

# **Module 12**

Mobile Devices, Phones, Tablets

# Objectives

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1. 3.1 Basic Mobile OS Features
2. 3.2 Network Connectivity
3. 3.3 Security Methods
4. 3.4 Hardware Differences
5. 3.5 Synchronization

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# **MOBILE DEVICE FEATURES**

# Mobile Devices

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1. Use an operating system to interact with user, run applications (apps), games, and play movies and music
2. Use many different wireless technologies to facilitate mobility
3. Many mobile device components, operating systems, and software are proprietary
4. You will be required to know how to configure, maintain, and repair various mobile devices
5. Some of the knowledge you acquired about desktop and laptop computers will help you
6. Mastering the skills necessary to work on mobile devices is important to your career advancement

# Operating Systems

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1. Two of the most popular OS manufacturers are:
  - A. iOS is developed by Apple
  - B. Android is developed by Google
2. The iPhone iOS was release in 2007. iOS is a closed source OS meaning the developer's programming code (source code) is not published or release to the public. Apple controls the entire development of the iOS.
3. The Android OS was release in 2008 and is open source. Open source means that the developer's programming code (source code) is open for everyone to see. The public can change, copy, or redistribute the code allowing anyone to contribute to the development and evolution of the software.

# Applications and Content

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1. Applications or apps are programs executed on mobile devices
2. Apps are used on mobile devices the same way that programs are used on PCs
3. Apps are downloaded from a content source instead of being installed from a disk
4. Mobile devices come with a number of different apps preinstalled to provide basic functionality
5. Many others can be added for free and purchased
6. Content sources available for Android mobile devices:
  - A. Google Play
  - B. Amazon App Store

# Applications and Content

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1. Apple App Store:
2. Only legitimate content source for iOS, apps, and content
3. Ensures that software:
  - A. Is free of harmful code
  - B. Meets strict performance guidelines
  - C. Does not infringe on copyrights
4. Other types of downloadable content (music, video, etc)
5. Only install apps from trusted sources
6. Content can be loaded through a data cable connection, cellular, or Wi-Fi

# Navigation

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1. Mobile devices organize icons and widgets on multiple screens called the **Home screens**
2. **Quick Response (QR) code**
  - A. Similar to a bar code, but can contain much more information (website, address, download)
  - B. Uses a special app to access the camera on a mobile device to scan the code

Note: Be careful when using QR codes, and only allow downloads and installations from trusted sources



# Notification and System Icons

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1. System icons (clock, battery status, cellular and Wi-Fi signal status)
2. Some apps (email, texting, Facebook) can display status icons to indicate communication activity
3. **Widgets:**
  - A. Programs that display information (weather widget to display weather conditions)
  - B. Can launch an associated app or website
  - C. Give quick access to often-used information or functions

# Screen Orientation and Brightness

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1. Content can be viewed in portrait or landscape modes
2. Some content fits better in a specific view
3. Users can usually choose the viewing mode that is most comfortable for them
4. Sensors (accelerometer) can determine orientation
5. Content is automatically rotated to the position of the device
6. Mobile screens use the most battery power
7. Lowering the brightness helps conserve battery power

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# **NETWORK CONNECTIVITY**

# Cellular Data Networks

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1. First generation (1G) – 1980s
  - A. Primarily used analog standards
  - B. Interference and noise limited usefulness
2. Second generation (2G) – 1990s
  - A. Switched from analog to digital standards
  - B. Provided higher call quality
  - C. Common 2G standards:
    - Personal Digital Cellular (PDC)
    - Integrated Digital Enhanced Network (IDEN)
    - Code Division Multiple Access (CDMA)
    - Global System for Mobile (GSM)

# Cellular Data Networks

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## 3. Third-generation (3G)

- A. Go beyond simple voice and data communications
- B. Add bandwidth can send and receive text, photos, audio, video, and video conferencing.
- C. Can access the Internet
- D. Common 3G standards:
  - Universal Mobile Telecommunications System (UMTS)
  - CDMA2000
  - Evolution-Data Optimized (EV-DO)
  - Freedom of Mobile Multimedia Access (FOMA)
  - Time Division Synchronous Code Division Multiple Access (TD-SCDMA)

# Cellular Data Networks

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## 4. Fourth-generation (4G)

A. Provides ultra-high broadband Internet access

B. Faster downloads, video conferencing, high-definition television

C. Common 4G standards:

- Mobile WiMAX
- Long Term Evolution (LTE)

5. As a mobile device moves from an area of 4G coverage to 3G coverage or visa versa, the 4G radio shuts off and turns on the 3G radio without losing connection

# Cellular Data Networks

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1. Multimedia and networking technologies add functionality and can be bundled with cellular standards:
  - A. **Short Message Service (SMS)**, used for text messaging
  - B. **Multimedia Message Service (MMS)**, used for sending and receiving photos and videos
  - C. Most cellular providers charge extra for adding these features
2. **Airplane Mode** – Turns off all cellular, Wi-Fi, and Bluetooth radios
3. Cellular standards vary from country to country
4. Some cell phones are capable of multiple standards

# Wireless Data Networks

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1. Portability, scalability, and flexibility
2. Capable of connecting to Wi-Fi networks
3. Cellular data plans can be expensive
4. Wi-Fi does not count against the cellular data plan
5. Wi-Fi radios use less power than cellular radios and conserves battery power
6. Wireless services and hotspots (Internet cafes, airports, hotels)



# Wireless Data Networks

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1. To connect to a broadcasting wireless network:
  - A. Touch Settings > turn Wi-Fi on (Airplane mode may apply)
  - B. The device searches for all available Wi-Fi networks and displays a list
  - C. Touch a Wi-Fi network in the list to connect and enter the password, if needed
2. When device roams out of the range of the Wi-Fi network, it attempts to connect to another Wi-Fi network in range
3. If no Wi-Fi networks are in range, the mobile device connects to the cellular data network
4. When Wi-Fi is on, it automatically connects to any Wi-Fi network that it has connected to previously

# Wireless Data Networks

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1. If a mobile device does not prompt to connect to a known Wi-Fi network, the network SSID broadcast may be turned off
2. Manually configure the Wi-Fi settings:
  - A. Select Settings > Wi-Fi (Add network)
  - B. Select from the list of available networks or manually enter the network SSID
  - C. Select a security type
  - D. Enter the password
  - E. Join or Save

# Bluetooth

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1. Provides a simple way for mobile devices to connect to each other and to wireless accessories
2. Up to eight Bluetooth devices can be connected together at any one time to form a **Personal Area Network (PAN)**
3. Bluetooth technologies available:
  - A. Hands-free headset - A small earpiece with a microphone used for making and receiving calls
  - B. Car speakerphone - A device that contains a speaker and a microphone used for making and receiving calls
  - C. Keyboard or mouse - A keyboard or mouse can be connected to make input easier
  - D. Stereo control - A mobile device can connect to a home or car stereo to play music
  - E. Mobile speaker - Portable speakers can connect to mobile devices to provide high-quality audio without a stereo system
  - F. Tethering - Connecting to another device to share a network connection and resources

# Bluetooth

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1. **Bluetooth pairing** – When two Bluetooth devices establish a connection to share resources
2. In order for the devices to pair
  - A. Both Bluetooth radios are turned on and one device begins searching for other devices
  - B. Other devices must be set to discoverable mode, also called visible, to send information when another Bluetooth device requests it including:
    - Name
    - Bluetooth class
    - Services that the device can use
    - Technical information
3. A **PIN** may be requested to authenticate the pairing process
4. To pair a Bluetooth device follow these steps:
  - A. Follow the instructions for your device to place it in discoverable mode
  - B. Check the instructions for your device to find the connection PIN
  - C. Select Settings, Wireless and networks or Settings, General, Bluetooth
  - D. Touch Bluetooth to turn it on and scan for devices
  - E. Touch the discovered device to select it
  - F. Type the PIN

# Email

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1. Email software is usually a preinstalled standalone application
2. Can be installed from a third party or accessed from a web browser
3. Gives the same access that you would have on your desktop or laptop
4. **Exchange**
  - A. Paid mail server, contact manager, and calendar software created by Microsoft
  - B. Exchange uses a proprietary messaging architecture called Messaging Application Programming Interface (MAPI) to connect Microsoft Office Outlook to Exchange servers
5. **Gmail**
  - A. Free advertising-supported email service provided by Google
  - B. Accessed as secure webmail, via POP3 or IMAP4
  - C. It gives each user 10 GB of free space

# Email

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1. Common mail protocols include:
  - A. Post Office Protocol version 3 (POP3)** retrieves emails from a remote server over TCP/IP. POP3 does not leave a copy of the email on the server, but some programs allow users to specify that mail be saved for some period of time. POP3 usually uses port 110 or 995.
  - B. Internet Message Access Protocol version 4 (IMAP)** allows local email clients to retrieve email from a server leaving the original email on the network email server. IMAP synchronizes email folders between the server and client. IMAP is faster than POP3, but IMAP requires more disk space on the server and more CPU resources. IMAP usually uses port 143 or 993.

# Email

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1. Common mail protocols include:

**C. Simple Mail Transfer Protocol (SMTP)** – A simple, text-based protocol that transmits emails across a TCP/IP network and is the email format for text that uses only ASCII encoding. It sends email from an email client to an email server, or from one email server to another. SMTP usually uses port 25, 587, or 465.

**D. Multipurpose Internet Mail Extensions (MIME)** – Extends the email format to include text in languages other than English as well as other formats, such as pictures and word processor documents. MIME is normally used in conjunction with SMTP.

**E. Secure Socket Layer (SSL)** – Developed to transmit files securely. All data exchanged between the email client and the email server is encrypted.

# Email

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1. You should have the following information available when setting up an email account:
  - A. Display name** – This can be your real name, nickname, or any other name that you want people to see
  - B. Email address** – This is the address people need to send email to you
  - C. Protocol and port used by the incoming and outgoing mail server** – Different protocols provide different email services
  - D. Incoming and outgoing mail server names** – These names are provided by the network administrator or ISP
  - E. Username** – This is used to log in to the mail servers.
  - F. Account password** – The password should be strong, because mail accounts are often available from websites



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# **MOBILE SECURITY**

# Passcodes

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1. If a mobile device is lost, anyone that finds the device has access to contacts, text messages, web accounts and other sensitive information
2. A **passcode lock** helps prevent theft of private information
3. Locks a device and puts it in a power-saving state
4. Many different types of passcode locks are available (PIN, password, pattern, biometrics)
5. Must be entered each time the device is turned on or resumes from a power-saving state
6. Can be set to lock after a certain number of incorrect attempts have been made
7. A mobile device can be put into a sleep state by pressing the main power button, after a certain amount of time, or closing the cover

# Location Services

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1. If a mobile device is misplaced or stolen, it is possible to find it using a locator app
2. Install the app, start it, and follow the instructions to configure the software
3. After initiating the location option from a website or second device, the locator app uses radios to determine the device's location.
4. Locator apps use location data from:
  - A. Cellular towers – Calculates the location of the device and triangulates the signal strength from the towers to which it can connect
  - B. Wi-Fi hotspots – Looks up the approximate location of Wi-Fi hotspots that the missing device can detect
  - C. GPS – Uses data from the GPS receiver to determine the location of the device

# Location Services

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1. Apple devices:
    - A. The Find My iPhone app can be installed on a different iOS device to locate the lost device
    - B. If a second iOS device is not available, the device can also be found by logging in to the iCloud website and using the Find My iPhone feature
  2. Android devices:
    - A. Locating method is specific to the app
    - B. Created an account when the app is first installed
    - C. Log in to the website indicated by the app
  3. Additional functions (sending a message or playing a sound)
  4. These options are useful if you have misplaced your device
- NOTE: The device must be turned on and connected to either a cellular or wireless network to receive commands from the app or to send location information to the user

# Security

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1. Usually the same apps that perform remote location have security measures
2. Find My iPhone from an iOS device, or Google Sync on Android
3. Common remote security measures are:
  - A. Remote lock** - Allows you to lock a device with a passcode
  - B. Remote wipe** - Deletes all data from the device and returns it to a factory state

Note: For these remote security measures to function, the device must be powered on and connected to a cellular or Wi-Fi network

# Antivirus

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1. Mobile devices are computers, and therefore vulnerable to malicious software
2. Download apps only from trusted sources
3. Antivirus apps are available for both Android and iOS
4. Mobile device apps run in a sandbox – A location of the OS that keeps code isolated from other resources or code
5. Makes it difficult for malicious programs to infect a mobile device
6. A mobile device could transfer a malicious program to another device (laptop or desktop)
7. A rooted or jailbroken device greatly increases the risk

# Updates

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1. Updates add functionality or increase performance
2. Patches can fix security problems or issues with hardware and software that do not work properly
3. Because there are so many different mobile devices, updates and patches are not released for all devices
4. Hardware may not meet the minimum specifications
5. Android and iOS updates and patches use an automated process for delivery
6. When a carrier or manufacturer has an update for a device, it shows up as a notification on the device that an update is ready
7. To manually check for updates, go to Settings > General > Software Update

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# **HARDWARE DIFFERENCES**



# Mobile Devices Repair

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1. Do not have field serviceable parts
2. Components integrated into a single unit
3. When a mobile device malfunctions, it is usually sent to the manufacturer for repair or replacement
4. Some functionality can be added through the use of built-in ports (docking to a sound system, keyboard, mouse, and monitor)
5. Usually not upgradable other than software or adding a SIM card

# Storage

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1. Use solid state drives built directly into device
2. Advantages:
  - A. Power efficiency
  - B. Reliability
  - C. Lightweight
  - D. Compact
  - E. Performance
  - F. Noise

# Touchscreens

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1. Allow users to physically interact with what is shown on the screen and type on a virtual keyboard
2. Types of touchscreens:
  - A. Capacitive** - Consists of a glass screen coated with a conductor
  - B. Resistive** - Consists of transparent layers of material capable of conducting electricity

# Multi-touch or Gestures

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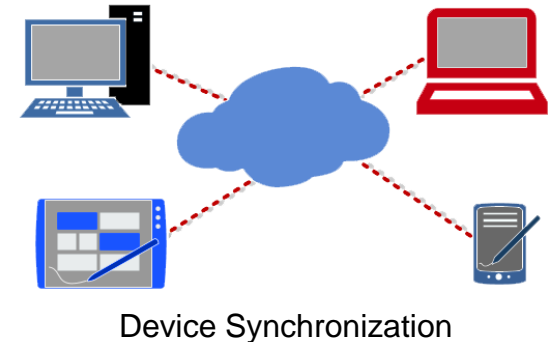
1. Ability to recognize when two or more contact points are made on the screen
2. Common gestures include:
  - A. Swipe (change screens)
  - B. Double touch (enlarge)
  - C. Long touch (open context menu)
  - D. Scroll
  - E. Pinch (shrink)
  - F. Spread (zoom)
3. Varies between devices
4. Proximity sensor – Prevents accidentally activating icons or numbers

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# **DEVICE SYNCHRONIZATION**

# Synchronization

1. Exchange of data between two or more devices
2. Maintaining consistent data on multiple devices
3. iOS users are given 5 GB of storage for free
4. Additional storage can be purchased
5. iCloud can back up:
  - A. Calendar
  - B. Mail
  - C. Contacts
  - D. Photos
  - E. Settings
  - F. App data
  - G. Screen icons and locations
  - H. Text and media messages
  - I. Ringtones
  - J. Content purchased from the Apple App Store (This content does not count against the 5 GB total)
6. Android devices can back up:
  - A. Calendar
  - B. Mail
  - C. Contacts
  - D. Purchased apps and content



# Remote Backup

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1. A **remote backup service** (cloud backup) – A service that provides users with a system for the backup, storage, and recovery of computer files
2. Data can be restored
3. Typically built around a client software program that runs on a schedule
4. Collects, compresses, encrypts, and transfers the data to the remote backup service provider's servers or off-site hardware
5. Offer different feature sets, service levels, and types of encryption
6. Consumer online backup companies frequently have free or trial backup services
7. Popular providers include:
  - A. iCloud
  - B. Google Sync
  - C. Dropbox
  - D. Google Drive
  - E. Skydrive
  - F. Cubby
  - G. Box
  - H. PogoPlug

# Summary

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In this module we discussed:

1. Mobile devices features
2. Type of connectivity
3. Cellular Data networks
4. Wireless Data networks
5. Bluetooth
6. Email communications
7. Mobile security
8. Location services
9. Antivirus and updates
10. Mobile hardware and repair
11. Device synchronization and backup



# Glossary and Terms

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1. **Apps** – Applications run on a mobile device.
2. **iPhone iOS** – Release in 2007. iOS is a closed source OS meaning the developer's programming code (source code) is not published or release to the public. Apple controls the entire development of the iOS.
3. **Android OS** – Release in 2008 and is open source. Open source means that the developer's programming code (source code) is open for everyone to see. The public can change, copy, or redistribute the code allowing anyone to contribute to the development and evolution of the software.
4. **Home screens** – Screens that hold icons and widgets.
5. **QR code** – Quick Response code. Similar to a bar code, but can contain much more information (website, address, download). Uses a special app to access the camera on a mobile device to scan the code.

# Glossary and Terms

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6. **Widgets** – Programs that display information.
7. **Accelerometer** – Sensors that can determine orientation and movement.
8. **PDC** – Personal Digital Cellular
9. **IDEN** – Integrated Digital Enhanced Network
10. **CDMA** – Code Division Multiple Access
11. **GMS** – Global System for Mobile
12. **UMTS** – Universal Mobile Telecommunications System
13. **EV-DO** – Evolution-Data Optimized
14. **FOMA** – Freedom of Mobile Multimedia Access
15. **TD-SCDMA** – Time Division Synchronous Code Division Multiple Access

# Glossary and Terms

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16. **LTE** – Long Term Evolution
17. **SMS** – Short Message Service. Used for text messaging.
18. **MMS** – Multimedia Message Service. Used for sending and receiving photos and videos.
19. **Airplane Mode** – Turns off all cellular, Wi-Fi, and Bluetooth radios.
20. **Hotspot** – A site that offers Internet access.
21. **PAN** – Personal Area Network
22. **Tethering** - Connecting to another device to share a network connection and resources.
23. **PIC** – Personal Identification Number
24. **POP3** – Post Office Protocol version 3. Retrieves emails from a remote server over TCP/IP. POP3 does not leave a copy of the email on the server, but some programs allow users to specify that mail be saved for some period of time. POP3 usually uses port 110 or 995.
25. **IMAP** – Internet Message Access Protocol

# Glossary and Terms

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- 26. SMTP** – Simple Mail Transfer Protocol. A simple, text-based protocol that transmits emails across a TCP/IP network and is the email format for text that uses only ASCII encoding. It sends email from an email client to an email server, or from one email server to another. SMTP usually uses port 25, 587, or 465.
- 27. MIME** – Multipurpose Internet Mail Extensions. Extends the email format to include text in languages other than English as well as other formats, such as pictures and word processor documents. MIME is normally used in conjunction with SMTP.
- 28. SSL** – Secure Socket Layer
- 29. Remote lock** – Allows you to lock a device with a passcode.
- 30. Remote wipe** – Deletes all data from the device and returns it to a factory state.

# Glossary and Terms

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- 31. Jailbreak** – Remove manufacturer restrictions from a device.
- 32. SIM** – Subscriber Identification Module. Stores identify and authenticate information on mobile telephones.
- 33. Capacitive Touchscreen** - Consists of a glass screen coated with a conductor.
- 34. Resistive Touchscreen** - Consists of transparent layers of material capable of conducting electricity.
- 35. Gesture** – Ability to recognize when two or more contact points are made on the screen.
- 36. Proximity sensor** – Turns off touchscreen to prevent accidentally activating icons or numbers.
- 37. Remote backup service** – A service that provides users with a system for the backup, storage, and recovery of computer files.