Instructor’s Manual: Chapter 2

E-commerce Infrastructure

**Teaching Objectives**

* Discuss the origins of, and the key technology concepts behind, the Internet.
* Explain the current structure of the Internet.
* Explain the limitations of today’s Internet and the potential capabilities of the Internet of the future.
* Explain how the Web works.
* Describe how Internet and Web features and services support e-commerce.
* Explain the impact of m-commerce applications.

# Key Terms

Internet, p. 98

the Web, p. 99

packet switching, p. 101

packet, p. 101

router, p. 105

routing algorithm, p. 105

protocol, p. 106

Transmission Control Protocol/Internet Protocol (TCP/IP), p. 106

TCP, p. 106

IP, p. 106

Network Interface Layer, p. 106

Internet Layer, p. 106

Transport Layer, p. 106

Application Layer, p. 106

IPv4 Internet address, p. 107

IPv6 Internet address, p. 107

domain name, p. 108

Domain Name System (DNS), p. 108

Uniform Resource Locator (URL), p. 108

client/server computing, p. 109

client, p. 109

server, p. 110

cloud computing, p. 111

public cloud, p. 111

private cloud, p. 112

hybrid cloud, p. 112

Hypertext Transfer Protocol (HTTP), p. 113

Simple Mail Transfer Protocol (SMTP), p. 113

Post Office Protocol 3 (POP3), p. 113

Internet Message Access Protocol (IMAP), p. 113

File Transfer Protocol (FTP), p. 114

Telnet, p. 114

Secure Sockets Layer (SSL)/Transport Layer Security (TLS), p. 114

Ping, p. 114

Tracert, p. 114

Network Technology Substrate layer, p. 116

Transport Services and Representation Standards layer, p. 116

Applications layer, p. 116

Middleware Services layer, p. 116

Network Service Provider (NSP), p. 117

backbone, p. 117

bandwidth, p. 117

redundancy, p. 118

Internet Exchange Point (IXP), p. 118

campus area networks (CAN), p. 118

Internet Service Provider (ISP), p. 118

narrowband, p. 120

broadband, p. 120

Digital Subscriber Line (DSL), p. 121

FiOS (fiber-optic service), p. 121

cable Internet, p. 121

T1, p. 121

T3, p. 121

satellite Internet, p. 121

intranet, p. 121

latency, p. 124

Internet2®, p. 128

fiber-optic cable, p. 130

Wi-Fi, p. 132

Bluetooth, p. 134

differentiated quality of service (diffserv), p. 135

Internet of Things (IoT), p. 136

Mosaic, p. 138

universal computing, p. 138

Netscape Navigator, p. 138

Internet Explorer, p. 138

hypertext, p. 139

Hypertext Markup Language (HTML), p. 141

eXtensible Markup Language (XML), p. 142

Web server software, p. 146

database server, p. 147

ad server, p. 147

mail server, p. 147

video server, p. 147

Web client, p. 147

Web browser, p. 147

electronic mail (e-mail), p. 147

attachment, p. 148

instant messaging (IM), p. 148

search engine, p. 148

online forum, p. 148

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cookie, p. 152

blog, p. 152

Really Simple Syndication (RSS), p. 153

podcast, p. 153

wiki, p. 154

IP telephony, p. 155

Voice over Internet Protocol (VoIP), p. 155

**Brief Chapter Outline**

*Wikitude, Layar, and Blippar: Augment My Reality*

2.1 The Internet: Technology Background

 The Evolution of the Internet: 1961—the Present

 The Internet: Key Technology Concepts

 The New Client: The Mobile Platform

 The Internet “Cloud Computing” Model: Software and Hardware as a Service

 Other Internet Protocols and Utility Programs

2.2 The Internet Today

 The Internet Backbone

 Internet Exchange Points

 Campus Area Networks

 Internet Service Providers

 Intranets

 Who Governs the Internet?

2.3 The Future Internet Infrastructure

 Limitations of the Current Internet

*Insight on Society: Government Regulation and Surveillance of the Internet*

 The Internet2® Project

 The First Mile and the Last Mile

 Internet Access Drones

 The Future Internet

2.4 The Web

 Hypertext

 Markup Languages

 *Insight on Technology: Is HTML5 Ready for Prime Time?*

 Web Servers and Clients

 Web Browsers

2.5 The Internet and the Web: Features and Services

 E-mail

 Instant Messaging

 Search Engines

 Online Forums

 Streaming Media

 Cookies

 Web 2.0 Features and Services

2.6 Mobile Apps: The Next Big Thing Is Here

 Platforms for Mobile Application Development

 App Marketplaces

 *Insight on Business: Apps for Everything: The Apps Ecosystem*

2.7 Case Study: *Akamai Technologies: Attempting to Keep Supply Ahead of Demand*

2.8 Review

 Key Concepts

 Questions

 Projects

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**Teaching Suggestions**

This chapter provides a description of today’s Internet, the World Wide Web (including Web 2.0 features and services), and the future Internet that will emerge in the next few years. The key take away from this chapter is that the Internet has never been a static technology. Instead, it has evolved over a period of sixty years into an unparalleled communication media that combines elements of text, television, and radio. The challenge in this chapter is to understand the technical elements of the Internet (without becoming too technical), and understand their business implications while not becoming overwhelmed by the details.

The opening case study, *Wikitude, Layar, and Blippar:* *Augment My Reality* examines one of the hottest recent developments in e-commerce, namely, the expansion of the mobile digital platform (smartphones) and the new possibilities for mobile e-commerce, coupled with a focus on localization and augmented reality technology combined with the geolocating functionalities built into smartphones. Along with other services, the mobile platform is enlarging the opportunities for e-commerce, and changing many business models. Possible class discussion questions for this case include the following:

* Have you used any augmented reality applications? If so, has it been useful; if not, is it a service that seems interesting? Why or why not?
* Are there any privacy issues raised by augmented reality applications?
* What are the potential benefits? Are there any disadvantages?
* What revenue models could work for providers of augmented reality services?

## Key Points

*Evolution of the Internet.* The Internet has evolved over three stages: Innovation (1961 to 1974), Institutionalization (1975 to 1995), and Commercialization (1995 to the present). You may want to point out to students the length of time required to build the Internet as we know it today and the irony of the phrase “Internet time.” You may also want to describe how long it took radio and television to develop into their current national and international networks.

*Internet Foundation Technologies*. The Internet relies on three foundation technologies: packet switching, TCP/IP, and client/server technology. You may want to illustrate each of these technologies, and in particular, describe how Internet addresses work. You should also note the sheer power of the computer chip as a driving technology force. Compare the power growth curves of the basic computer chip with that of trains, automobiles, and television. For instance, trains moved from 15 miles an hour in 1865, to over 100 miles per hour by 1965. Although this is impressive, it is nothing compared to computer chips. The cost performance of computers has improved by ten to the seventh power in the last forty years. A computer purchased in the year 2000 runs 10 million times faster than a computer purchased in the 1960s. A computer purchased in 2014 comes with a terabyte drive and is approximately 3 million times faster than a year 2000 computer. There is every reason to believe this performance curve will be maintained in the short-term future. The business possibilities here are mind-boggling and we can’t count on so-called Internet experts and gurus to predict how these technologies will be used in business even three years from now.

The very nature of the client computer itself is changing by becoming much smaller and more mobile. Smartphones and tablet computers are leading the charge here, and in the next five years we should expect to see these devices continue to shrink by an order of magnitude while increasing in power.

Another important development to discuss with students is the growing importance of “cloud computing,” which refers to a model of computing in which firms and individuals obtain computing power and software applications over the Internet, rather than purchasing the hardware and software, and installing it on their own computers. Cloud computing is the fastest growing form of computing right now, and radically reduces the cost of building and operating Web sites because the necessary hardware infrastructure and software can be licensed as a service from Internet providers at a fraction of the cost of purchasing these services as products. Also note the differences between public, private and hybrid clouds, since students need to understand what these terms refer to.

*Internet Protocols and Utility Programs.*The Internet relies on a number of communications protocols such as HTTP, SMTP and POP mail protocols, FTP, and utility programs (software applications) such as Ping and Tracert. You can illustrate many of the protocols and programs in class. A favorite is tracing a message using Visualroute (see Figure 2.10).

*The Internet Today.* The current Internet’s network architecture relies on four primary elements: the backbone, Internet Exchange Points (IXPs), Campus Area Networks (CANs), and Internet Service Providers (ISPs), which provide the last mile of service to the home or office. You can use Figure 2.12 to illustrate how a message moves, from the client on the left of the figure to the client on the right. Also, Figure 2.11, the Hourglass Model of the Internet,is very useful for illustrating how Internet hardware and software relate to one another.

This may be a good time to discuss the *Insight on Society* case, *Government Regulation and Surveillance of the Internet*. Students might be surprised at the extent to which governments surveil the Internet. Class discussion questions might include the following:

* How is it possible for any government to “control” or censor the Web?
* Does the Chinese government, or the U.S. government, have the right to censor content on the Web?
* How should U.S. companies deal with governments that want to censor content?
* What would happen to e-commerce if the existing Web split into a different Web for each country?

*Limitations of the current Internet.* To understand the potential benefits of the future Internet infrastructure, your students must first understand the limitations of the current infrastructure. To do so, you can review the bulleted list on page 122 with them. It is helpful at this point to have students give examples of their own experience with Internet limitations. Students will usually experience this as extended wait times, lengthy downloads, and interrupted downloads of music tracks. The growth of Netflix’s streaming movie service is beginning to cause bandwidth shortages, as is the growth of music services like Pandora. The 3G and 4G networks are similarly bandwidth-challenged.

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*Potential capabilities of the Internet of the future.*The Internet2 project and GENI initiative are doing some exciting work that is reviewed on page 128 to 129. It is also important for students to understand the idea of the “first mile” and “last mile” as it applies to Internet infrastructure (see pages 129 to 134). We have added a short section on Internet access drones, which students may have read about recently in the popular press. Finally, before leaving this topic, talk about the coming Internet of Things (IoT) (page 136) and the advent of “smart”, connected “things”, which is likely to revolutionize many aspects of life in the future.

*How the Web Works.* The Web was created between 1989 and 1991. In 1993, a graphical user interface was built for the Web. The Web allows formatted pages to be displayed and linked with one another. Key concepts for understanding the Web are hypertext, URLs, HTML, XML, Web servers, and Web clients (see pages 142 to 153). You may wish to show the HTML code behind a popular Web page such as Amazon. The Insight on Technology case, *Is HTML5 Ready for Primetime?*, provides a good jumping-off point for the discussion of the impact that advances in technology can have on business. Class discussion classes include:

* What features of HTML5 are changing the way Web sites are built?
* Is HTML5 a disruptive technology, and if so, for whom?
* Are there any disadvantages in Web sites and mobile apps moving to an HTML5 platform?

*How the Web Supports E-commerce.*Without the Web and the Internet, e-commerce would be a fraction of its current size. The Web has enabled e-commerce to explode rapidly because of its ability to store and display product information (enabling order entry), receive payments, allow consumers to search for products, and support a wide range of commercial communication. You may wish to visit a retail Web site such as Landsend’s or LLBean’s to illustrate how the Web enables commerce through catalogs, payment systems, community features, advertising, and communications. Groupon is another interesting and innovative site. Groupon serves up ads and coupons for local businesses.

*Web 2.0 Features and Services.* This section of the text highlights a number of Web 2.0 applications and technologies that are beginning to have a significant impact on e-com­merce. Online social networks, apps, blogs, podcasts, RSS, wikis, video sharing, widgets, and gadgets, and intelligent personal assistants such as Apple’s Siri are at the forefront of the explosion in services-based e-commerce. Ask your students to offer examples of each of these features/services that they have used within the past month.

*Mobile Apps: The Next Big Thing Is Here*. The section focuses on the explosion of mobile Internet access devices. Mobile commerce has finally arrived and become a reality. The *Insight on Business* case*, Apps for Everything: The App Ecosystem,* examines the role that apps (both iPhone and Android) are playing in the establishment of a new e-commerce platform. Apps are used for marketing, advertising, direct sales, Web services, and book readers. Questions for class discussion might include the following:

* What are apps and why are they so popular?
* Do you use any apps regularly? If so, which ones, and what are their functions?
* What are the benefits of apps? The weaknesses?
* Are there any benefits/disadvantages to the proprietary nature of the Apple platform?

**Case Study Questions**

1. *Why does Akamai need to geographically disperse its servers to deliver its customers’ Web content?*

The Internet was originally developed to carry text-based e-mail messages among a relatively small group of researchers, not bandwidth-hogging graphics, sound, and video files to tens of millions of people all at once. Also, every 1,500-byte packet of information sent over the Internet must be verified by the receiving server and an acknowledgment sent to the sending server. Each packet can go through many different servers on its way to its final destination, multiplying by several orders of magnitude the number of acknowledgments required to move a packet from New York to San Francisco. This means that the Internet today spends much of its time and capacity verifying packets, causing “latency.” One of the founders of Akamai, Daniel Lewin, came up with the idea to store copies of Web content such as pictures and video clips at many different locations around the Internet. This is so that a client can always retrieve a nearby copy, making Web pages load faster. Akamai’s main product does just that—it allows customers to move their Web content closer to end users, which increases the speed at which the content can be served.

1. If you wanted to deliver software content over the Internet, would you sign up for Akamai’s service? Why or why not?

Bandwidth requirements of the software or content, the number of simultaneous downloads, and the customer requirements are all factors in determining whether a firm should use a service such as Akamai’s. A small piece of software, less than one megabyte, can be downloaded from a single server to a single user in a few seconds using a DSL or cable modem. However, if 10,000 users sought to download the same software simultaneously, the time required to serve all users would be significantly higher—on the order of several minutes or more. Firms that expect this sort of demand would be well served by Akamai.

1. What advantages does an advertiser derive from using Akamai’s service? What kinds of products might benefit from this kind of service?

Akamai provides advertising firms with intelligence generated by Akamai’s knowledge base of Internet network activity. This kind of intelligence allows advertisers to deliver ads based on country, region, city, market area, area code, county, zip code, connection type, and speed. Akamai enables firms to deliver personalized content to end users. Bandwidth-appropriate presentation is also automatically determined, enabling companies to leverage high-speed end-user connections without leaving behind those customers who are still on dial-up. Akamai also allows companies to present location-specific pricing and promotions. It tailors programs around regional and connection-defined market differences. Akamai helps firms to validate an end user’s location, ensuring that information and goods are delivered only to trusted users in authorized geographies. This capability allows firms to protect goods and information and reduce the occurrence and expense of distributing products to unauthorized locations/customers.

1. *Do you think Internet users should be charged based on the amount of bandwidth they consume, or a tiered plan where users would pay in rough proportion to their usage?*

Pay-for-use is a simple principle in economics that is widely accepted. Applied to the Internet in a way similar to telephone systems throughout the world, users would be charged a metered amount for their use of bandwidth. People who streamed Netflix all day long would pay more for their Internet service than people who just send e-mail messages. In general, the ISP industry, from AT&T, Verizon, and Comcast to little mom-and-pop local providers, support pay-for-use in large part because it would allow them to maximize revenue from their technology investments (and to gather up some of the profits that Google, Netflix, Amazon, and others produce). So-called “net neutrality” supporters argue that Internet access should be available to all regardless of use, and paid for equally by all (sort of a “freeway”) through flat fees. Charging for use would “discriminate” in their view against certain kinds of content, like high bandwidth video, streaming music, and perhaps games. In general, Internet companies such as Google, Amazon, Yahoo, Netflix, and many others do not want pay-for-use because they are concerned that it would hinder their ability to maximize revenue from their platforms.

**End-of-Chapter Questions**

1. *What advantages does client/server computing have over mainframe computing?*

With client/server computing, it is easy to expand capacity by adding servers and clients. Client/server networks are less vulnerable than centralized computing architectures. If one server goes down, backup or mirror servers can pick up the slack; if a client computer is inoperable, the rest of the network continues operating. Moreover, processing load is balanced over many powerful smaller computers rather than being concentrated in a single huge computer that performs processing for everyone. Both software and hardware in client/server environments can be built more simply and economically.

1. What are three different types of cloud computing models that have been developed?

A number of different types of cloud computing models have developed. The most well-known type is referred to as a public cloud. A public cloud is offered by a third-party service provider, such as Amazon Web Services, IBM, HP, and Dell, who own and manage very large, scalable cloud computing centers that provide computing power, data storage, and high-speed Internet connections to multiple customers who are able to choose from a variety of options, such as servers, operating systems, storage, and bandwidth, and pay only for the resources they use. Gartner estimates that spending on public cloud services worldwide will grow almost 20% in 2014, to$158 billion. A private cloud provides similar options but has only a single tenant (either on the customer’s premises or off the premises), and is most often used for customers who require enhanced security or compliance for their applications, such as the financial services or medical service providers. A hybrid loud is one that offers customers both options—both a public cloud and a private loud.

1. *Why is packet switching so essential to the Internet?*

Packet switching is what allows communication between computers in a way that doesn’t require a direct, point-to-point connection between two computers. A point-to-point connection wastes communications capacity because the connection is required regardless of whether data is being sent. Packet switching allows information to be broken up into smaller segments, each of which can be routed in different ways to its final destination. Thus, packet switching allows better use of network communication lines in terms of speed and also the amount of data that can be exchanged. Also, because of the routing and switching, this means that if one network computer or routing path goes down, a packet can be sent along another route and not lost.

1. What are four Internet protocols besides HTTP (the Web) and sending e-mail (SMTP)?

Other Internet protocols include POP/IMAP, which is used for retrieving e-mails, FTP, which is used for file transfers between computers, Telnet, which is used to log on remotely to another computer, and SSL/TLS which is used to secure communications between computers.

1. What are the three main phases in the evolution of the Internet? Briefly describe each.

The three main phases are Innovation (1961-1974), Institutionalization (1975-1995), and Commercialization (1995 to present.) In the Innovation phase, the fundamental building blocks of the Internet were developed: packet switching, TCP/IP, and client/server computing. In the Commercialization phase, large institutions funded the creation and building of the first Internet-technology networks, ARPANET, and its civilian counterpart, NSFNET. In the Commercialization phase, the government agencies encouraged private companies to take over the Internet backbone and provide access to ordinary citizens.

1. What is the difference between video conferencing and telepresence?

Internet video conferencing is accessible to anyone with a broadband Internet connection and a Web camera (webcam). Telepresence takes video conferencing up several notches. Rather than single persons “meeting” by using webcams, telepresence creates an environment in a room using multiple cameras and higher-resolution screens, which surround the users.

1. Why are smartphones a disruptive technology?

Smartphones are a disruptive technology because they have radically altered the personal computing and e-commerce landscape. They involve a major shift in computer processors and software from the 40-year dual monopolies established by Intel and Microsoft. The mobile platform also has profound implications for e-commerce because it influences how, where, and when consumers are able to shop and buy.

1. What types of companies form the Internet backbone today?

The Internet backbone is formed by the Network Service Providers (NSPs) that own and control the major networks; NSPs are for-profit companies. Some of the major U.S. Internet backbone owners include: AT&T, Cable & Wireless, and Sprint, among others. The backbones in foreign countries are usually operated by a mixture of government-owned and for-profit companies.

1. Identify the various types of narrowband and broadband ISP Internet connections. Of all, which is the fastest and which is the slowest?

Types of ISP Internet connections are dial-up (telephone modem), DLS (digital subscriber line), FiOS (fiber optic), cable modem, satellite, T1/T3. All are broadband except for dial-up, which is narrowband. The fastest connection is FiOS and the slowest is dial-up.

1. What are three concerns about the Internet of Things?

Despite all of the IoT activity, there are a number of concerns. One is interoperability. As with many technologies in the early stages of development, many organizations are fighting to create the standards that participants in the market will follow. Other concerns include security and privacy. Security experts believe that IoT devices could potentially be a security disaster, with the potential for malware being spread through a connected network, and difficulty in issuing patches to devices, leaving them vulnerable. Data from stand-alone smart devices can reveal much personal detail about a consumer’s life, and if those devices are all ultimately interconnected, there will be little that is truly private.

*Explain what domain names, URLs, and IP addresses are and provide an example of each. How are they used when a user is browsing the Web?*

IP addresses are the unique addresses assigned to each computer on the Internet. An example is 111.111.111.111. Domain names are a way for humans to more easily remember and share the IP address of a host, a web server for example. An example is yahoo.com. A URL is the address of a file or content that is being shared on the Internet. An example is yahoo.com/filename/. In Web browsing, a user will request a file through a link. The link will be a URL, which typically contains either a domain name or and IP address, and the content’s location at that IP address. A domain name server is used to translate the domain name in the URL to its IP address, so that the request can be sent to the right host or server on the Internet. The server will use the file location in the URL request to locate the file and send it to the Web browser.

*12.* *What are the main mobile platforms used by mobile devices?*

The main platforms are Apple’s iOS used for iPhones and iPads, the open-source Android platform, used by Google and other manufacturers, the Blackberry platform, and the Windows mobile platform.

13. What technologies and tools do governments use to monitor, censor, and limit their citizens’ activities on the Internet?

Some countries have regulations that telecommunications companies must follow in order to continue to do business in their country, regulations that may prevent access to certain sites or domain names or areas on the Internet. Technologies include configuring routers and servers to prevent access to forbidden sites, prevent communication that contains specific words or content, and slow down traffic so that communications like e-mail and text messages can be inspected before being allowed to continue to their destination. Deep packet inspection allows governments to read messages, alter their content, and identify senders and recipients, and is accomplished by installing computers along the communications lines between users and ISPs. Databases are used to store messages and software is used to analyze messages.

14. Identify the layers used in Internet technology. What is their importance to Internet communications?

The layers are the Application layer, the Middleware layer, the Transport Services and Representation Standards layer, and the Network Technology substrates layer. The importance of having these separate layers is so that underlying communications technologies can change without disrupting the top application layer (applications used by users). This ability has meant that the Internet technologies have been able to change to accommodate greater and greater numbers of users and data capacity without affecting the end-user.

*15*. *Describe at least two differences between a public Web server connected to the Internet and an end-user’s computer connected to the Internet.*

The Web server is a computer that is running Web server software and has content or services that it is sharing to client computers. The client or user computer typically isn’t sharing any services to other users. A public Web server must also have a publicly available IP address, and typically uses domain names to identify any Web sites that it is serving.

16. Define and contrast the “First Mile” and “Last Mile.” What is the importance of making these distinctions in Internet telecommunications?

The First Mile describes the backbone Internet services that carry bulk traffic long distances. Last Mile describes how internet traffic reaches the end-users or individuals accessing the Internet. The importance in making this distinction is that different technologies and often different companies are used for bulk transport and delivery to end users. First mile technologies include very large bandwidth trunk lines managed by NSPs and IXPs, and last mile technologies include the narrowband, broadband, and wireless technologies used by ISPs to provide Internet access to end users.

17. What is the Internet of Things and how is it being created and enabled?

The Internet of Things (IoT) describes the evolution of Internet technology to allow consumer electronics, electrical appliances, cars, medical devices, utility systems, machines of all types, even clothing—almost anything that can be equipped with sensors that collect data--to connect to the Internet, enabling the data to be analyzed with data analytics software. The Internet of Things builds on a foundation of existing technologies, such as RFID, and is being enabled by the availability of low-cost sensors, the drop in price of data storage, the development of “Big Data” analytics software that can work with trillions of pieces of data, as well as implementation of IPV6, which will allow Internet addresses to be assigned to all of these new devices.

18. What is the difference between HTML and XML?

HTML defines the structure and style of a Web page using “tags”, including the headings, graphic positioning, tables, and text formatting. XML is a markup language specification developed by the W3C that is similar to HTML, but has a different purpose. Whereas the purpose of HTML is to control the “look and feel” and display of data on the Web page, XML is designed to describe and standardize data and information. XML has a rich syntax and an enormous set of software tools, which make XML ideal for storing and communicating many types of data on the Web. XML is “extensible,” which means the tags used to describe and display data are defined by the user, whereas in HTML the tags are limited and predefined. XML can also transform information into new formats, such as by importing information from a database and displaying it as a table. With XML, information can be analyzed and displayed selectively, making it a more powerful alternative to HTML. This means that business firms, or entire industries, can describe all of their invoices, accounts payable, payroll records, and financial information using a Web-compatible markup language. Once described, these business documents can be stored on intranet Web servers and shared throughout the corporation.

19. Identify and describe four Internet services besides e-mail that enable individual users to communicate with each other through text.

* Other Internet services include text messaging (IM), which allow users to send text messages to each other in real time; search engines, which allow users to find Web content by entering in keywords describing the type of content they want to find; online forums (or message, discussion, or bulletin boards), which allow users to post and read messages in a central location, but not in “real-time”; online chat, which allows multiple users send messages to a group of users in real-time; social networks, which allow users to post profiles and personal information as well as send messages to other subscribed users; blogging services, which allow users to post content in a journal-style format.

20. Explain how apps are distributed once they have been created.

Once written, applications are distributed through various marketplaces. Android apps for Android-based phones are distributed through Google Play, which is controlled by Google. iPhone applications are distributed through Apple’s App Store. BlackBerry applications can be found in RIM’s App World, while Microsoft operates the WindowsPhone Marketplace for Windows mobile devices. Apps can also be purchased from third-party vendors such as Amazon’s Appstore..

# Projects

*1. Review the opening case on augmented reality. What developments have occurred since the date this case was written in September 2014?*

Students should conduct an online search using Google or another search engine on augmented reality, Google Glass, and any of the other companies mentioned in opening case to find new developments on this topic since September 2014. Answers will vary depending on when the search is conducted.

*2. Locate where cookies are stored on your computer. (They are probably in a folder* *entitled “cookies” within your browser program.) List the top 10 cookies you find, and write a brief report describing the kinds of sites that placed the cookies. What purpose do you think the cookies serve? Also, what do you believe are the major advantages and disadvantages of cookies? In your opinion, do the advantages outweigh the disadvantages, or vice versa?*

The purpose of this project is for students to begin thinking about the implications of cookie use by Web sites. The location of cookie files on a computer depends on the browser version being used. In Firefox, cookie files can be accessed by selecting options, selecting the Privacy tab, and then under the History section, selecting the Remove individual cookies link. This will open the Cookies dialog box, which lists the cookies stored on the computer. Cookie files on a computer using Internet Explorer can be viewed by selecting Tools, clicking Internet Options, and on the General tab, in the Browsing History section, clicking the Settings button, and then clicking View Files. Both Internet Explorer and Firefox have menu options that allow users to accept all, some, or none of their incoming cookies. Students may not be able to identify all cookies they locate because abbreviations and acronyms are used, but they should be able to identify many of them because they are familiar with the sites they have visited. Advertising cookies that they may not have been aware of are also deposited. For example, cookies from DoubleClick, Advertising.com, 24/7RealMedia, RightMedia, and other advertising networks may be discovered. These firms use cookies to track users and serve advertising content.

Most sites on the Internet do not place advertisements on their sites themselves. Rather, they subscribe to a media service that places those ads for them. When an HTTP request for an advertising image is made to a media service, it returns the ad and also a cookie. Or, if a user has received a cookie previously, it can read that first and check to see what ad to send. Advantages include the faster loading of pages on future visits and the ability to only register once when a user visits a site. Disadvantages include the privacy implications of having one’s Web surfing habits tracked by cookies. Opinion will vary on whether the advantages outweigh the disadvantages.

3. Call or visit the Web sites of a cable provider, a DSL provider, and satellite provider to obtain information on their Internet services. Prepare a brief report summarizing the features, benefits, and costs of each. Which is the fastest? What, if any, are the downsides of selecting any of the three for Internet service (such as additional equipment purchases)?

Student reports should include the name of the companies they called to request information from, statistics on upload and download speeds, price, and availability. Students should discuss at least some of these issues in summarizing the features, benefits, and downsides of the three providers.

4. Select two countries (excluding the United States) and prepare a short report describing their basic Internet infrastructure. Are they public or commercial? How and where do they connect to backbones within the United States?

The purpose of this project is for students to understand the global Internet infrastructure and the significant jump the United States still has on the rest of the world. In order to prepare this report, students should consult online reference sources. They are likely to find that New York plays a big role in connecting the United States to Europe. New York is the “capital” of the global Internet because it has the highest aggregation of Internet capacity that travels between the world’s regions. The United States is still a key staging ground for the rest of the world’s Internet. For example, France Telecom is not based in the United States, but it has a substantial presence in the United States. France Telecom, and other companies like it, must deploy bandwidth in the United States and connect with other ISPs to effectively serve their customers.

Students may also find that Miami has more Internet capacity into Latin American countries than any Latin American city does. If they choose an African country, they will likely find that there are few regional links in Africa, and that almost all upstream Internet circuits connect to the United States (with a few to the United Kingdom, Italy, and France).

ISPs in countries with borders shared with South Africa benefit from low tariff policies of the public South African telecom operator for international links to neighboring countries. As a result, South Africa is a hub for some of its neighbors: Lesotho, Namibia, and Swaziland. There are no other regional backbones or links between neighboring countries aside from Mauritius to Madagascar and the links to South Africa’s neighbors, so much local traffic must go via the United States. This means that significant and rapidly increasing capital outflows from the region are occurring for Internet traffic between African countries paid to U.S. or European telecom operators and ISPs. Vast amounts of telecom transit payments a year leave the continent that could have been invested in local infrastructure. This project should help students grasp the extent of the worldwide digital divide.

5. Investigate the Internet of Things. Select one example and describe what it is and how it works.

RFID chips are one early example of the Internet of Things. RFID chips use radio waves to send information to RFID readers that can be connected to the Internet. RFID chips are commonly used for automated payment systems and in manufacturing and retailing to track the location of goods. Sensors in smartphones and embedded in devices are another example of the Internet of Things.

**Companion Web Site, Learning Tracks, and Video Cases**

You can also direct your students to the Companion Web Site for the book, located at [www.azimuth-interactive.com/ecommerce11e](http://www.azimuth-interactive.com/ecommerce11e). There they will find a collection of additional projects and exercises for each chapter; links to various technology tutorials; information on how to build a business plan and revenue models; information on careers in e-commerce, and more. Learning Tracks that provide additional coverage of various topics and a collection of video cases that integrate short videos, supporting case study material, and case study questions are also available for download from the books’ Online Instructor Resource Center at www.pearsonglobaleditions.com/Laudon. Video Cases for this chapter include:

* Video Case 2.1 Google Data Center Efficiency Best Practices
* Video Case 2.2 NBA: Competing on Global Delivery