16th Edition

Understanding Computers

Today and Tomorrow

Comprehensive

Chapter 8
The Internet

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Evolution of the Internet

- The **Internet** is the largest and most well-known computer network, linking millions of computers all over the world
  - The Internet has actually operated in one form or another for several decades
- **ARPANET** is the predecessor of the Internet
  - Created in 1969 and named after the Advanced Research Projects Agency (ARPA), which sponsored its development
  - Initially connected four supercomputers; eventually evolved into today's Internet

Evolution of the Internet (cont'd)

- The **World Wide Web (Web)** is the collection of Web pages available through the Internet
  - Proposed by Tim Berners-Lee in 1989
  - Originally only text-based content; release of the Mosaic browser in 1993 led to graphical content
  - The Web is the most widely use part of the Internet
- Internet2 is a consortium of researchers, educators, and technology leaders from industry, government, and the international community
  - Dedicated to the development of revolutionary Internet technologies; much of the focus is on speed

The Internet Yesterday and Today

EARLY 1990s
Even at the beginning of the 1990s, using the Internet for most people meant learning how to work with a cryptic sequence of commands. Virtually all information was text-based.

TODAY
Today's Web organizes much of the Internet's content into easy-to-read pages that can contain text, graphics, animation, video, and interactive content that users access via hyperlinks.

FIGURE 8-1
Using the Internet: Back in the "old days" versus now.

The Internet Community Today: Users, ISPs, and Internet Content Providers

- Users – People who use the Internet
- **Internet service providers (ISPs)** provide access to the Internet, typically for a fee
- **Internet content providers** refer to persons or organizations that provide Internet content
  - Businesses, non-profit organizations, educational institutions, individuals

FIGURE 8-2
Companies that provide Internet access today include telephone, cable, and satellite companies.

The Government & Hardware and Software Companies

- Government and other organizations impact the Internet
  - Some countries limit information and access
  - FCC influences communications in the United States
  - Internet Society (ISOC)
    - Addresses issues impacting the future of the internet
  - Internet Corporation for Assigned Names and Numbers (ICANN)
    - Domain and IP address management
  - World Wide Web Consortium (W3C)
    - Protocols and standards, ensures interoperability
- Hardware and software companies provide the hardware and software used in conjunction with the Internet and Web
  - Application Service Providers & Infrastructure Companies

ASPs and Infrastructure Companies

- **Application service providers (ASPs)** refer to companies that manage and distribute Web-based software services over the Internet
  - Cloud software, Software as a Service (SaaS), cloudware
  - Often fee-based business software
  - A **Web service** is a self-contained business application that operates over the Internet
    - XML protocols and standards to support
    - Application to application communication
- Infrastructure companies are enterprises that own or operate the physical structure of the Internet
  - Conventional and mobile phone companies, cable companies, and satellite Internet providers

Myths About the Internet

- Myth 1: The Internet is free
  - Most people and businesses pay for Internet access
  - Businesses, schools, and libraries lease communications lines from phone companies
  - Mobile phone users pay hotspot or mobile phone providers for access
  - Fee-based content is growing at a rapid pace
    - Music/movie downloads
    - Donation-based sites

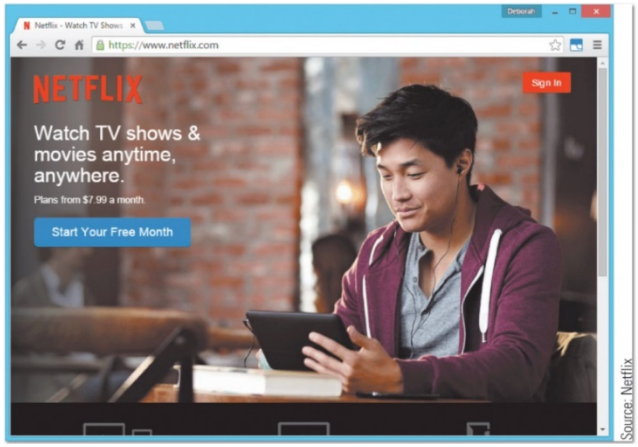


FIGURE 8-4
Fee-based Web content. The use of fee-based Web content, such as streaming movies via Netflix as shown here, is growing.

Myths About the Internet (cont'd.)

- Myth 2: Someone controls the Internet
  - No single group or organization controls the Internet
  - Governments can regulate Internet use within its country, but this is difficult to enforce
- Myth 3: The Internet and World Wide Web are identical
  - Internet is the physical network
  - WWW is the collection of Web pages available over the Internet
  - Other resources are available via the Internet, for example, FTP

Home Internet Connection Options

TYPE OF INTERNET CONNECTION	AVAILABILITY	APPROXIMATE MAXIMUM SPEED*	APPROXIMATE MONTHLY PRICE
Conventional dial-up	Anywhere there is telephone service	56 Kbps	Free–$30
Cable	Virtually anywhere cable TV service is available	6–200 Mbps	$30–110
DSL	Within 3 miles of a switching station that supports DSL	3–15 Mbps	$30–40
Satellite	Anywhere there is a clear view of the southern sky and where a satellite dish can be mounted and receive a signal; most often in rural or mountainous areas	5–15 Mbps	$40–80
Fixed wireless	Selected areas where service is available; most often in rural areas	2–12 Mbps	$60–250
Broadband over fiber (BoF)	Anywhere fiber has been installed to the building; most often in urban areas	5 Mbps–1 Gbps	$30–70
Mobile wireless (4G)	Virtually anywhere cellular phone service is available	3–100 Mbps	Varies greatly depending on data plan

* Download speed; most connections have slower upload speeds.

FIGURE 8-7
Typical home Internet connection options.

Cable and DSL

- **Cable Internet access** is most widely used home broadband connection
  - Delivers via a cable provider's network
  - Fast, typically around 25 Mbps
  - Requires a cable modem
- **DSL (Digital Subscriber Line) Internet access** delivers data via standard telephone lines
  - Must be less than 3 miles from a switching station
  - Transmits over telephone lines but does not tie up the line
  - Typically around 10 Mbps

Satellite and Fixed Wireless

- **Satellite Internet access** is often the only broadband option for rural areas
  - Slower than cable and more expensive that cable or DSL
  - Requires satellite modem and transceiver dish
  - Performance might degrade or stop altogether during bad weather
- **Fixed wireless Internet access** uses radio transmission towers rather than satellites
  - Requires a modem and, sometimes, an outside-mounted transceiver
  - Uses Wi-Fi or WiMAX technology
  - Typically between 2 and 10 Mbps

Broadband over Fiber (BoF) and Mobile Wireless

- **Broadband over Fiber (BoF) Internet access** delivers data over fiber-optic cabling all the way to the building
  - Also called fiber-to-the-premises (FTTP)
  - Verzion Fios and Google Fiber
  - Very fast—up to 1 Gbps
  - Requires special networking equipment
- **Mobile wireless Internet access** delivers data via a cellular network
  - Often used with smartphones and tablets while on the go
  - Typically requires a data plan
  - Speed depends on the cellular standard and specific network

Searching the Internet

- **Search sites** are Web sites designed to help users find Web pages that contain the information they are seeking
  - Typically use a **search engine** in conjunction with a database containing information about Web pages to locate appropriate Web pages
  - Search site databases are updated on a regular basis
  - Automated programs (often called spiders or web crawlers) use the hyperlinks to crawl (jump continually) from page to page to update the search database
  - To search, type the URL of a search site or search using the Address bar of your browser to use your default site

Evaluating Search Results

- Does the title and listed description sound appropriate for the information you are seeking?
- Is the URL from an appropriate company or organization?
- You should also evaluate:
  - The author
  - The source
    - Determine if reliable or biased
  - The currency of information
    - Many online articles are years old
- Verify online information with a second source

Citing Internet Resources

- To avoid plagiarism, proper citation procedures should be used for all Internet content used in a paper, book, or on a Web site
- Citations for online sources are similar to written sources:
  - Author
  - Date of publication
  - Article or Web page title
  - Date the article was retrieved from the Internet
  - URL used
- Note Internet Archive Wayback Machine

Beyond Browsing, Searching, and E-Mail

- Many other activities take place via the Web in addition to browsing, searching, and e-mail
- Today's online communications programs can typically be used for a variety of activities
  - Messaging
  - Message Boards
  - VOIP
  - E-mail
  - Web Conferencing, Skype, Facetime, etc.
  - Online communication convergence is referred to as unified communications (UC)

Forums and VoIP

- A **forum** (discussion group or message board) is a Web page that enables individuals to post messages on a particular topic for others to read and respond to
  - Typically organized by topics (threads)
- **Voice over Internet Protocol (VoIP)** refers to making telephone calls over the Internet
  - Computer to computer
  - More permanent VoIP setups replace landline phones
  - Relatively inexpensive
  - Does not work when Internet connection or power is out

Social Networking/Social Media

- **Social networking site**: A site that enables a community of individuals to communicate and share information
  - Facebook, Google +, etc.
- **Social media**: The collection of social networking sites and other communications channels used to share information with a broad audience
  - Media-sharing sites (YouTube and Flickr)
  - Microblogging sites (Twitter)
  - Social curation sites (Digg, Reddit, and Pinterest)
- For security and safety reasons, be careful not to reveal too much about yourself

E-Commerce

- **E-commerce** is performing financial transactions over the Internet
  - More convenient and easier comparison shopping for individuals
  - Reduced costs and increased customer satisfaction for businesses
  - Be cautious to prevent fraud and identity theft
    - Enter sensitive data only on secure Web sites
    - Use a credit card or online payment service
  - **Online shopping**: Buying products or services over the Internet
  - **Online auctions**: Bids are placed for items and the highest bidder purchases the item
  - **Online banking**: Performing banking activities via the Web
  - **Online investing**: Buying and selling stocks or other types of investments via the Web

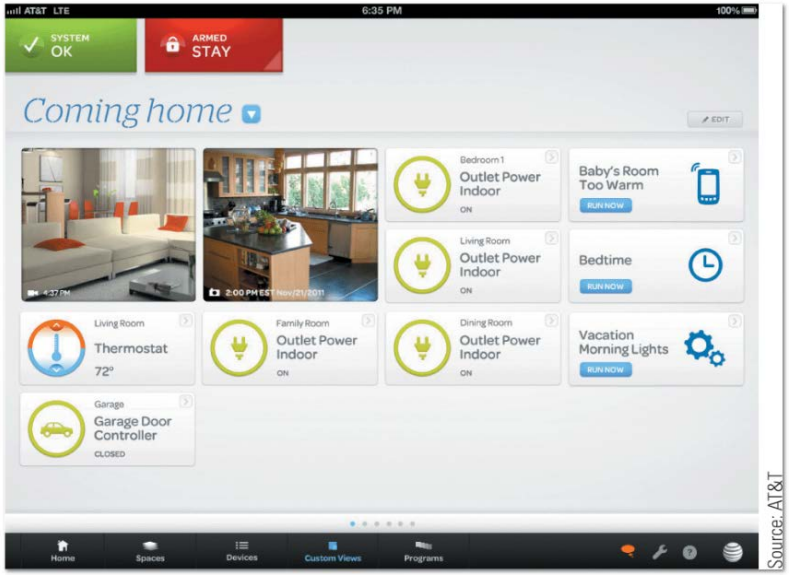
RSS Feeds and Podcasts

- **RSS (Really Simple Syndication)** feed
  - News tool that delivers selected Web content to subscribers as the content is published to a Web site
  - RSS registered w/client -> Pull Technology
    - ***Push vs Pull***
  - **Podcast**
  - Recorded audio or video file that can be played or downloaded via the Web
  - Prepared by individuals and businesses
  - Used to share knowledge, express opinions, share original poems, songs, or short stories
  - Typically uploaded to the Web on a regular basis

Trend

Internet of Things (IoT)

- Facilitated by move from IPV4 (32bit) to IPV6 (128bit)
- Everyday objects interconnected via the Internet
- Sensors in shoes and other objects, smart fitness devices, home automation systems, smart freeways and traffic lights, for example
- Devices will communicate with each other and provide feedback to users as needed



A home automation system.

Censorship and Privacy Issues

- Internet Filtering
  - Using software or browser options to block access to particular Web pages or types of Web pages
  - Used by individuals, schools, employers, public computers, etc.
  - Can use browser settings or special filtering software
  - Algorithmic personalization
  - *** NOTE emergence of Big Tech filtering/manipulating Search**
- Some countries attempt to regulate Internet content
  - To hinder spread of information from political opposition
  - To filter out material determined to be offensive
  - To protect national security
  - *** NOTE emergence of Big Tech taking censoring and removing information**

    See ➔ ciss100.com ➔ LM8 ➔ Censorship
- In the United States:
  - Difficult to define "patently offensive" and "indecent"
    - Communications Decency Act
  - Difficult to find a fair balance between protection and censorship
    - Children's Internet Protection Act (CIPA)

Censorship and Privacy Issues (cont'd)

- **Internet filtering** can be used to block access to particular Web pages or types of Web pages
  - Via software or browser settings
  - Used by individuals, schools, employers, public computers, etc.
  - Can be used to restrict the hours the Internet can be used

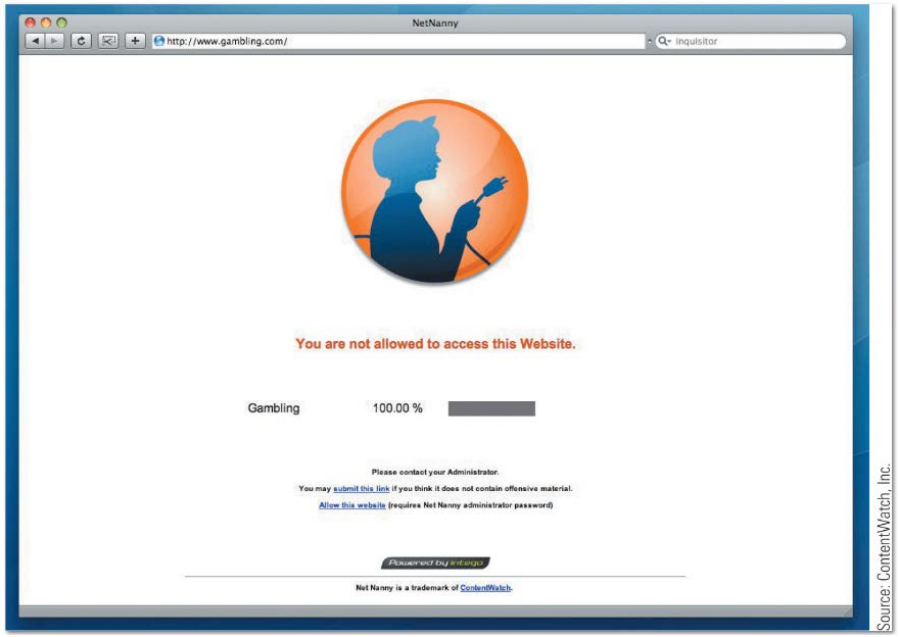


FIGURE 8-34
Internet filtering.

Web Browsing Privacy: Cookies

- Web Browsing Privacy
  - Encompasses what information about individuals is available, how it is used, and by whom
- **Cookies** are small files stored on a hard drive by a Web server
  - Can be session-based or persistent cookies
    - Necessary due to stateless HTTP protocol
  - Can be used to identify return visitors and their preferences (first-party cookies)
  - Can be tracking cookies used to track Web activity (third-party cookies)
  - Can include personally identifiable information (PII) or non-personally identifiable information (Non-PII)
  - Cookie data can be viewed or deleted
  - Cookie settings can be changed and/or managed with software

Spyware and Adware

- **Spyware:** Software installed without users knowledge that transmits data secretly through the user's Internet connection
  - Sometimes used by advertisers to gather marketing information
  - Can be used by criminals to gather personal data stored on your computer
- **Adware:** Software supported by onscreen advertising
  - Often included in free programs
  - Does not gather information
  - Is not installed without user's consent but may be installed without the user's direct knowledge

E-Mail Privacy

- Only encrypted e-mail can be transmitted privately
  - Unencrypted e-mail can be read by others if intercepted
  - Employers and ISPs have access to e-mails sent through those organizations
  - Businesses and ISPs typically archive e-mail messages

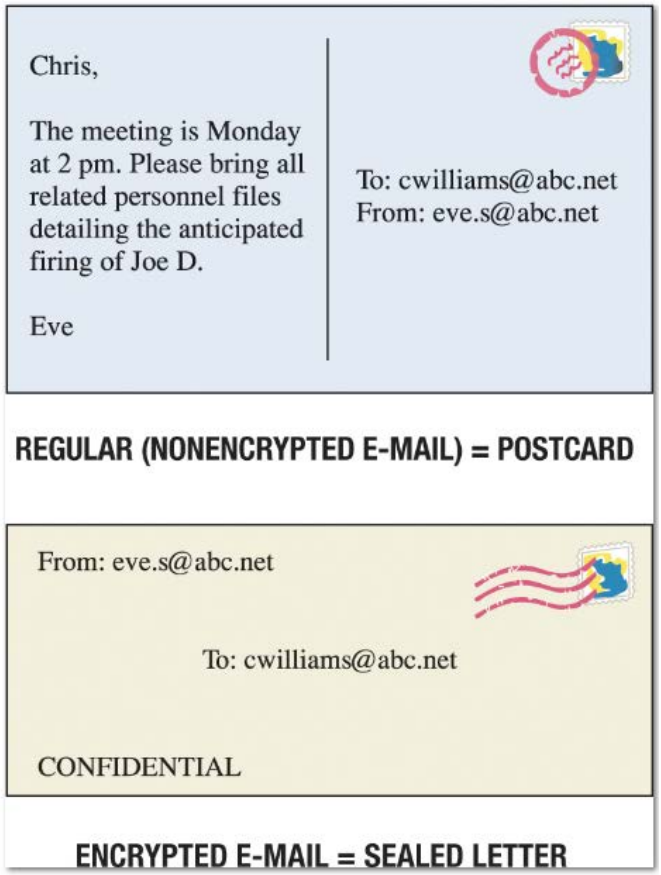


FIGURE 8-36
You cannot assume e-mail messages are private, unless they are encrypted.

Summary

- Evolution of the Internet
- Getting Set Up to Use the Internet
- Searching the Internet
- Beyond Browsing, Searching, and E-Mail
- Censorship and Privacy Issues