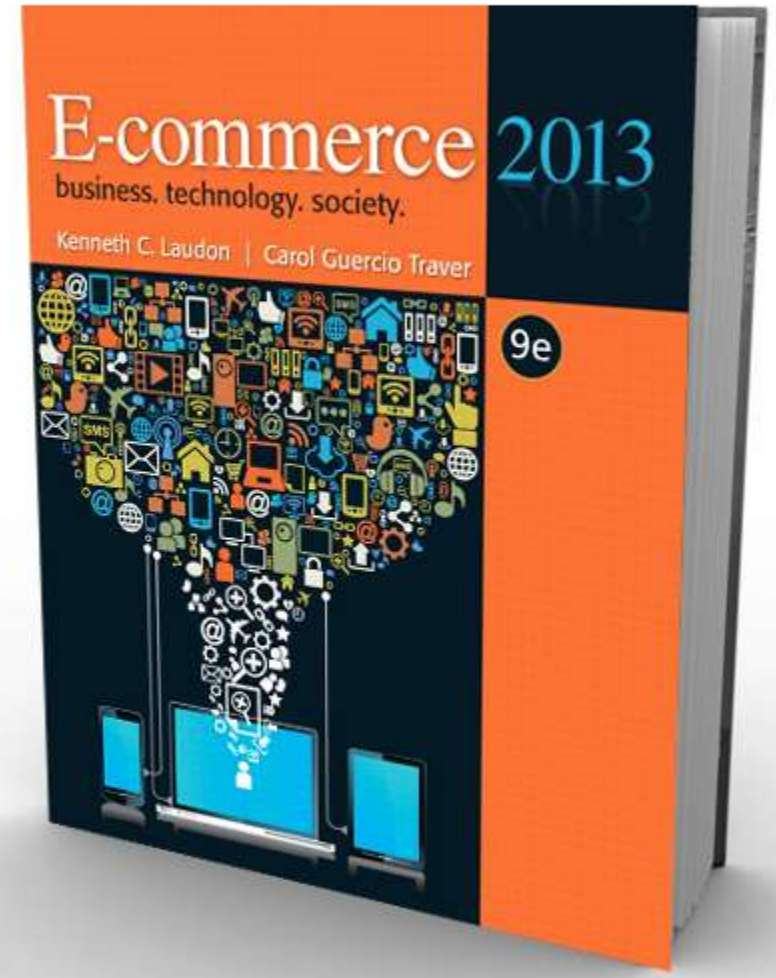

E-commerce 2013

business. technology. society.

ninth edition

Kenneth C. Laudon

Carol Guercio Traver

Chapter 3

E-commerce Infrastructure: The Internet, Web, and Mobile Platform

Class Discussion

Google Glass: Augment My Reality

- **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 to? Are there any disadvantages?**
- **What revenue models could work for providers of augmented services?**

Copyright © 2013 Pearson Education, Inc.

The Internet: Technology Background

- **Internet**
  - Interconnected network of thousands of networks and millions of computers
  - Links businesses, educational institutions, government agencies, and individuals
- **World Wide Web (Web)**
  - One of the Internet's most popular services
  - Provides access to billions, possibly trillions, of Web pages

Copyright © 2013 Pearson Education, Inc.

The Evolution of the Internet 1961–Present

- **Innovation Phase, 1964–1974**
  - Creation of fundamental building blocks
- **Institutionalization Phase, 1975–1995**
  - Large institutions provide funding and legitimization
- **Commercialization Phase, 1995–present**
  - Private corporations take over, expand Internet backbone and local service

Copyright © 2013 Pearson Education, Inc.

The Internet: Key Technology Concepts

- **Defined as network that:**
  - Uses IP addressing
  - Supports TCP/IP
  - Provides services to users, in manner similar to telephone system
- **Three important concepts:**
  - Packet switching
  - TCP/IP communications protocol
  - Client/server computing

Copyright © 2013 Pearson Education, Inc.

Packet Switching

- **Slices digital messages into packets**
- **Sends packets along different communication paths as they become available**
- **Reassembles packets once they arrive at destination**
- **Uses routers**
  - Special purpose computers that interconnect the computer networks that make up the Internet and route packets
  - Routing algorithms ensure packets take the best available path toward their destination
- **Less expensive, wasteful than circuit-switching**

Copyright © 2013 Pearson Education, Inc.

Packet Switching

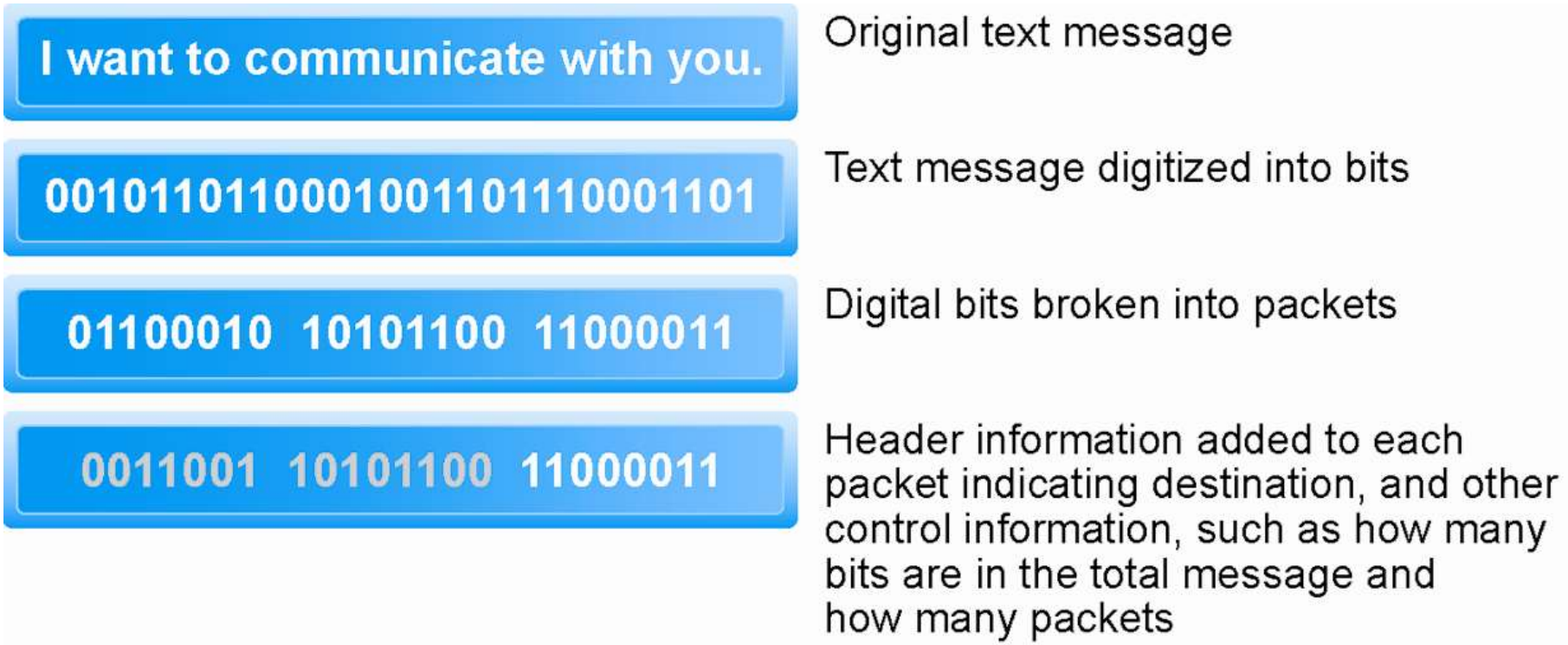

Figure 3.3, Page 123

Copyright © 2013 Pearson Education, Inc.

TCP/IP

- **Transmission Control Protocol (TCP):**
  - Establishes connections among sending and receiving Web computers
  - Handles assembly of packets at point of transmission, and reassembly at receiving end
- **Internet Protocol (IP):**
  - Provides the Internet's addressing scheme
- **Four TCP/IP layers**
  - Network interface layer
  - Internet layer
  - Transport layer
  - Application layer

Copyright © 2013 Pearson Education, Inc.

The TCP/IP Architecture and Protocol Suite

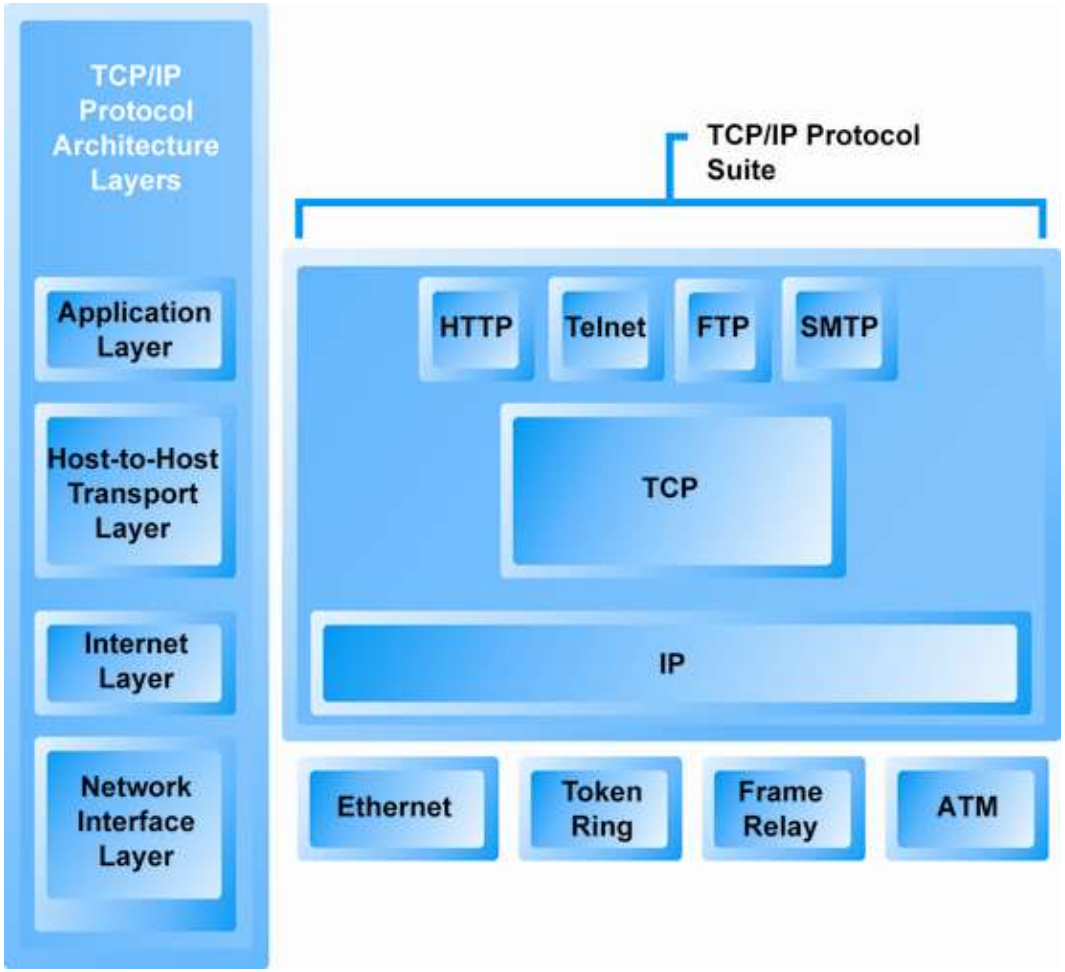

Figure 3.4, Page 125

Internet (IP) Addresses

- **IPv4:**
  - 32-bit number
  - Four sets of numbers marked off by periods: 201.61.186.227
    - Class C address: Network identified by first three sets, computer identified by last set
- **IPv6**
  - 128-bit addresses, able to handle up to 1 quadrillion addresses (IPv4 can only handle 4 billion)

Copyright © 2013 Pearson Education, Inc.

Routing Internet Messages: TCP/IP and Packet Switching

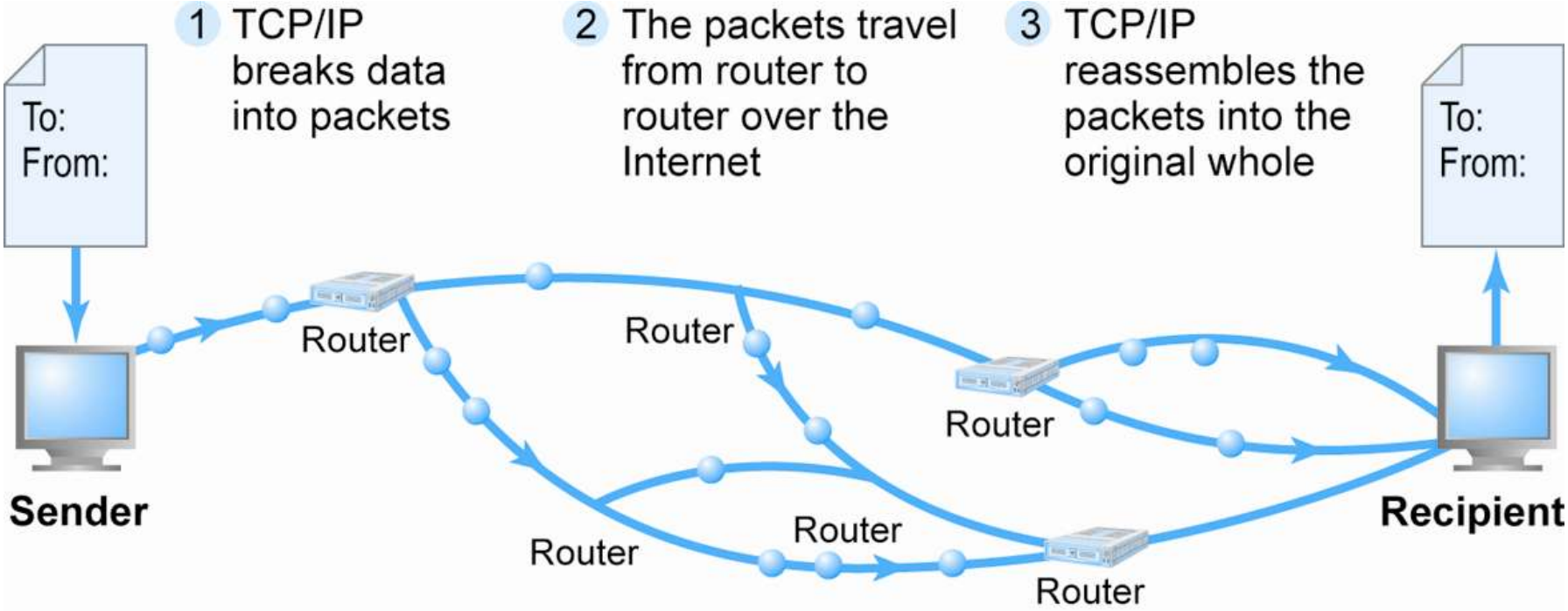

Figure 3.5, Page 126

Copyright © 2013 Pearson Education, Inc.

Domain Names, DNS, and URLs

- **Domain name**
  - IP address expressed in natural language
- **Domain name system (DNS)**
  - Allows numeric IP addresses to be expressed in natural language
- **Uniform resource locator (URL)**
  - Address used by Web browser to identify location of content on the Web
  - E.g. http://www.azimuth-interactive.com/flash_test

Copyright © 2013 Pearson Education, Inc.

Client/Server Computing

- **Powerful personal computers (clients) connected in network with one or more servers**
- **Servers perform common functions for the clients**
  - Storing files
  - Software applications
  - Access to printers, etc.

Copyright © 2013 Pearson Education, Inc.

The New Client: The Mobile Platform

- **In a few years, primary Internet access will be through:**
  - Tablets
    - Supplementing PCs for mobile situations
  - Smartphones
    - Disruptive technology:
      - Shift in processors, operating systems
    - 25% of all cell phones

Copyright © 2013 Pearson Education, Inc.

Cloud Computing

- **Firms and individuals obtain computing power and software over Internet**
  - e.g., Google Apps
- **Fastest growing form of computing**
- **Radically reduces costs of:**
  - Building and operating Web sites
  - Infrastructure, IT support
  - Hardware, software

Copyright © 2013 Pearson Education, Inc.

Other Internet Protocols and Utility Programs

- **Internet protocols**
  - HTTP
  - E-mail: SMTP, POP3, IMAP
  - FTP, Telnet, SSL/TLS
- **Utility programs**
  - Ping
  - Tracert

Copyright © 2013 Pearson Education, Inc.

The Internet Today

- **Internet growth has boomed without disruption because of:**
  - Client/server computing model
  - Hourglass, layered architecture
    - Network Technology Substrate
    - Transport Services and Representation Standards
    - Middleware Services
    - Applications

Copyright © 2013 Pearson Education, Inc.

The Hourglass Model of the Internet

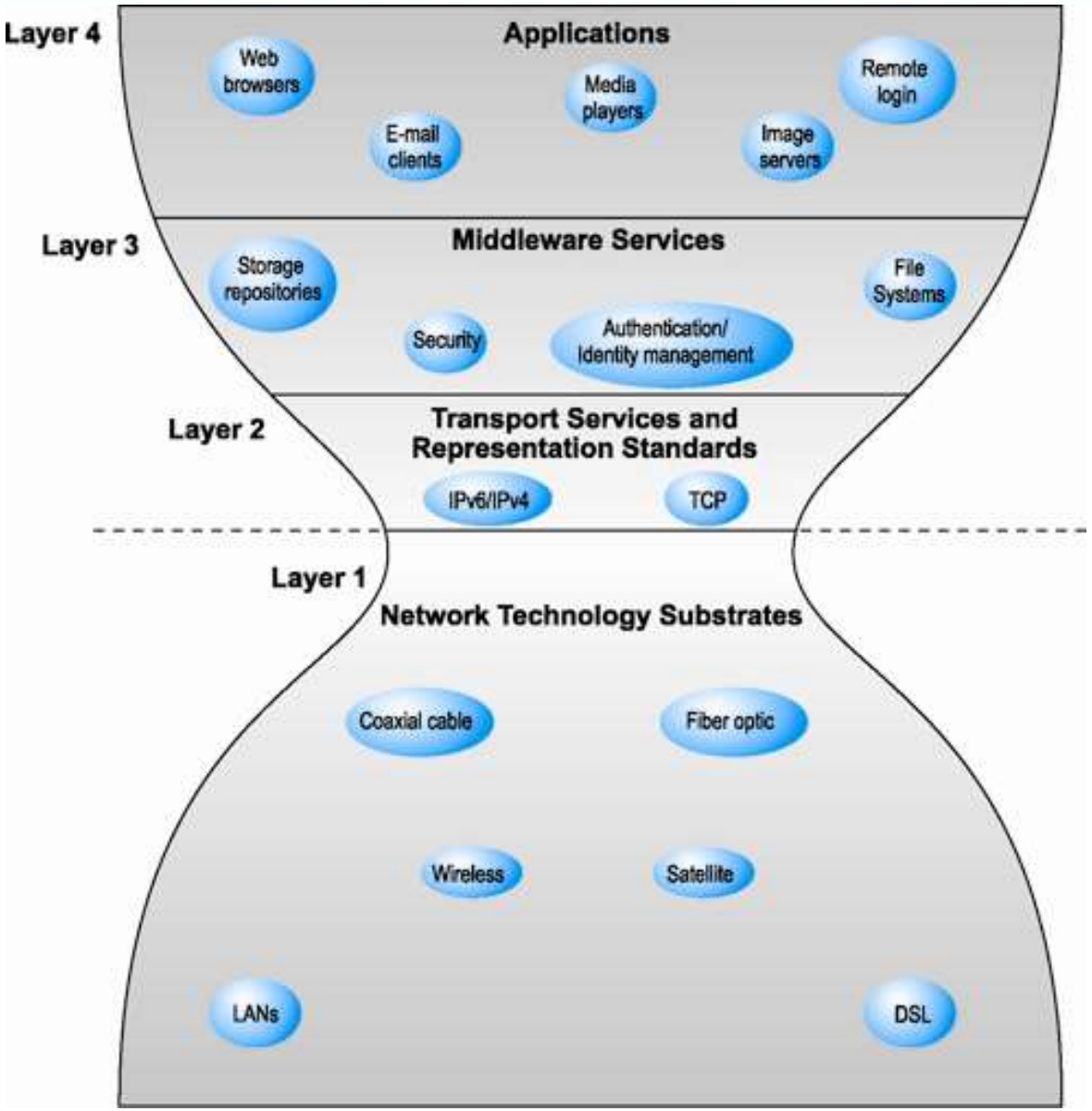

Figure 3.11, Page 134

Copyright © 2013 Pearson Education, Inc.

Internet Network Architecture

- **Backbone:**
  - High-bandwidth fiber-optic cable networks
  - Private networks owned by a variety of NSPs
  - Bandwidth: 155 Mbps–2.5 Gbps
  - Built-in redundancy
- **IXPs:**
  - Hubs where backbones intersect with regional and local networks, and backbone owners connect with one another
- **CANs:**
  - LANs operating within a single organization that leases Internet access directly from regional or national carrier

Copyright © 2013 Pearson Education, Inc.

Internet Network Architecture

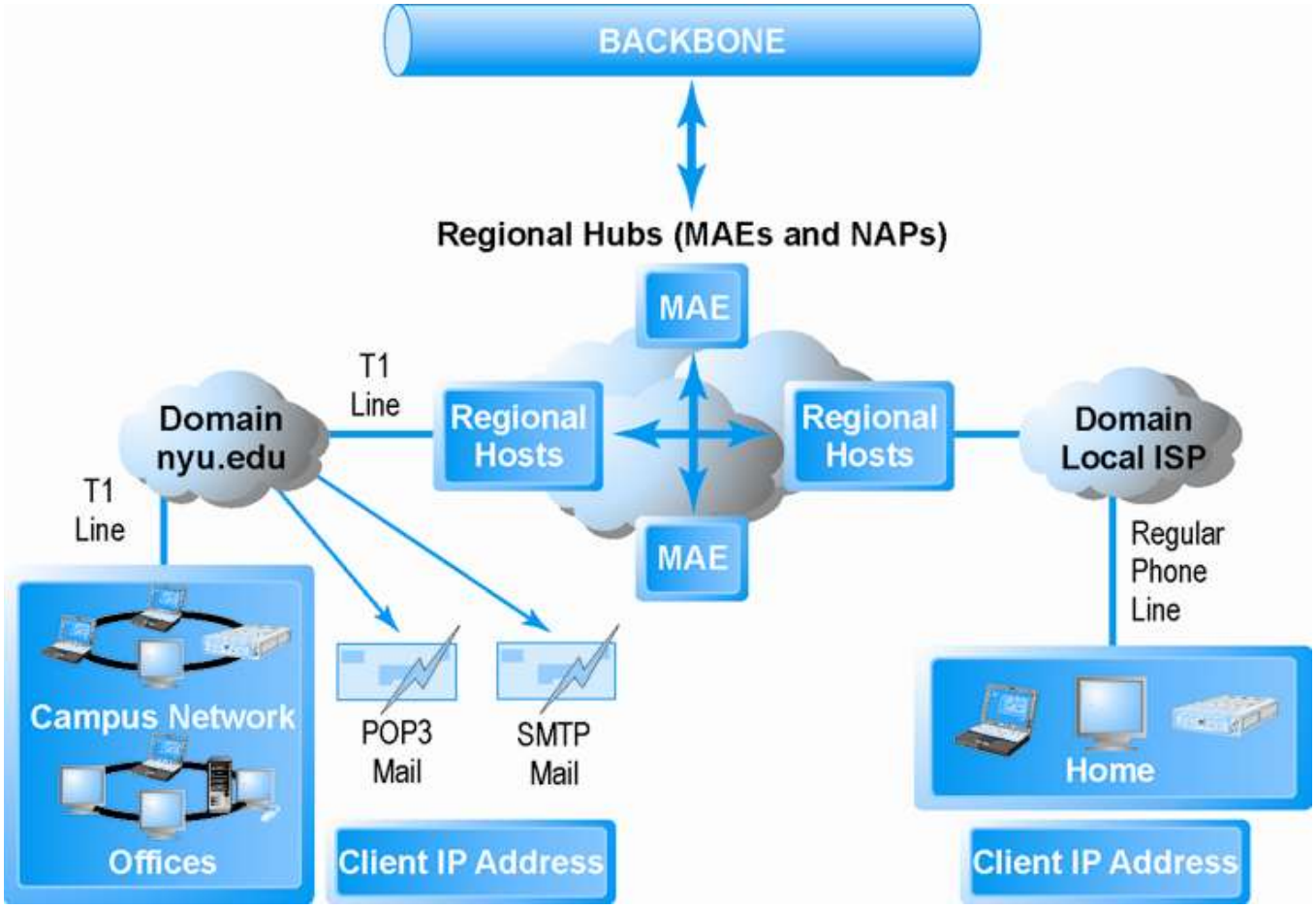

Figure 3.12, Page 135

Copyright © 2013 Pearson Education, Inc.

Internet Service Providers (ISPs)

- **Provide lowest level of service to individuals, small businesses, some institutions**
- **Types of service**
  - Narrowband (dial-up)
  - Broadband
    - Digital Subscriber Line (DSL)
    - Cable modem
    - T1 and T3
    - Satellite

Copyright © 2013 Pearson Education, Inc.

Intranets and Extranets

- **Intranet**
  - TCP/IP network located within a single organization for communications and processing
- **Extranet**
  - Formed when firms permit outsiders to access their internal TCP/IP networks

Who Governs the Internet?

- **Organizations that influence the Internet and monitor its operations include:**
  - Internet Architecture Board (IAB)
  - Internet Corporation for Assigned Names and Numbers (ICANN)
  - Internet Engineering Steering Group (IESG)
  - Internet Engineering Task Force (IETF)
  - Internet Society (ISOC)
  - World Wide Web Consortium (W3C)
  - International Telecommunications Union (ITU)

Copyright © 2013 Pearson Education, Inc.

Government Regulation and Surveillance of the Internet

- **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?**

Copyright © 2013 Pearson Education, Inc.

The Internet2 Project

- **Consortium of 350+ institutions collaborating to facilitate revolutionary Internet technologies**
- **Primary goals:**
  - Create leading-edge very-high speed network for national research community
  - Enable revolutionary Internet applications
  - Distributed and collaborative computing environments for sciences, health, arts and humanities initiatives

Copyright © 2013 Pearson Education, Inc.

The First Mile and the Last Mile

- **GENI Initiative**
  - Proposed by NSF to develop new core functionality for Internet
- **Most significant private initiatives**
  - Fiber optics
  - Mobile wireless Internet services

Copyright © 2013 Pearson Education, Inc.

Fiber Optics and the Bandwidth Explosion in the First Mile

- "First mile": Backbone Internet services that carry bulk traffic over long distances
- Older transmission lines being replaced with fiber-optic cable
- Much of fiber-optic cable laid in United States is "dark," but represents a vast digital highway that can be utilized in the future
- Technology improvement has also expanded capacity of existing fiber lines

Copyright © 2013 Pearson Education, Inc.

The Last Mile: Mobile Wireless Internet Access

- **"Last mile": From Internet backbone to user's computer, smartphone, etc.**
- **Two different basic types of wireless Internet access:**
  - Telephone-based (mobile phones, smartphones)
  - Computer network-based

Copyright © 2013 Pearson Education, Inc.

Telephone-based Wireless Internet Access

- **Competing 3G standards**
  - GSM: Used world-wide, AT&T, T-Mobile
  - CDMA: Used primarily in U.S., Verizon, Sprint
- **Evolution:**
  - 3G cellular networks: next generation, packet-switched
  - 3.5G (3G+)
  - 4G (WiMax, LTE)

Copyright © 2013 Pearson Education, Inc.

Wireless Internet Access Network Technologies

- **Wi-Fi**
  - High-speed, fixed broadband wireless LAN (WLAN). Different versions for home and business market. Limited range.
- **WiMax**
  - High-speed, medium range broadband wireless metropolitan area network
- **Bluetooth**
  - Low-speed, short range connection
- **Ultra-Wideband (UWB)**
  - Low power, short-range high bandwidth network
- **Zigbee**
  - Short-range, low-power wireless network technology for remotely controlling digital devices

Copyright © 2013 Pearson Education, Inc.

Wi-Fi Networks

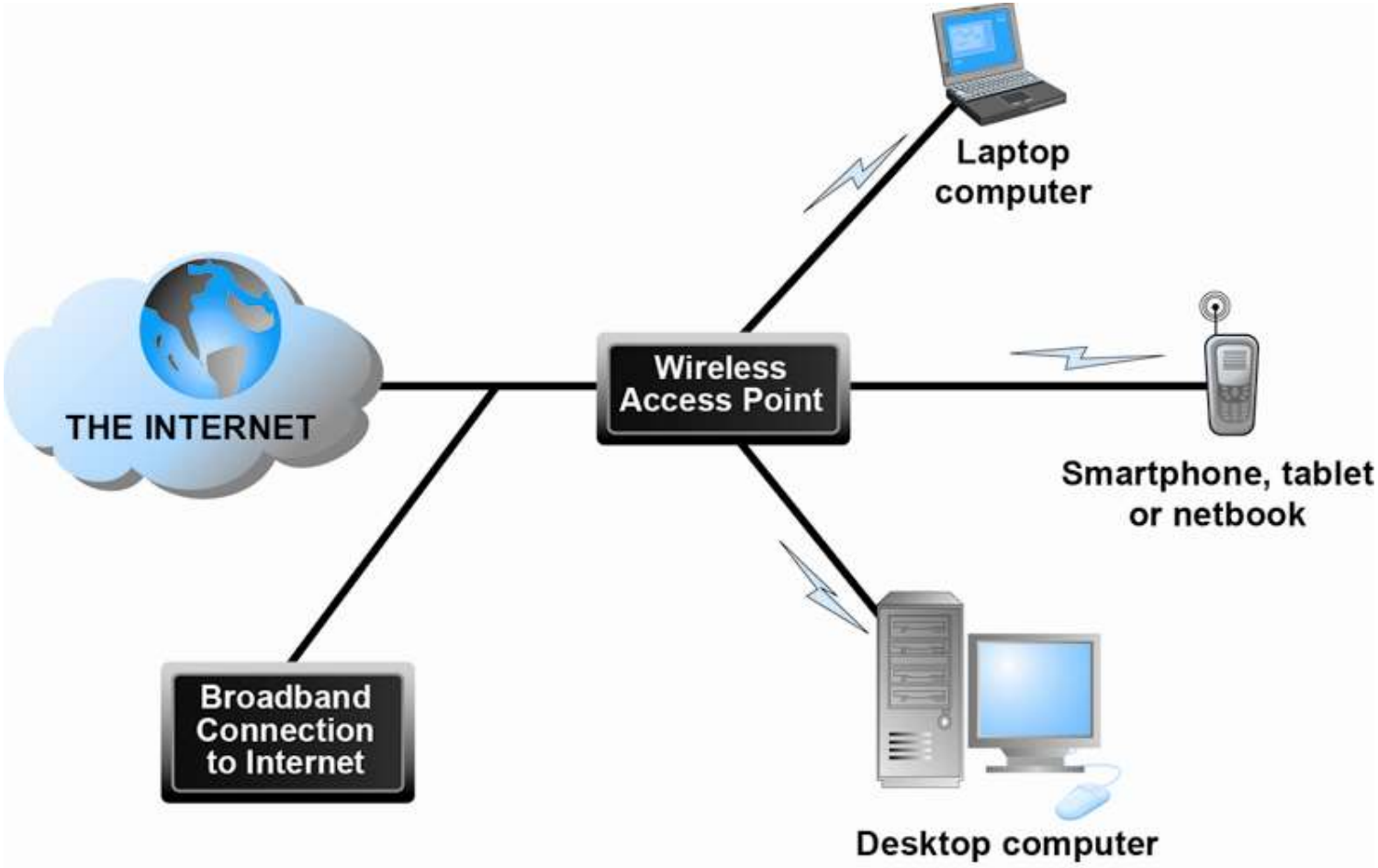

Figure 3.16, Page 153

Copyright © 2013 Pearson Education, Inc.

The Future Internet

- **Latency solutions**
  - diffserv (differentiated quality of service)
- **Guaranteed service levels and lower error rates**
  - Ability to purchase the right to move data through network at guaranteed speed in return for higher fee
- **Declining costs**
- **The Internet of Things (IoT)**
  - Objects connected via sensors/RFID to the Internet
  - Spearheaded by EU and China

Copyright © 2013 Pearson Education, Inc.

The Web

- **1989–1991: Web invented**
  - Tim Berners-Lee at CERN
  - HTML, HTTP, Web server, Web browser
- **1993: Mosaic Web browser w/ GUI**
  - Andreessen and others at NCSA
  - Runs on Windows, Macintosh, or Unix
- **1994: Netscape Navigator, first commercial Web browser**
  - Andreessen, Jim Clark
- **1995: Microsoft Internet Explorer**

Copyright © 2013 Pearson Education, Inc.

Hypertext

- **Text formatted with embedded links**
  - Links connect documents to one another, and to other objects such as sound, video, or animation files
- **Uses Hypertext Transfer Protocol (HTTP) and URLs to locate resources on the Web**
  - URL e.g., http://megacorp.com/content/features/082602.html

Copyright © 2013 Pearson Education, Inc.

Markup Languages

- **Hypertext Markup Language (HTML)**
  - Fixed set of pre-defined markup "tags" used to format text
  - Controls look and feel of Web pages
  - HTML5 the newest version
- **eXtensible Markup Language (XML)**
  - Designed to describe data and information
  - Tags used are defined by user

Copyright © 2013 Pearson Education, Inc.

Is HTML5 Ready for Primetime?

- **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?**

Copyright © 2013 Pearson Education, Inc.

Web Servers and Web Clients

- **Web server software:**
  - Enables a computer to deliver Web pages to clients on a network that request this service by sending an HTTP request
  - Apache, Microsoft IIS
  - Basic capabilities: Security services, FTP, search engine, data capture
- **Web server**
  - Web server software or physical server
  - Specialized servers: Database servers, ad servers, etc.
- **Web client:**
  - Any computing device attached to the Internet that is capable of making HTTP requests and displaying HTML pages

Copyright © 2013 Pearson Education, Inc.

Web Browsers

- **Primary purpose to display Web pages**
- **Internet Explorer—49% of market**
- **Mozilla Firefox—18%**
  - Open source
- **Other browsers:**
  - Google Chrome—17%
  - Apple's Safari—11%

Copyright © 2013 Pearson Education, Inc.

The Internet and Web: Features

- **Features on which the foundations of e-commerce are built:**
  - E-mail
  - Instant messaging
  - Search engines
  - Online forums and chat
  - Streaming media
  - Cookies

Copyright © 2013 Pearson Education, Inc.

E-mail

- Most used application of the Internet
- Uses series of protocols for transferring messages with text and attachments from one Internet user to another

Instant Messaging

- Displays words typed on a computer almost instantly, and recipients can respond immediately in the same way

Copyright © 2013 Pearson Education, Inc.

Search Engines

- **Identify Web pages that match queries based on one or more techniques**
  - Keyword indexes, page ranking
- **Also serve as:**
  - Shopping tools
  - Advertising vehicles (search engine marketing)
  - Tool within e-commerce sites
- **Outside of e-mail, most commonly used Internet activity**

Copyright © 2013 Pearson Education, Inc.

How Google Works

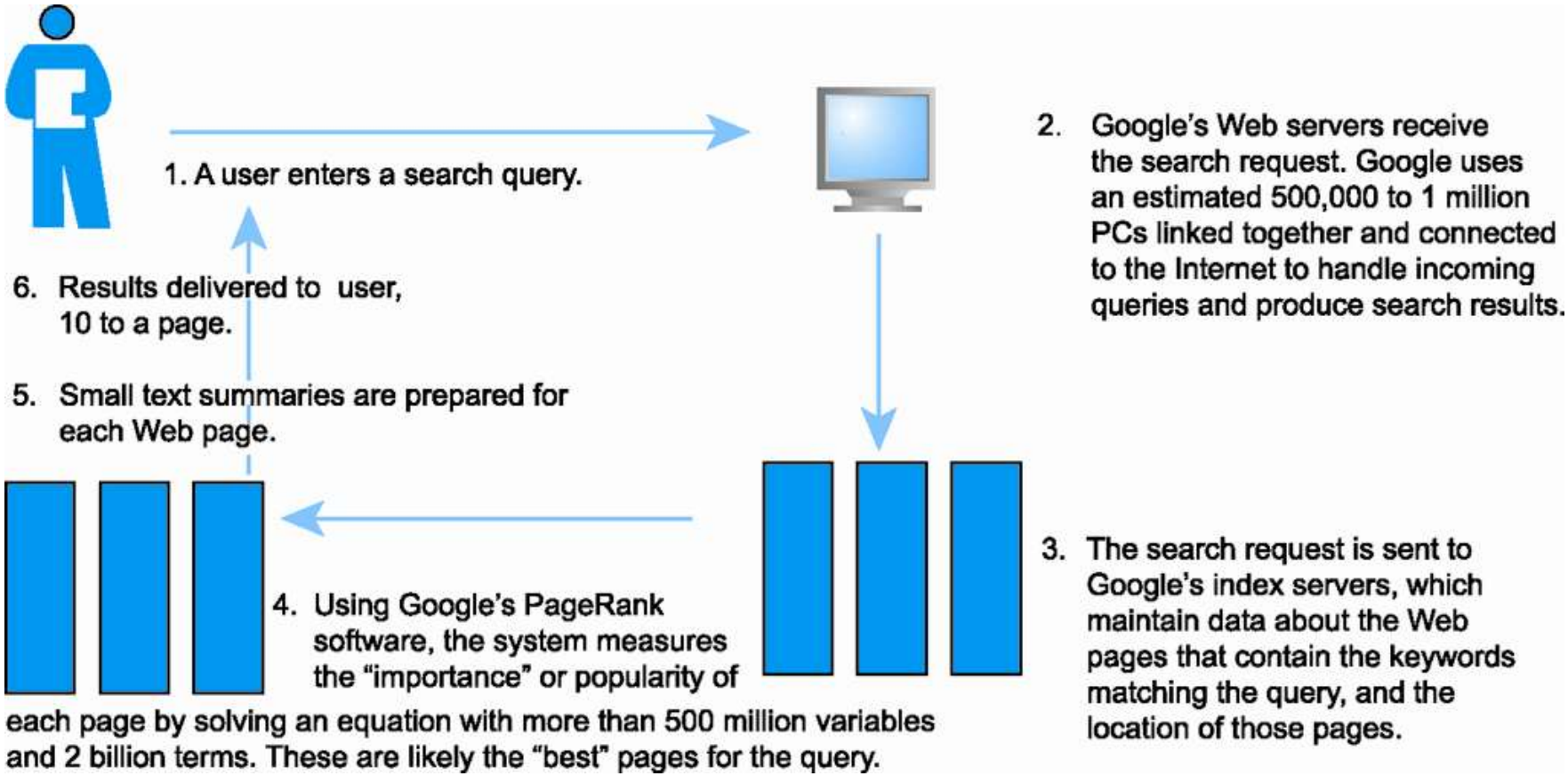

Figure 3.22, Page 173

Copyright © 2013 Pearson Education, Inc.

Online Forums and Chat

- **Online forum:**
  - Also known as a message board, bulletin board, discussion board, discussion group, board or forum
  - Web application that enables Internet users to communicate with each other, although not in real time
  - Members visit online forum to check for new posts
- **Online chat:**
  - Similar to IM, but for multiple users
  - Typically, users log into chat room

Copyright © 2013 Pearson Education, Inc.

Streaming Media

- Enables music, video, and other large files to be sent to users in chunks so that when received and played, file comes through uninterrupted
- Allows users to begin playing media files before file is fully downloaded

Copyright © 2013 Pearson Education, Inc.

Cookies

- Small text files deposited by Web site on user's computer to store information about user, accessed when user next visits Web site
- Can help personalize Web site experience
- Can pose privacy threat

Copyright © 2013 Pearson Education, Inc.

Web 2.0 Features and Services

- **Online Social Networks**
  - Services that support communication among networks of friends, peers
- **Blogs**
  - Personal Web page of chronological entries
- **Really Simple Syndication (RSS)**
  - Program that allows users to have digital content automatically sent to their computers over the Internet

Copyright © 2013 Pearson Education, Inc.

Web 2.0 Features and Services

- **Podcasting**
  - Audio presentation stored as an audio file and available for download from Web
- **Wikis**
  - Allows user to easily add and edit content on Web page
- **Music and video services**
  - Online video viewing
  - Digital video on demand

Copyright © 2013 Pearson Education, Inc.

Web 2.0 Features and Services

- **Internet telephony (VOIP)**
  - Voice over Internet Protocol (VOIP) uses Internet to transmit voice communication
- **Internet television (IPTV)**
- **Video conferencing and telepresence**
- **Online software and Web services**
  - Web apps, widgets, and gadgets

Copyright © 2013 Pearson Education, Inc.

Intelligent Personal Assistants

- **Software that interacts with the user through voice commands**
- **Features**
  - Natural language; conversational interface
  - Situational awareness
  - Interpret voice commands to interact with various Web services
- **e.g., Siri, Google Now**

Mobile Apps

- **Use of mobile apps continues to explode in 2012**
  - 70% of mobile phone owners research products and services, 35% have made purchase
- **Increased use/purchasing from tablets**
- **Platforms:**
  - iPhone/iPad, Android, Blackberry
- **App marketplaces:**
  - Google Play, Apple's App Store, RIM's App World, Windows Phone Marketplace

Copyright © 2013 Pearson Education, Inc.

Apps for Everything: The App Ecosystem

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

Copyright © 2013 Pearson Education, Inc.