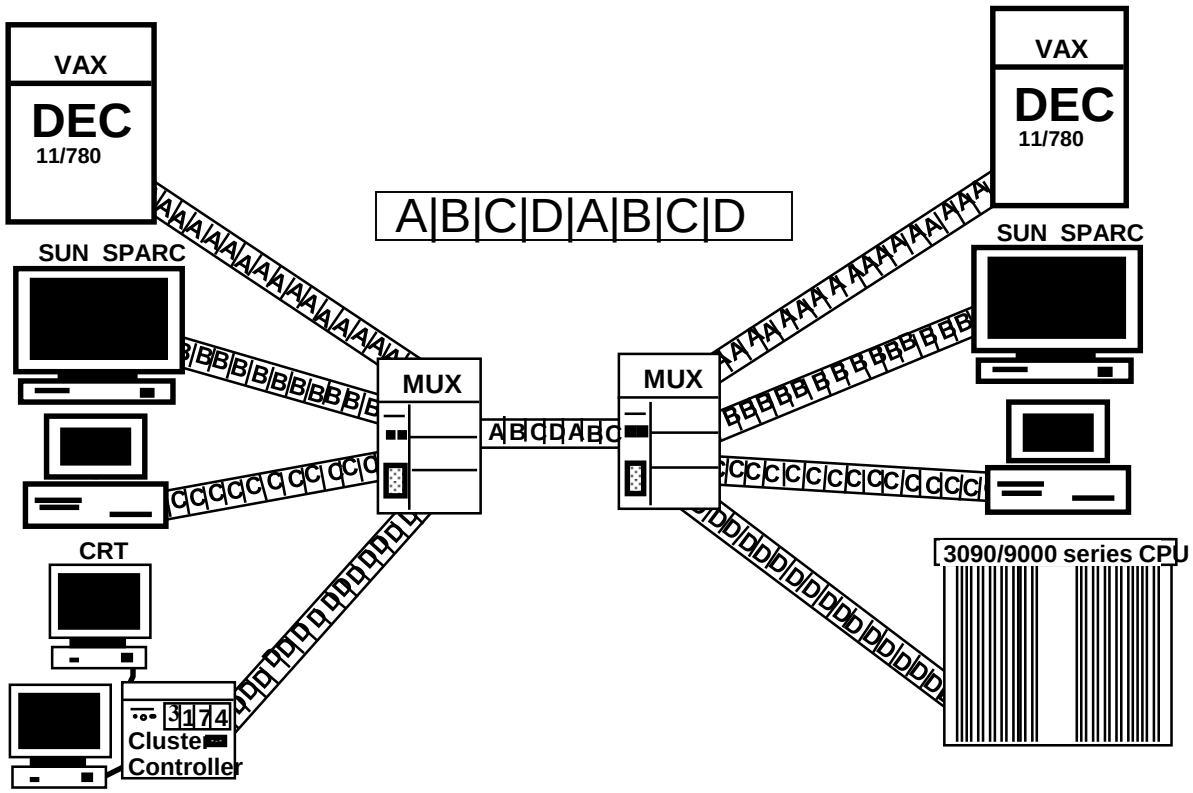
Star Topology: (Example – Ethernet Hub & Switched LANs, WANs)



Each station connected directly to central node
Physical star, logical bus
Central control and management

Multiplexing



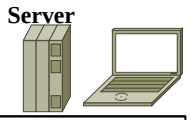


Network Architectures & Protocols

Introduction to Networking

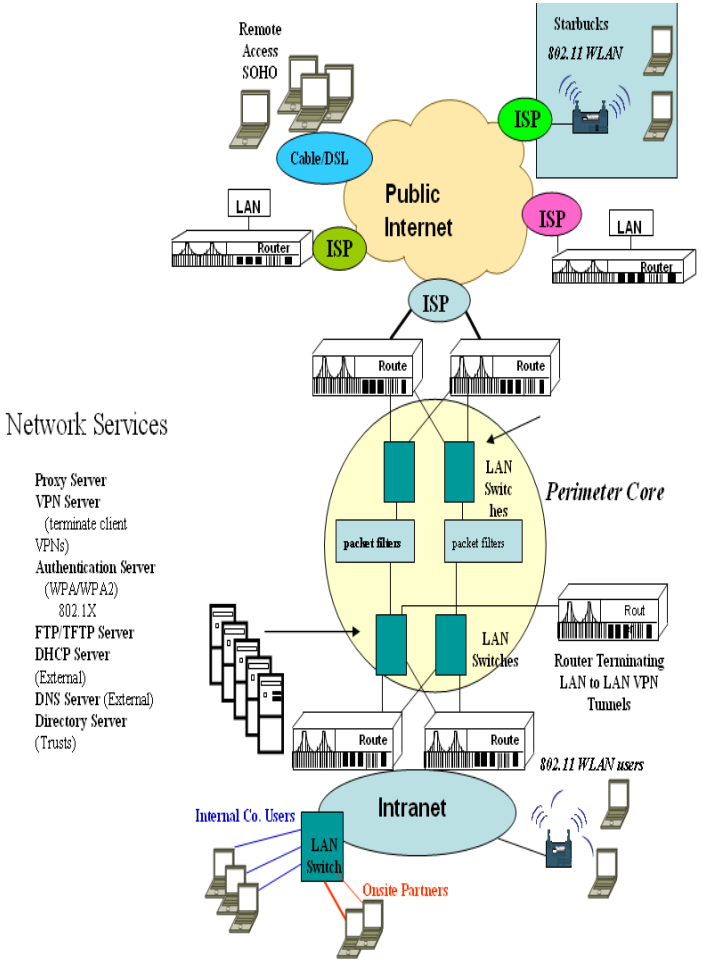
Network Architectures & Protocols

OSI Reference Model

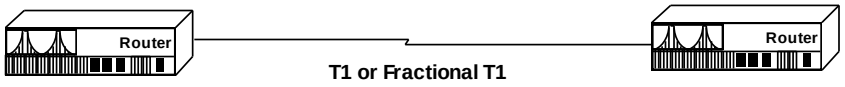


Application	End User Interface to net.
Presentation	Data Transform
Session	Synch end to end conversation
Transport	End to end service quality
Network	Routing data
LLC (Logical Link)	Framing, Error Detect/Correct
MAC (Media Access)	NIC (MAC add)
Physical	Media contention: CSMA/CSMA-CD

Physical Medium: UTP/Coax/Fiber/RF

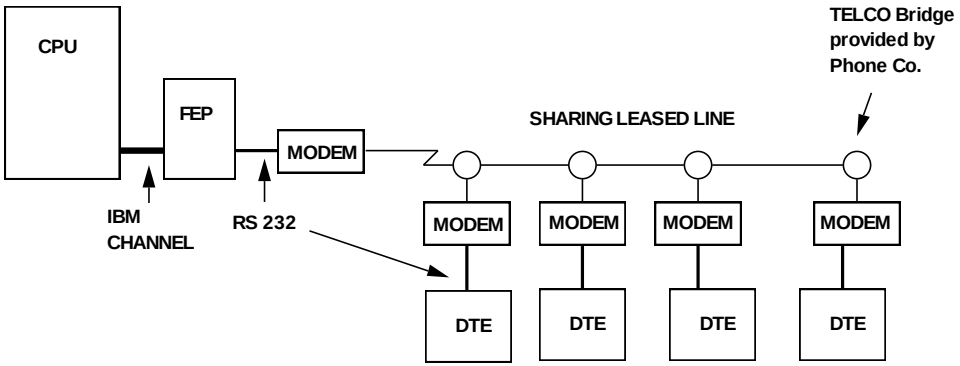


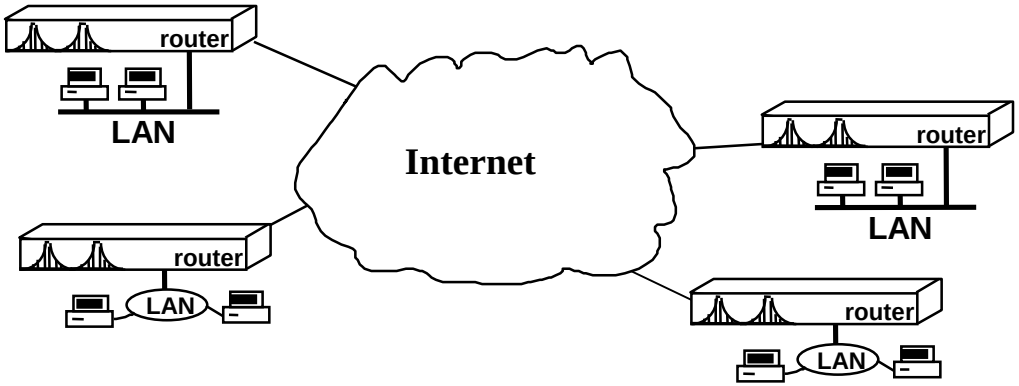
Types of Network Links/Services



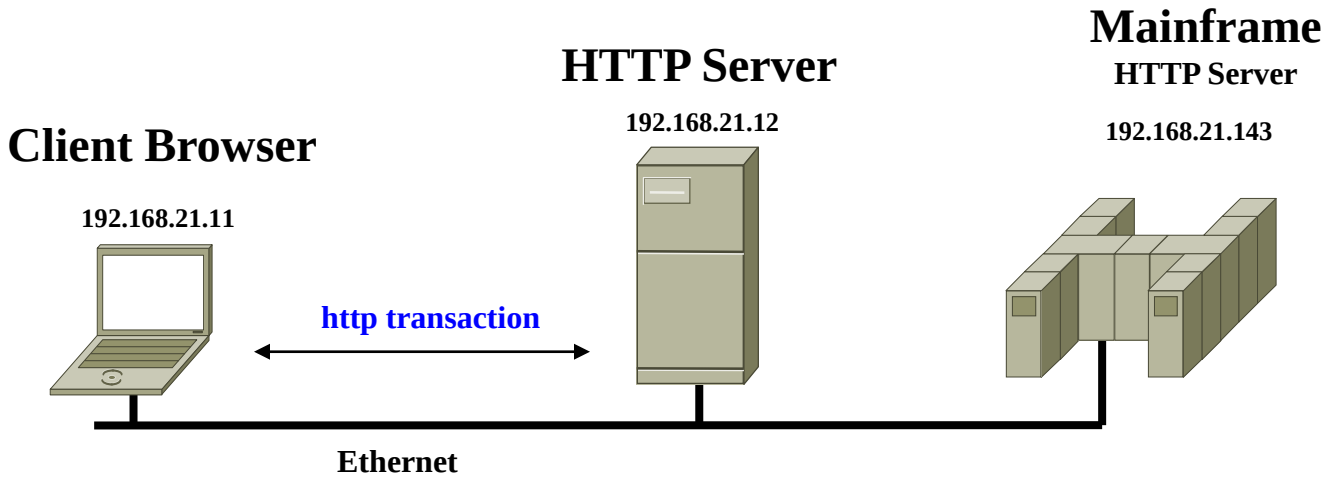
Point-to-Point: single communications link not shared with any other statior

Multipoint (Polled Multipoint)



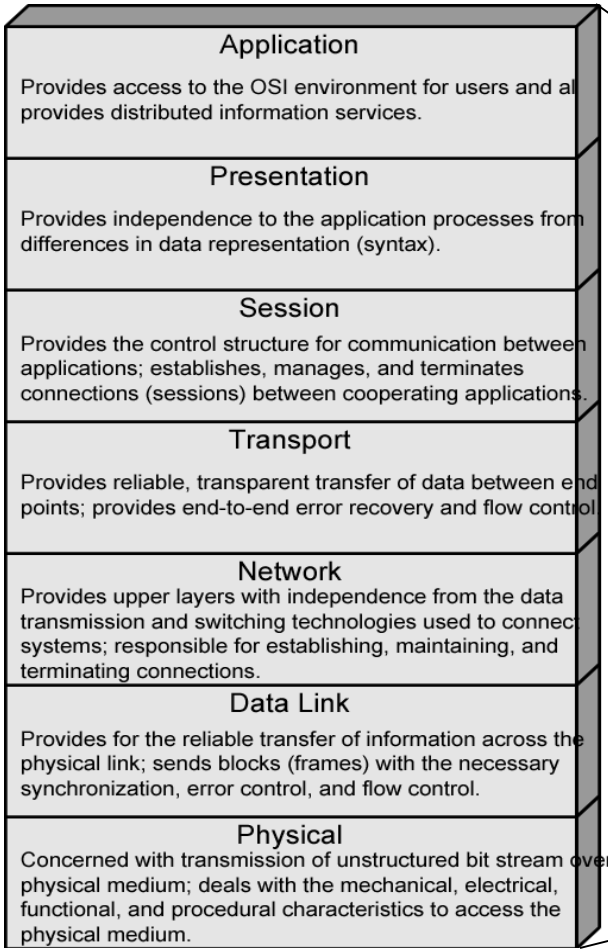


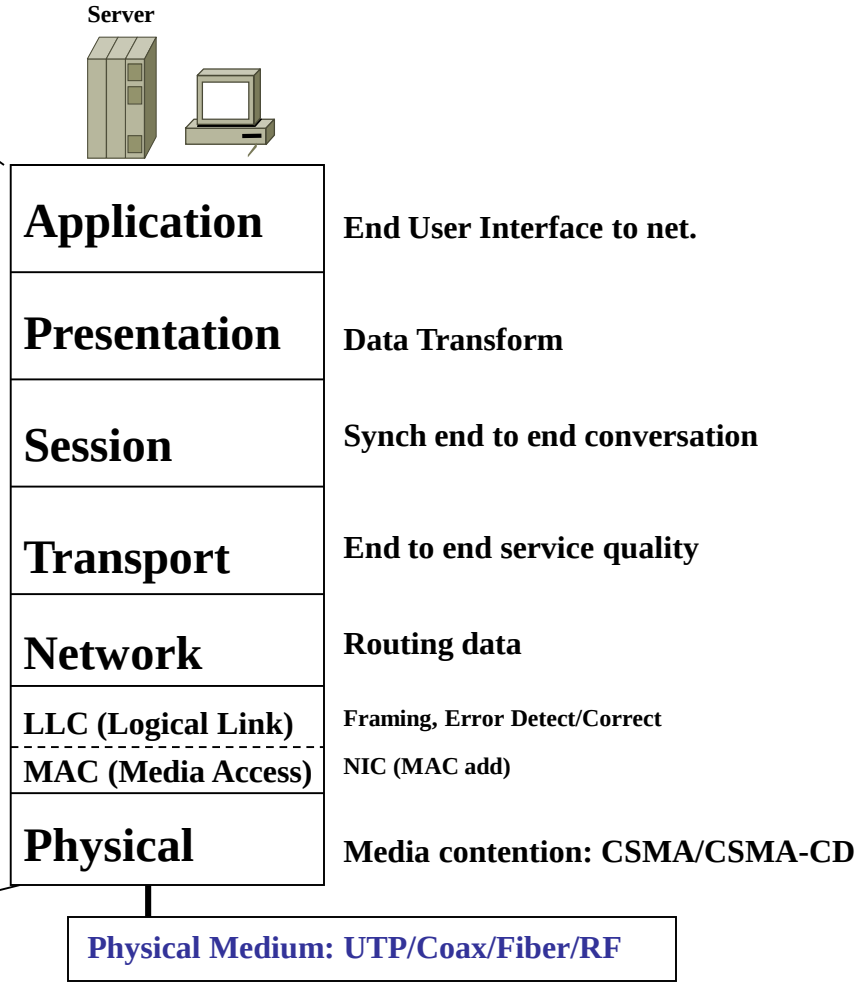
Data Communications/Network Usage



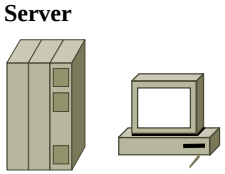
ARINC 429, 629
AFDX

OSI Reference Model





OSI Reference Model



Format recognizable to end system/appl.

upper layer protocols

lower layer protocols

Fast, error free comm.

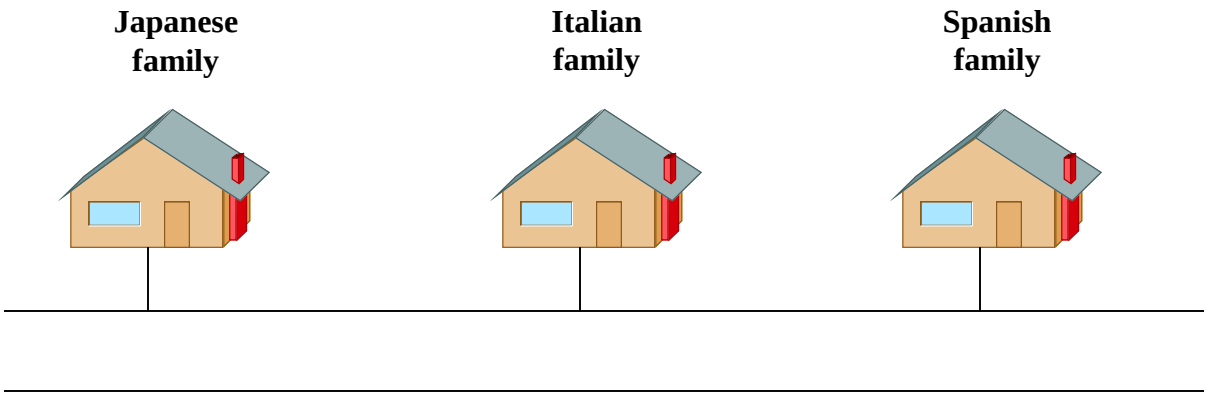
Application	**End User Interface to net.**
Presentation	**Data Transform**
Session	**Synch end to end conversation**
Transport	**End to end service quality**
Network	**Routing data**
LLC (Logical Link)	**Framing, Error Detect/Correct**
MAC (Media Access)	**NIC (MAC add)**
Physical	**Media contention: CSMA/CSMA-CD**

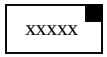
Physical Medium: UTP/Coax/Fiber/RF

What protocols do you know ?

Protocol Layering/Enveloping

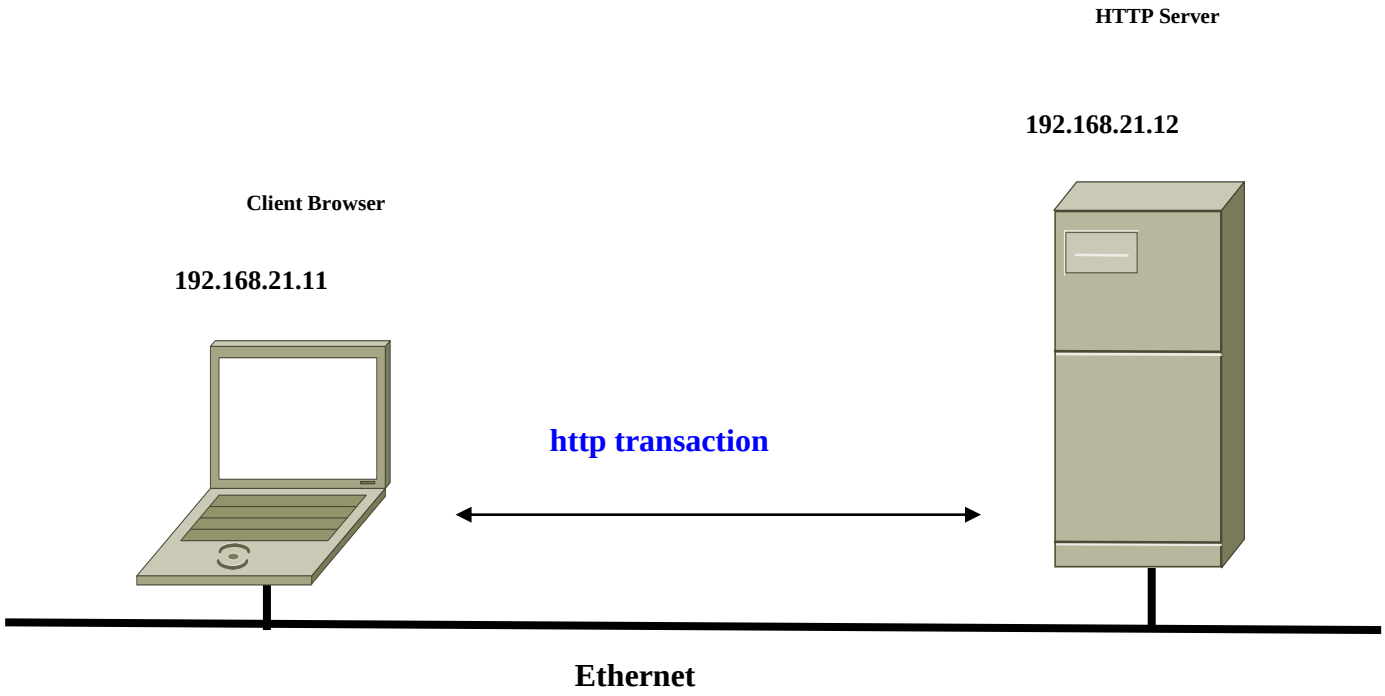
Anytown, USA



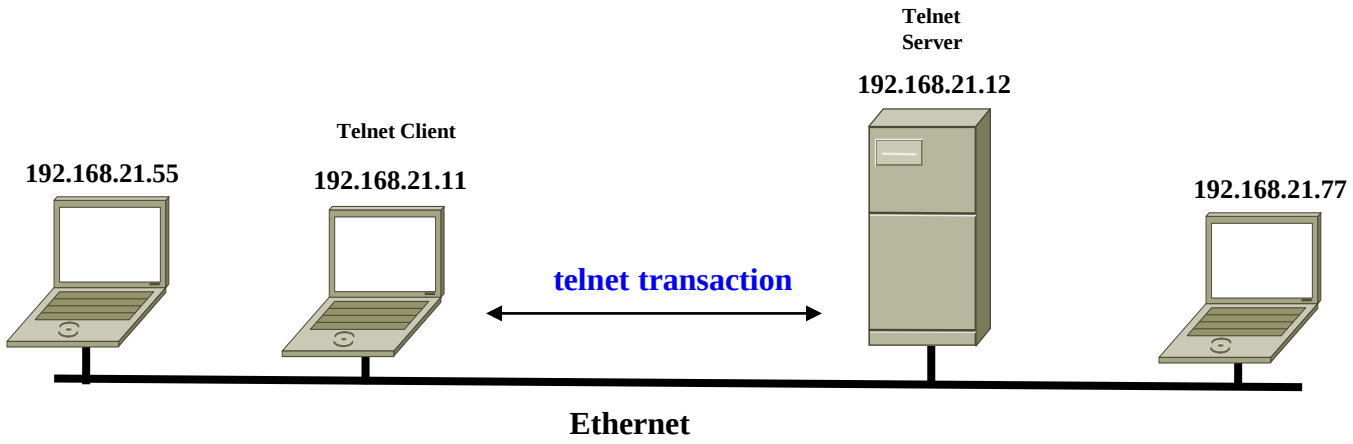


International Letter

Making Sense of the OSI Reference Model – Why do I Care ?



Making Sense of the OSI Reference Model – Why do I Care ?



*** Telnet is an application which permits a device to remotely login**

HTTP Session in Context of OSI Reference Model