

NET 363

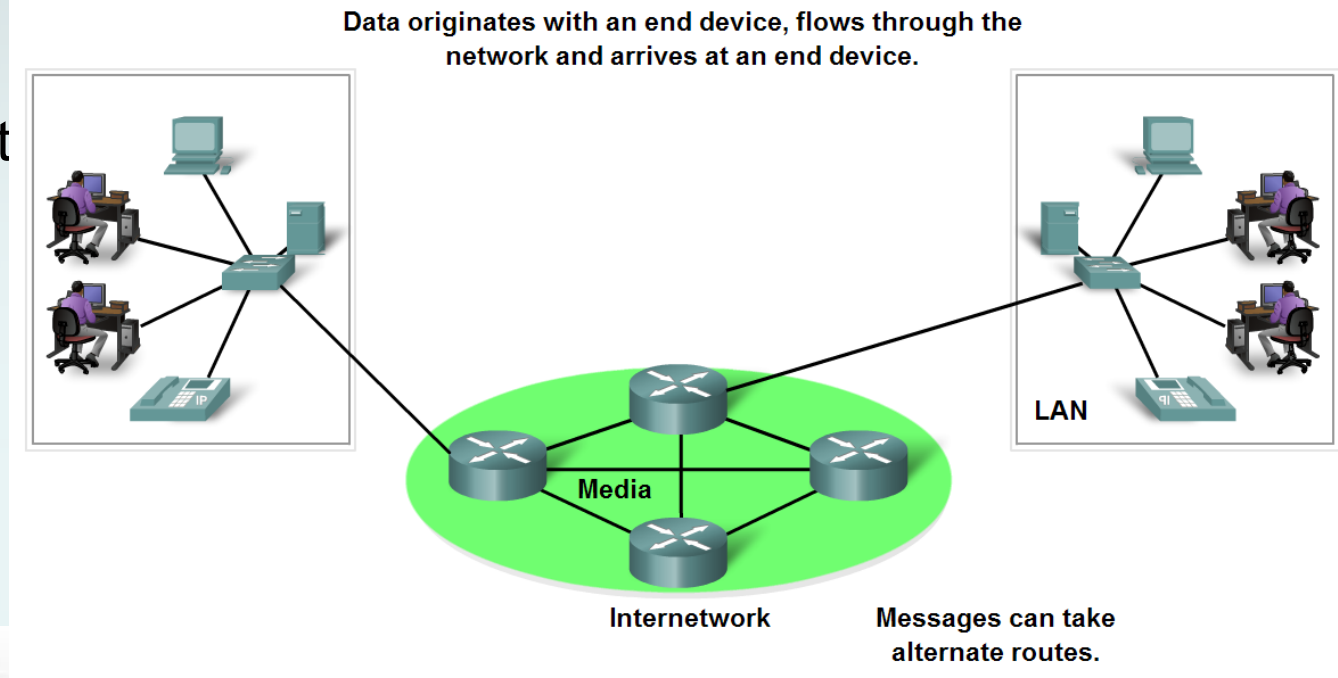
Introduction to LANs

Network Structure

Greg Brewster
DePaul University

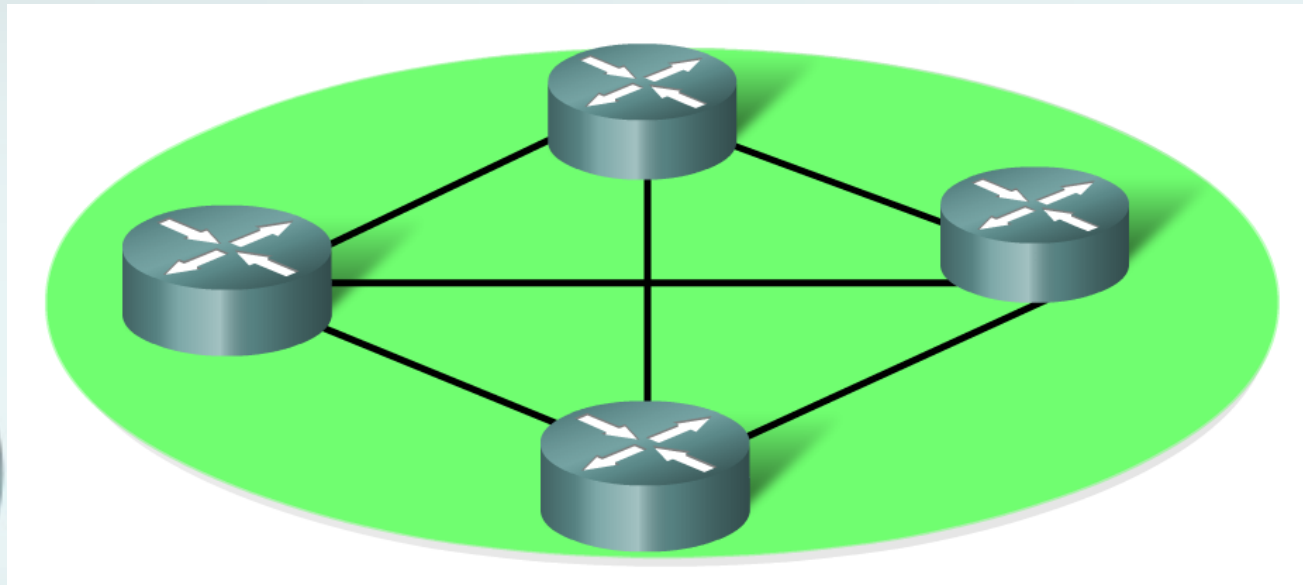
Network Structure

- End Devices and their Role in the Network
 - End devices form interface between humans & the communications network
 - Role of end devices:
 - * client = “Host”
 - * server
 - * both client and server



Network Structure

- The role of an intermediary device in a data network
 - provides connectivity and ensures data flows across network



Network Structure

- Network media
 - this is the channel over which a message travels
- Criteria for making a network media choice

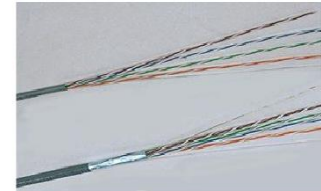


NET 363

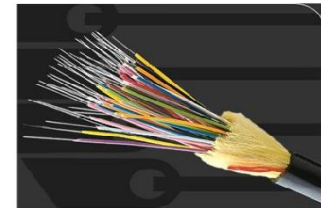
Network Media



Copper



Fiber Optics



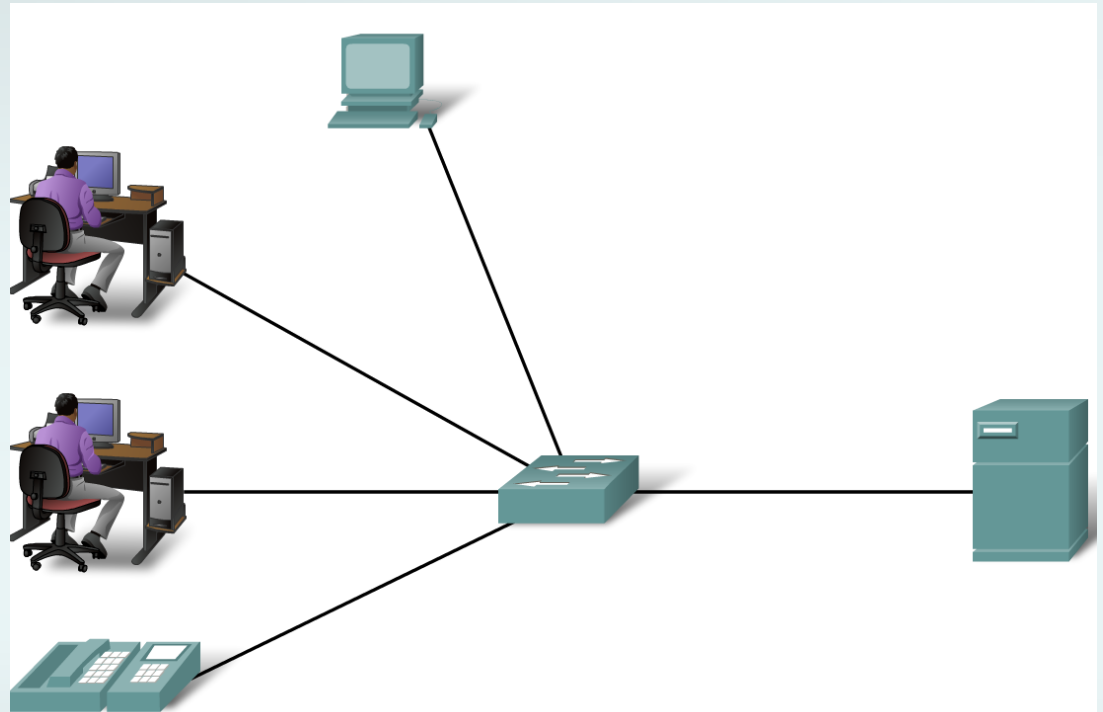
Wireless



Greg Brewster, DePaul University

Network Types

- Local Area Networks (LANs)
 - A network serving a home, building or campus is considered a Local Area Network (LAN)



Local Area Network

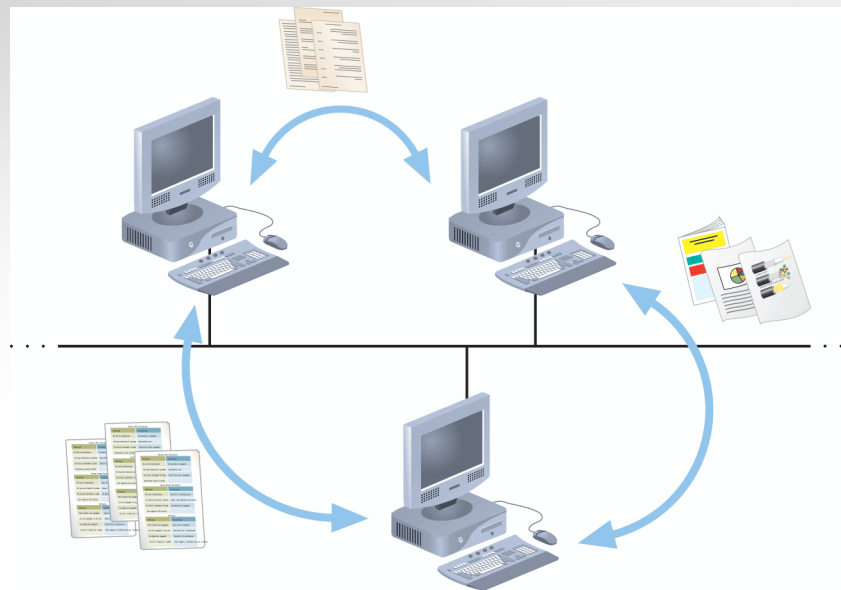
- Characteristics:
 - High Communications Speed (10Mbps – 10Gbps)
 - Very Low Error Rate ($< 10^{-8}$)
 - Limited Geographic Boundaries (within 1 building)
 - Simple Cabling System (star-wired or wireless)
 - Originally designed to use *broadcast transmission* to deliver data (that is, each transmitted data packet is delivered to all other devices on LAN).



LAN Type:

Peer-to-Peer Network

- Computers communicate on single segment of cable and share each other's data and devices
- Simple example of a local area network (LAN)



Each device maintains its own list of users and passwords

Figure 1-1 Resource sharing on a simple peer-to-peer network



LAN Type: Client/Server Network

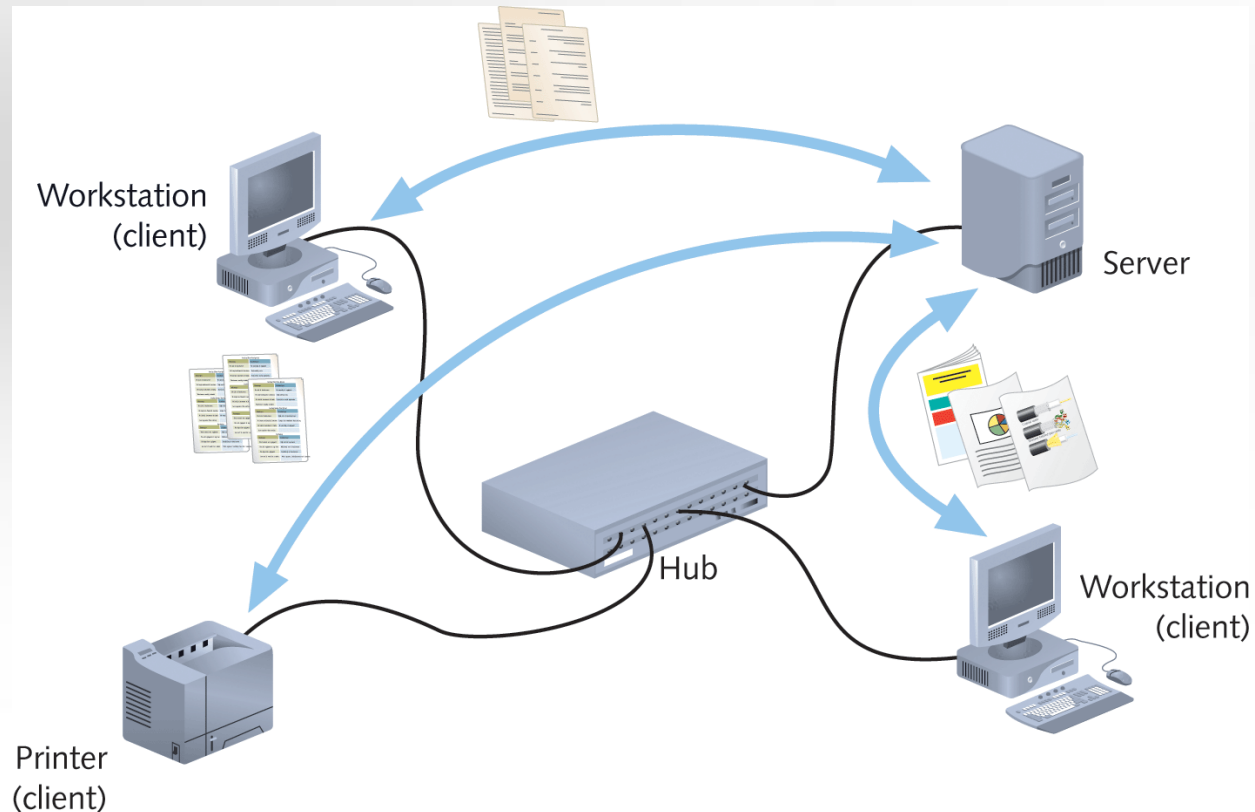
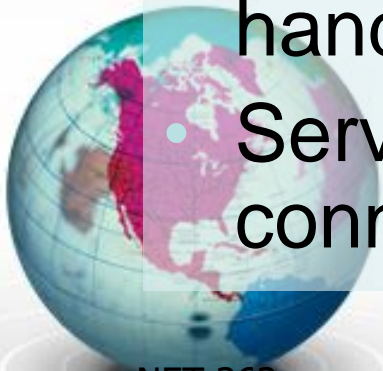


Figure 1-2 Resource sharing on a client/server network



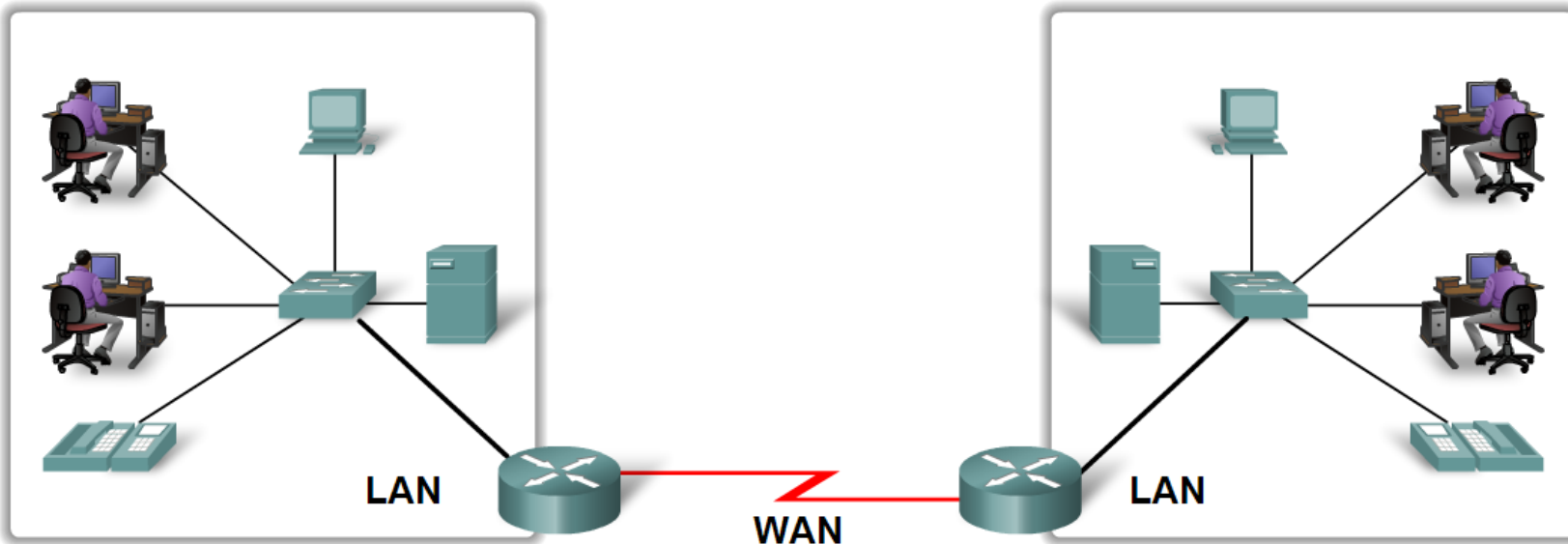
Advantages of Server-Based over Peer-to-Peer Networks

- User login accounts and passwords can be assigned in one place.
- Access to multiple shared resources can be centrally controlled.
- Servers are optimized to handle heavy processing loads and dedicated to handling requests from clients.
- Servers can support a large number of connections.



Network Types

- Wide Area Networks (WANs)
 - LANs separated by geographic distance are connected by a network known as a Wide Area Network (WAN)



Network Types

- Network representations

Common Data Network Symbols



Router



LAN Switch



LAN Hub



Server



Desktop Computer



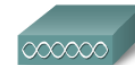
Laptop



Firewall



IP Phone



Wireless Access Point



Wireless Router



WAN Media



LAN Media



Wireless Media



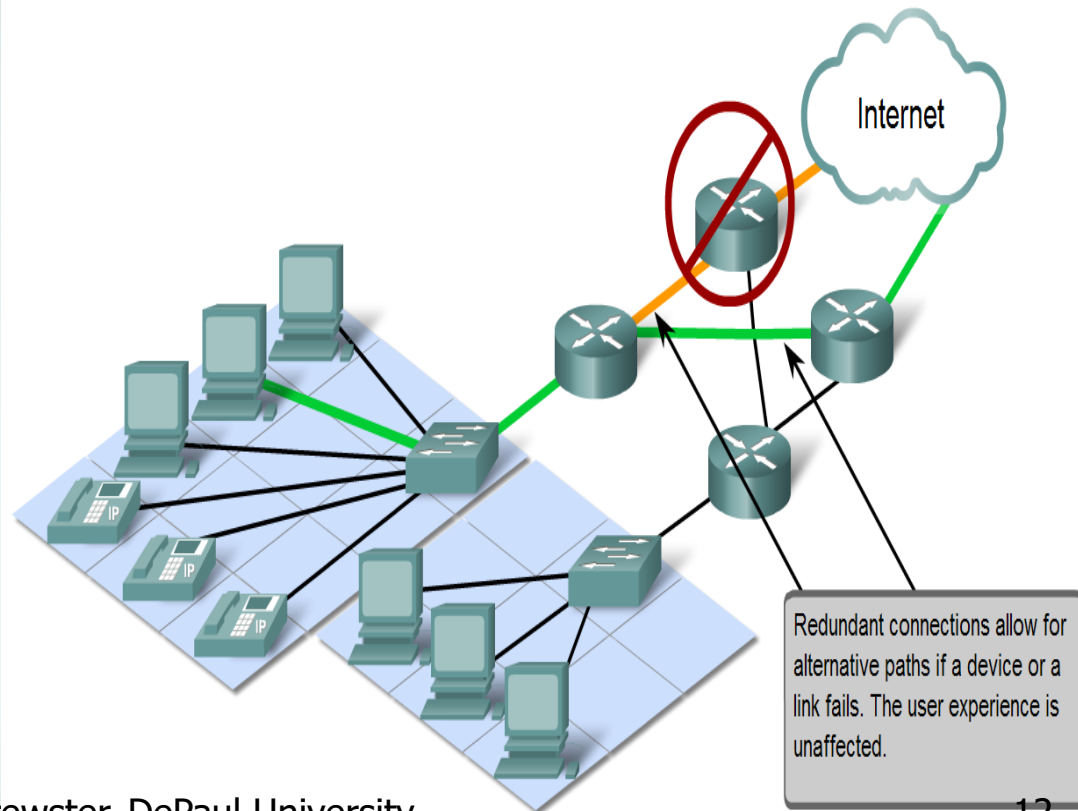
Network Architecture Characteristics

- Four characteristics that are addressed by network architecture design
 - Fault tolerance
 - Scalability
 - Quality of service
 - Security



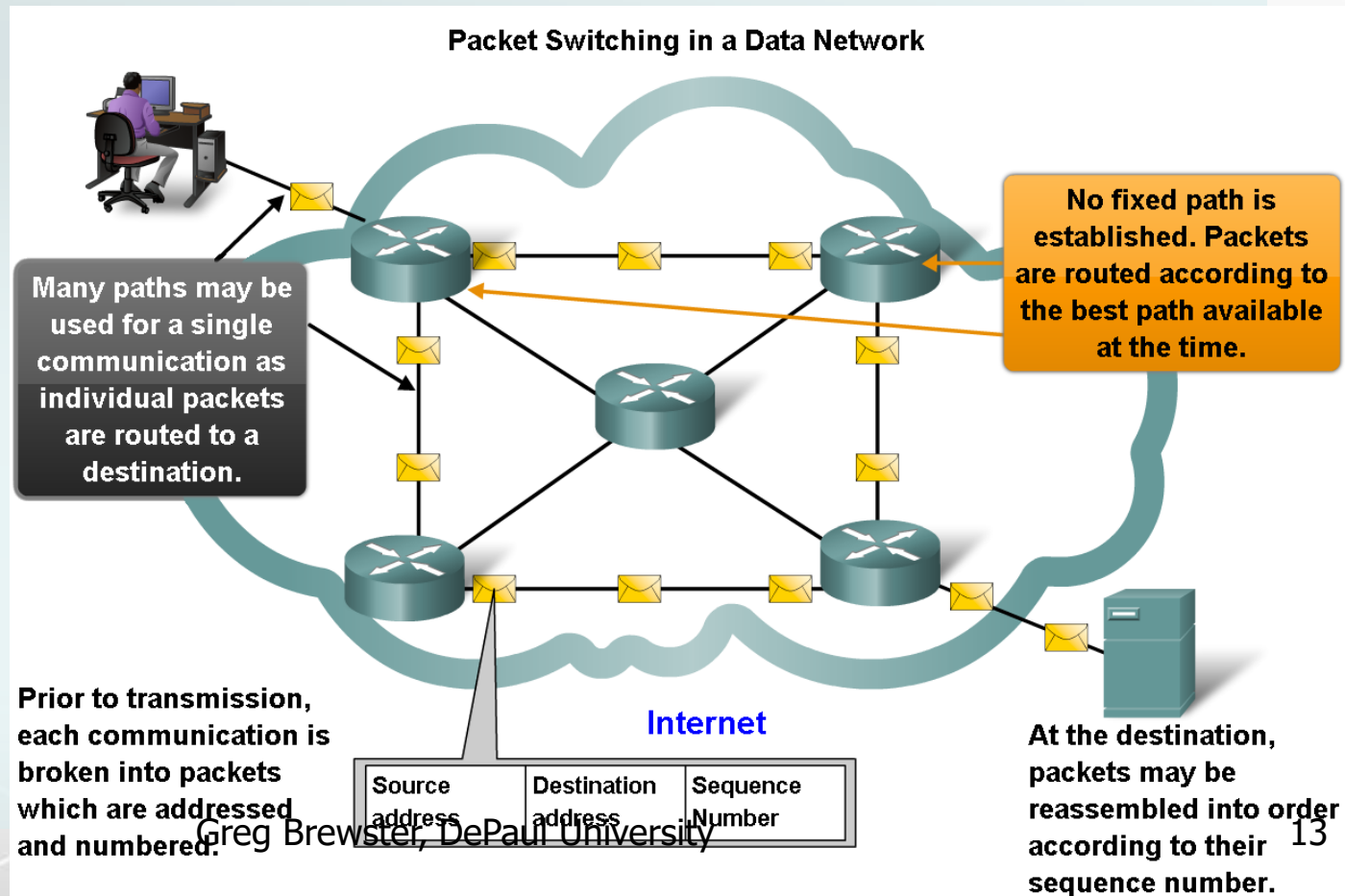
NET 363

Greg Brewster, DePaul University



Network Architecture Characteristics

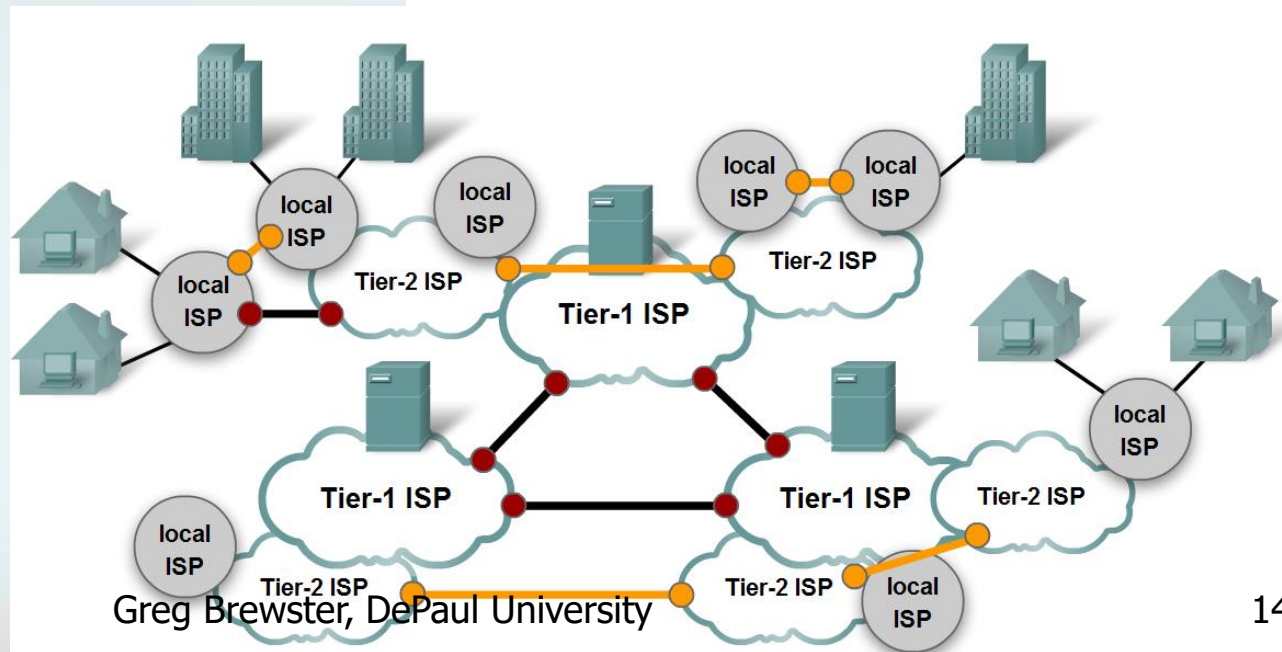
- Packet switching helps improve the resiliency and fault tolerance of the Internet architecture



Network Architecture Characteristics

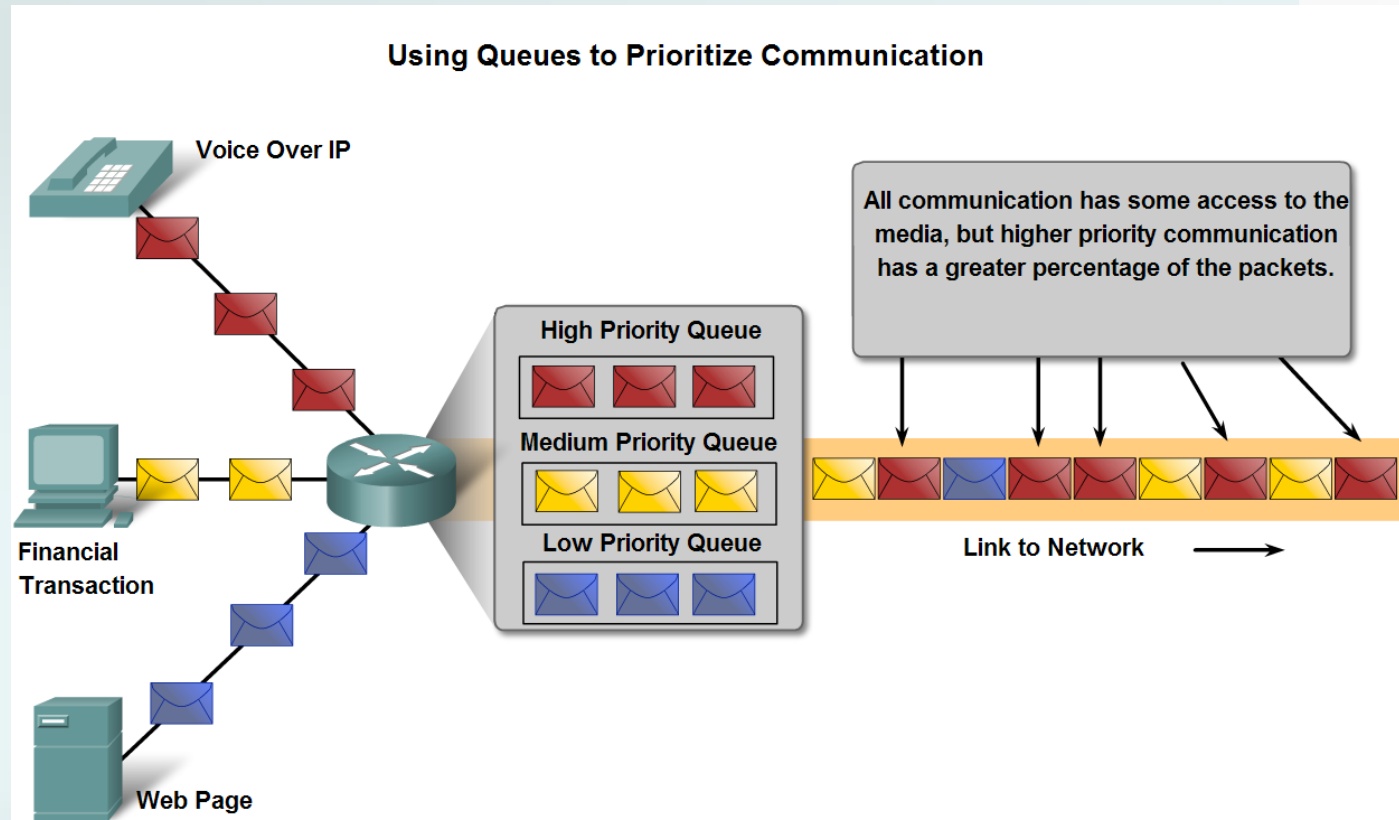
- Characteristics of the Internet that help it scale to meet user demand
 - Hierarchical
 - Common standards
 - Common protocols

Internet Structure - A Network of Networks



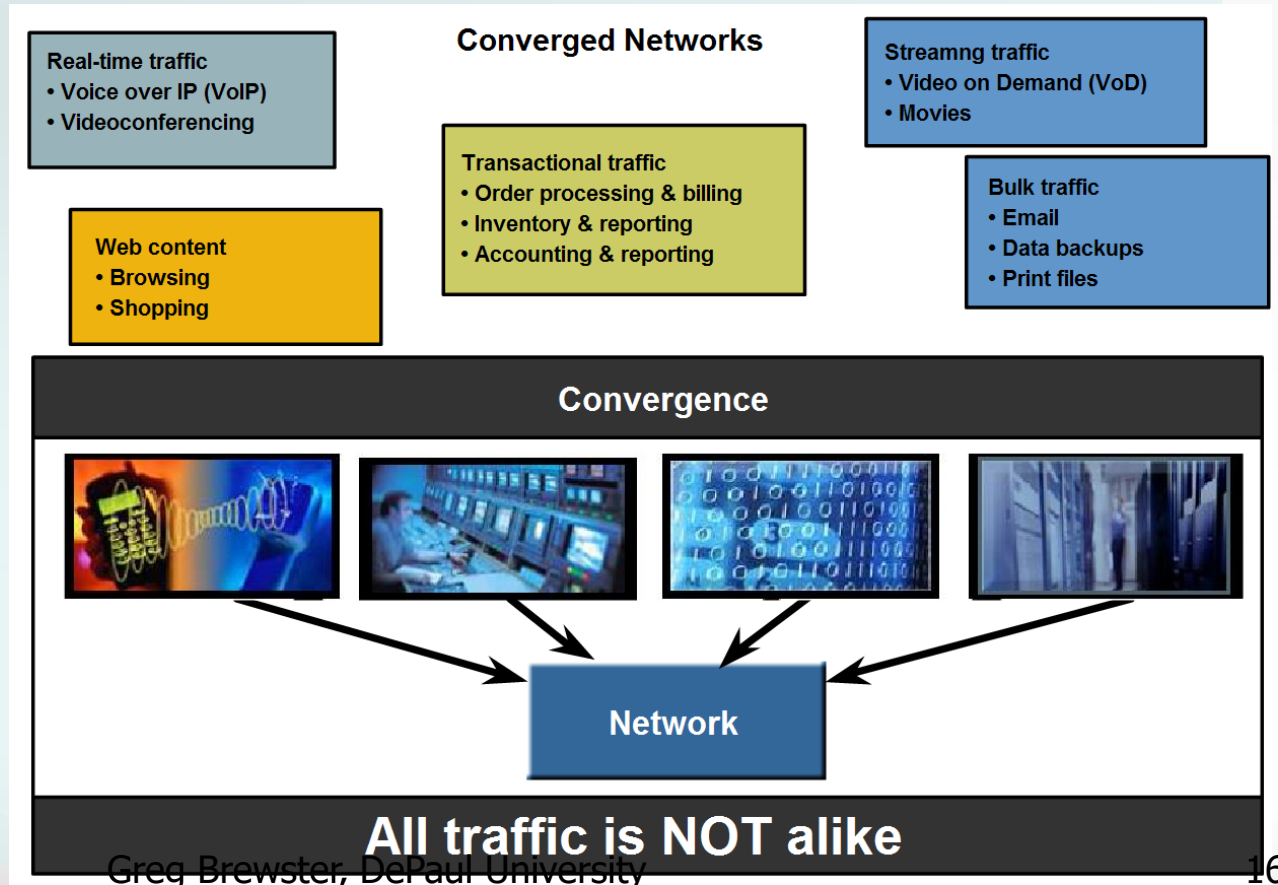
Network Architecture Characteristics

- Factors that necessitate Quality of Service and the mechanisms necessary to ensure it



Network Architecture Characteristics


- QoS mechanisms work to ensure quality of service for applications that require it.



Network Architecture Characteristics

- Networks must be secure

Unauthorized Transactions



CREDIT CARD
STATEMENT

SEND PAYMENT TO
Box 1234
Anytown, USA

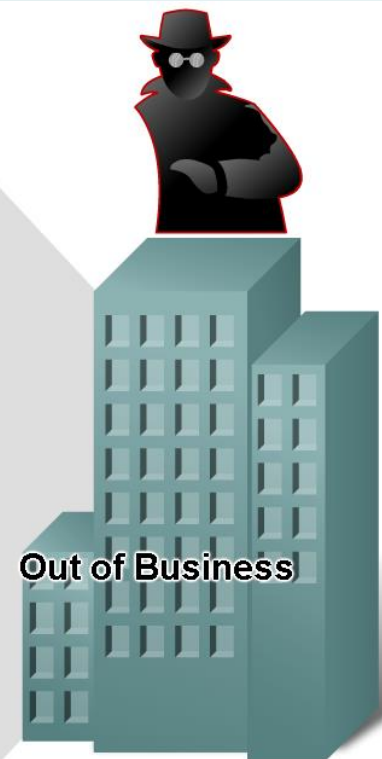
ACCOUNT NUMBER	NAME	STATEMENT DATE	PAYMENT DUE DATE
4125-239-412	John Doe	2/13/01	3/09/01
CREDIT LINE	CREDIT AVAILABLE	NEW BALANCE	MINIMUM PAYMENT DUE
\$1200.00	\$1074.76	\$125.24	\$20.00

REFERENCE	GOLD	POSTED	ACTMITY SINCE LAST STATEMENT	AMOUNT
403GB7302		1/25	PAYMENT THANK YOU	-168.80
32F349ER3	1/12	1/15	RECORD RECYCLER ANYTOWN USA	14.83
89102DIS2	1/13	1/15	BEEFORAMA REST ANYTOWN USA	30.55
NX34FUD32	1/18	1/18	GREAT EXPECTORATIONS BIG CITY USA	27.50
84RT3293A	1/20	1/21	DINO-GEL PETROLEUM ANYTOWN USA	12.26
873DWS321	2/09	2/09	SHIRTS 'N SUCH TINYVILLEUSA	40.10

Previous Balance	(+)	168.80	Current Amount Due	125.24
Purchases	(+)	125.24	Amount Past Due	
Cash Advances	(+)		Amount Over Credit Line	
Payments	(-)	168.80	Minimum Payment Due	20.00
Credits	(-)			
FINANCE CHARGES	(+)			
Late Charges	(+)			
NEW BALANCE	(=)	125.24		

FINANCE CHARGE SUMMARY	PURCHASES	ADVANCES	For Customer Service Call: 1-800-XXX-XXXX
Periodic Rate	1.55%	0.054%	For Lost or Stolen Card, Call: 1-800-XXX-XXXX
Annual Percentage Rate	19.80%	19.80%	24-Hour Telephone Numbers

Please make check or money order payable to Your First Bank. Include account number on front.



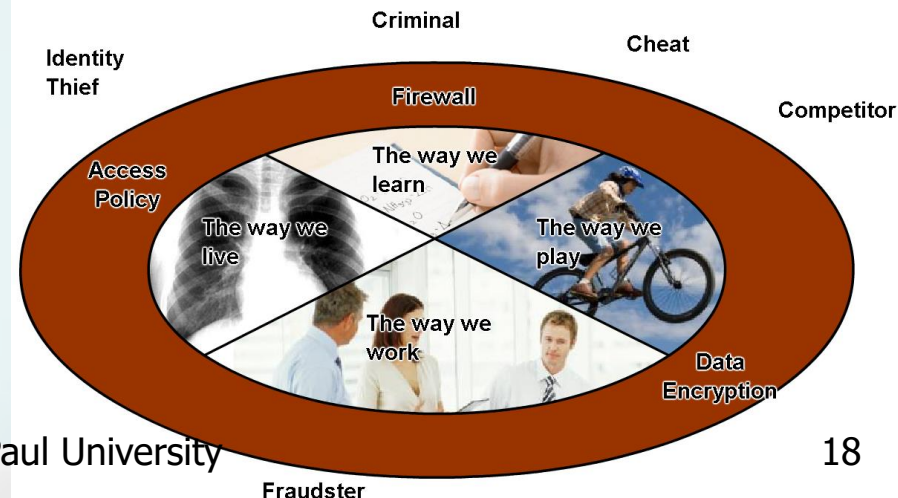
Network Architecture Characteristics

- Basic measures to secure data networks
 - Ensure confidentiality through use of
 - User authentication
 - Data encryption
 - Maintain communication integrity through use of
 - Digital signatures
 - Ensure availability through use of
 - Firewalls
 - Redundant network architecture
 - Hardware without a single point of failure



NET 363

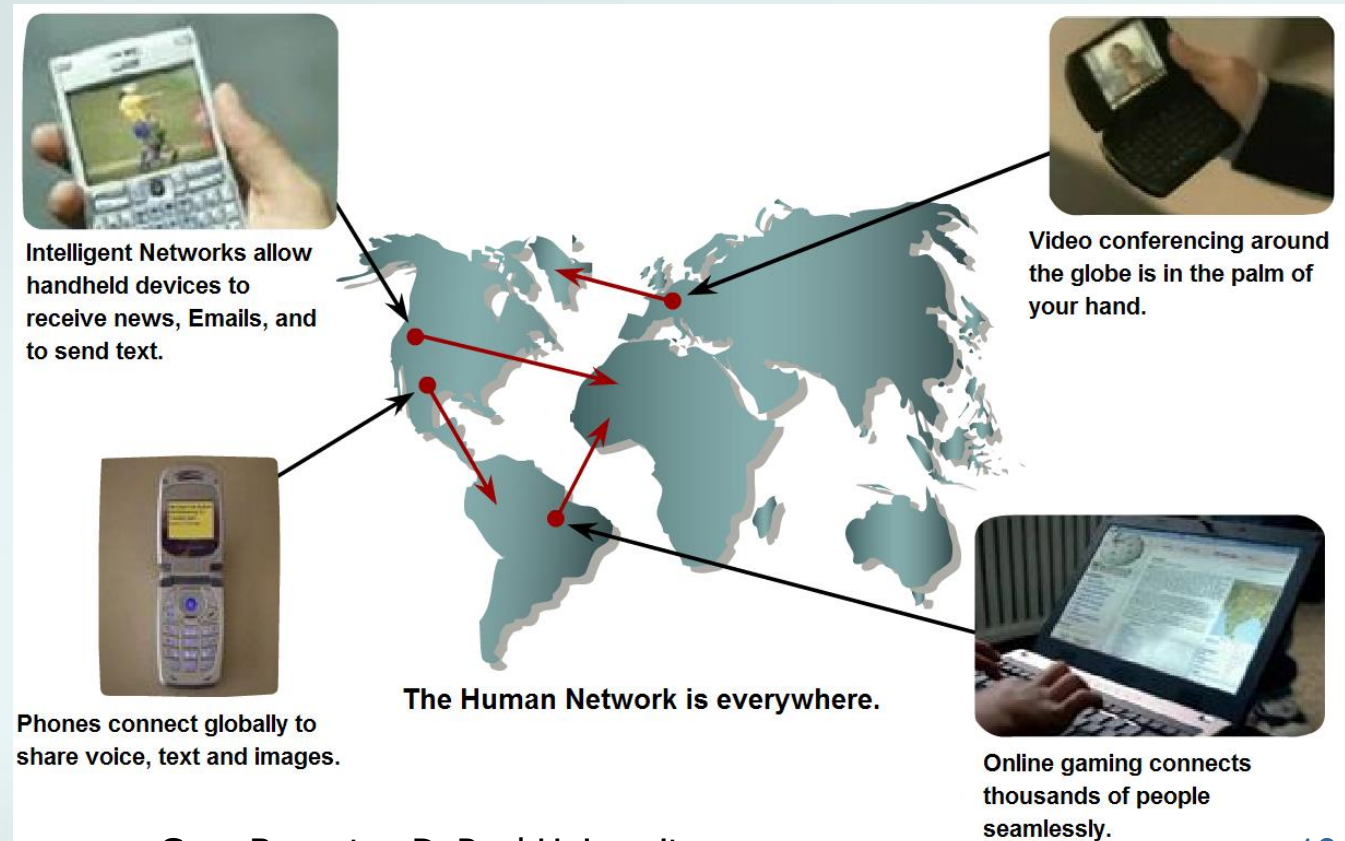
Greg Brewster, DePaul University



18

Converged Networks

- A type of network that can carry voice, video & data over the same network



NET 363

Greg Brewster, DePaul University