



# Living in a Network Centric World



## Network Fundamentals – Chapter 1

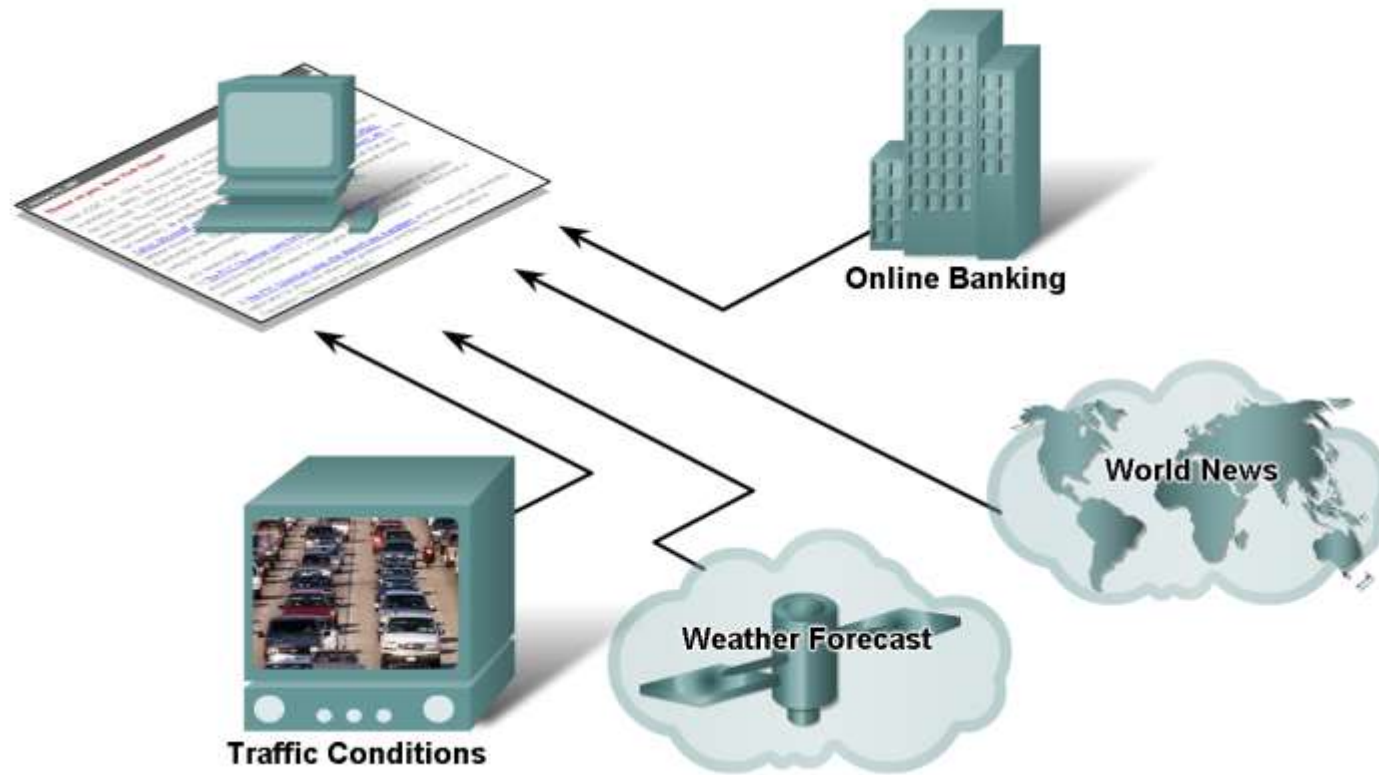
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Mind Wide Open™

# Objectives

- Describe how networks impact our daily lives.
- Describe the role of data networking in the human network.
- Identify the key components of any data network.
- Identify the opportunities and challenges posed by converged networks.
- Describe the characteristics of network architectures: fault tolerance, scalability, quality of service and security.
- Install and use IRC clients and a Wiki server.

# How Networks Impact Daily Life

- Explain the benefits of instantaneous communication and how it supports and improves our lives.



# How Networks Impact Daily Life

- Describe the characteristics and purpose of popular communication media such as, IM, Wikis , Blogs, Podcasting, and Collaboration Tools

## –Instant messaging

- Real time communication between 2 or more people based on typed text

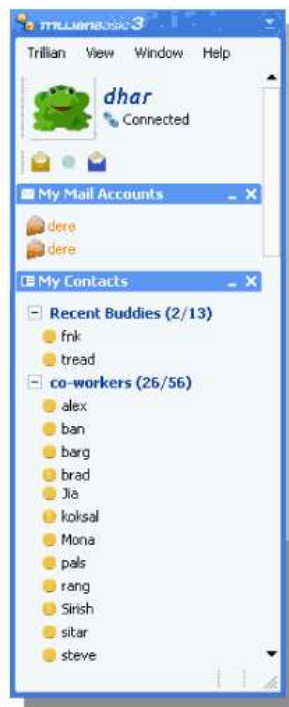
## –Weblogs (Blogs)

- Web pages created by an individual

## –Podcasting

- Website that contains audio files available for downloading

### Instant Messaging



### Weblog

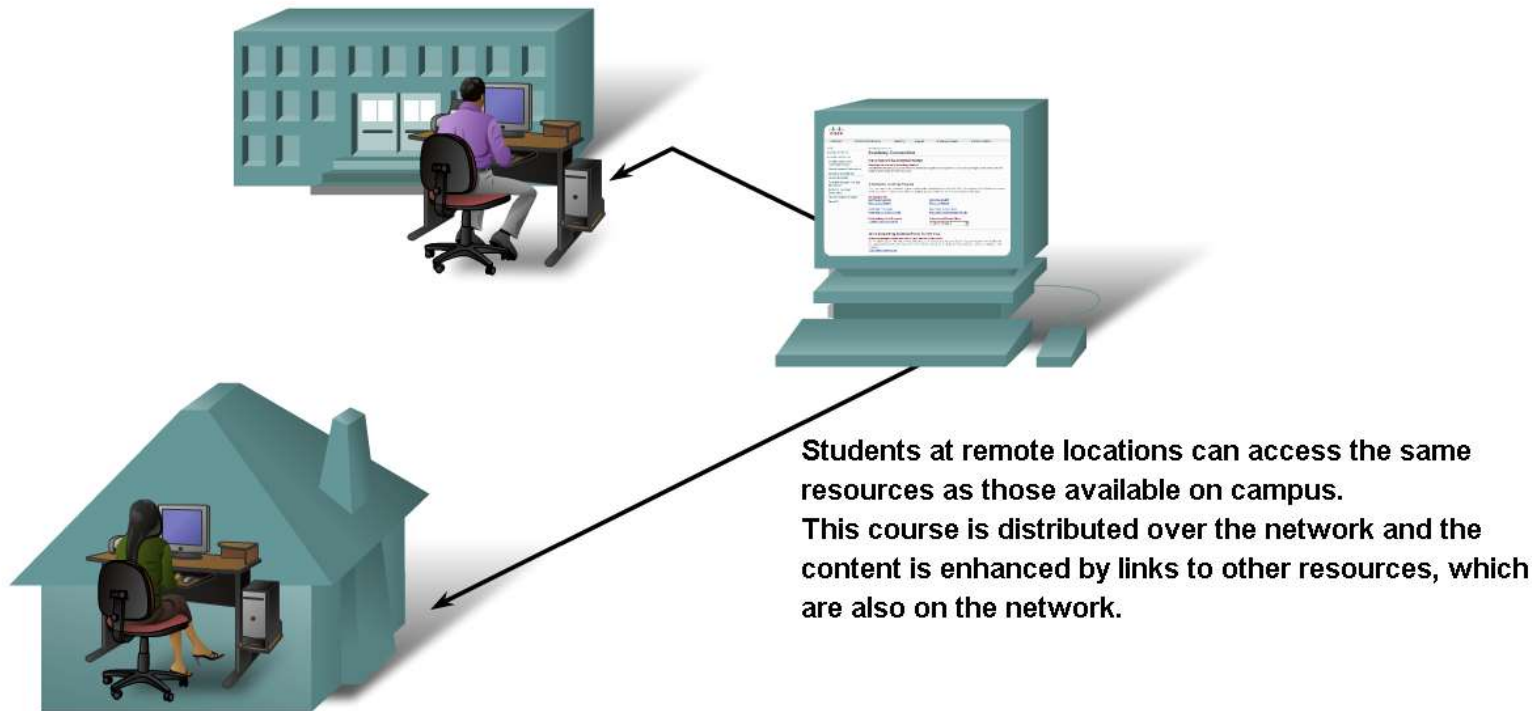


### Podcasting



# How Networks Impact Daily Life

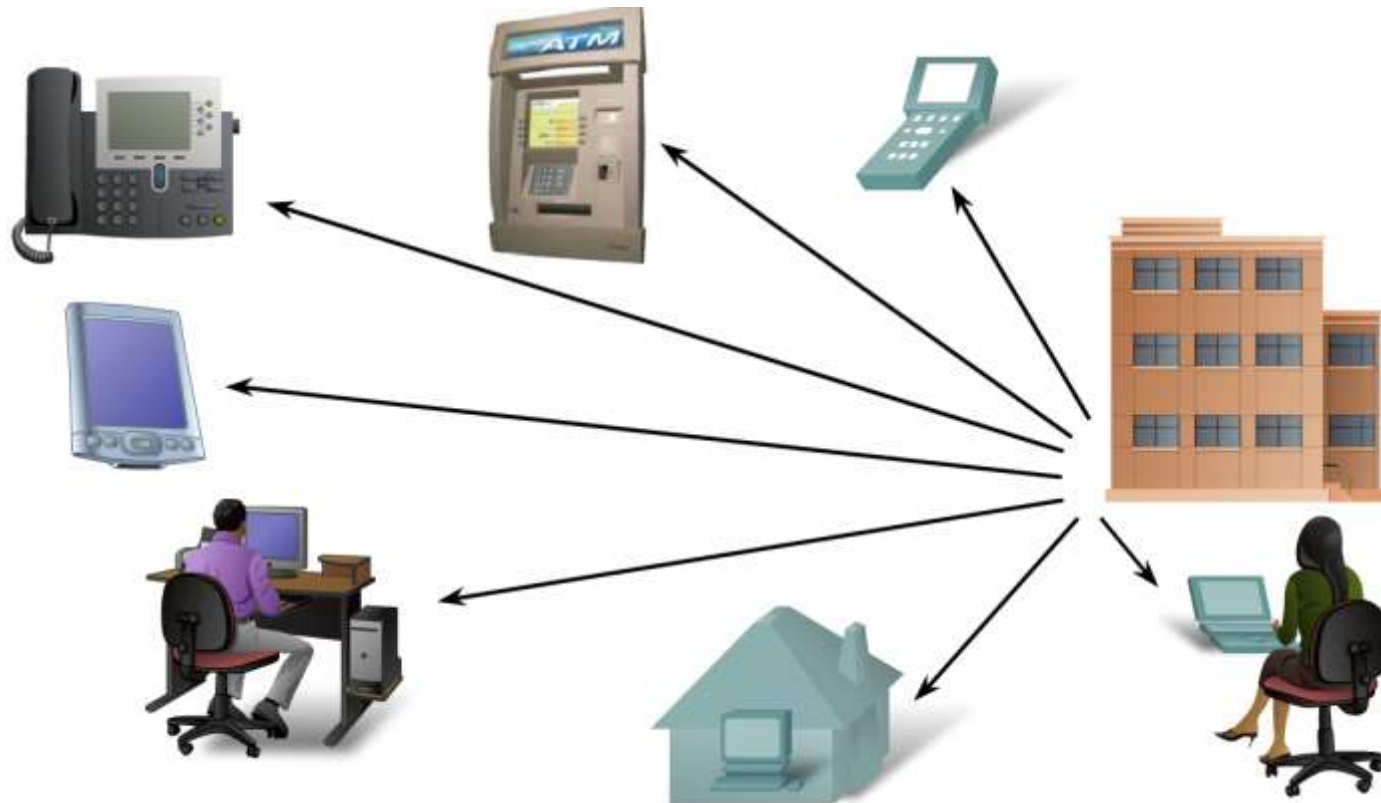
- Explain ways that using information networks to share and collaborate improves teaching and learning





# How Networks Impact Daily Life

- Describe ways communication over a network changes the way we work



# How Networks Impact Daily Life

- Describe ways communication over a network supports the way we play



**Online Interest Groups**



**Online Travel**



**Online Games**



**Online Entertainment**



The onboard data network provides a range of services to airline personal seatback video systems.



**Instant Messaging**

# Data Networking Role, Components, and Challenges

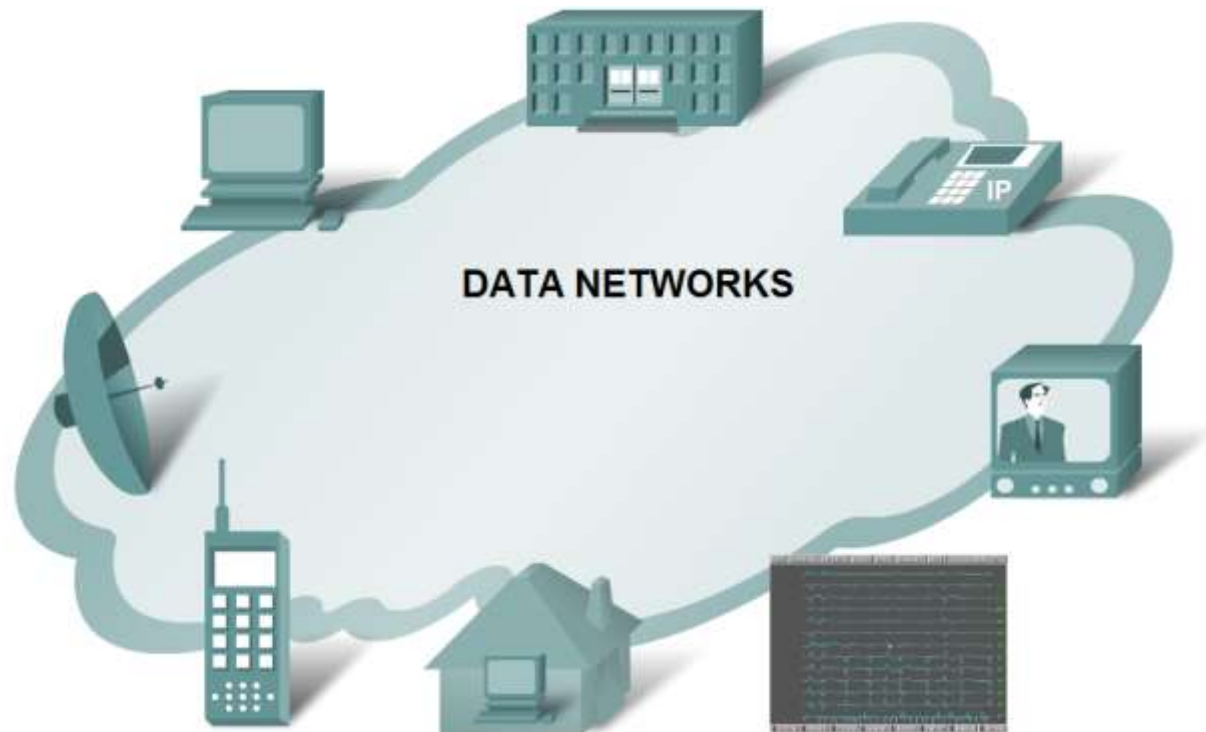
- Basic characteristics of communication
  - Rules or agreements are 1<sup>st</sup> established
  - Important information may need to be repeated
  - Various modes of communication may impact the effectiveness of getting the message across.





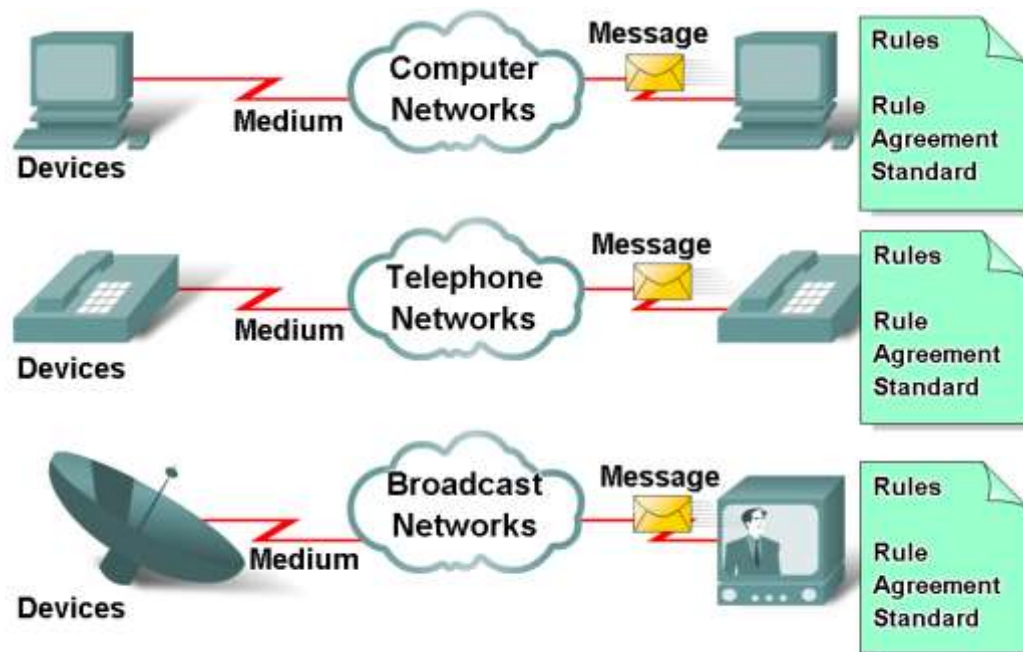
# Data Networking Role, Components, and Challenges

- Describe the role of data networking in communications



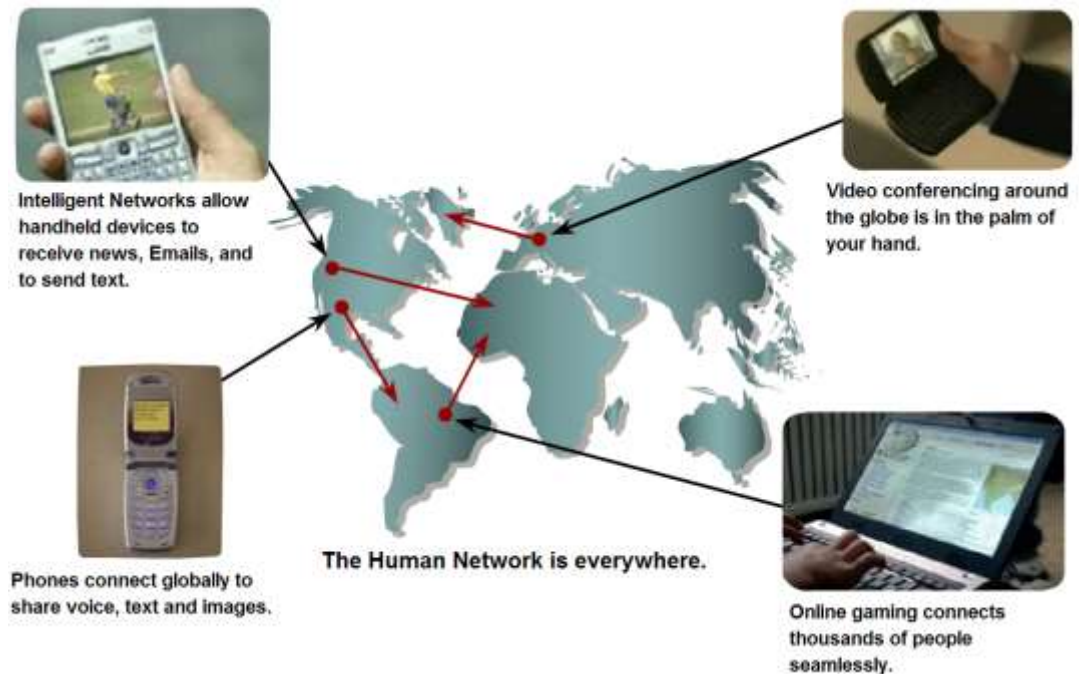
# Data Networking Role, Components, and Challenges

- Describe the various elements that make up a network
  - Devices
    - These are used to communicate with one another
  - Medium
    - This is how the devices are connected together
  - Messages
    - Information that travels over the medium
  - Rules
    - Governs how messages flow across network



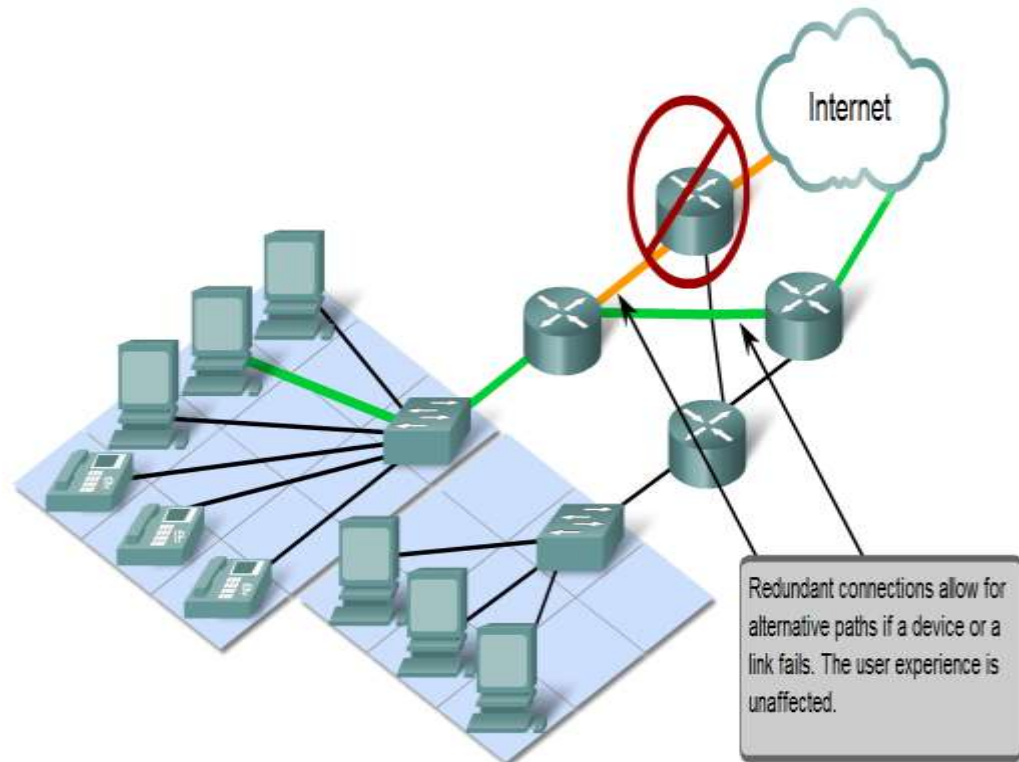
# Data Networking Role, Components, and Challenges

- Describe the role of converged networks in communications
  - Converged network
    - A type of network that can carry voice, video & data over the same network



# Network Architecture Characteristics

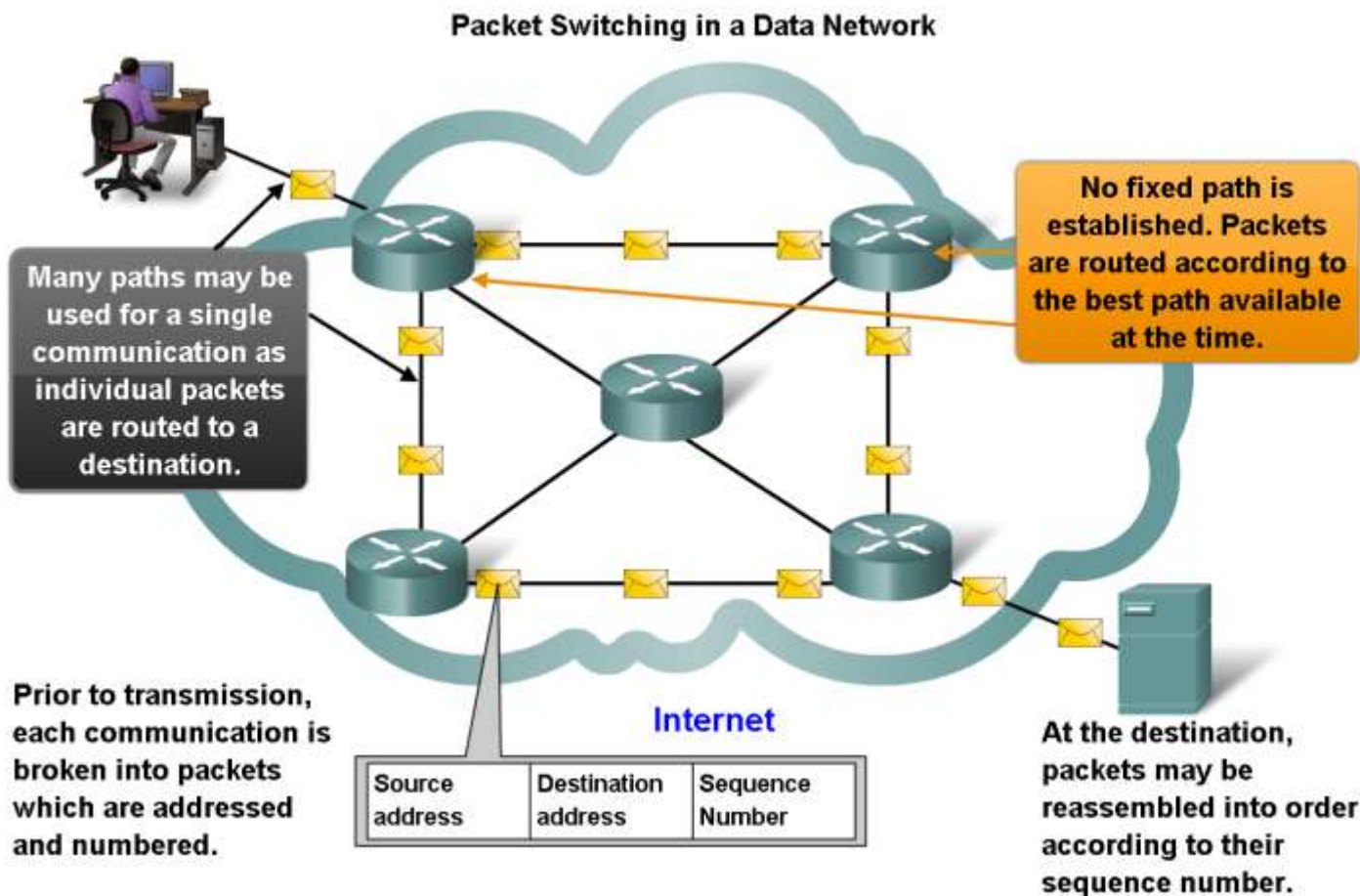
- Explain four characteristics that are addressed by network architecture design
  - Fault tolerance
  - Scalability
  - Quality of service
  - Security





# Network Architecture Characteristics

- Describe how packet switching helps improve the resiliency and fault tolerance of the Internet architecture

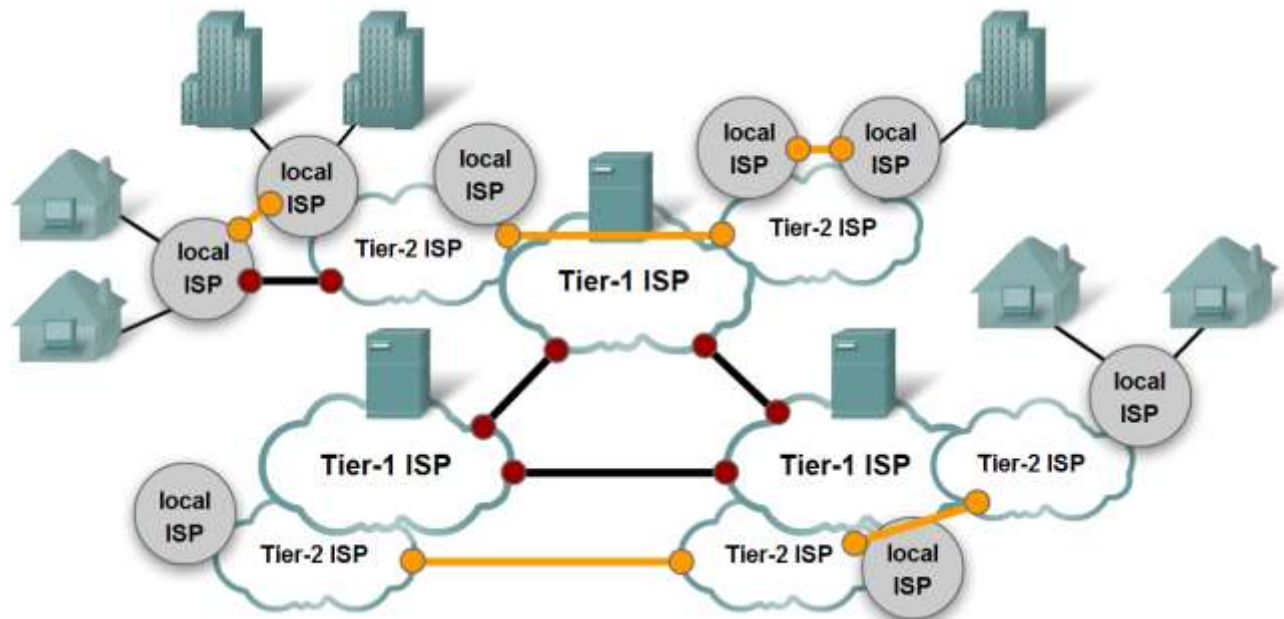




# Network Architecture Characteristics

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

**Internet Structure - A Network of Networks**



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

The diagram illustrates a packet scheduling mechanism in a network router. Three different types of traffic are shown entering the router from the left:

- Voice Over IP:** Represented by a telephone icon and a sequence of red envelope icons (packets).
- Financial Transaction:** Represented by a laptop icon and a sequence of yellow envelope icons.
- Web Page:** Represented by a server icon and a sequence of blue envelope icons.

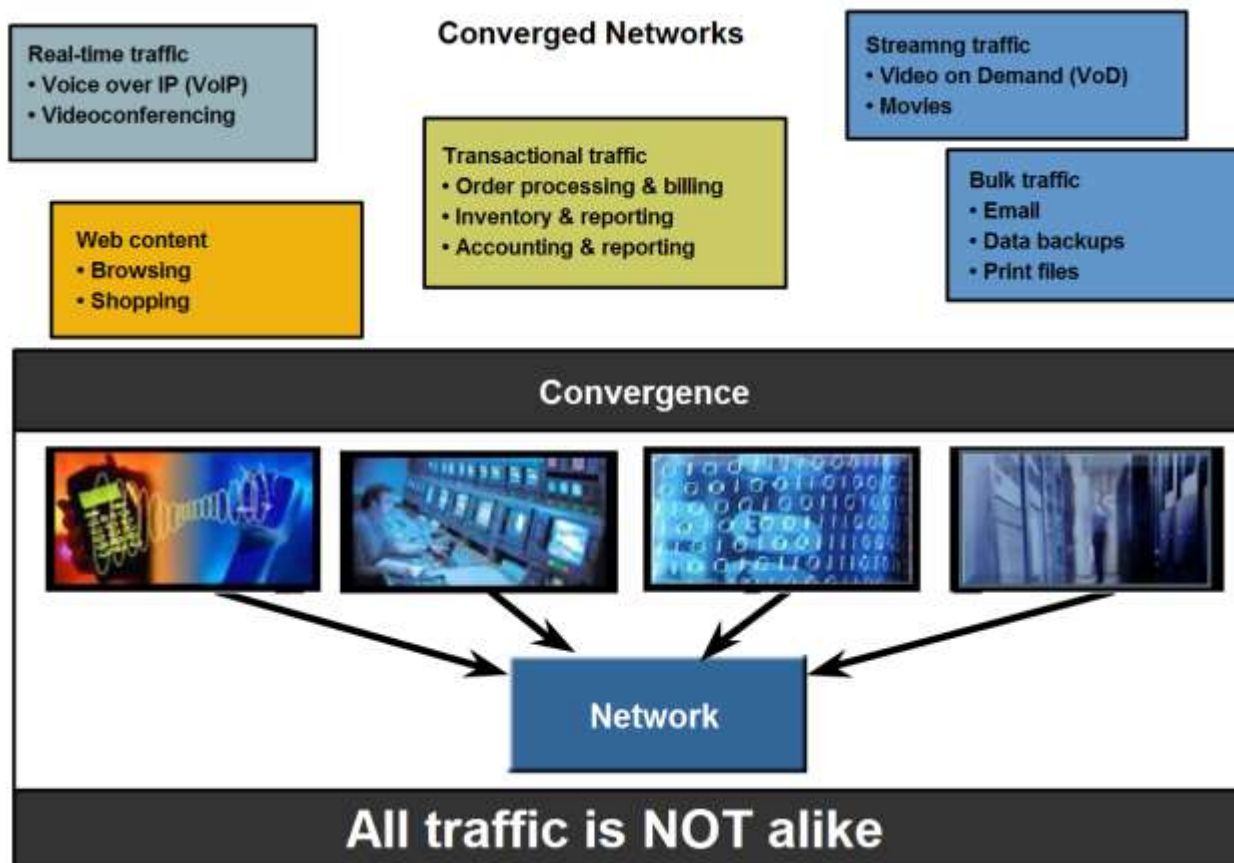
All packets enter a central router (a green cylinder with a white 'X'). The router's internal structure shows three distinct queues:

- High Priority Queue:** Contains three red packets.
- Medium Priority Queue:** Contains three yellow packets.
- Low Priority Queue:** Contains three blue packets.

Packets are then sent to the **Link to Network**, represented by a horizontal orange bar. The packets on the link are ordered by priority: yellow, red, blue, red, red, yellow, red, red, yellow, red. A text box above the link states: "All communication has some access to the media, but higher priority communication has a greater percentage of the packets." An arrow points to the right from the end of the link.

# Network Architecture Characteristics

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



# Network Architecture Characteristics

- Describe how to select the appropriate QoS strategy for a given type of traffic

## Quality of Service Matters


Communication Type	Without QoS	With QoS
Streaming video or audio	 <p>Choppy picture starts and stops.</p>	 <p>Clear, continuous service.</p>
Vital Transactions	<p>Time : Price</p> <p>02:14:05 \$1.54</p> <p>Just one second earlier...</p>	<p>Time : Price</p> <p>02:14:04 \$1.52</p> <p>The price may be better.</p>
Downloading web pages (often lower priority)	 <p>Web pages arrive a bit later...</p>	 <p>But the end result is identical.</p>



# Network Architecture Characteristics

- Describe why networks must be secure

## Unauthorized Transactions



SEND PAYMENT TO  
Box 1234  
Anytown, USA

CREDIT CARD  
STATEMENT

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		2/25	PAYMENT THANK YOU	-168.80
3273498R3	1/12	1/15	RECORD RECYCLER ANYTOWN USA	14.83
89102DIS2	1/13	1/15	BEEFORAMA REST ANYTOWN USA	30.55
SD3 4PJD32	1/18	1/18	GREAT EXPECTORATIONS BIG CITY USA	27.50
84K13293A	1/20	1/21	DIWO-GEL PETROLEUM ANYTOWN USA	12.26
873DMS321	2/09	2/09	SHIRTS 'N SUCH TINYVILLEUSA	40.10

Previous Balance	(+)	168.80	Current Amount Due	125.24
Purchases	(+)	125.24	Amount Paid 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:
Periodic Rate	1.55%	8.054%	1-800-XXX-XXXX
Annual Percentage Rate	19.80%	19.80%	For Lost or Stolen Card, Call:
			1-800-XXX-XXXX
			24-Hour Telephone Numbers

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

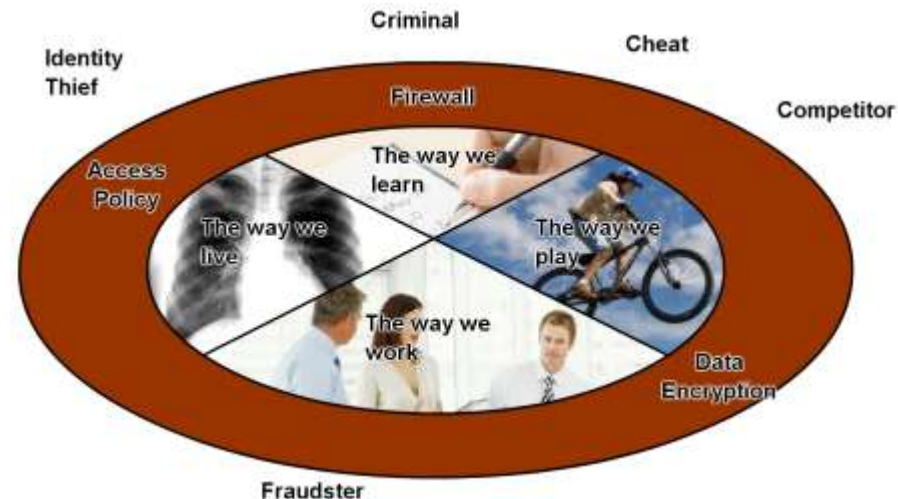


Out of Business



# Network Architecture Characteristics

- Describe 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



# IRC Clients and Wiki Server

- Install and use IRC clients and a Wiki server



# Summary

## In this chapter, you learned to:

- Describe how networks impact our daily lives.
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