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?

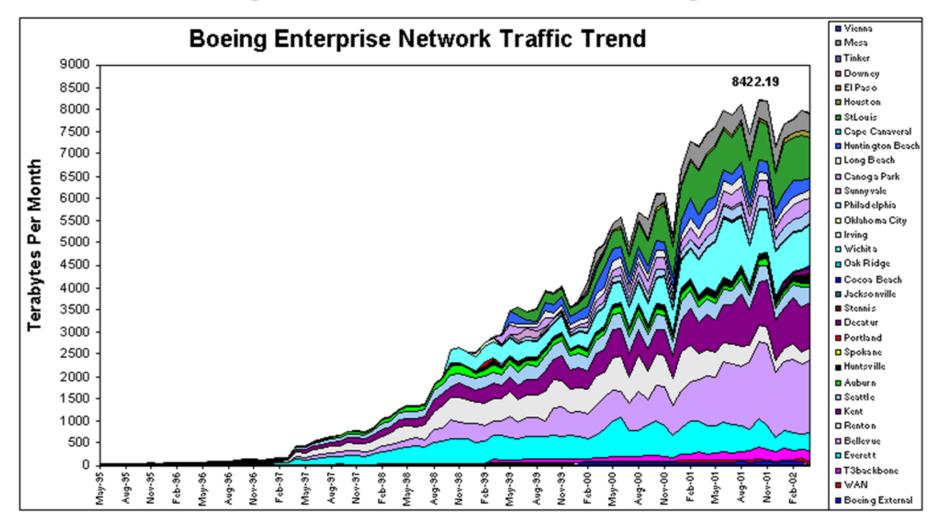
How/why did you choose the carrier (cell co) you did?

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



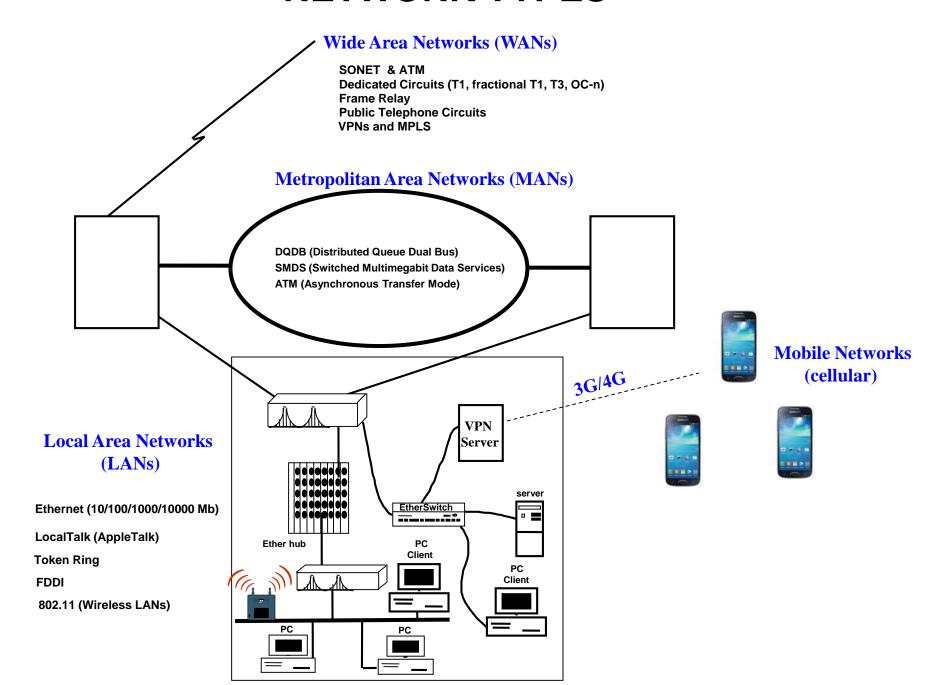
What types of work do Net people do?

What about a server system administrator?

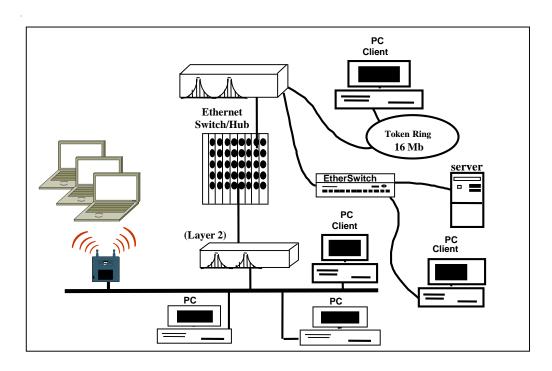
What skills are required for Net jobs?

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

NETWORK TYPES



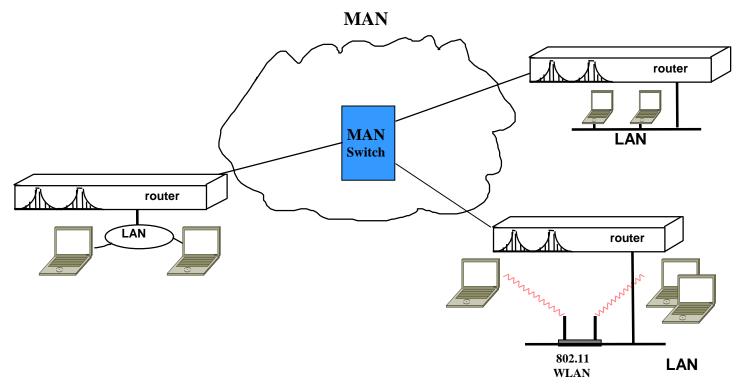
Local Area Networks (LANs):



Basic characteristics of a LAN:

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

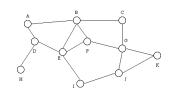
Metropolitan Area Networks (MANs):

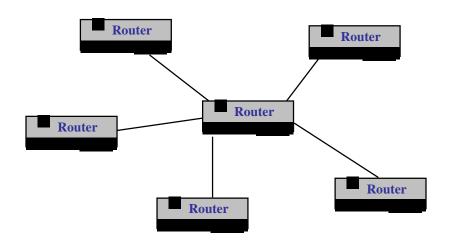


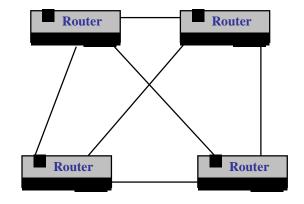
Basic characteristics of a MAN:

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

Wide Area Networks (WANs):







Star (WAN)

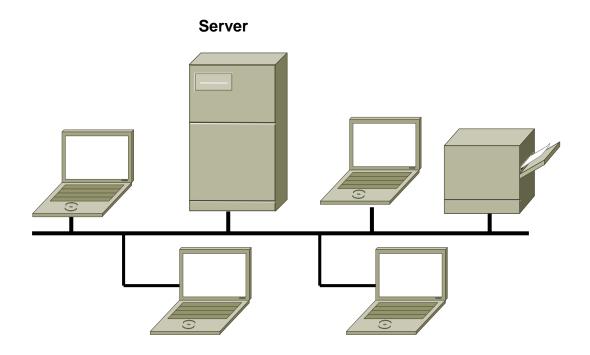
Mesh (WAN)

Basic characteristics of a WAN:

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

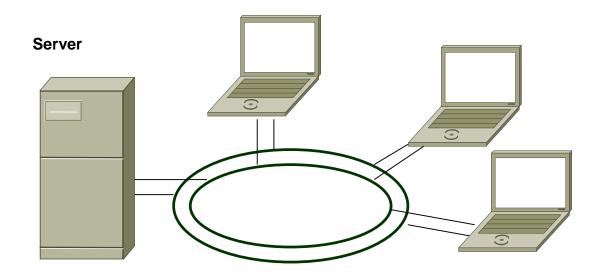
Network Topologies

Bus Topology: (Example – ThickNet Ethernet)



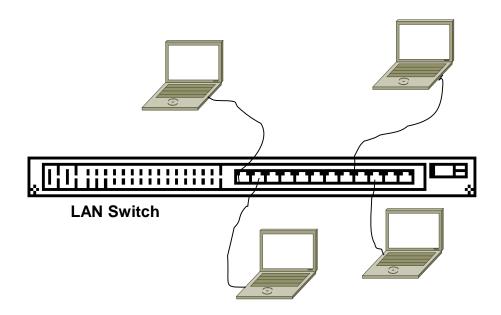
Broadcast-oriented – all transmissions heard by all stations
Multipoint medium
Transmission propagates throughout medium

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



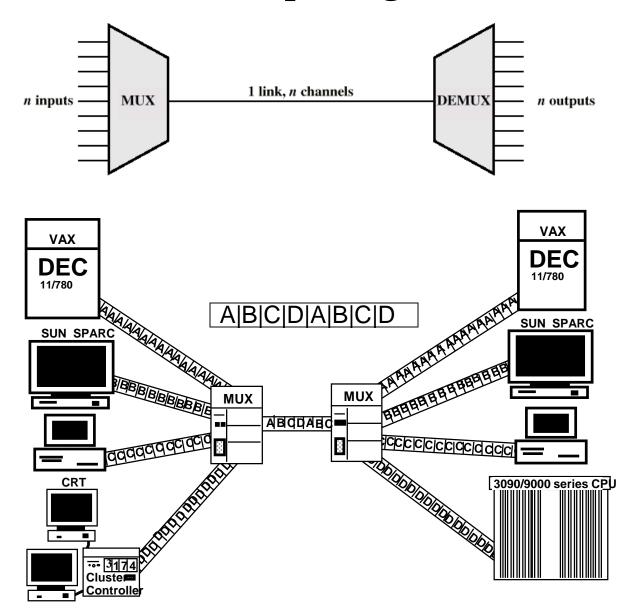
Data in frames
Circulate past all stations
Destination recognizes address and copies frame
Frame circulates back to source where it is removed
Media access control determines when station can insert frame

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

Laptop

OSI Reference Model

Server

End User Interface to net. **Application**

Data Transform Presentation

Synch end to end conversation Session

End to end service quality **Transport**

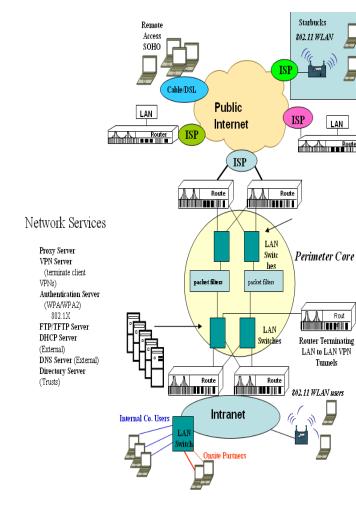
Routing data Network

Framing, Error Detect/Correct LLC_(Logical Link)

MAC (Media Access NIC (MAC add)

Media contention: CSMA/CSMA-CD **Physical**

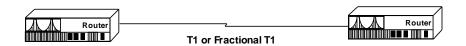
Physical Medium: UTP/Coax/Fiber/RF



LAN

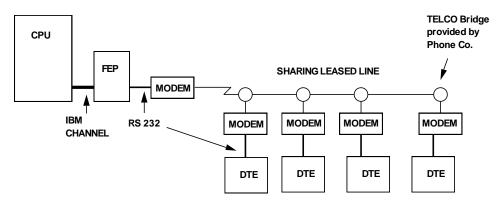
Tunnels

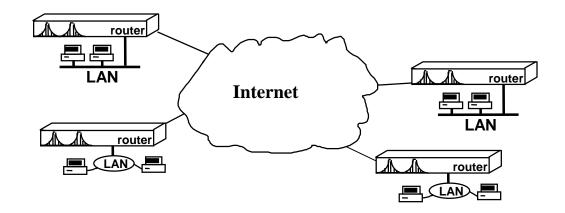
Types of Network Links/Services



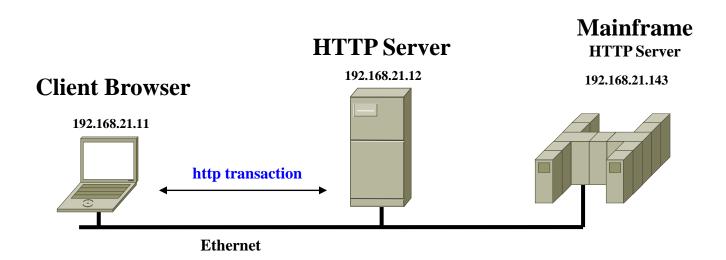
Point-to-Point: single communications link not shared with any other statior

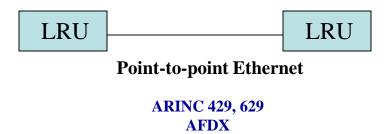
Multipoint (Polled Multipoint)





Data Communications/Network Usage





OSI Reference Model

Application

Provides access to the OSI environment for users and al provides distributed information services.

Presentation

Provides independence to the application processes from differences in data representation (syntax).

Session

Provides the control structure for communication between applications; establishes, manages, and terminates connections (sessions) between cooperating applications.

Transport

Provides reliable, transparent transfer of data between end points; provides end-to-end error recovery and flow control

Network

Provides upper layers with independence from the data transmission and switching technologies used to connec systems; responsible for establishing, maintaining, and terminating connections.

Data Link

Provides for the reliable transfer of information across the physical link; sends blocks (frames) with the necessary synchronization, error control, and flow control.

Physical

Concerned with transmission of unstructured bit stream over physical medium; deals with the mechanical, electrical, functional, and procedural characteristics to access the physical medium.



Server



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)

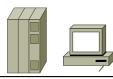
Physical

Media contention: CSMA/CSMA-CD

Physical Medium: UTP/Coax/Fiber/RF

OSI Reference Model

Server



Application

End User Interface to net.

Presentation

Data Transform

Format recognizable to end system/appl.

upper layer protocols

lower layer protocols

Fast, error free comm.

Session

Transport

Network

LLC (Logical Link)

MAC (Media Access)

Physical

Synch end to end conversation

End to end service quality

Routing data

Framing, Error Detect/Correct

NIC (MAC add)

Media contention: CSMA/CSMA-CD

Physical Medium: UTP/Coax/Fiber/RF

What protocols do you know?

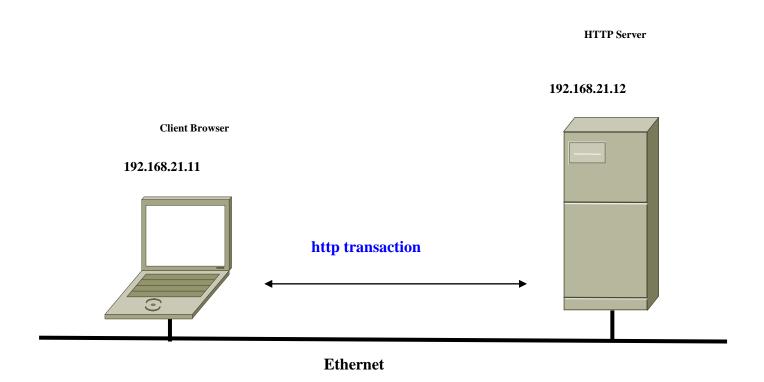
Protocol Layering/Enveloping

Anytown, USA

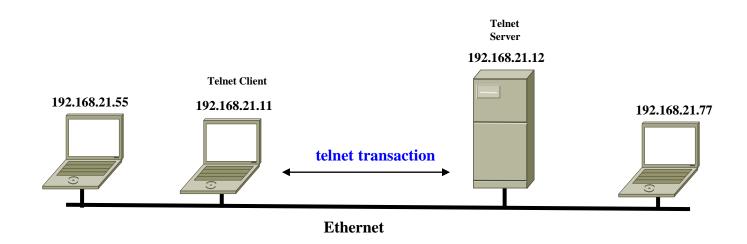


International Letter

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

