Technology in Action

Chapter 6
Digital Devices and Media: Managing a Digital Lifestyle
Chapter Topics

- Digital Convergence
- Telephony: Smartphones and Beyond
- Tablets, Netbooks, and Ultrabooks
- Digital Defined
- Digital Media
Digital Convergence

• Digital convergence
  – The use of a single unifying device to handle media, Internet, entertainment, and telephony needs
  – Smartphones do almost anything computers do
  – Refrigerators can include LCD touch-screen and network adapters
Digital Convergence (cont.)

• Digital Living Network Alliance
  – Organization working to standardize different kinds of appliances and network devices
• Telephony
  – The use of equipment to provide voice communications over a distance
Telephony: Smartphones and Beyond
Smartphone Basics

• Smartphone functions and features
  – Internet access
  – Personal information management (PIM)
  – Voice recording
  – Play and organize music files
  – GPS services
  – Digital image and video capture
  – Computing power to run programs
• Cellular (cell) phones are all phones that use mobile, cellular technology
• Feature phones are inexpensive, less powerful cell phones with modest processors, simpler interfaces, and often no touch screen
• Smartphones have the same components as a computer
  – CPU
  – Memory
  – Input and output devices
  – Require their own operating system
  – Processors
    • Qualcomm Snapdragon
    • Apple A5
Telephony: Smartphones and Beyond

Smartphone Components (cont.)
• Smartphone operating systems
  – Android OS
  – iOS (Apple iPhone)
  – Window 8 mobile OS
• Phone’s memory stores all the phone’s information and programs
• OS is stored in read-only memory (ROM)
• Phone data is stored in separate internal memory chips
• Many smartphones let you add additional memory
  – Micro SD flash cards
  – iPhones don’t let you add memory
• Primary input devices for smartphone
  – Microphone
  – Touch pad
  – Samsung Impression offers both keyboard and touch screen
  – Apple iPhone provides software-based keyboard
Telephony: Smartphones and Beyond
Smartphone Components (cont.)

• Output devices
  – Speaker
  – Liquid crystal display (LCD)
  – OLED: Newer display screen
• Smartphone OS comes with standard collection of software
  – To-do list
  – Contact manager
  – Calendar

• Web-based software stores for software applications
Set of connected “cells” make up cellular network

Base transceiver station
- Picks up the request for service and passes it to central location

Mobile switching center
- Monitors the strength of the signal
- When signal is weak, it orders the next base station to take charge of the call
• Digital Processing steps when speaking in a cell phone
  – Sound enters microphone as sound wave
  – Analog-to-digital converter chip converts voice sound waves into digital signals
  – Digital signal processor compresses the signal so it will transmit more quickly
Telephony: Smartphones and Beyond
How cell phone Technology Works (cont.)

- Digital Processing steps when speaking in a cell phone (cont.)
  - Digital data is transmitted as a radio wave through the cellular network to the destination phone
  - Digital signal processor decompresses incoming message
  - Amplifier boosts signal to make it louder and passes it to speaker
Synchronizing

- Process of updating your data so your to-do lists, schedules, and other files on your cell phone and computer are the same

Two main ways to transfer information

- Wired: Use a micro SD card or USB cable
- Wireless: Use wireless connection to transfer data
Telephony: Smartphones and Beyond

Synchronizing (cont.)
Telephony: Smartphones and Beyond
Synchronizing (cont.)

• Wired solutions
  – Use USB data cable to connect phone to standard USB port
  – Remove flash card and insert it into flash card reader on computer
Wireless synchronization

- Bluetooth uses radio waves
- WiFi connection through cloud
  - SugarSync
  - Apple’s iOS 5

Other providers of wireless synchronization

- Google Sync
- Amazon Kindle
Telephony: Smartphones and Beyond

Text Messaging

• Short message service (SMS)
  – Allows you to send short text messages
  – Up to 160 characters
  – Convenient and quicker than e-mail
• SMS uses cell phone network to send messages to any SMS device in world
• Multimedia message (MMS) is an extension that allows you to send messages that include, text, sound, images, and video
## Text Messaging Information Services

<table>
<thead>
<tr>
<th>SMS CODE</th>
<th>SERVICE NAME</th>
<th>WEBSITE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>466453 (google)</td>
<td>Google SMS Search</td>
<td>google.com/mobile/sms</td>
<td>Obtains information such as addresses, phone numbers, driving directions, sports scores, and movie listings from the Google search engine</td>
</tr>
<tr>
<td>44636 (4Info)</td>
<td>4INFO</td>
<td>alerts.4info.com</td>
<td>Similar to Google SMS, but also handles flight information and mobile coupons</td>
</tr>
<tr>
<td>242 242 (cha cha)</td>
<td>ChaCha</td>
<td>chacha.com</td>
<td>Human “guides” answer any question in conversational English</td>
</tr>
<tr>
<td>3109043113</td>
<td>411sms</td>
<td>411sms.com</td>
<td>Offers address and phone listings, turn-by-turn directions, movie show times, stock quotes, hot spot locations, dictionary definitions, horoscopes, and foreign language translations</td>
</tr>
</tbody>
</table>
Telephony: Smartphones and Beyond

Mobile Internet

• Two ways smartphones connect to Internet
  – WiFi network
  – Cellular phone system (3G or 4G connection)

• WiFi is faster

• Cellular network more available

• Wireless Internet service provider
  – Phone companies double as wireless ISPs
Providers measure Internet usage according to how much data you download and upload.

Internet connectivity plan is known as data plan:
- One monthly price
- Fixed data transfer limit
- Data transfer done with WiFi does not count as data plan usage.
• Estimate monthly data transfer to pick data plan
There are two cellular data-transfer standards

- 3G: Mobile device data-transfer rates as high as 3.8 Mbps
- 4G: Mobile connection speeds of up to 100 Mbps

- True 4G speeds not available; they deliver 6 Mbps to 11 Mbps
• Connection speed will depend on which technology you are using
• Setting phone to WiFi connection slightly different for each OS
• WiFi saves on data plan usage but uses more battery life
• If WiFi isn’t available devices are available to create mobile hot spot

• Mi-Fi devices are often available free
  – Devices connect to the Internet through 3G/4G wireless phone network
  – Distribute the WiFi signal over 30 feet area
  – Can support up to 5 devices
• Tethering
  – Connecting smartphone to computer using 3G/4G signal to access the Internet
• Viruses can infect cell/smartphones
• It is expected that virus attacks will increase
• Antivirus software for mobile devices
  – Symantec
  – McAfee
  – F-Secure
Telephony: Smartphones and Beyond

Smartphone Security (cont.)

- Download only from familiar websites
- Use a virtual phone number
VoIP

• A fully digital phone service
• Uses technology similar to e-mail
• Skype is well-known free provider
  – Requires callers and receivers to have company’s software installed on computers
• Vonage
  – More complicated to set up, not free
VoIP calls can be placed anywhere you have Internet access.

Any Android or iOS phone or tablet can be used as a VoIP device.

Free or low-cost long-distance calling.

Portability

– Can sign into VoIP as long as connected to Internet.
Telephony: Smartphones and Beyond

VoIP (cont.)

• Drawbacks
  – Sound quality and reliability
  – Loss of service at home if power is out
  – Security risks
Telephony: Smartphones and Beyond

VoIP (cont.)

• New Features
  – Telephone messages can be bundled up as e-mails
  – Caller ID information can be displayed on TV
  – Learning systems use VoIP so students can call professor instead of using personal numbers
• Every cell/smartphone has a GPS chip
  – Enhanced 911 program
  – Automatically gives dispatchers precise location
  – Built and operated by the U.S. Department of Defense
Tablets, Netbooks, and Ultrabooks

Tablets

• Light, very portable devices
• Top-selling tablets
  – Apple iPad and Samsung Galaxy
  – More than 75 tablets on the market
• Main difference between tablets and smartphones is screen size
Tablets, Netbooks, and Ultrabooks

Tablets (cont.)

- Smartphone and tablet similarities
  - Operating systems
  - Processors
  - Touch-screen interfaces
  - Long battery life
  - Similar software applications
  - Similar Internet connectivity
  - Bluetooth
Tablets cannot make cell phone calls

Tablets can place audio or video phone calls with WiFi connection
  - Skype

Heywire
  - Supports free national and international texting from a range of devices
Netbooks

- Traditional OS
- Keyboard
- Weigh 2 pounds or less
- Inexpensive compared with both tablets and ultrabooks
Ultrabooks

- Full-featured computers
- Very thin, lightweight computing solution
- Don’t have optical drives
- Offer SSD drives
Ultrabooks (cont.)

- Weigh under 3 pounds
- Full-size keyboards
- 13- to 15-inch screens
- Examples - Apple Macbook Air and Asus Zenbook
Tablets versus Ultrabooks

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>TABLET</th>
<th>ULTRABOOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>Mobile OS (iOS, Android, Windows)</td>
<td>Traditional OS (Windows or OS X)</td>
</tr>
<tr>
<td>Interface</td>
<td>Touch screen</td>
<td>Non-touch screen and full-size keyboard</td>
</tr>
<tr>
<td>Screen Size</td>
<td>7 to 10 inches</td>
<td>13 to 15 inches</td>
</tr>
<tr>
<td>Processing Power</td>
<td>Mobile processor</td>
<td>Full quad-core Intel i5, i7</td>
</tr>
<tr>
<td>Storage</td>
<td>&lt;= 64 GB</td>
<td>128 to 500 GB</td>
</tr>
<tr>
<td>Software</td>
<td>Specialized applications custom designed for touch interface</td>
<td>Standard versions of software for desktop environments (Microsoft Office, etc.)</td>
</tr>
</tbody>
</table>
Tablets, Netbooks, and Ultrabooks
Making a Choice

• Guidelines to determine what best fits your personal needs
  – Screen size and style of keyboard
  – Weight
  – Number of devices
Digital Defined

• All forms of entertainment have migrated to digital domain
  – Phone systems
  – TV signals
  – Music
  – Films
  – Sound

**Analog versus Digital Entertainment**

<table>
<thead>
<tr>
<th></th>
<th>Analog</th>
<th>Digital</th>
</tr>
</thead>
<tbody>
<tr>
<td>Publishing</td>
<td>Magazines, books</td>
<td>E-books, e-zines</td>
</tr>
<tr>
<td>Music</td>
<td>Vinyl record albums and cassette tapes</td>
<td>CDs, MP3 files, and streaming music stations</td>
</tr>
<tr>
<td>Photography</td>
<td>35-mm single-lens reflex (SLR) cameras, Photos stored on film</td>
<td>Digital cameras, including digital SLRs, Photos stored as digital files</td>
</tr>
<tr>
<td>Video</td>
<td>8-mm, VHS, and Hi8 camcorders, Film stored on tapes</td>
<td>HD digital video (DV) cameras, Film stored as digital files; distributed on DVD and Blu-ray discs and streamed</td>
</tr>
<tr>
<td>Radio</td>
<td>AM/FM radio</td>
<td>HD Radio, SiriusXM satellite radio</td>
</tr>
<tr>
<td>Television</td>
<td>Analog TV broadcast</td>
<td>High-definition digital television (HDTV)</td>
</tr>
</tbody>
</table>
Digital Defined (cont.)

• Any kind of information can be digitized
  – Sound
Digital Defined (cont.)

- Digital formats describe signals as long strings of numbers
- Analog-to-digital conversion
  - Measures the incoming analog signal many times each second
  - The strength of the signal at each measurement is recorded as a simple number
  - The series of numbers produced is the digital form of the wave
Digital Defined (cont.)

(a) Analog Sound Wave

(b) Digitized Sound Wave
Digital Media

- Entertainment industry has become all-digital
Digital Media
Digital Publishing

• Electronic text (e-text)
  – Textual information captured digitally so that it can be stored, manipulated, and transmitted by electronic devices

• E-readers
  – Display e-text and having supporting tools, like note taking, bookmarks, and integrated dictionaries
Digital Media
Digital Publishing (cont.)

• The basic features of e-readers offer advantages over paper books
  – Integrated dictionaries
  – Note taking and highlighting
  – URL links or links to glossary
  – Bookmarks are immediately pushed through cloud technology
Digital Media
Digital Publishing (cont.)

• Free software download versions of the Kindle and the NOOK
  – Run on PC or Apple computers

• Can download texts as PDF or using Microsoft Reader or MobiPocket reader
• Two popular technologies for representing digital text
  – Electronic ink: Very crisp, sharp grayscale representation of text
  – Backlit monitors: Screens illuminate themselves
Digital Media
Digital Publishing (cont.)
Digital Media
Digital Publishing (cont.)

• Digital formats for publishing
  – Amazon uses proprietary format: .azw
  – Open format: ePub
Digital Media
Digital Publishing (cont.)

• Vendors associated with e-reader devices
  – Amazon: Kindle
  – Barnes and Noble: NOOK
  – There are many publishers selling e-books for any kind of device
  – Textbooks can be purchased in e-book format directly from the publisher
Digital Media
Digital Publishing (cont.)

• Libraries are lending e-books and audio books

• Overdrive Media Console
  – Search to find which area library has the book you want

• Some publishers are refusing to allow their e-books to be distributed through libraries

• Lending your own e-books
  – Barnes and Noble NOOK
Digital Media
Digital Publishing (cont.)

• Project Gutenberg
  – Source of free reading
  – Repository site of 38,000 free books
  – Copyrights have expired

• Self-publishing
  – Self-publish into Amazon Kindle Store
  – Smashwords
  – Lulu
Digital Media
Digital Music

- Digital music is created by turning sound waves created by instruments into a string of digital information.
• Sampling rate
  – Specifies the number of times the analog waves is measured each second
  – The higher the sampling rate, the more accurately the original wave can be re-created
  – Higher sampling rate produces bigger files
Digital Media

Digital Music (cont.)

• Digital music file formats
  – MP3
  – AAC
  – WMA
  – DivX
  – MPEG-4
  – WMV
  – Xvid
• File formats compete on sound and video quality and compression
• Number of songs or hours of video devices can hold depends on storage space
• Another factor includes the quality
• When ripping, or converting, a song you can select sampling rate
• Always limited by the amount of storage of the player
• Some devices allow you to add storage
• Subscription plans
  – Spotify
  – Rhapsody
Digital Media
Digital Music (cont.)

• High-speed port
  – Used to move large volumes of data between your computer and music device

• Cloud services can automatically sync music to mobile device
Digital Media
Digital Music (cont.)

• Listening options
  – Audio receivers have ports for mobile devices
  – Networked audio/video receivers
  – Auxiliary inputs in cars
  – Home speaker docks
Business models are still evolving to meet audience needs and protect intellectual property rights.
Digital Media
Digital Music (cont.)

• Tethered downloads
  – Pay for music and own it, but are subject to restrictions on its use
  – DRM-free music
    • Music without any digital rights management
    • DRM is a system of access control that allows only limited use of material that’s been legally purchased
Digital Media
Digital Music (cont.)

• The Internet allows artists to release new songs immediately
• Radio stations make their stations available through Internet sites
• Digital music has made distributing your own recordings very simple
  – ReverbNation
Digital cameras capture images on electric sensors and then convert them to digital data.

Most cameras also record digital video.

Point-and-shoot vs. digital SLR.

Digital Photography Review is a site that compares cameras and provides feedback from owners.
• Smartphone cameras provide lower resolutions and inferior lenses than standalone cameras

• Do not provide many features that photographers rely on
  – Autofocus
  – Image stabilization algorithms
  – Smile shutter
Digital Media
Digital Photography (cont.)

• Image quality is determined by many factors
  – Quality of lenses
  – File format and compression
  – Color management software
  – Resolution – the number of data points it records for each image captured
    • Point-and-shoot offer from 10 MP to 15 MP
    • Digital SLRs use resolutions as high as 24 MP
Digital Media

Digital Photography (cont.)

• Most common formats
  – Raw uncompressed data (RAW)
    • Records all original image information
    • Larger than compressed files
  – Joint Photographic Experts Group (JPEG)
    • Either some compression keeping most details or
great compression losing some detail
Digital Media
Digital Photography (cont.)

- Transferring files from camera
  - USB port
  - Flash card
  - Wireless network connections
  - Eye-Fi
  - Eye-Fi Mobile X2
Digital Media
Digital Photography (cont.)

- Scanners can turn sketches and photos into a digital file
  - Film negatives and slides
  - Quality is measured by its resolution
  - Optical character recognition: Converts pages of handwritten or typed text electronic files that can be opened and edited with Microsoft Word
Digital Media
Digital Photography (cont.)

• Sharing digital photos
  – Facebook
  – Picasa
  – Digital scrapbook site such as Cottagearts.net
  – Tablets and smartphones
  – Connect iPad wirelessly to TV

• Printing digital photos
  – Photo printer
  – Photo-printing service
Digital video surrounds us

- TV
- The Internet (Google Video, YouTube, Vimeo, Ustream)
- Hulu
- On-demand streaming video (cable, iTunes, Netflix, Amazon)
- Create your own
Digital Media
Digital Video (cont.)

- Video equipment for home use stores in DV format
  - Cameras don’t require tapes
Digital Media
Digital Video (cont.)

• Digital video-editing software allows you to
  – Edit digital video
  – Review clips frame by frame
  – Reorder segments
  – Correct color, balance, brightness, or contrast

• Codec (compression/decompression)
  – A rule, implemented in either software or hardware, that squeezes the same audio and video information into less space
Digital Media
Digital Video (cont.)
Digital Media
Digital Video (cont.)

• Special authoring software
  – Pinnacle Studio HD
  – Adobe Encore
  – Create final discs and have animated menu systems and easy navigation controls
Digital Media
Digital Video (cont.)

• Webcasting
  – Broadcasting your video live to an audience
  – Need webcam and a site like justin.tv or ustream.tv
  – Can display interactive chat next to video feed
• HD stands for high definition
  – Standard of digital tv signal that guarantees a specific level of resolution and a specific aspect ratio
• Advantages of watching digital video
  – Other information services can be integrated with the broadcast
  – Additional content can be delivered in real time
• More interactivity will be integrated in broadcasts
Digital Media
Digital Video (cont.)

• DVR
  – Digital video recorder

• PVR
  – Personal video recording software for your computer
  – SnapStream

• Slingbox
  – Device that takes video from your TV and broadcasts it over the Internet
Chapter 8 Summary Questions

1. How is the trend of digital convergence seen in the market?
Chapter 8 Summary Questions

2. What hardware and software comprise a typical smartphone?
3. How do I synchronize information between my phone and my computer, and how do mobile Internet data plans work?
4. What do I need to keep my smartphone secure?
Chapter 8 Summary Questions

5. How does digital telephony support VoIP services?
6. What distinguishes the performance of tablets, netbooks, and ultrabooks?
Chapter 8 Summary Questions

7. What advantage do digital formats have over analog signals?
Chapter 8 Summary Questions

8. How is the digital format changing the way media is created and distributed?
9. How do I work with digital images and video?