NET 363
Introduction to LANs

Network Structure

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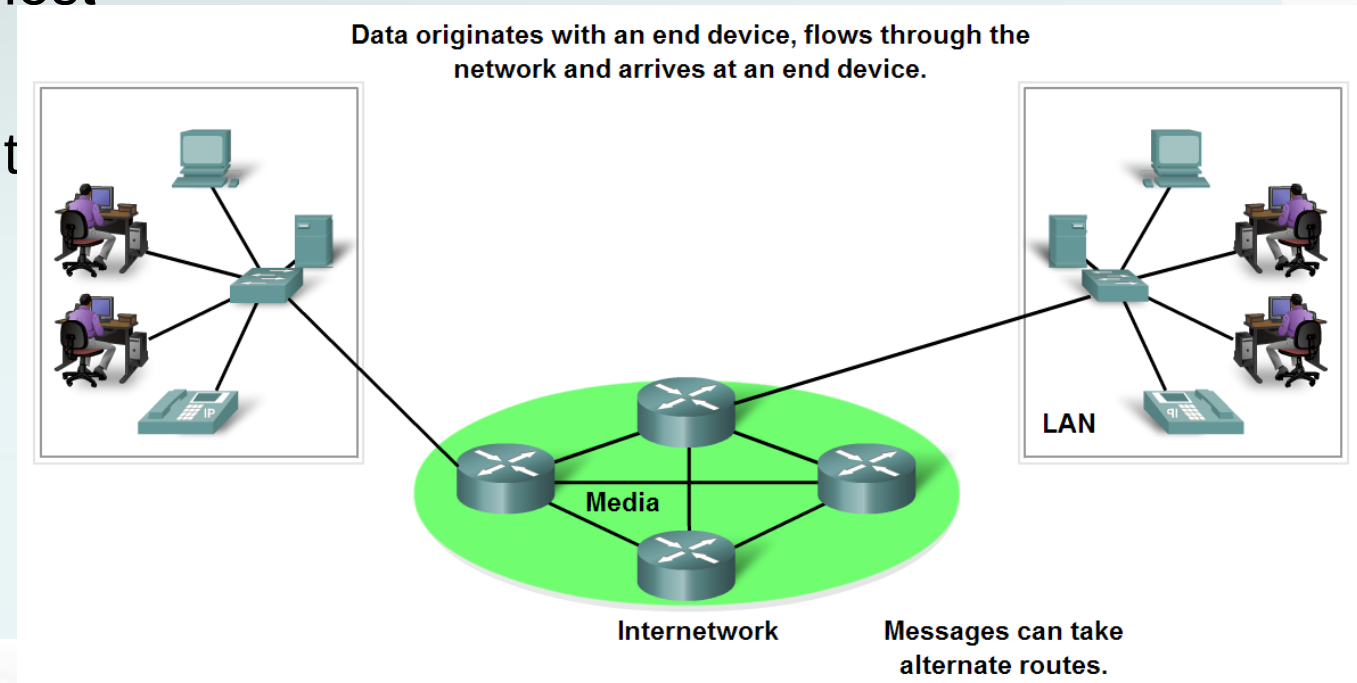
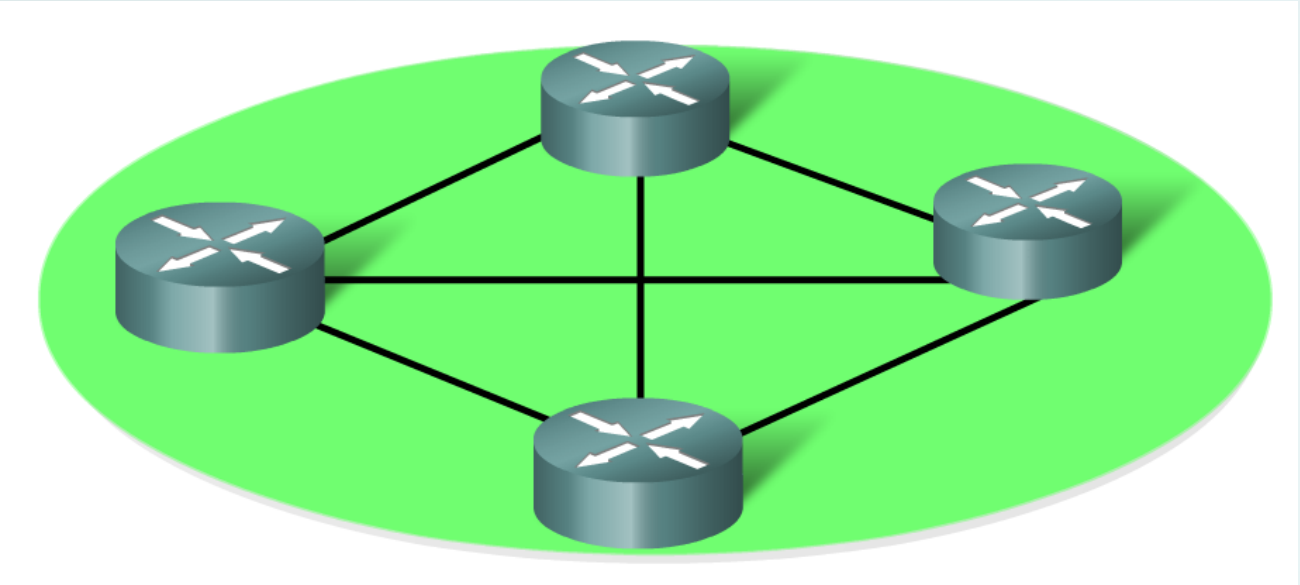
Network Structure

- 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



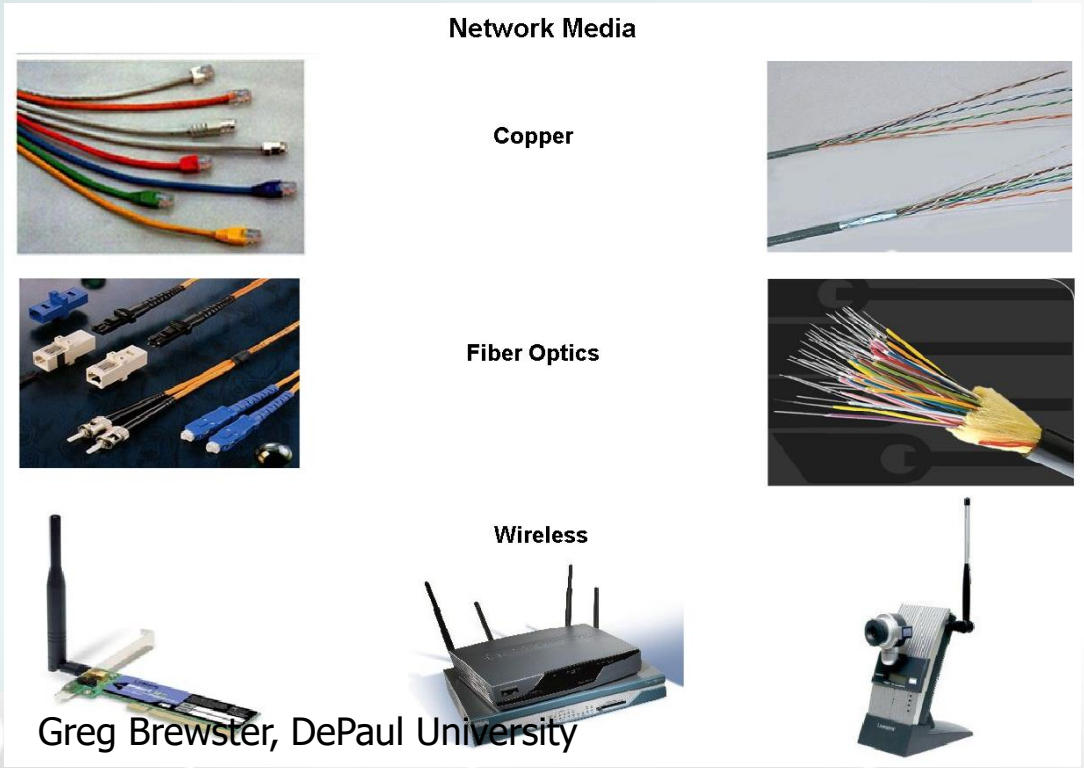
Network Structure

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



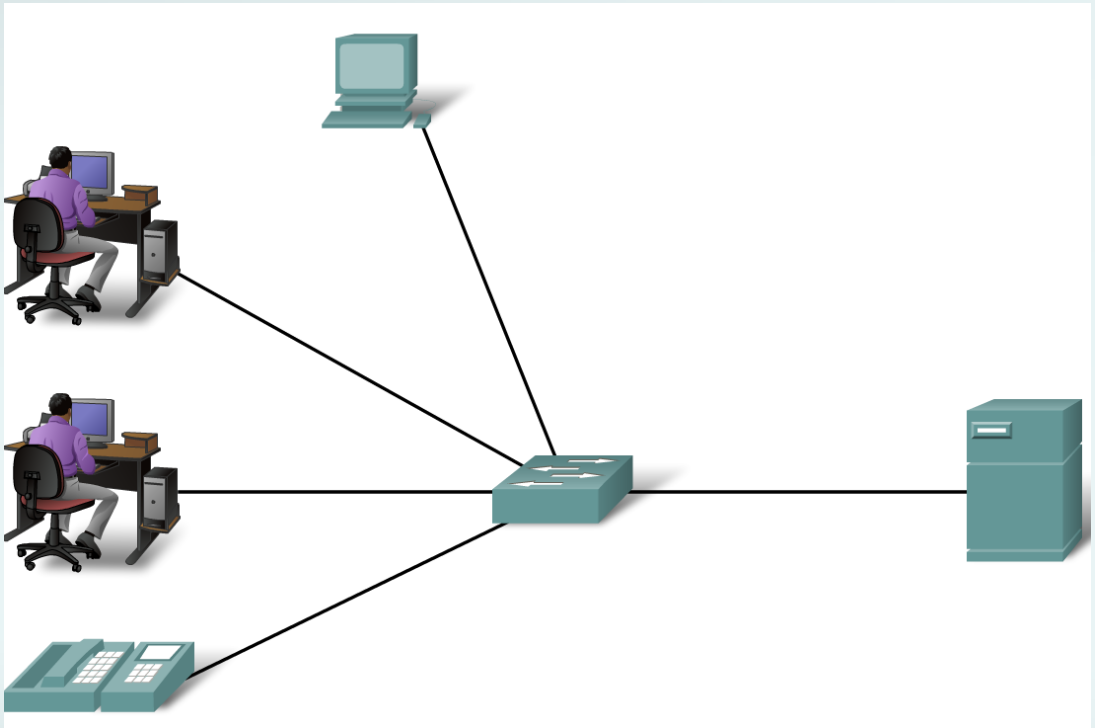
Network Structure

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



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)

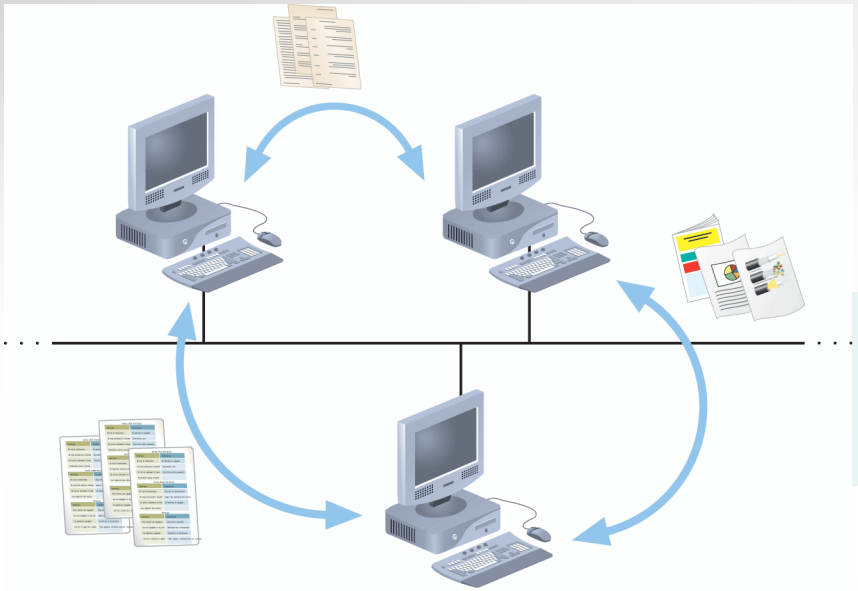


Figure 1-1 Resource sharing on a simple peer-to-peer network

Each device maintains its own list of users and passwords

LAN Type: Client/Server Network

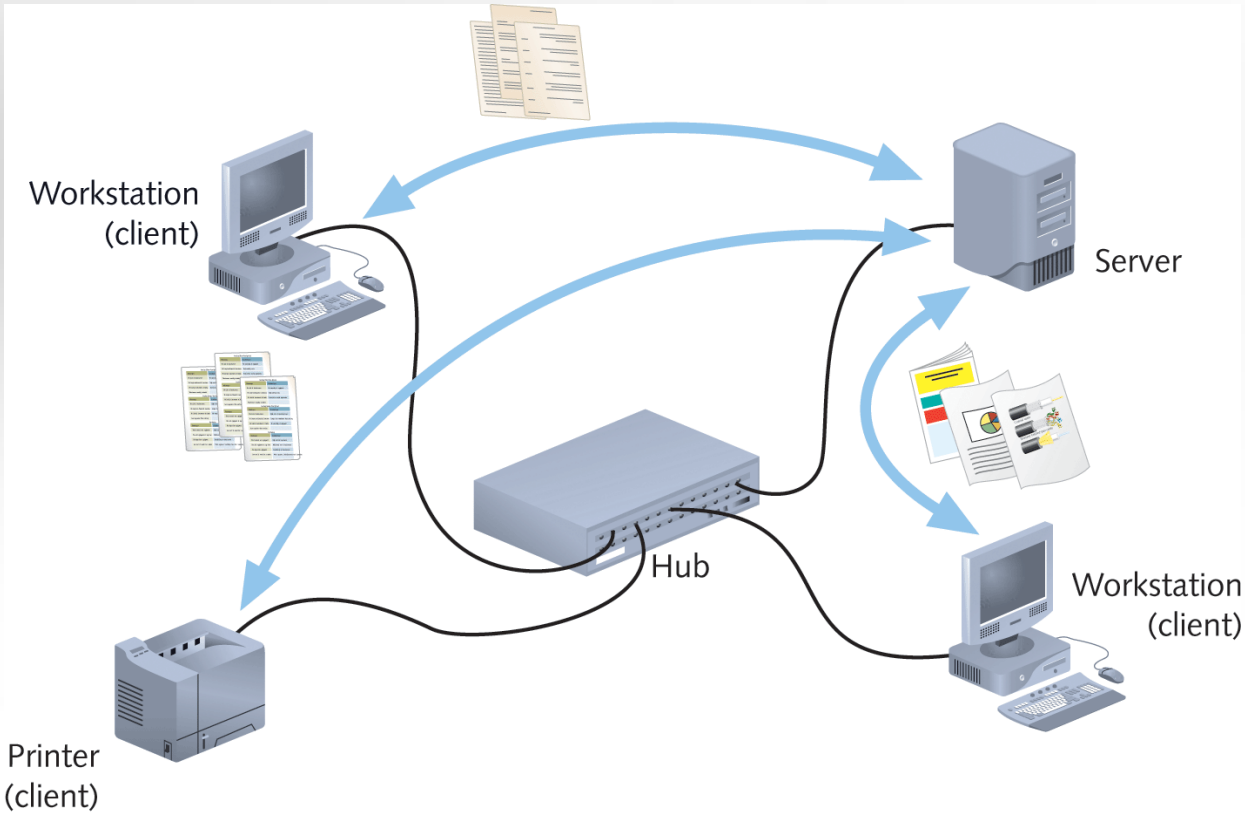


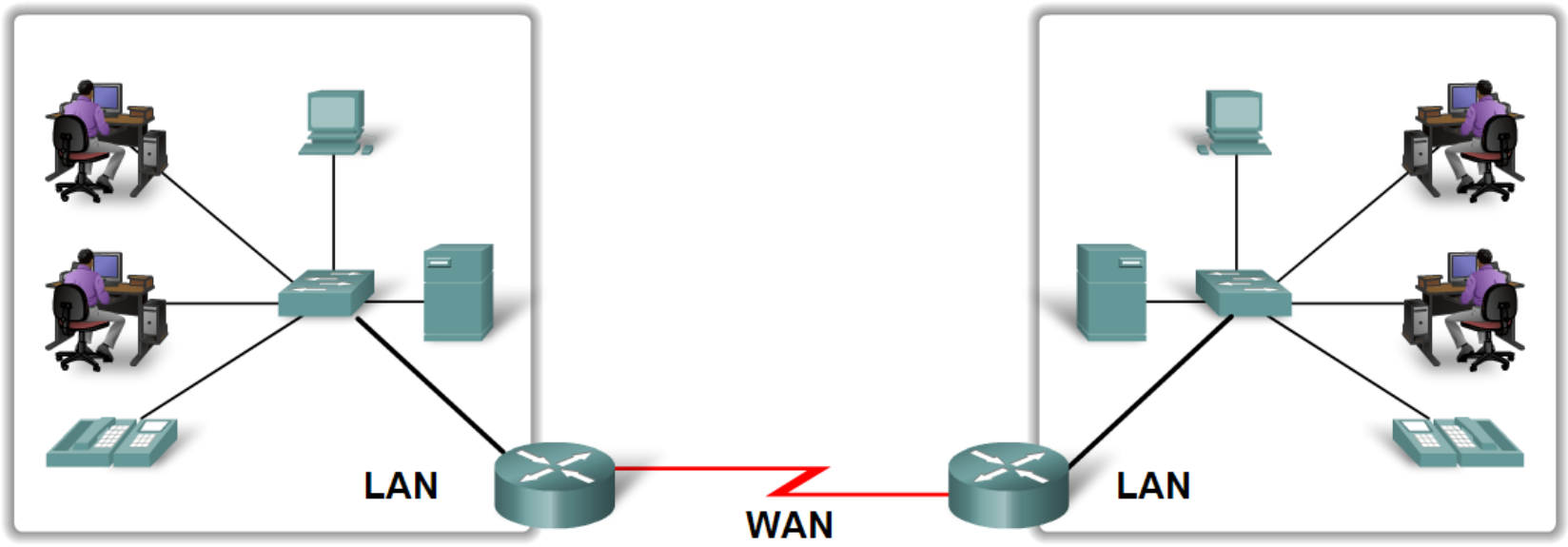
Figure 1-2 Resource sharing on a client/server network

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.

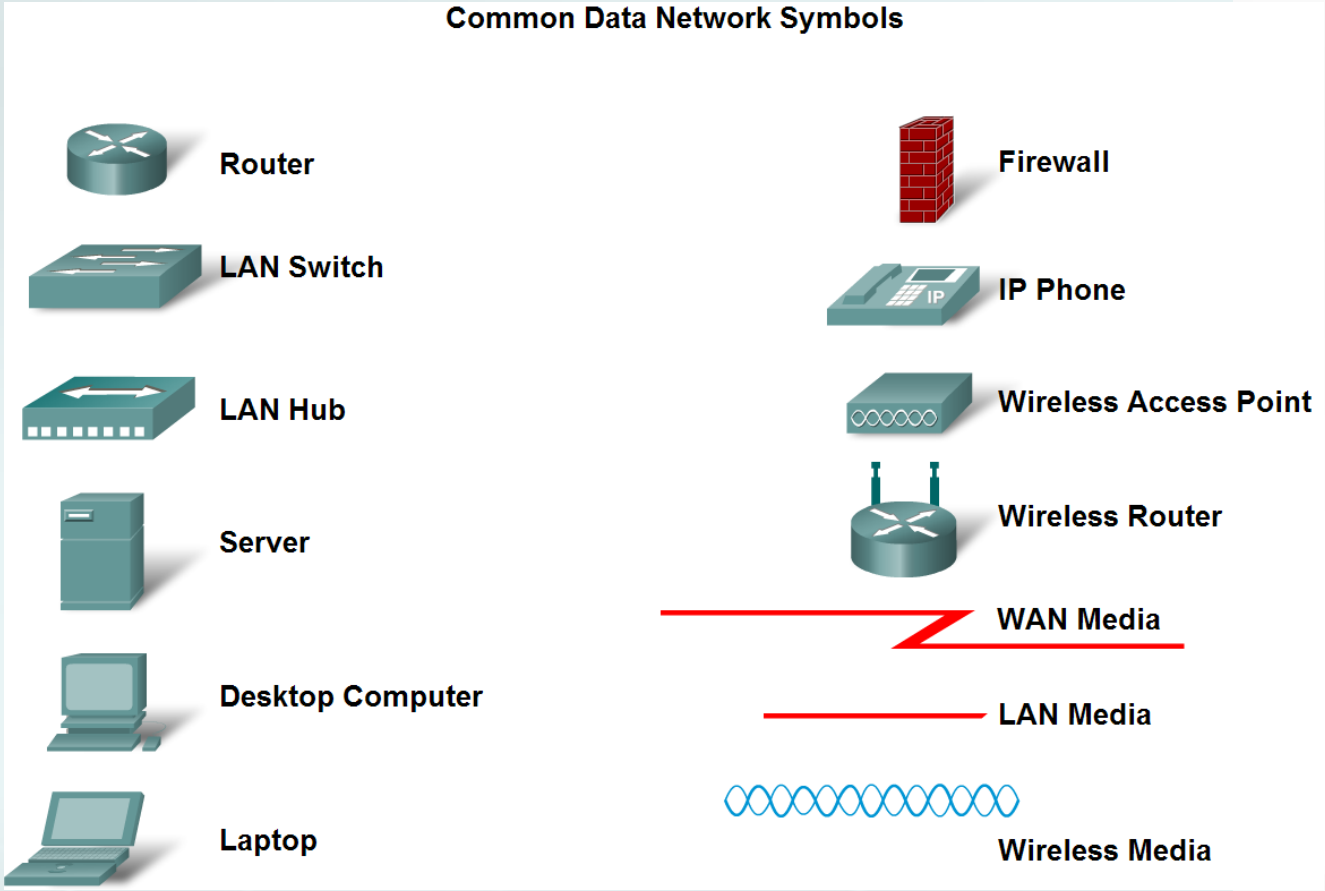
Network Types

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



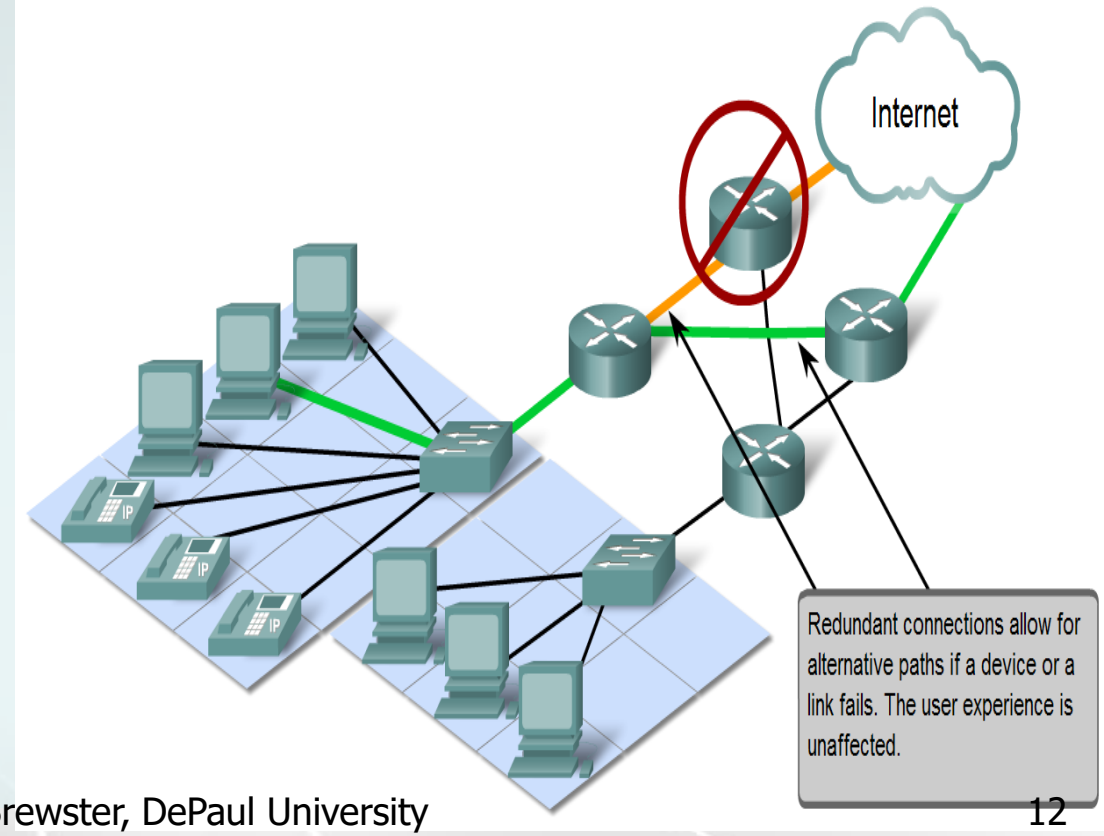
Network Types

- Network representations



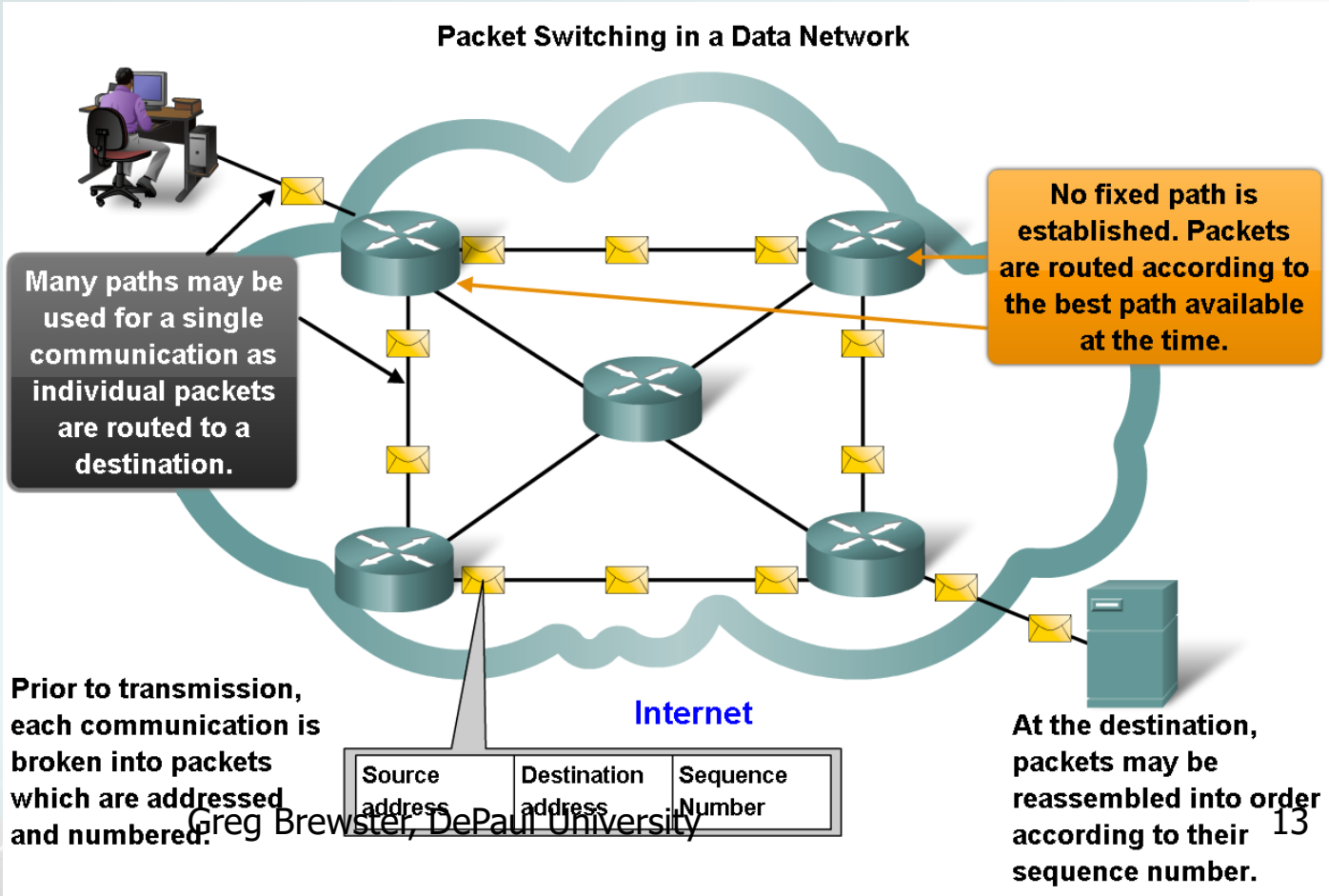
Network Architecture Characteristics

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



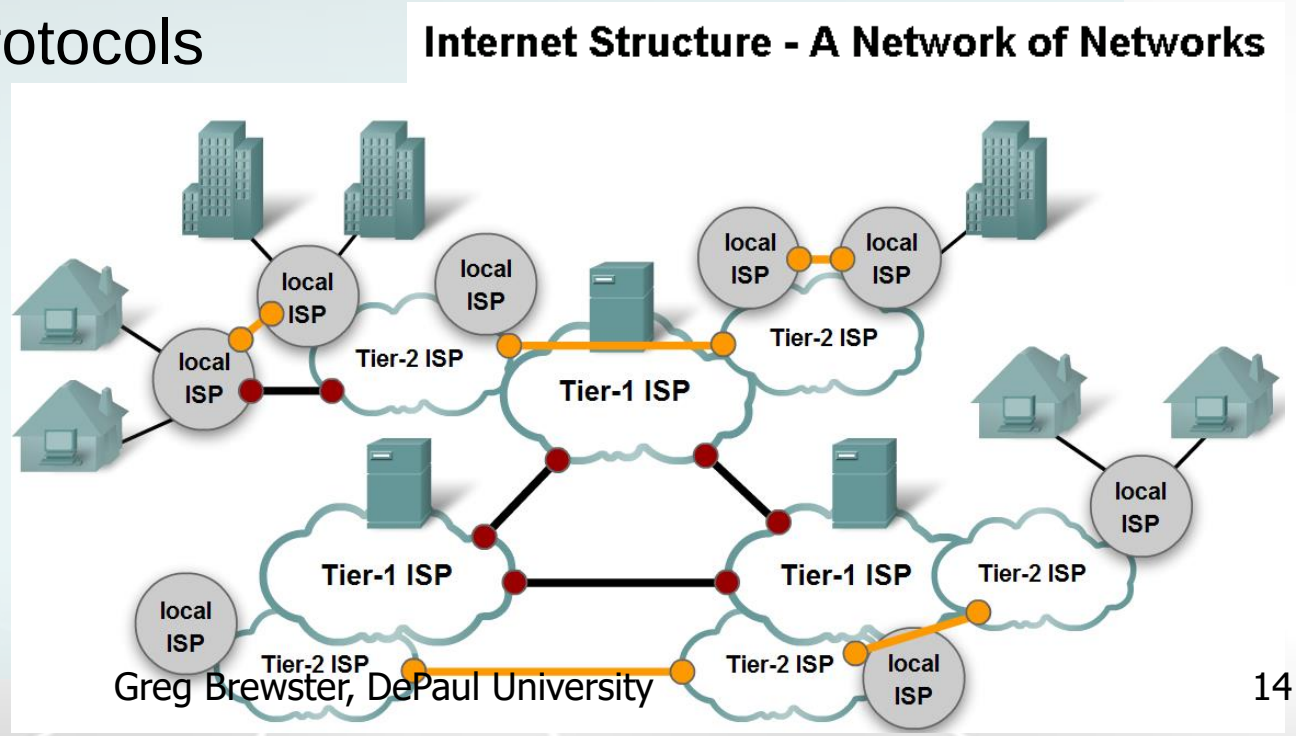
Network Architecture Characteristics

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



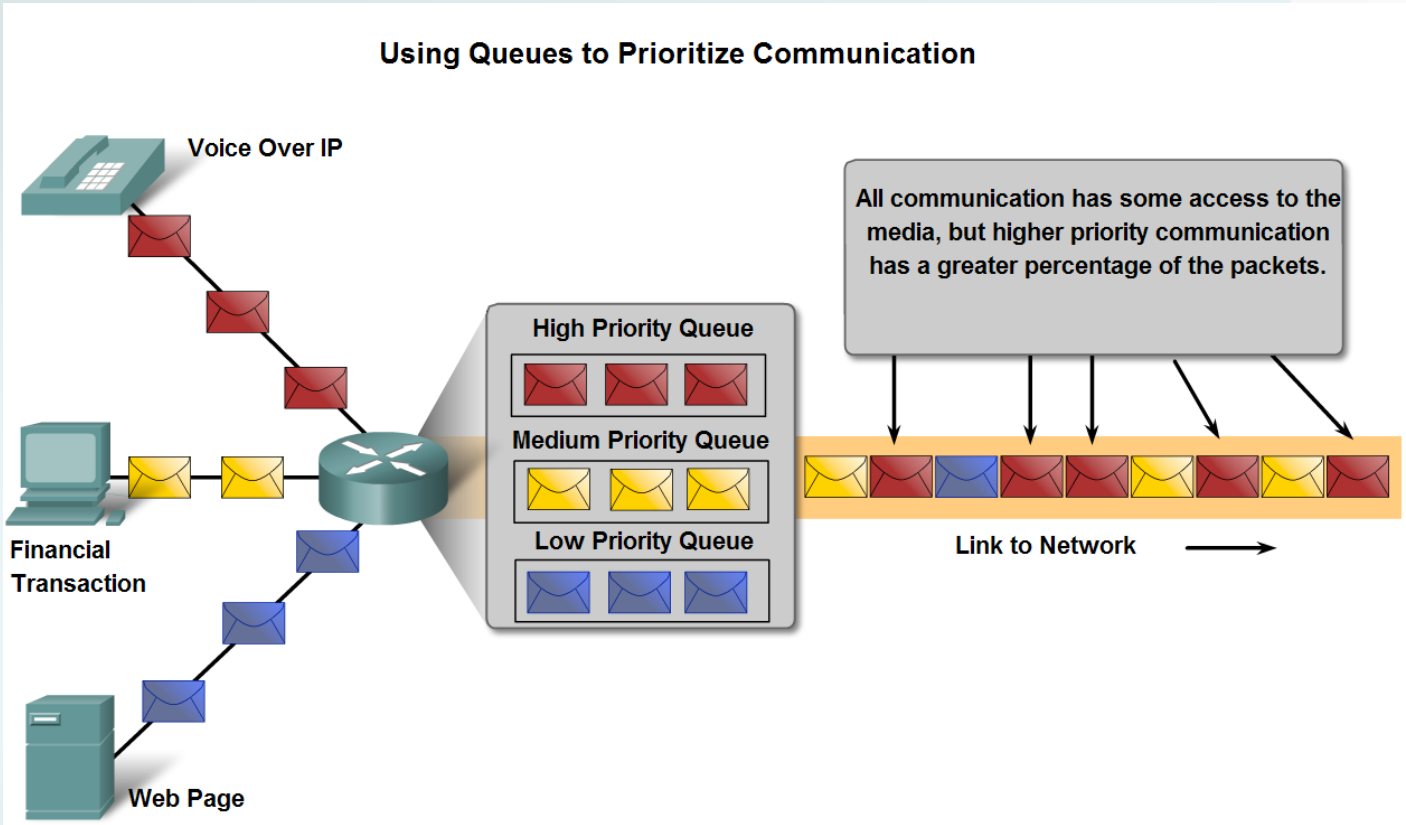
Network Architecture Characteristics

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



Network Architecture Characteristics

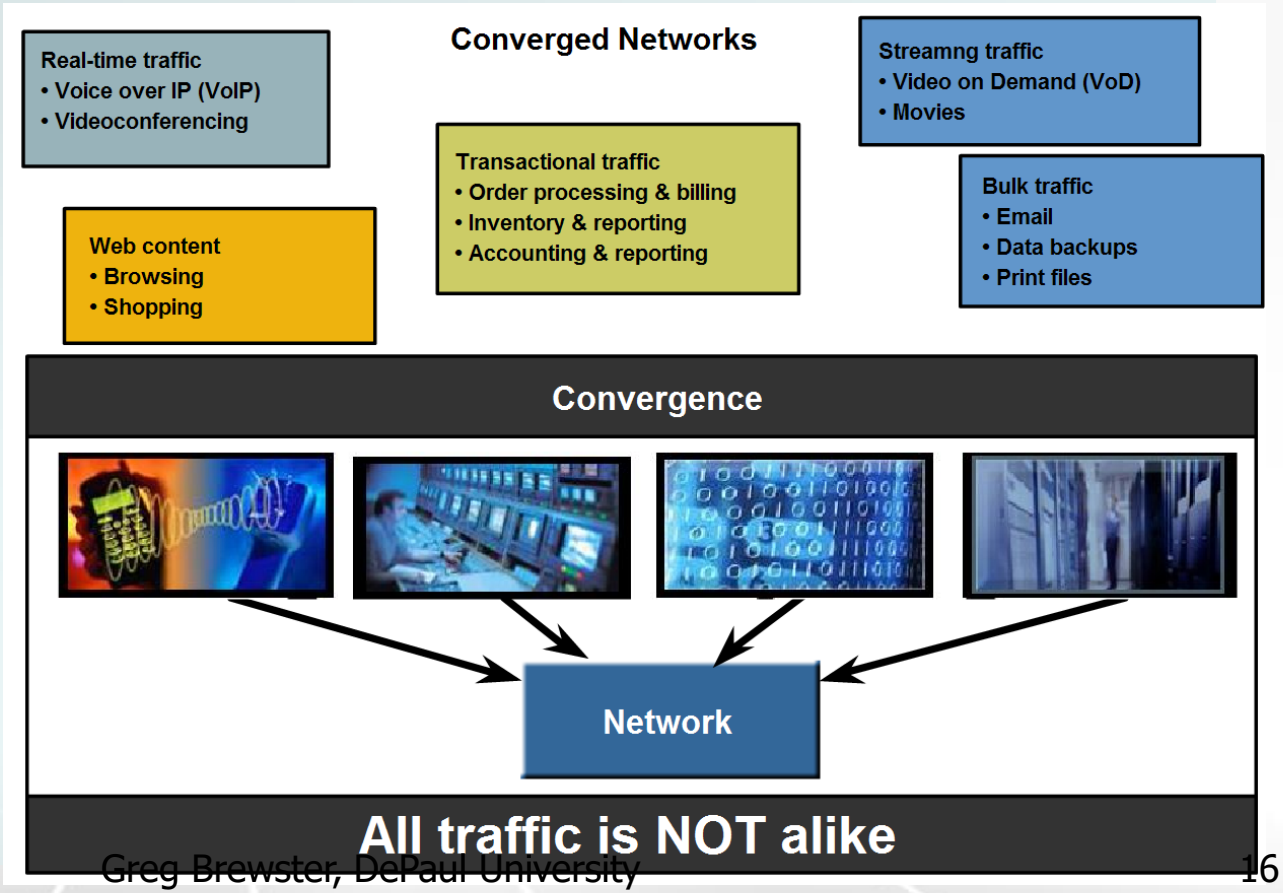
- Factors that necessitate Quality of Service and the mechanisms necessary to ensure it



Queuing according to data type enables voice data to have priority over transaction data, which has priority over web data.

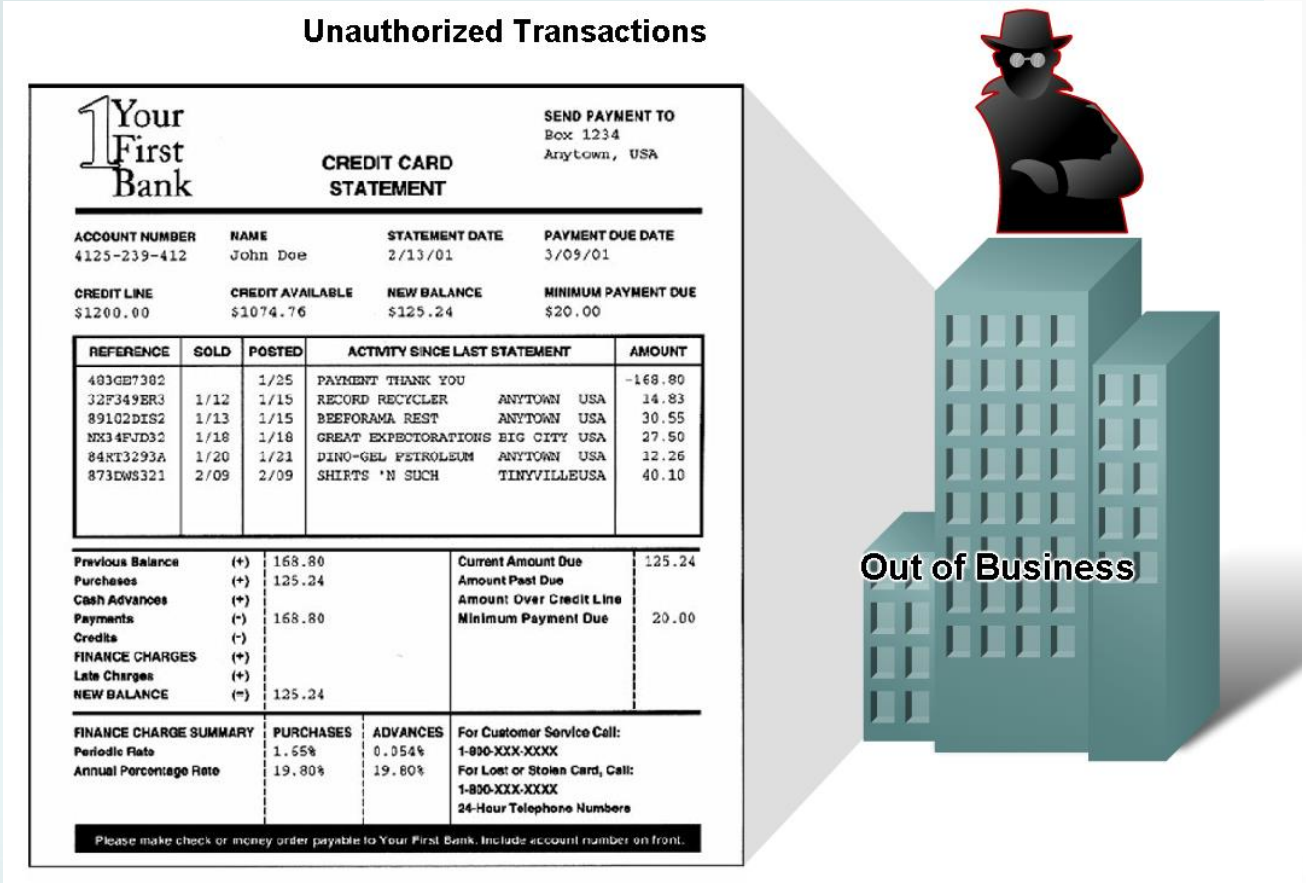
Network Architecture Characteristics

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



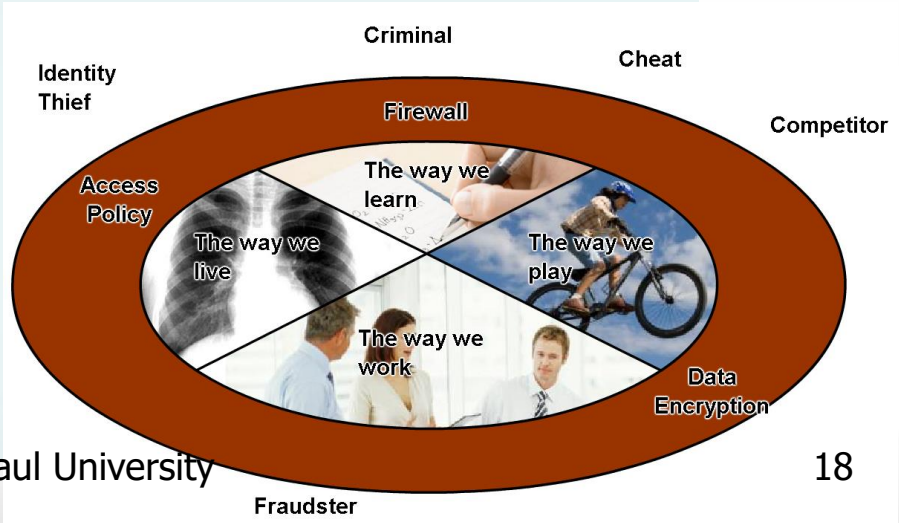
Network Architecture Characteristics

- Networks must be secure



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



Converged Networks

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