Chapter 8
The Internet
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

**FIGURE 8-1**
Using the Internet: Back in the “old days” versus now.

**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.
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
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
• **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 operating 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
• 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

<table>
<thead>
<tr>
<th>TYPE OF Internet Connection</th>
<th>AVAILABILITY</th>
<th>APPROXIMATE MAXIMUM SPEED*</th>
<th>APPROXIMATE MONTHLY PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional dial-up</td>
<td>Anywhere there is telephone service</td>
<td>56 Kbps</td>
<td>Free—$30</td>
</tr>
<tr>
<td>Cable</td>
<td>Virtually anywhere cable TV service is available</td>
<td>6–200 Mbps</td>
<td>$30–110</td>
</tr>
<tr>
<td>DSL</td>
<td>Within 3 miles of a switching station that supports DSL</td>
<td>3–15 Mbps</td>
<td>$30–40</td>
</tr>
<tr>
<td>Satellite</td>
<td>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</td>
<td>5–15 Mbps</td>
<td>$40–80</td>
</tr>
<tr>
<td>Fixed wireless</td>
<td>Selected areas where service is available; most often in rural areas</td>
<td>2–12 Mbps</td>
<td>$60–250</td>
</tr>
<tr>
<td>Broadband over fiber (BoF)</td>
<td>Anywhere fiber has been installed to the building; most often in urban areas</td>
<td>5 Mbps–1 Gbps</td>
<td>$30–70</td>
</tr>
<tr>
<td>Mobile wireless (4G)</td>
<td>Virtually anywhere cellular phone service is available</td>
<td>3–100 Mbps</td>
<td>Varies greatly depending on data plan</td>
</tr>
</tbody>
</table>

* 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 than 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)
  – Verizon 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 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

• **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
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

• 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

• 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
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
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