Introduction to Computer Networks

Network Fundamentals – Chapter 1

Cisco Networking Academy®
Mind Wide Open™

Version 4.0

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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.

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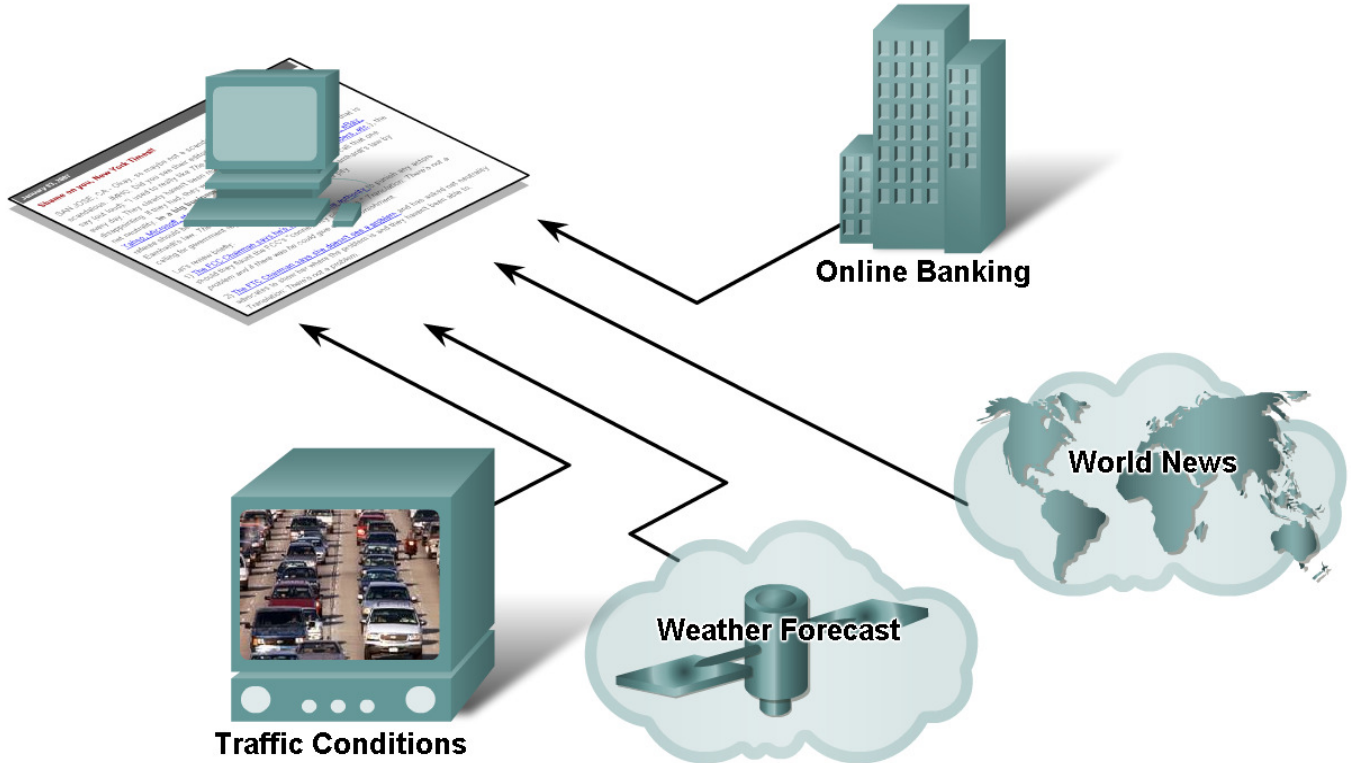
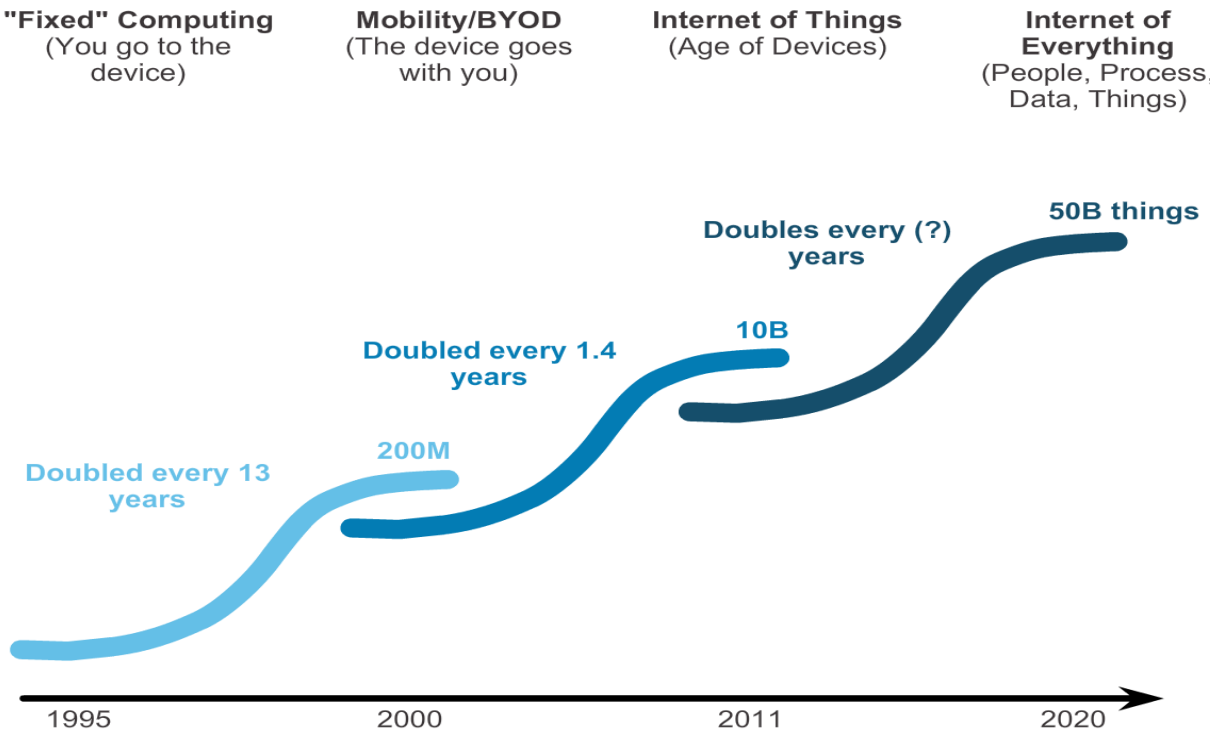
How Networks Impact Daily Life

- How does instantaneous communication support and improves our lives?
- (what we wear, how we travel, how we pay bills, obtain information from health to cooking, downloading files, sharing photos, etc.)



Networks in Our Past and Daily Lives



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Networking Today

The Global Community

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Network Trends

Online Collaboration

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Types of Networks

The two most common types of network infrastructures are:

- Local Area Network (LAN)
- Wide Area Network (WAN).

Other types of networks include:

- Metropolitan Area Network (MAN)
- Wireless LAN (WLAN)
- Storage Area Network (SAN)

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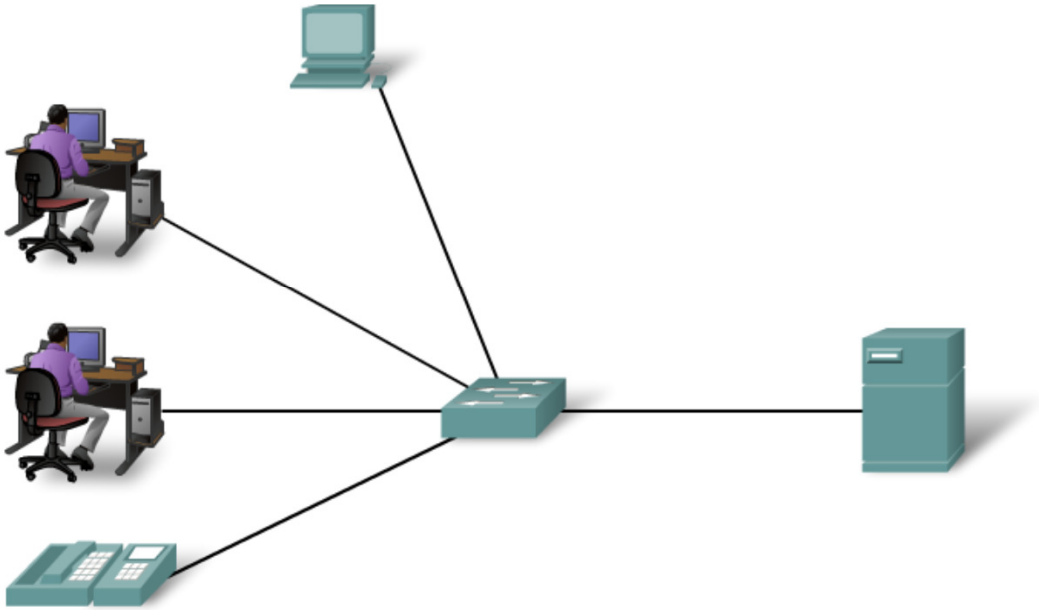
LANs and WANs

Local Area Networks (LAN)

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



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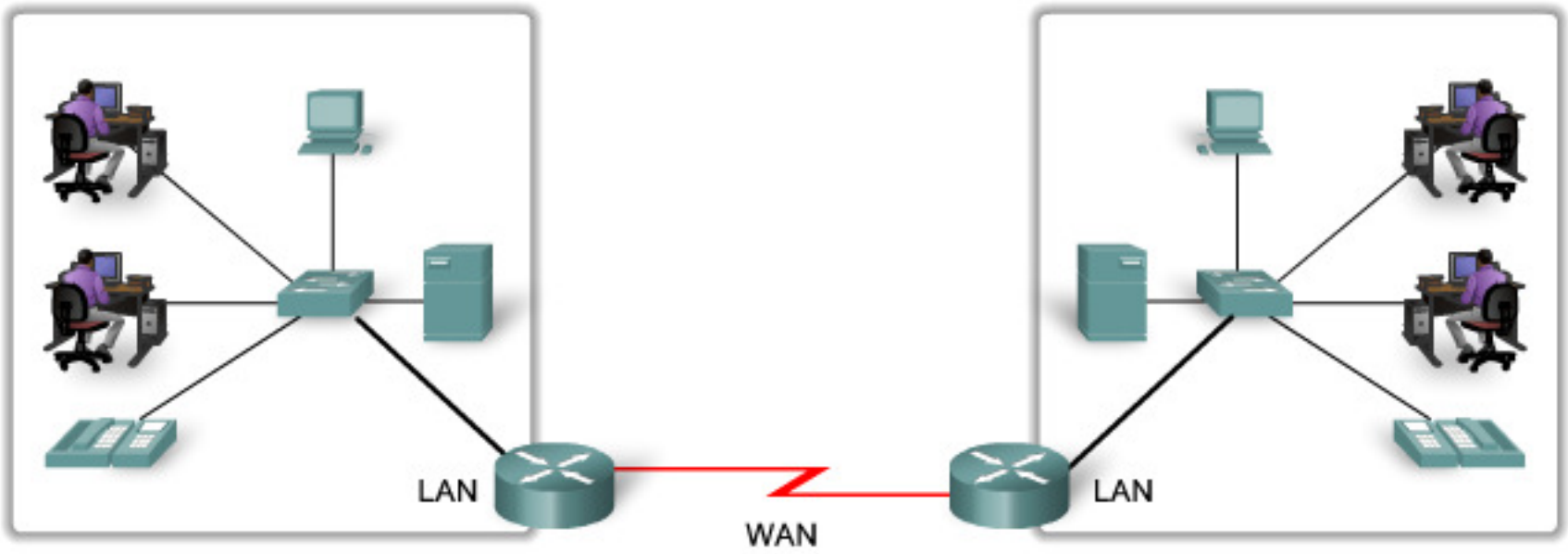
LANs and WANs

Wide Area Networks (WAN)

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



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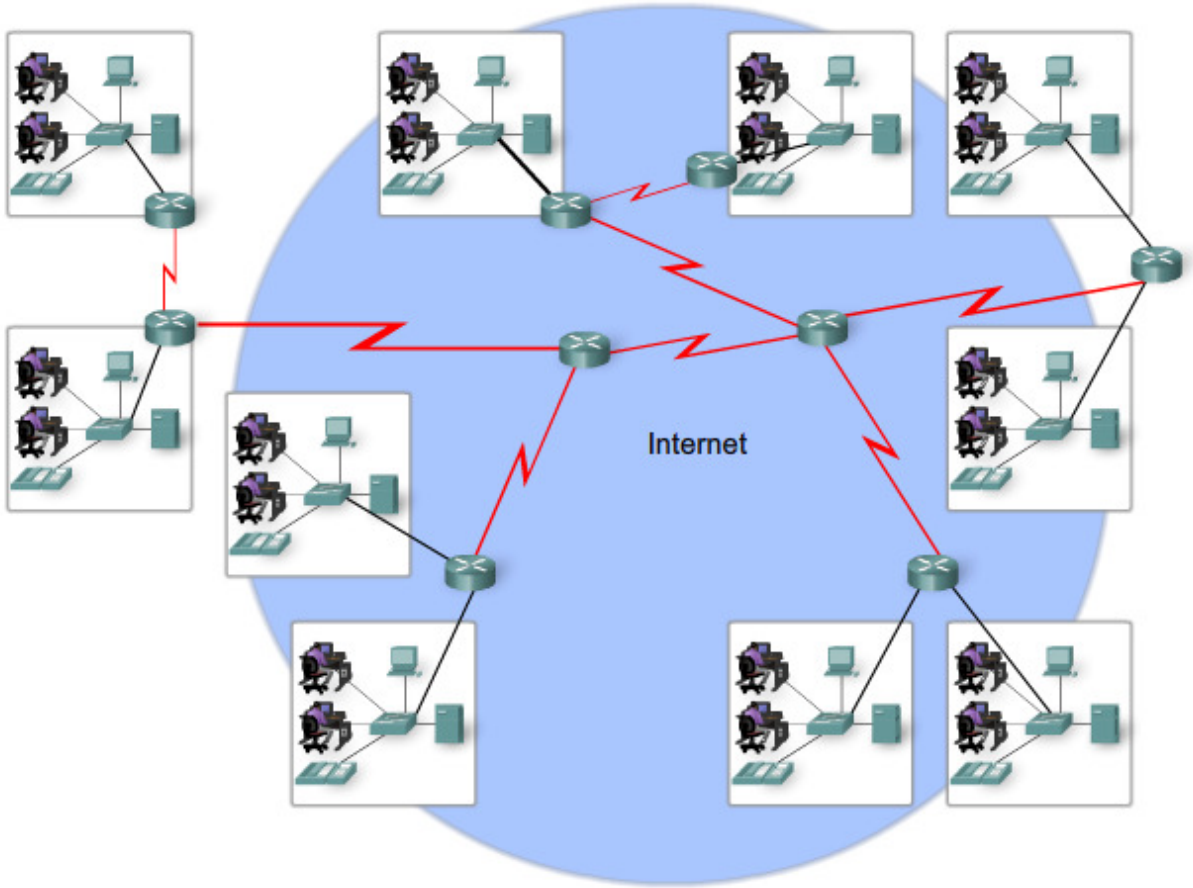
LANs, WANs, and Internets

The Internet

LANs and WANs may be connected into internetworks.



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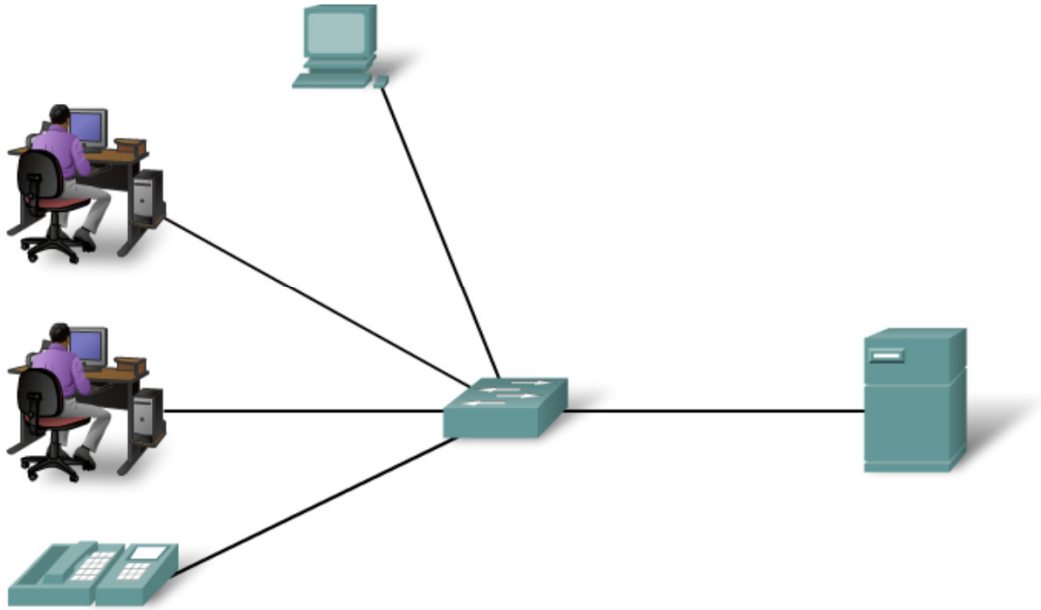

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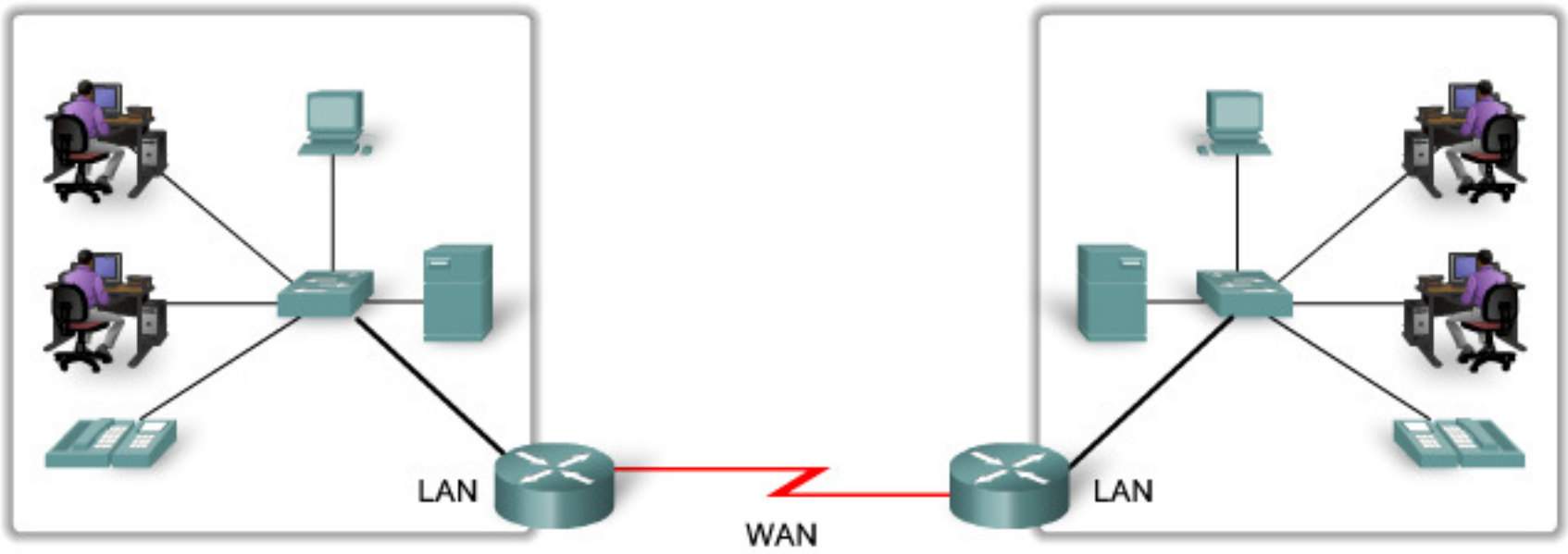

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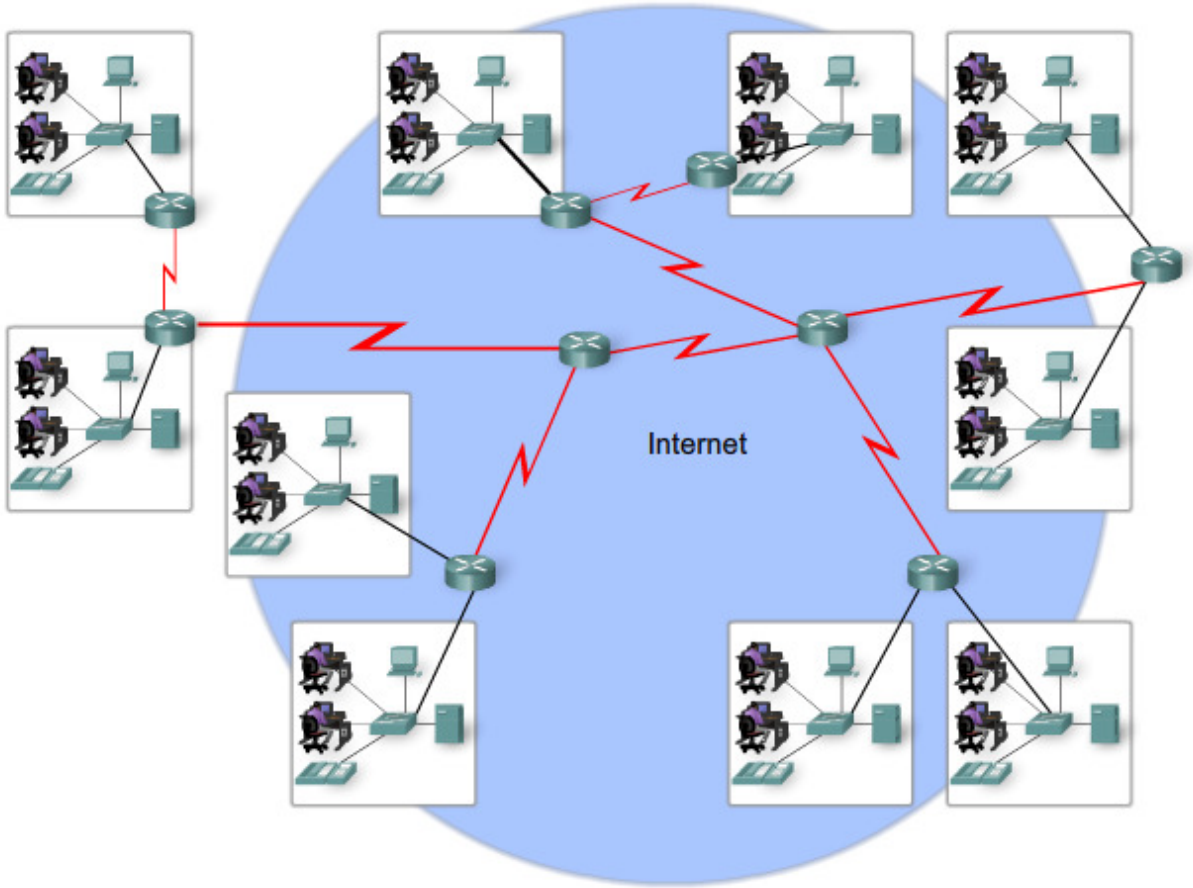

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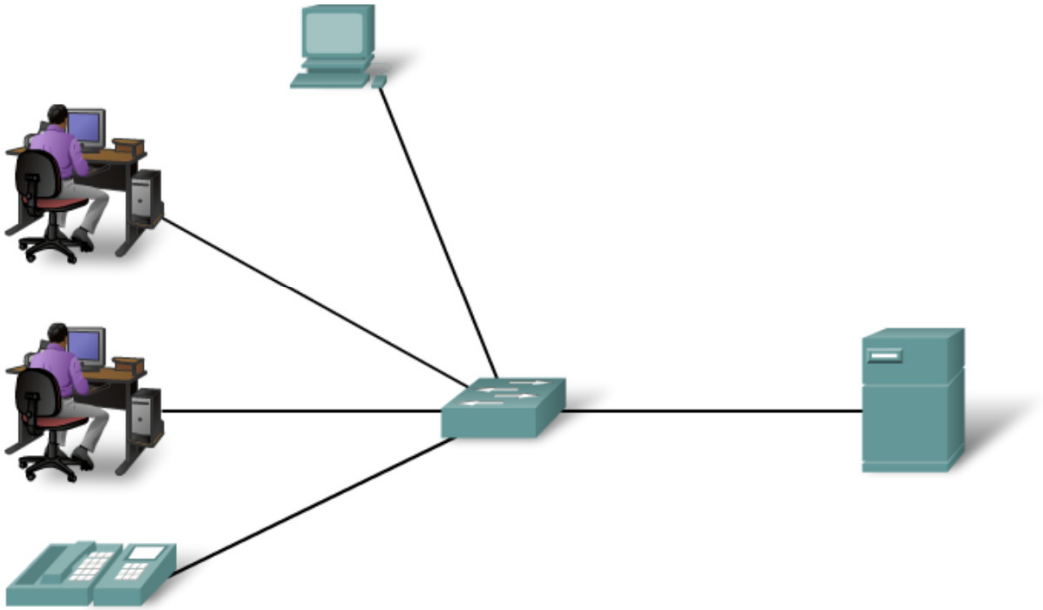

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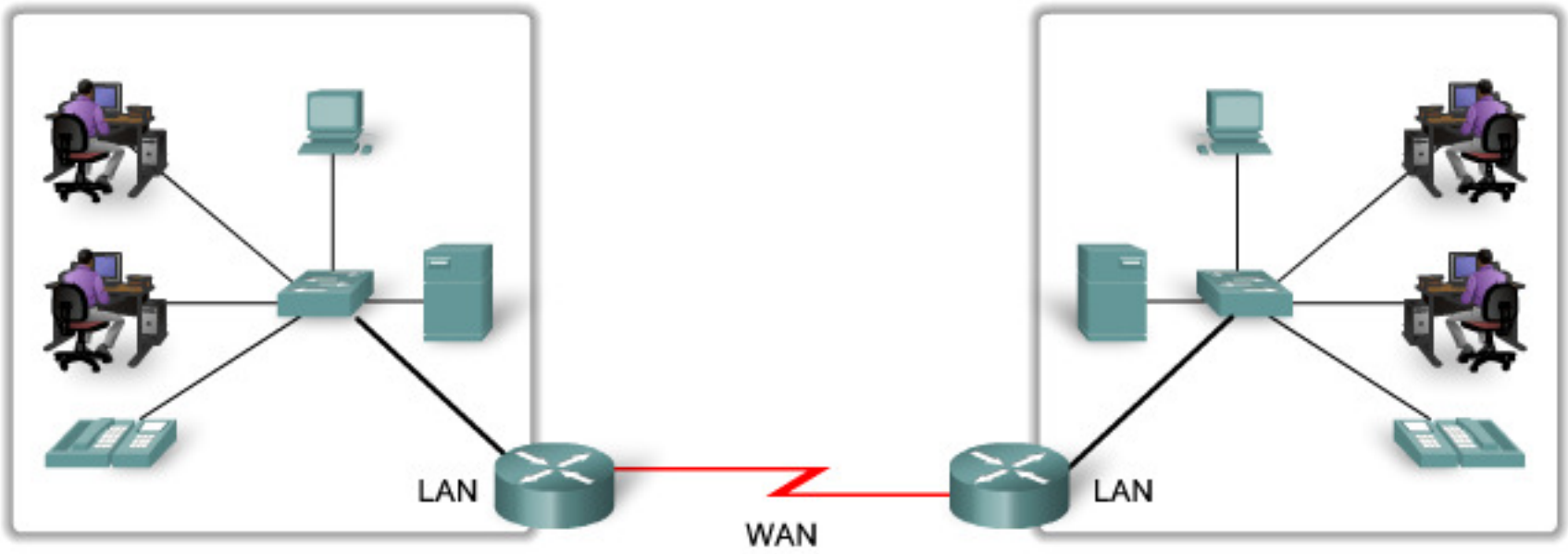

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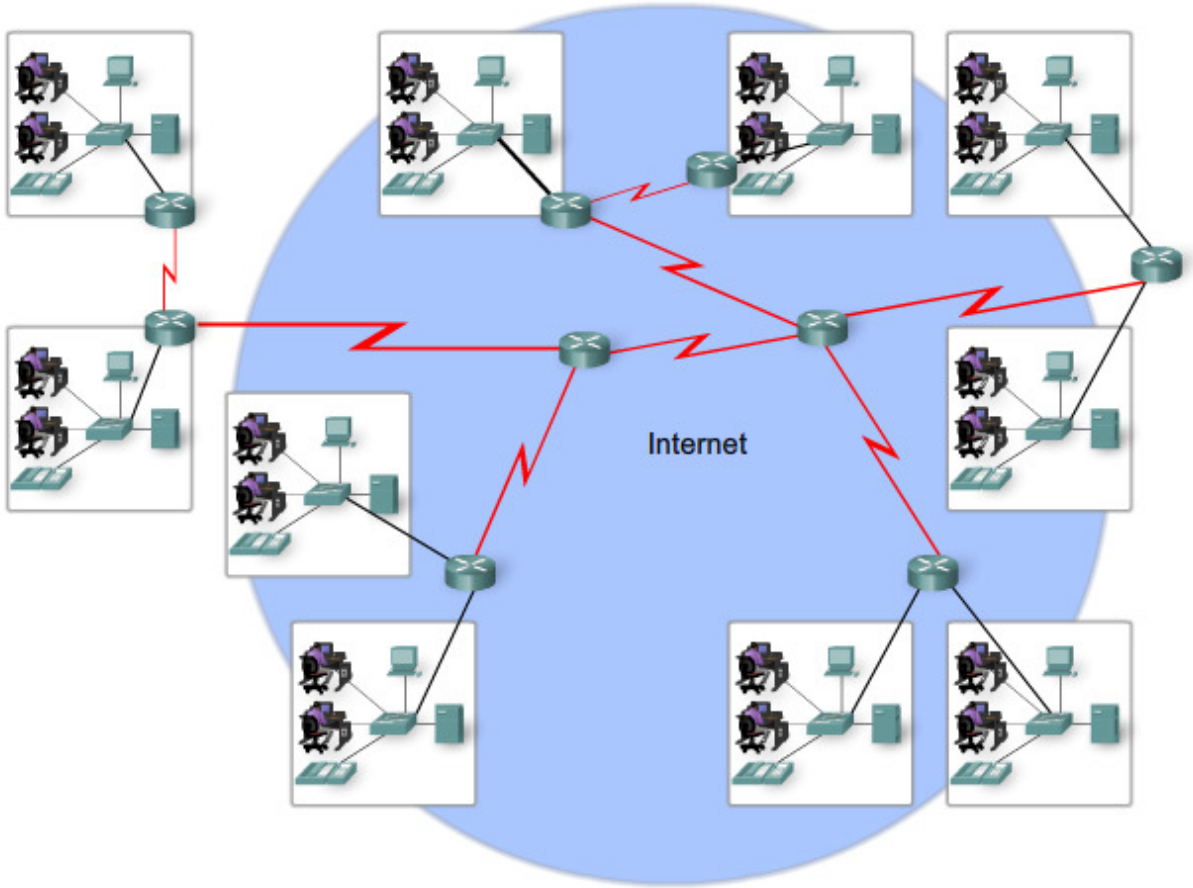

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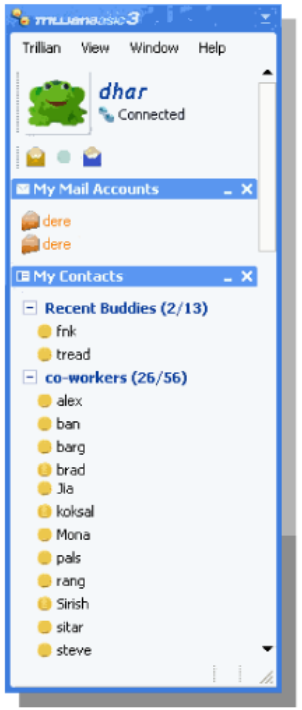
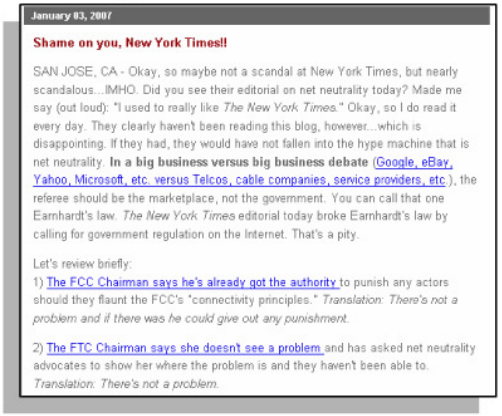
- Describe the characteristics and purpose of popular communication media such as, IM, Wikis , Blogs, Podcasting, and Collaboration Tools
  - Instant messaging
    - Real time communication between 2 or more people based on typed text
  - Weblogs (Blogs)
    - Web pages created by an individual
  - Podcasting
    - Website that contains audio files available for downloading
  - Wikis
    - web pages that groups of people can edit and view together.

Instant Messaging



Weblog



Podcasting

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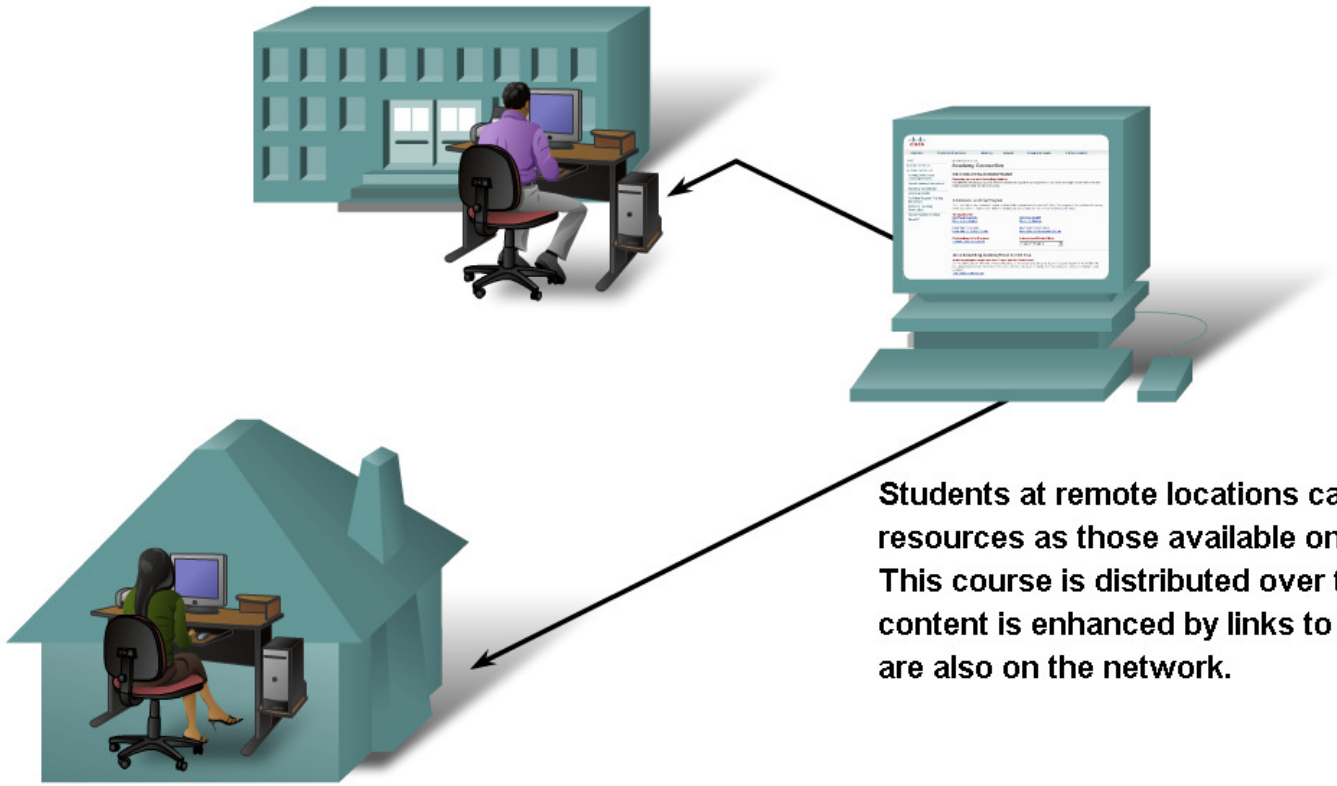
- Explain ways that using information networks to share and collaborate improves teaching and learning (e-learning)



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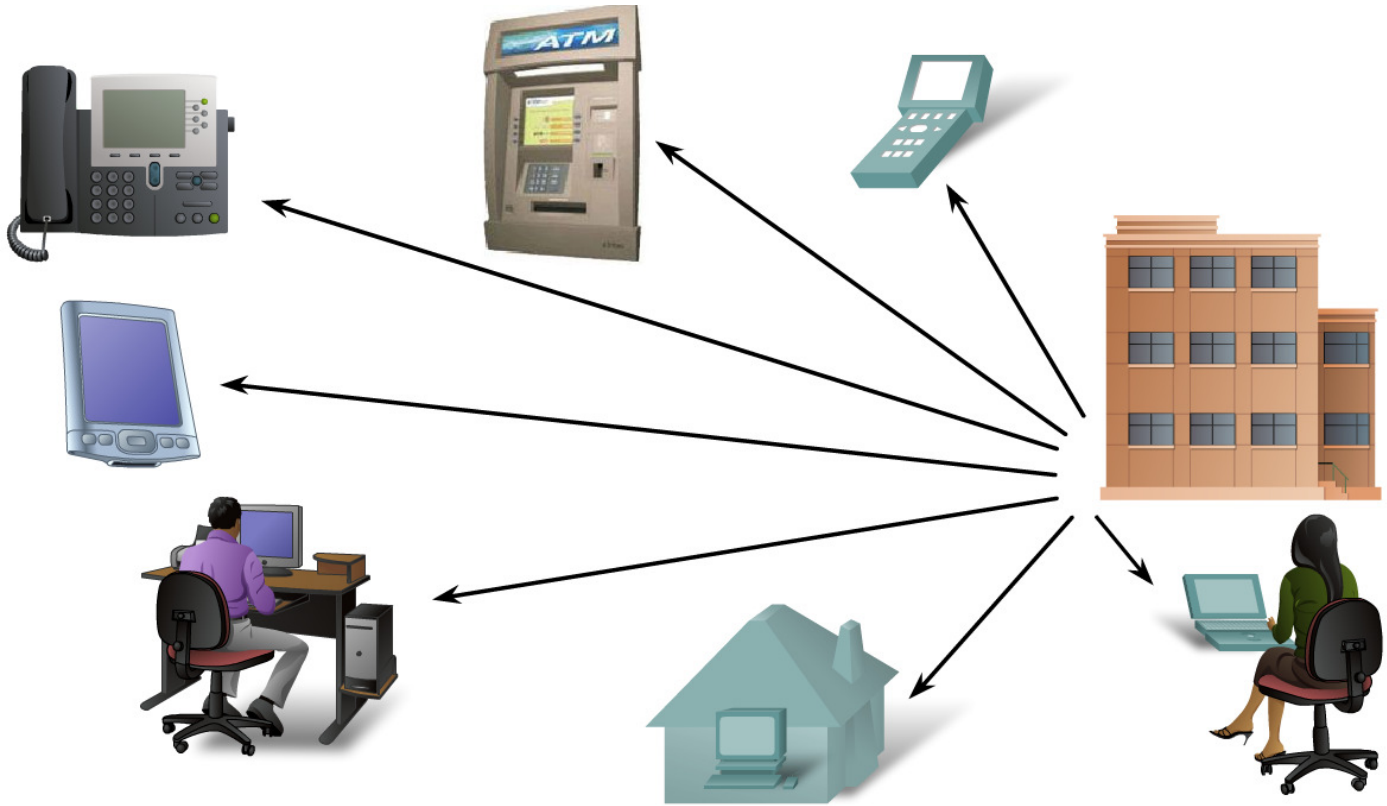
- Describe ways communication over a network changes the way we work



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Work Collaboration Tools

- Intranets – private networks used by ONE company..employees WITHIN the company have access to it
- Extranets – provides suppliers, vendors, and/or customers limited access to corporate data
- There are many ways to use technology even in businesses that aren't traditionally technology oriented (Ex. Farming)
- There are more telecommuters today than ever before.

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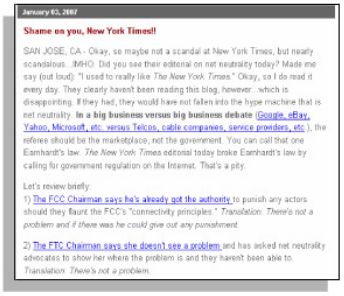
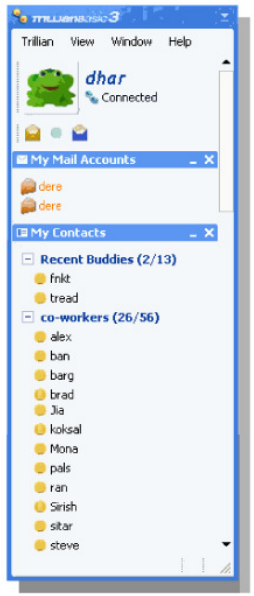
- Describe ways communication over a network supports the way we play (travel, listening to music, watching movies/videos, reading books, watching sporting events, etc.)



Online Interest Groups

Online Entertainment

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



Instant Messaging

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Data Networking Role, Components, and Challenges

- Basic characteristics of communication
  - Rules or agreements are 1st established (who, methods, common language, timing, confirmation)
  - Important information may need to be repeated
  - Various modes of communication may impact the effectiveness of getting the message across

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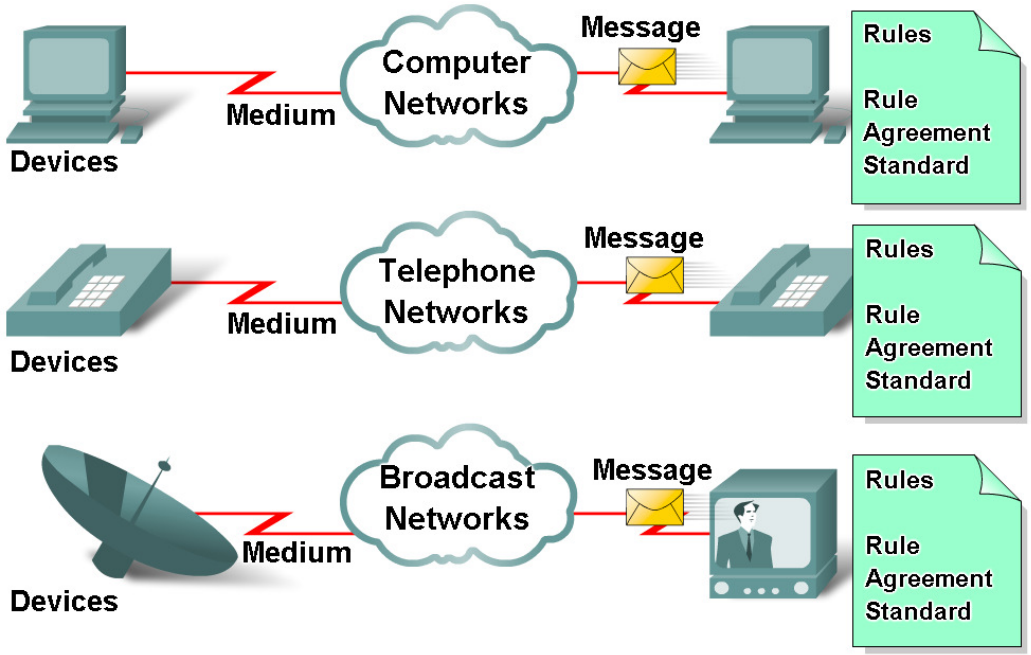
- Describe the various elements that make up a network
  - Devices
    - These are used to communicate with one another
  - Medium
    - This is how the devices are connected together
  - Messages
    - Information that travels over the medium
  - Rules
    - Governs how messages flow across network



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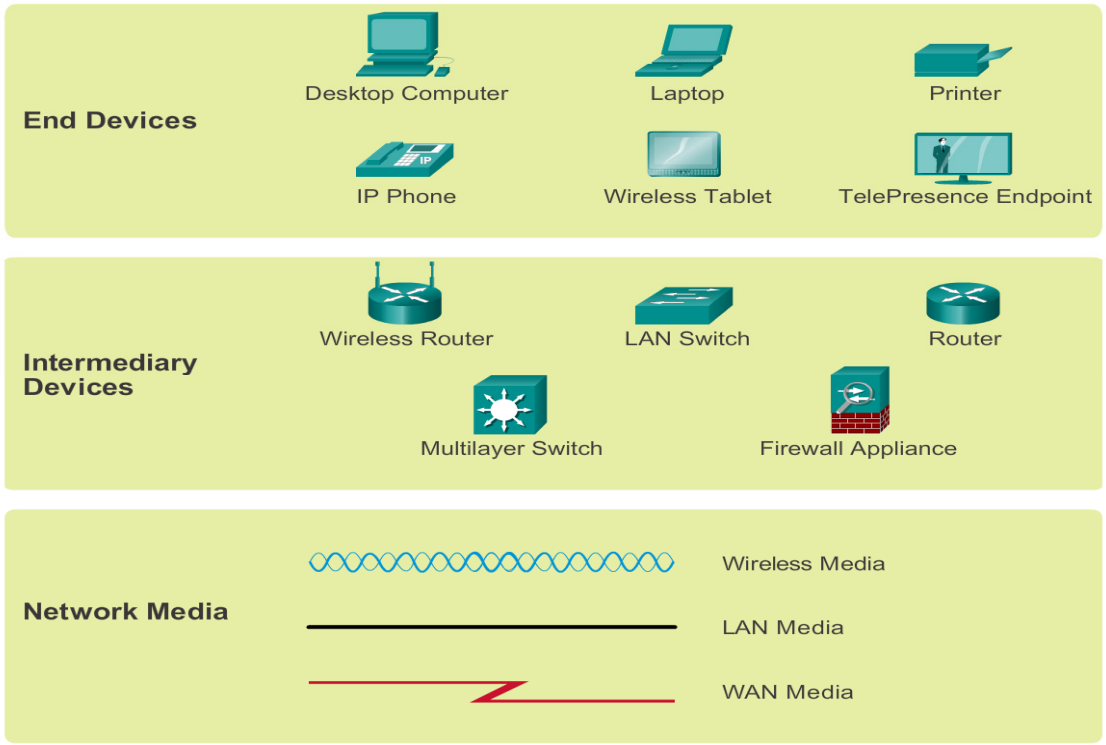
Components of a Network

Network Representations



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Devices on a network

- Switch
- Firewall
- Router
- Wireless router
- Cloud
- Links (serial, wireless, etc.)

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Types of media

- For communication to take place, there has to be a connection -
  - UTP
  - STP
  - Optical cable (fiber)
  - Atmosphere
  - Coaxial (cable TV)

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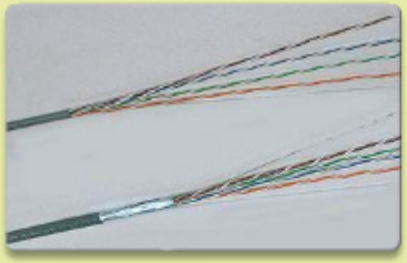
Components of a Network

Network Media

Copper



Fiber Optic

Wireless

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Protocols

- There must be rules to govern communication:
  - HTTP
  - SMTP
  - SNMP
  - FTP
  - TFTP
  - POP
  - TCP/IP

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Components of a Network

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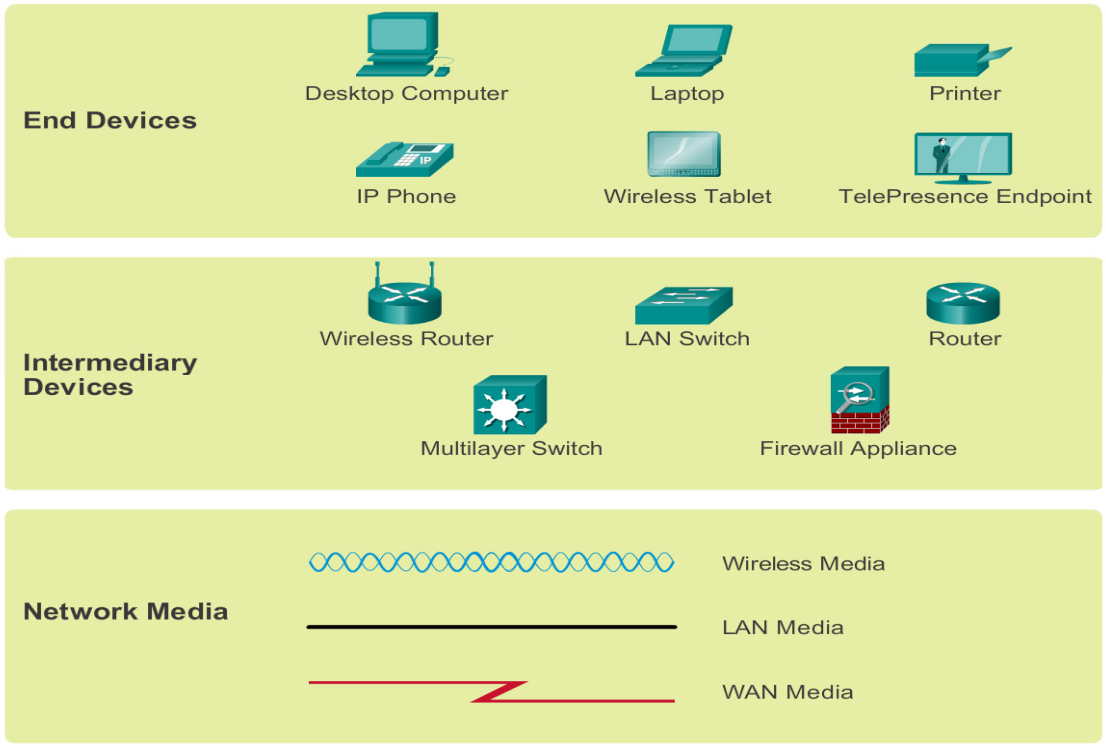

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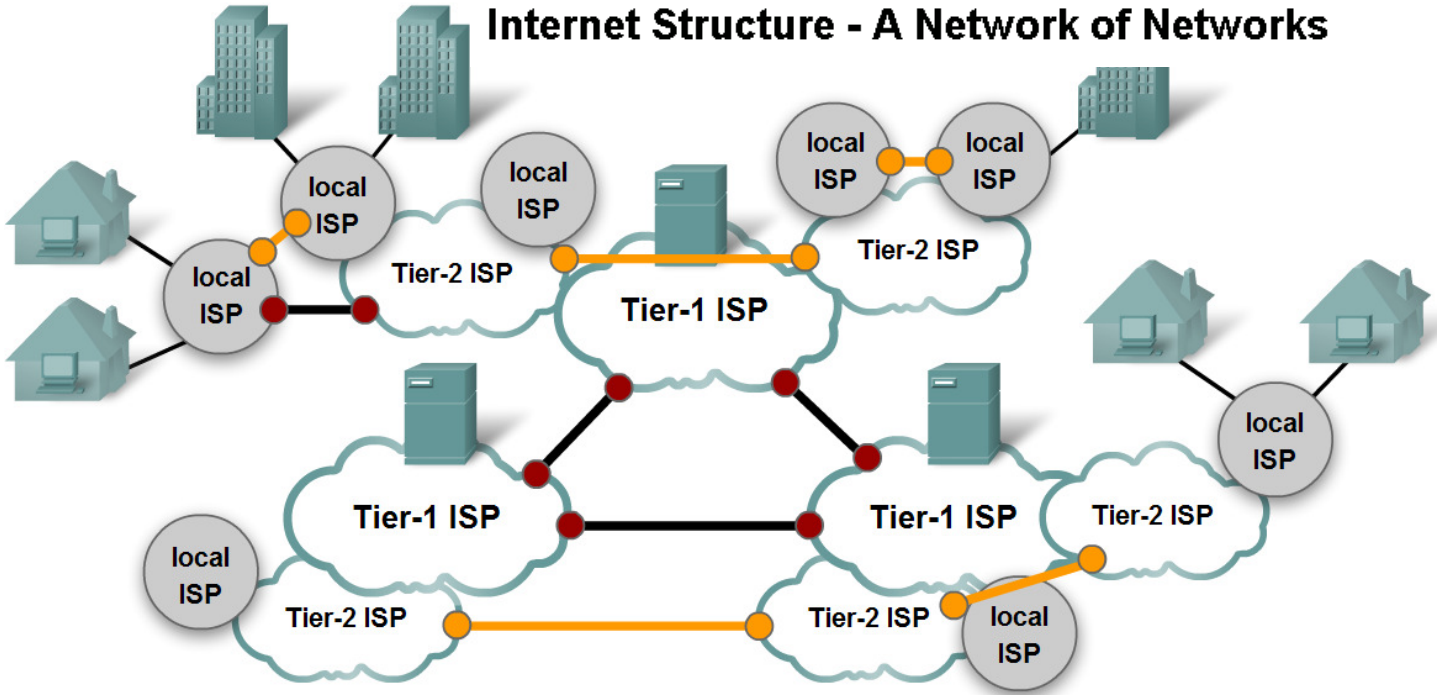
- Describe characteristics of the Internet that help it scale to meet user demand
  - Hierarchical
  - Common standards
  - Common protocols



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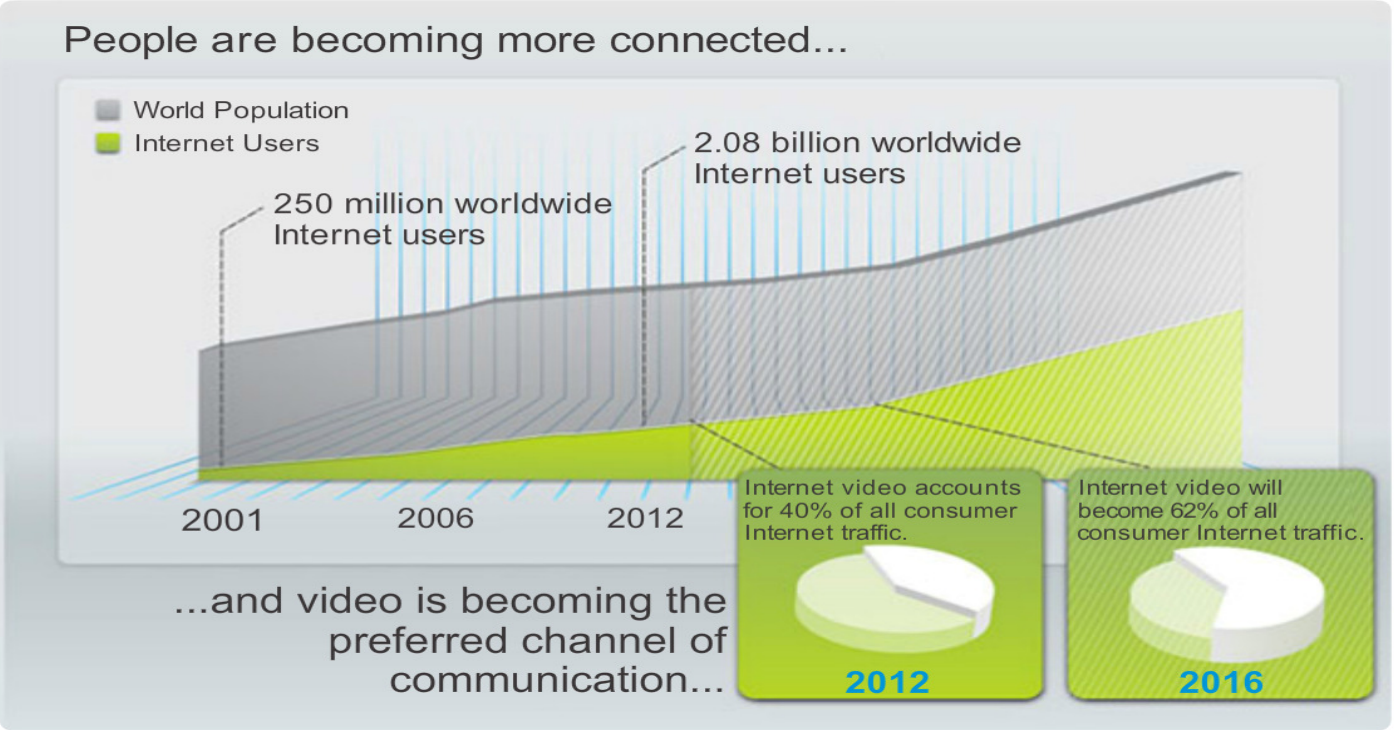
Network Trends

Video Communication



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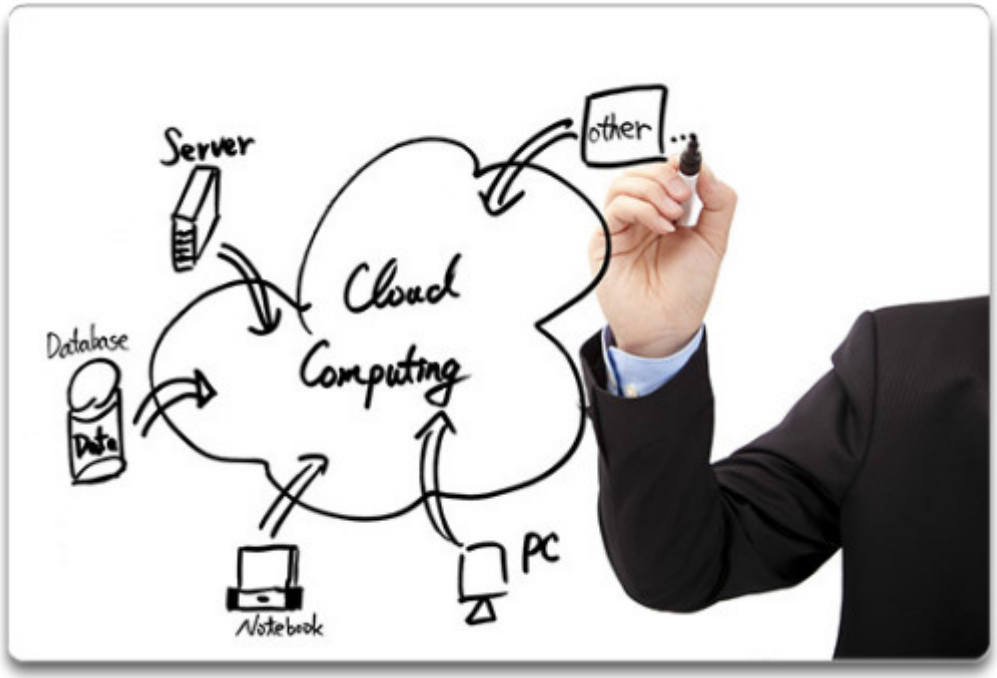
Cloud Computing

There are four primary types of clouds:

- Public clouds
- Private clouds
- Custom clouds
- Hybrid clouds



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Data Centers

A data center is a facility used to house computer systems and associated components including:

- Redundant data communications connections
- High-speed virtual servers (sometimes referred to as server farms or server clusters)
- Redundant storage systems (typically uses SAN technology)
- Redundant or backup power supplies
- Environmental controls (e.g., air conditioning, fire suppression)
- Security devices

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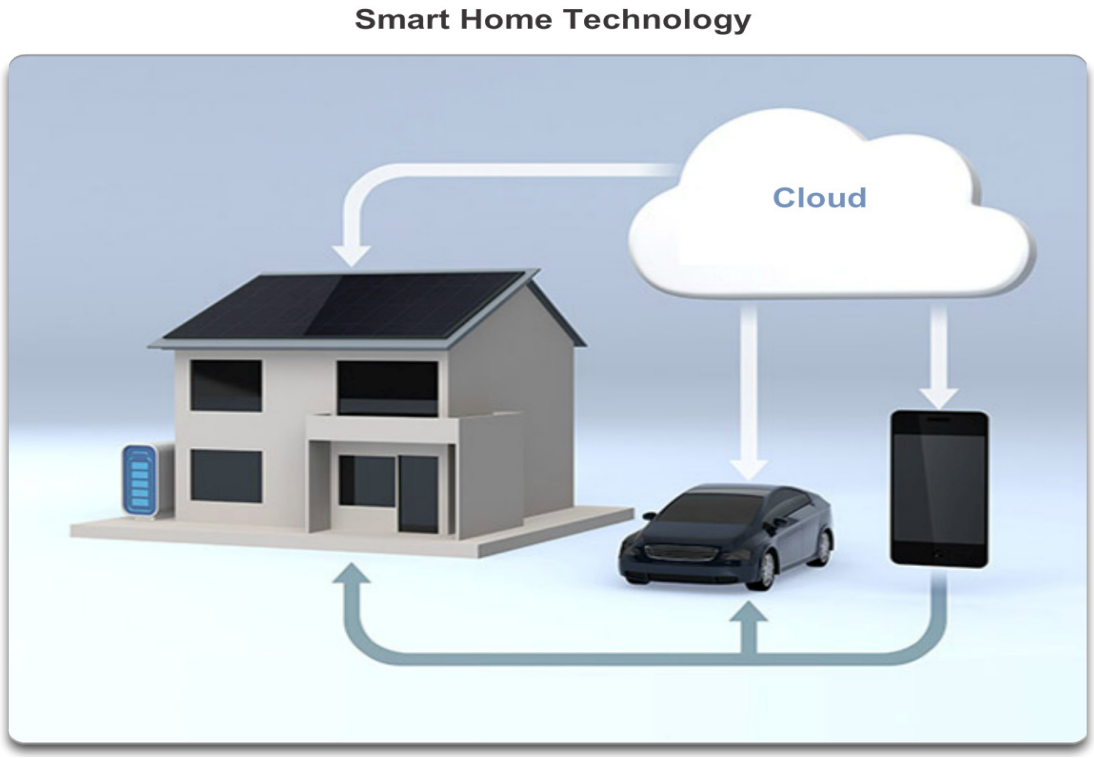
Technology Trends in the Home



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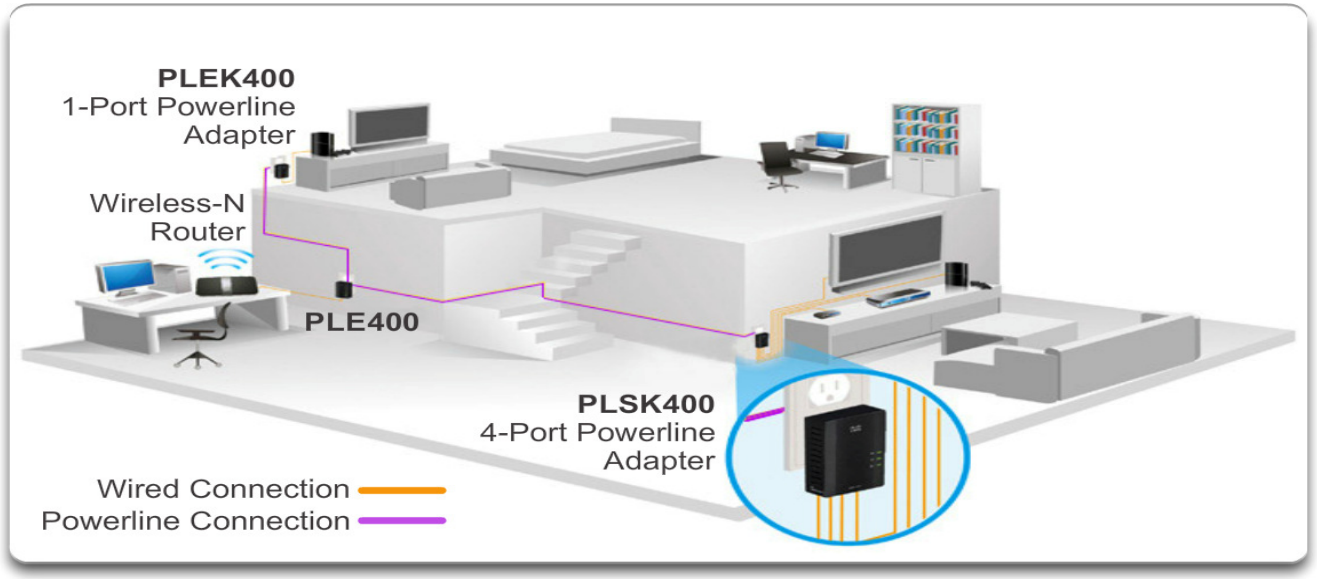
Powerline Networking



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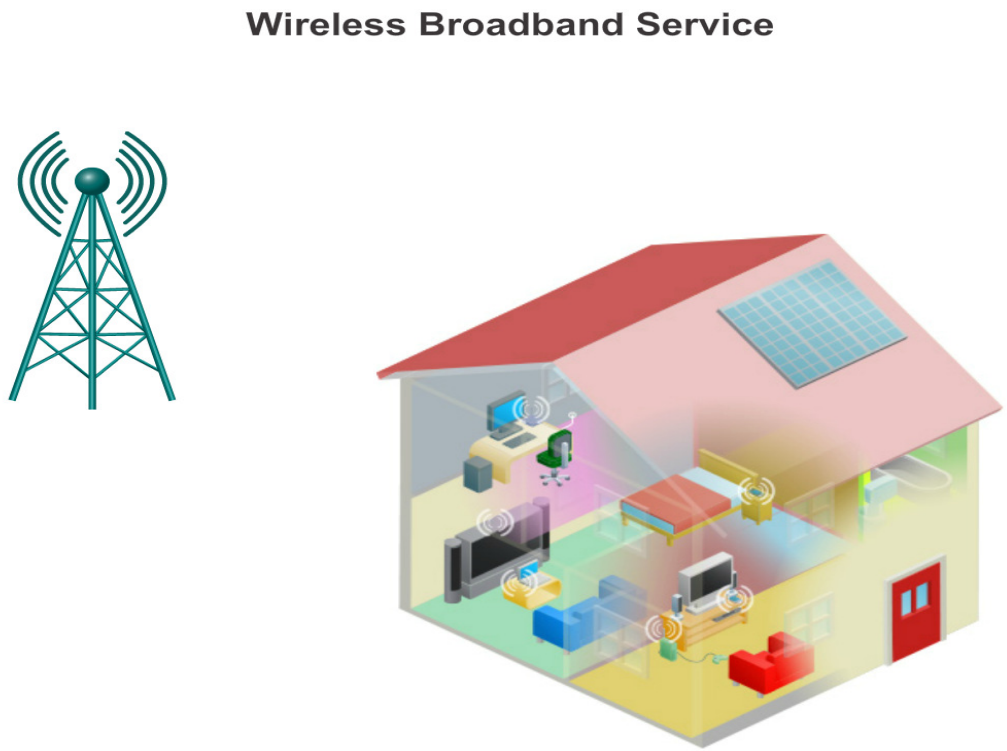
Networking Technologies for the Home

Wireless Broadband



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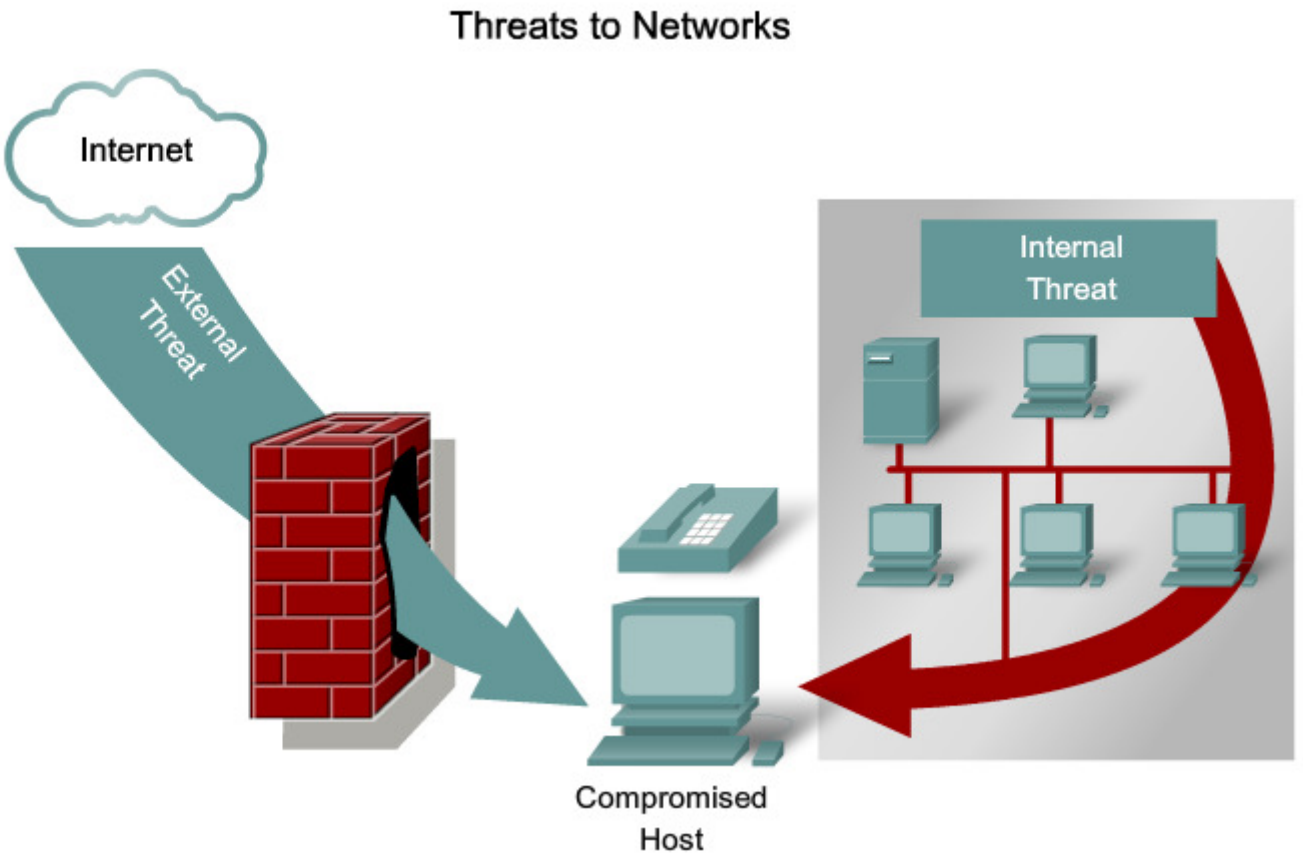
Future of Networking

Network Security



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Security Threats

The most common external threats to networks include:

- Viruses, worms, and Trojan horses
- Spyware and adware
- Zero-day attacks, also called zero-hour attacks
- Hacker attacks
- Denial of service attacks
- Data interception and theft
- Identity theft

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Exploring the Networking

Summary

In this chapter, you learned:

- Networks and the Internet have changed the way we communicate, learn, work, and even play.
- Networks come in all sizes. They can range from simple networks consisting of two computers, to networks connecting millions of devices.
- The Internet is the largest network in existence. In fact, the term Internet means a ‘network of networks. The Internet provides the services that enable us to connect and communicate with our families, friends, work, and interests.

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Exploring the Networking

Summary

In this chapter, you learned:

- The network infrastructure is the platform that supports the network. It provides the stable and reliable channel over which communication can occur. It is made up of network components including end devices, intermediate device, and network media.
- Networks must be reliable.
- Network security is an integral part of computer networking, regardless of whether the network is limited to a home environment with a single connection to the Internet, or as large as a corporation with thousands of users.

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Exploring the Networking

Summary

In this chapter, you learned:

- The network infrastructure can vary greatly in terms of size, number of users, and number and types of services that are supported on it. The network infrastructure must grow and adjust to support the way the network is used. The routing and switching platform is the foundation of any network infrastructure.

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