CH 9: Syncing and Setup of Mobile Devices

Supporting and Troubleshooting Mobile Devices

Mobile Device Types

Connect and Configure Mobile Device Accessories

Configure Mobile Device Network Connectivity

Support Mobile Apps

Topic A: Mobile Device Types

Mobile Devices

Smartphones and tablets used in the workplace need support, too.

Mobile OSs (iOS, Android, Chrome Books).

Smartphones

Touchscreen displays
Screen sizes range from 4.5” to 5.7”

Multicore CPUs
2 to 6 GB system memory
16 GB+ flash memory storage

Features:

- Digital cameras
- Input sensors
- Networking via Wi-Fi or cellular data

Mobile Display Types

- Liquid crystal displays (LCD)/Thin Film Transistor (TFT)
  - Twisted nematic (TN)—Fast response times
  - In-plane switching (IPS)—Better viewing angles and best overall quality
  - Vertical alignment (VA)—Best contrast ratio

- LED backlights
- Cold cathode fluorescent (CCFL) bulb and inverter backlights (Outdated)
- Organic LED (OLED) displays
  - No separate backlight and can use flexible plastics

Mobile Display Components

Image © 123RF.com

- Digitizer functions
  - Converts analog touch events to digital input
  - Multitouch and gesture support
- Glass layer and screen protectors
- Rotating and removable screens
  - Accelerometers and gyroscopes
  - Keyboard covers for hybrid laptop/tablets

Tablets

Usually 7” or 10” screen

Might be able to connect to a removable physical keyboard

Some laptops can also function as a tablet by flipping the screen

Usually connect to a Wi-Fi network; some have cellular option

Phablets—cross between a phone and a tablet with 5.5” to 7” screen

Mobile Devices vs. Laptops

Factor	Description
Processors	Mobile devices: • CPUs and chipsets are based on ARM microarchitecture. • Dual- and quad-core CPUs are common, with some 64-bit CPUs available. • Provide more power and thermal efficiency. PCs and laptops: • CPUs and chipsets are based on CISC and RISC microarchitecture. • Dual- and quad-core CPUs are widespread, with many 64-bit CPUs available.
System memory	Tablet RAM is a low power DDR SDRAM variant. Works similarly to PC/laptop RAM.
Storage	SSDs used in mobile devices instead of HDDs.
Component replacements and upgrades	More FRUs for PCs and laptops. Tablet components are soldered and glued, making it necessary to replace the entire device.
OSs	More OS options for PCs and laptops. Mobile devices limited to the mobile OS they were designed to run.

Advanced RISC Machines (ARM) produce the CPU designs most widely used smartphones

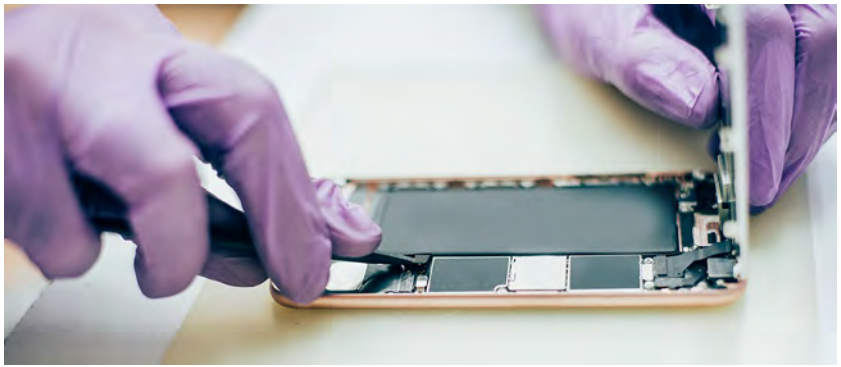
Mobile Display/Touch Interface

Touchscreen: A display screen combined with a digitizer that is responsive to touch input.

- Capacitive touchscreens support multitouch (sweep, pinch, etc.).
- Haptic feedback provides a more realistic feel to the user.
- Protected by scratch- and shock-resistant tempered glass.
- Screen orientation is changeable.

Mobile Device Form Factors

- Fewer field serviceable parts than PCs and laptops.
- Return to manufacturer for replacing screens, storage devices, and possibly batteries.
- Some batteries can be replaced by the user.
- Some devices will have a SIM card port.

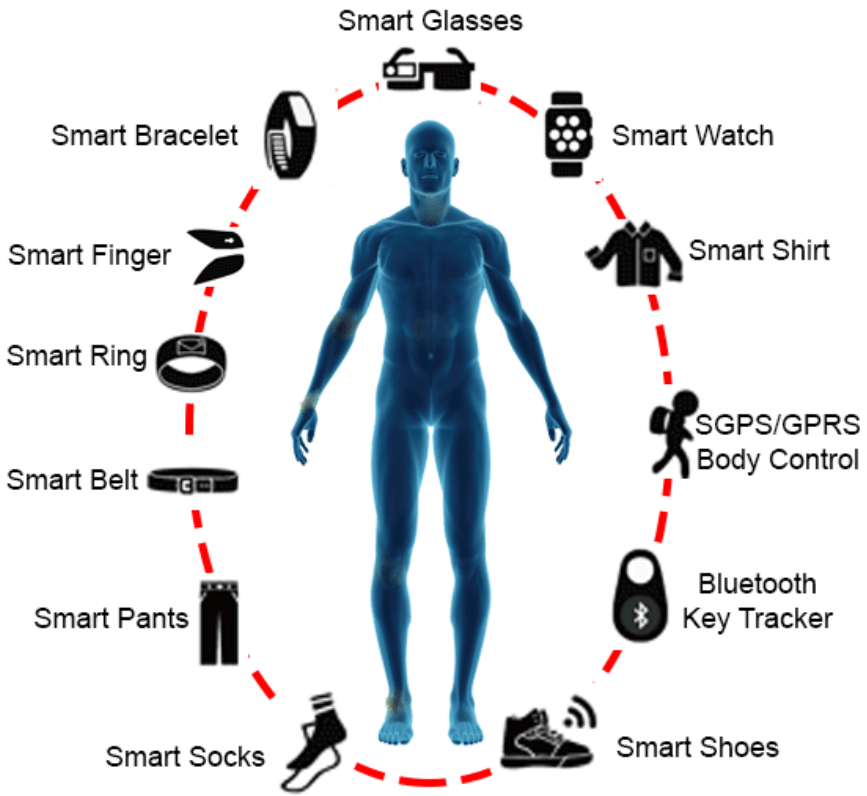


E-Readers

e-reader: A tablet-sized device designed for reading.

- E-ink technology creates EPD.
- Low-power, high-contrast display.
- Backlights often not needed, saving power.
- USB chargers.
- Wi-Fi connectivity for downloading e-books.

Wearable Technology



- Smart watches
- Fitness monitors
- VR/AR headsets and smart glasses
- And more to come!

Mobile Device Accessories

- Touchpads, trackpads, and drawing pads
- Touch pens
  - Use instead of fingers to operate touchscreen
  - Drawing/annotating with compatible apps
- Microphone, speakers, and camera/webcam
  - Placement of built-in devices
  - Connectors for peripheral devices

GPS Navigation Devices

Global Positioning System (GPS): Means of determining position on the Earth based on information received from GPS satellites.

- Built into smartphones and other devices.
- Dedicated units for vehicles, cyclists, or walkers.
- Geolocation system, map, and local traffic information.
- Route planning and directions.
- Some provide live traffic information.
- Touch and voice controls available.

Discussing Mobile Device Types

- **What technology gives an e-Reader better battery life than a tablet?**

- **ANSWER:**
  - The e-Ink display works without backlighting, producing little to no heat through resistance and better energy efficiency.

Discussing Mobile Device Types

- **What is the relevance of ARM to smartphones?**

- **ANSWER:**
  - Advanced RISC Machines (ARM) produce the CPU designs most widely used in smartphones.

Discussing Mobile Device Types

- **What are the principal characteristics of the phablet form factor?**

- **ANSWER:**
  - A phablet is essentially a smartphone with a screen size of more than approximately 5.5" but less than about 7".

  - Phablets can make voice calls and use cellular data, while many tablets are limited to Wi-Fi connectivity.

Discussing Mobile Device Types

- **True or false? Smartphones use a type of memory technology that works both as system memory and as persistent storage.**

- **ANSWER:**
  - False—like PCs, smartphones use a variant of DDR for system memory. This is volatile storage so a flash memory device is used for persistent storage.

Discussing Mobile Device Types

- **What is meant by wearable technology?**

- **ANSWER:**
  - Wearable technology is devices that the user doesn't need to hold (as they are affixed to the wearer via a band or clip) to provide uninterrupted interaction between computer and network systems and the user.

  - Examples include Virtual Reality (VR) headsets, smartwatches (such as Apple's iWatch), and fitness monitors like FitBit.

Topic B: Connect and Configure Mobile Device Accessories

Wired Connections for Accessories

- Apple devices:
  - Apple Dock for older devices.
  - Apple Lightning connector.
  - USB-C

- Android devices:
  - Micro-B USB connectors for most devices.
  - Mini-B for older devices.
  - USB-C on newer devices.

Wireless Connections for Accessories

- Bluetooth
- NFC
- IR

Wireless Connections for Accessories

Bluetooth pairing process

1. Enable Bluetooth on both devices
- – Android and iOS: Settings / Bluetooth

2. Set devices to discoverable mode
- – May require key sequence on Bluetooth device

3. Select discovered device
- – Many devices may appear!

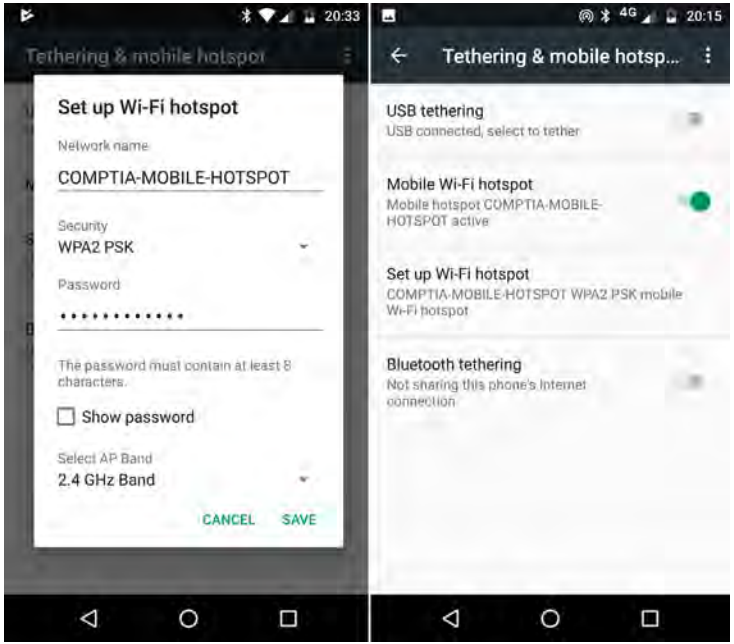
4. Enter or confirm PIN
- – Should be the same on both devices

5. Test connectivity
- – Devices should now communicate

Wireless Connections for Accessories

Tethering

Mobile hotspots



Common Mobile Device Accessories

- External keyboard
- Headset
- Speaker dock
- Micro-SD slot
- Docking stations
- Protective covers and waterproofing
- Credit card readers
- Mobile power

Discussing Mobile Device Accessory

- **What type of peripheral port would you expect to find on a current generation smartphone?**

- **ANSWER:**
  - For Apple devices, the Lightning port. For Android and Windows, it will be USB—either Micro Type B or Type-C.

Discussing Mobile Device Accessory

- **How would you upgrade storage capacity on a typical smartphone?**

- **ANSWER:**
  - Micro-SD, you can add a larger card.
  - Otherwise, the components in these devices are not FRU, so there are no upgrade options.

Discussing Mobile Device Accessory

- **What technology do smartphones use to facilitate payment at points of sale?**

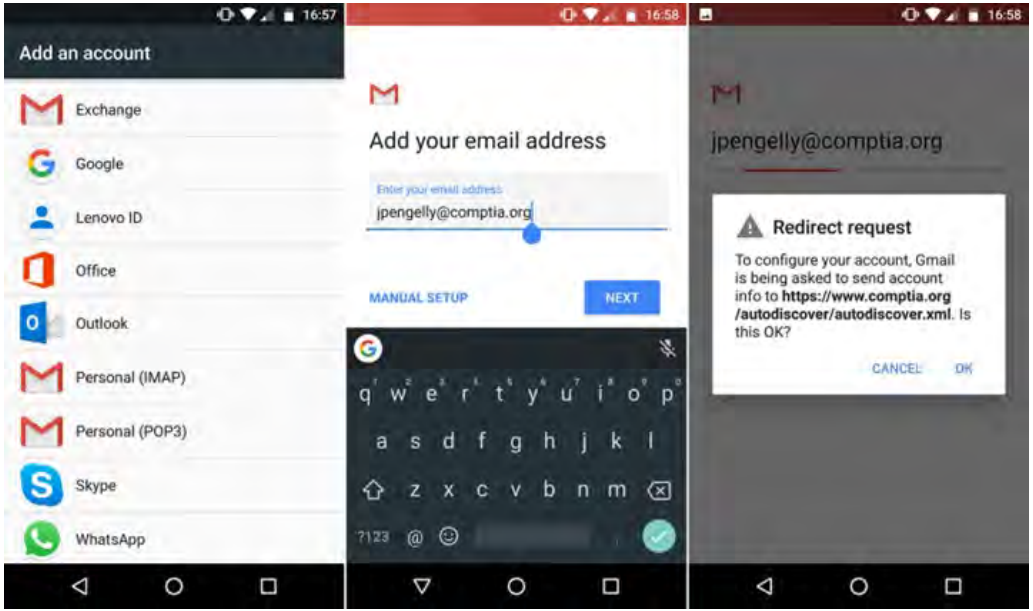
- **ANSWER:**
  - Near Field Communications (NFC) allows the user to touch a receiver for the phone to pass card data to a point of sale terminal.

Discussing Mobile Device Accessory

- **True or false? An IP67-rated smartwatch could be considered risk-free for wear while swimming in an indoor pool.**

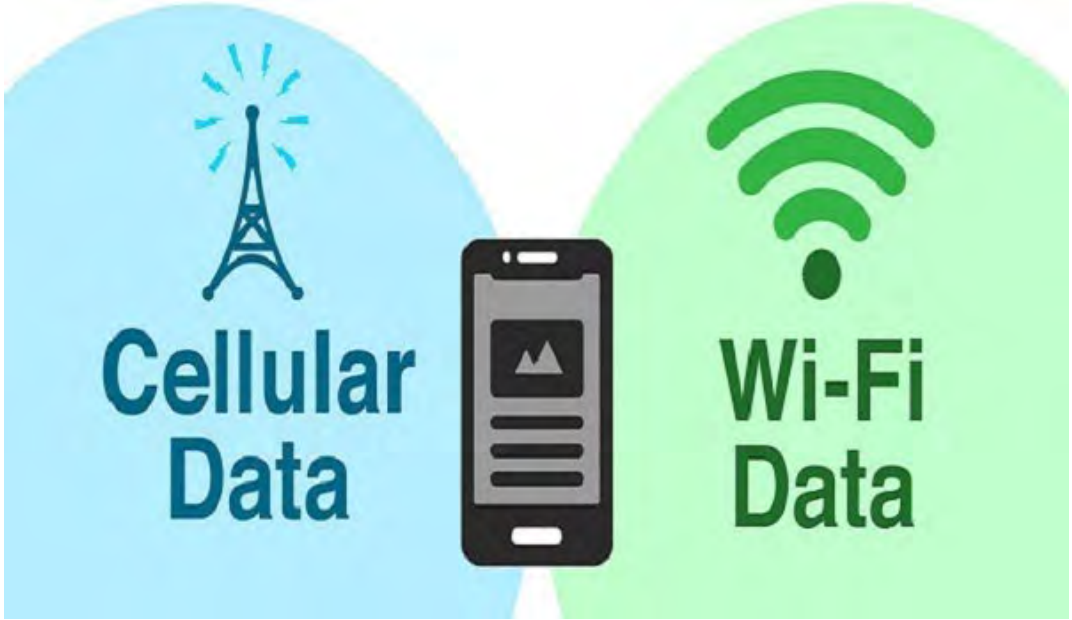
- **ANSWER:**
  - False—IP67 rates immersion up to 1 m (for up to 30 minutes).
  - Wearing a device while swimming would be a significant risk.

Topic C: Configure Mobile Device Network Connectivity



Cellular Data Networks

Cellular data: Connecting to the Internet via the device's cell phone radio and the handset's cellar network provider.

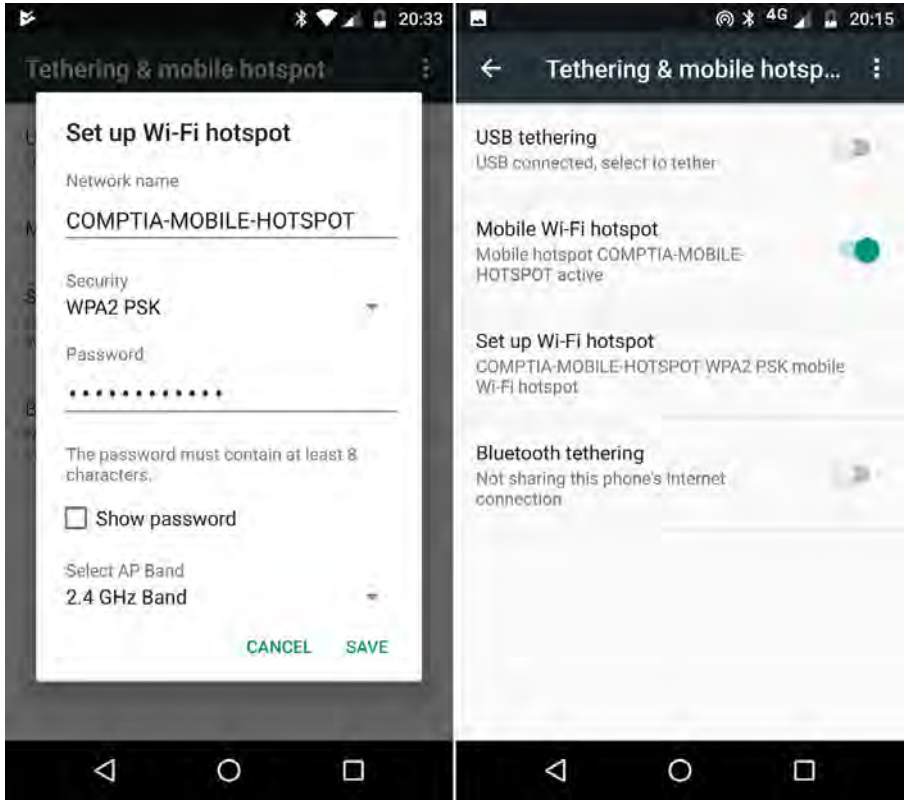


Cellular Data Networks

- Mobile hotspots vs tethering

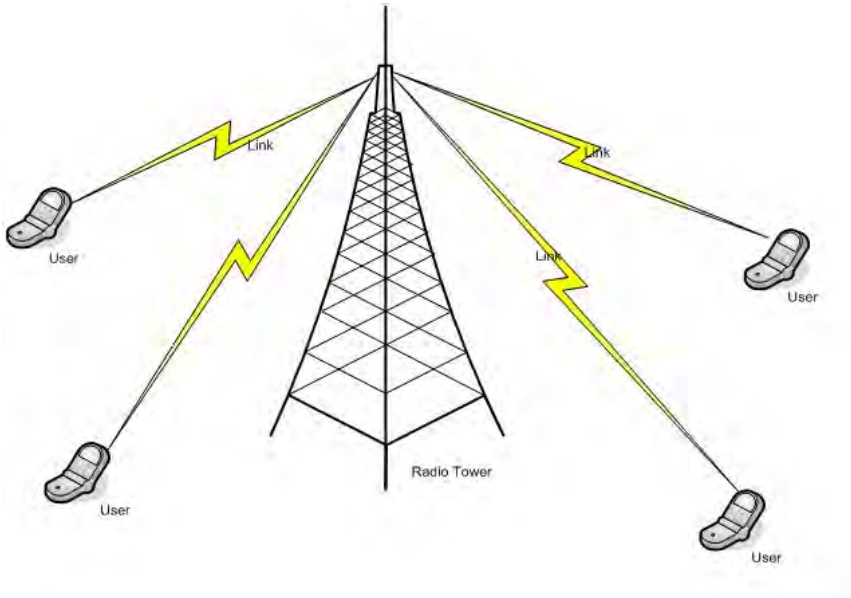
Mobile Hotspots and Tethering

- Hotspot
  - Configure soft access point to share mobile device's data connection with nearby computers (Wi-Fi)
- Tethering
  - Share data connection with computer connected via USB/Bluetooth



Screenshot courtesy of Android platform, a trademark of Google LLC

Cellular Data Networks



- Cellular radios:
  - Base station effective range up to 5 miles
  - Works in the 850 and 1900 MHz frequency bands in Americas
  - Works in the 900 and 1800 MHz frequency bands in the rest of the world
  - GSM deployed worldwide
  - CDMA used in the Americas

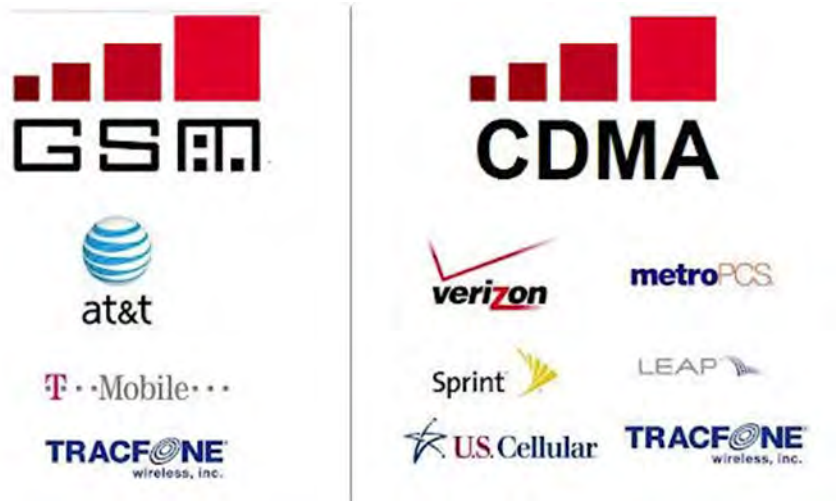
Cellular Data Networks

- GSM networks and SIM cards:
  - GSM works with SIM cards
  - Handsets are identified by IMEI number(International Mobile Equipment Identity)
  - Users are identified by IMSI number(subscriber Identity)
- SIM card number format:
  - 3-digit mobile country code
  - 2-digit mobile network code
  - Up to 10-digit mobile station identification number

Cellular Data Networks

- CDMA networks:
  - Locks handset to original provider
  - Does not require use of a SIM card
  - Handsets are identified by MEID number mobile equipment identifier
  - Uses PRI and PRL databases for information needed to connect cellular radio to the network
  - The PRL is to communicate on networks other than the carrier network.
  - The PRI configures the data rates between the device and the cell tower.
  - If the handset contains a SIM card, it is to connect to 4G networks, which are GSM-based networks

Cellular Data Networking



(GSM) Global System Mobile Communications

- Subscriber identity module (SIM)
- Code-division Multiple Access (CDMA)
- Preferred roaming list (PRL) updates
- Cellular networking data indicators

Data Speeds:

- G/E or 1X (50-400 Kbps)
- 3G (3 Mbps) and H/H+ (42 Mbps)
- 4G and 4G+ (20-90 Mbps)
- 5G (100-900 Mbit/s Mbps)

Eventually 10Gbp/s

Baseband Updates and Radio Firmware

Baseband update: Modification to firmware of a cell modem.

Realtime Operating System (RTOS): An OS that is optimized for use in embedded or real-time apps.

- Baseband updates modify the Radio Firmware.
  - Firmware OS is separate from the user OS.
  - Controls low-level timing-dependent functions (USB, and GPS).
  - Runs all available radio functions (cellular, Wi-Fi, and Bluetooth).
- Updates usually pushed by device vendor as part of an OS upgrade.

Wi-Fi Networks and Hotspots

Hotspot: Use the mobile device to connect a device to the Internet.

- All smartphones and tablets support Wi-Fi communication.
  - In iOS, select **Settings**→**Wi-Fi** to connect.
  - In Android, use the notification shade or open the **Settings**→**Wi-Fi** menu.

- Hotspot implementations:
  - Public access point (free or paid).
  - Smartphone or tablet.
  - Wireless router designed for personal hotspots.

Wi-Fi Networks and Hotspots

Data caps and transfer costs

- Cellular vs 802.11
- Enable or disable network connections
- Control the use of cellular downloads

Mobile VPN Configuration

Virtual Private Network (VPN): A secure tunnel created via an unsecure network (typically the Internet).

Mobile VPN: A VPN that can maintain the VPN link across multiple carrier networks.

- Tunnel contents often encrypted to secure communications.
- Mobile VPN assigns virtual IP address for connecting to VPN server.
- Links maintained even in sleep mode.
- Available as third-party apps for Android and iOS.

Bluetooth

Bluetooth: Short-range radio-based technology, up to 10 m or (30 feet) at up to 1 Mbps, used to connect two devices.

- Latest versions support 24 Mbps data rate.
- Used for PANs (Personal Area Networks).
  - Share data with a PC. Connect to a printer, wireless headset, or other peripheral.
- Pairing connects the devices.
  - In iOS, select **Settings→General→Bluetooth.**
  - In Android, access through the notification shade.
  - In Windows, access through Control Panel, Windows Settings, or the Bluetooth icon in the notification area.

Enterprise Mobility Management

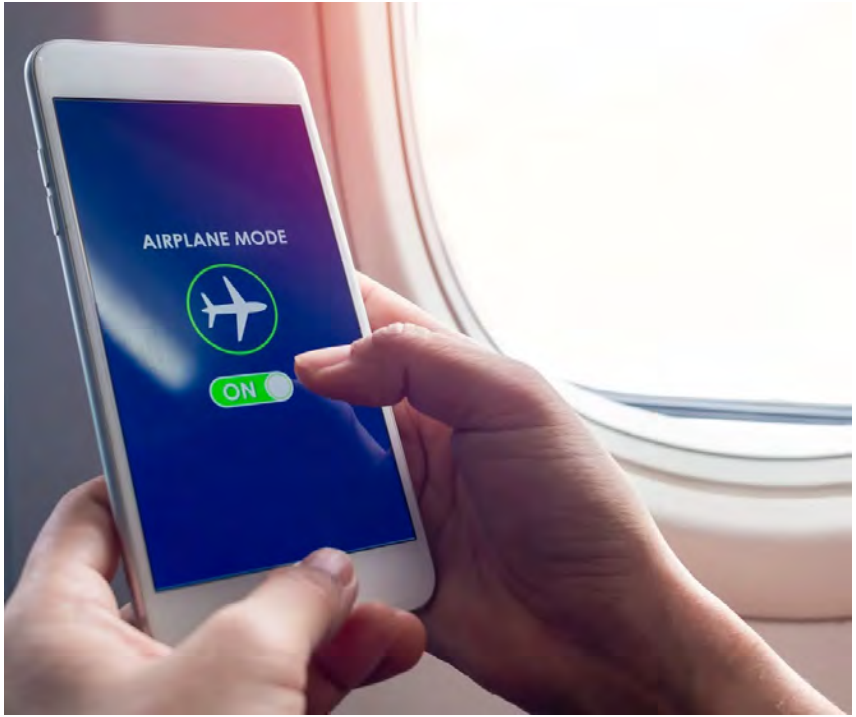
- Mobile device management (MDM)
  - Authentication policies
  - Control device features (webcam/microphone)
  - Remote device reset/data wipe

- Mobile application management (MAM)
  - Establish protected container to run corporate apps
  - Enterprise app developer programs and distribution channels
  - BYOD

Location Services

- Geolocation
  - Identify/estimate device position on Earth
- Location service mechanisms
  - Global Positioning System (GPS)
    - Triangulate via orbital satellites
  - Indoor Positioning System (IPS)
    - Triangulate to cellular and Wi-Fi radio sources
- Enable/disable and privacy options

Airplane Mode

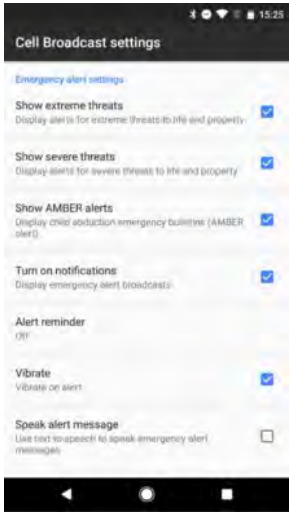


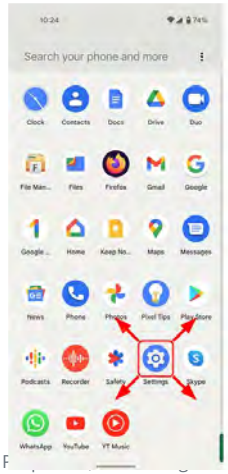
- Disables all wireless features.
  - Cellular data
  - Wi-Fi
  - GPS
  - Bluetooth
  - NFC

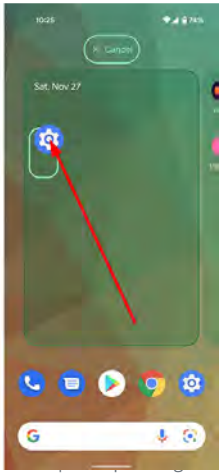
Settings

Control Center: An iOS feature that is accessed by swiping up from the bottom of the display to access iOS feature settings.

Notification shade: An Android feature that is accessed by swiping down from the top of the display to access Android OS feature settings.

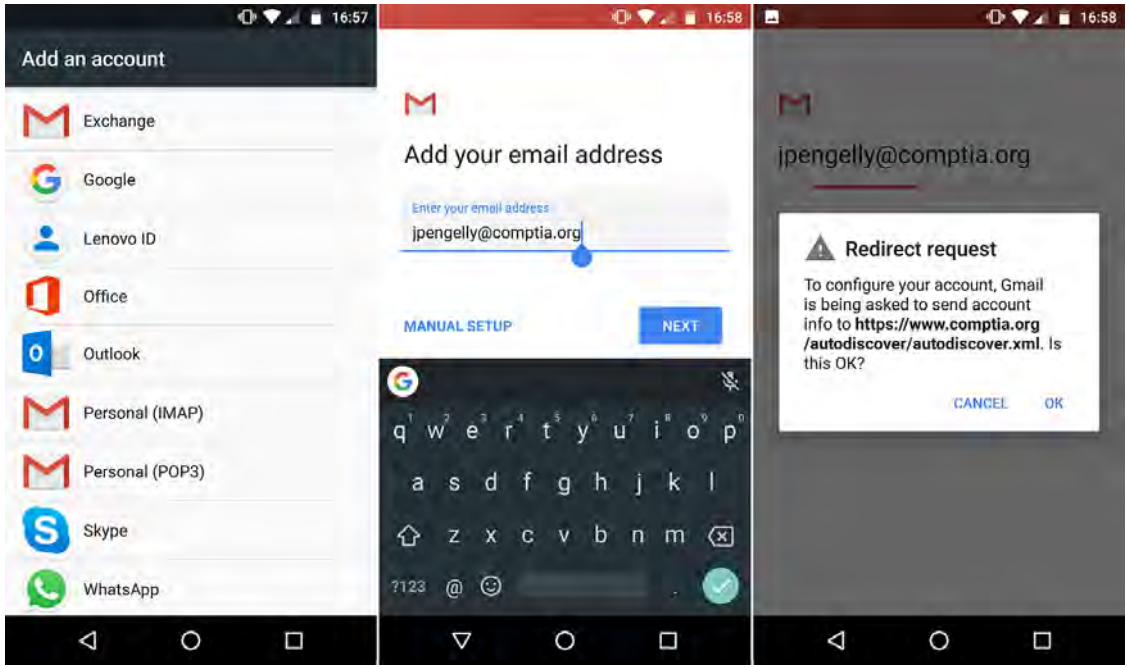






Email Configuration Options

- Commercial Provider Email Configuration



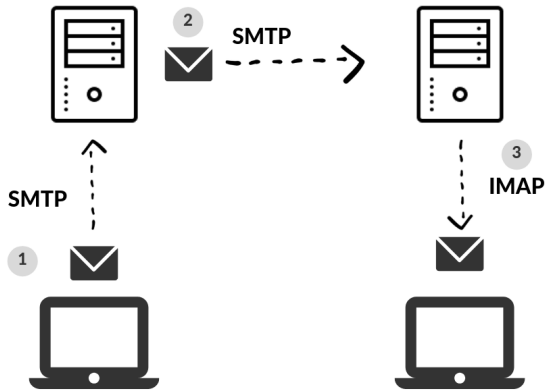
Email Configuration Options

- Corporate and ISP Email Configuration:
  - Autodiscover-enabled service can be configured with just the email address and password.
  - Autodiscover with Exchange and Exchange ActiveSync.
  - For ISPs and corporate mail gateways that don't support Autodiscover, manually enter the mail server address information:
    - Incoming mail server type (IMAP 143 or 993)
    - Outgoing mail server type (SMTP 25 or 587)
    - Incoming mail server type PoP3 (110 or 995)

Email Configuration Options

- POP3 downloads the email from a server to a single computer, then deletes the email from the server.

- IMAP stores the message on a server and synchronizes the message across multiple devices.



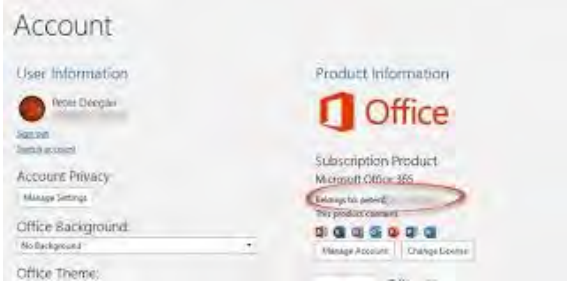
Email Configuration Options

Microsoft 365

- Outlook, Exchange

– Microsoft's email service

– Usually, the same for Hotmail and Outlook.com



- Authenticate to Microsoft 365

– Username, password

–Select the items to synchronize (Calendar, Contacts)

Changes in Outlook will appear on the mobile device

- Same process for Google Workspace
- – Formerly known as G Suite

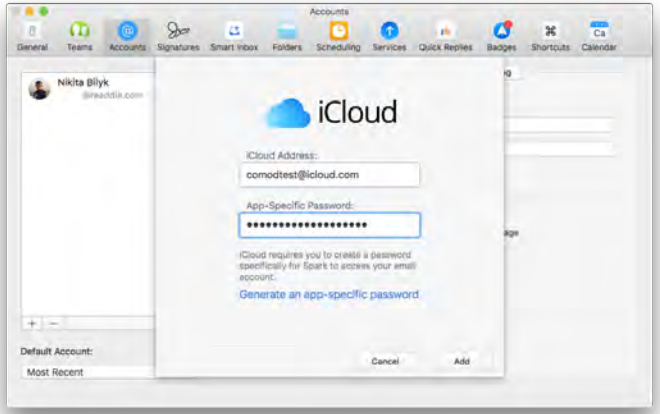
Email Configuration Options

iCloud

- Integrated into iOS and iPad OS
  - Provide an iCloud username and password

- Select synchronization options
  - Extensive customization

- Synchronize to macOS
  - Use your desktop, laptop, or mobile device

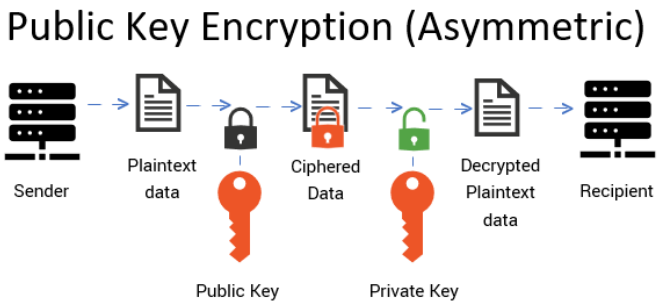


Email Configuration Options

- S/MIME (Secure/Multipurpose internet Mail Extensions) is a widely accepted protocol for sending digitally signed and encrypted messages.

- Using secure ports does not provide end-to-end encryption for messages.
  - Encryption with digital certificates and digital signatures does.

Email Configuration Options



- PGP and S/MIME use digital certificates and public/private key pairs.
  - When you sign a message, your private key validates who you are, the public key related to that private key goes to the recipients.
  - The public key allows the recipient to verify who you are.
  - When you want to receive secure messages, the sender uses your public key to encrypt the message.
  - Once encrypted, only your private key can decrypt it (your public key cannot be used to reverse the encryption).
- Digital and root certificates are often added to the device by using **MDM** software.

Discussing Mobile Device Network Connectivity Configuration

- **Why would a user be likely to disable cellular data access but leave Wi-Fi enabled?**

- **ANSWER:**
  - To avoid data charges (especially when using the device abroad).

Discussing Mobile Device Network Connectivity Configuration

- **What serial number uniquely identifies a particular handset?**

- **ANSWER:**
  - International Mobile Station Equipment Identity (IMEI) for handsets (GSM)
  - Mobile Equipment ID (MEID) from CDMA providers.

Discussing Mobile Device Network Connectivity Configuration

- **What is tethering?**

- **ANSWER:**
  - Tethering is the use of a smartphone as an Internet connectivity hub.
  - It can share its Internet connection with a computer via either a cable, Bluetooth, or Wi-Fi.

Discussing Mobile Device Network Connectivity Configuration

- **True or false? S/MIME is used to configure a secure connection to a mailbox server, so that your password cannot be intercepted when connecting over an open access point.**

- **ANSWER:**
  - False—S/MIME is for encrypting messages.
  - SSL/TLS is used to secure connections.

Discussing Mobile Device Network Connectivity Configuration

- **How do you configure an autodiscover-enabled email provider on a smartphone?**

- **ANSWER:**
  - Just enter the email address.
  - If the account is detected, you will be prompted for the password.

Discussing Mobile Device Network Connectivity Configuration

- **What is the function of a smartphone's baseband processor?**

- **ANSWER:**
  - The baseband system acts as an interface with the cell tower, access point, or other radio source to transmit signals.

Topic D: Support Mobile Apps

Mobile Account Setup

- User accounts:
  - Normally One per device, created at initial use.

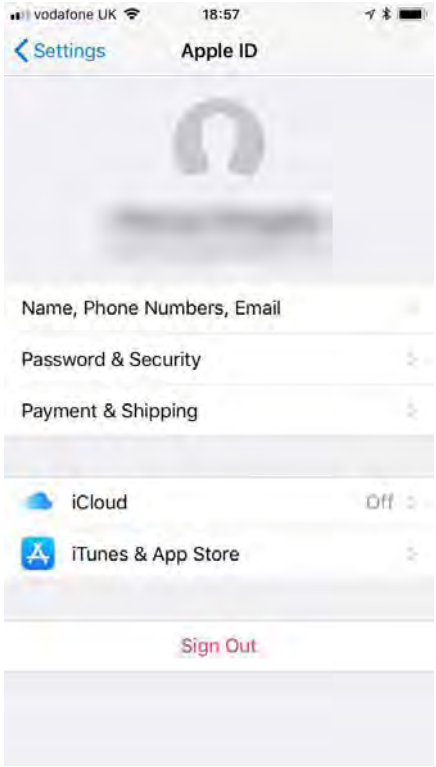
  For iOS: Apple ID.

  - For Android:

  Google account, and Samsung account, are similar.

  - Unique ID and credentials required.

  Provides access to app store, email, cloud storage.



Mobile Account Setup

- Sub-accounts for additional services and apps:
  - Corporate email or messaging.
  - Facebook.
  - LinkedIn.

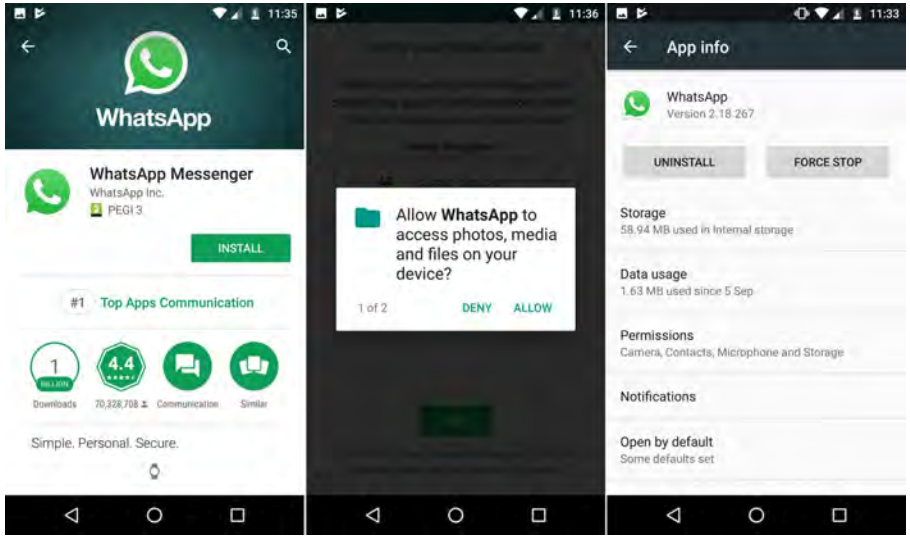
Mobile Applications and App Stores

App: Installable programs the extend the functionality of a mobile device.

- iOS apps:
  - Get from App Store.
  - Free or paid.
  - Walled garden model—a limited set of technology provided to users with the intention of creating a monopoly .
  - All apps scrutinized by Apple!

Mobile Applications and App Stores (slide 2 of 2)

- Android apps:
  - Get from Google Play Store or third-party sites.
  - Free or paid.
  - More open model for app acquisition: store model, or APKs.



Types of Data to Synchronize

Mobile device synchronization: The act of copying data back and forth between devices to keep the information up-to-date on all devices.

- Contacts
- Calendar
- Email
- Pictures, music, and video
- Documents
- E-books

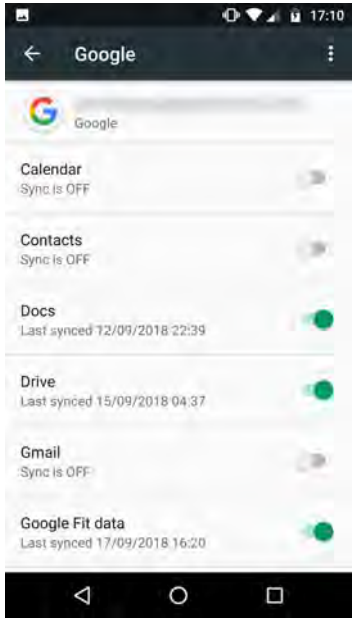
- Location data
- Social media data
- Apps
- Bookmarks
- Passwords

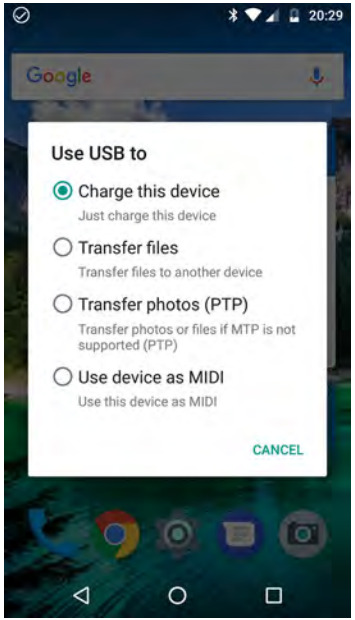
iOS Synchronization Methods

- iOS syncs to desktop via iTunes
- iOS syncs to cloud via iCloud

Synchronization Methods

- Android uses the gmail account to sync with cloud storage and Google Play Store.
- You can connect to a PC via USB to transfer data directly.





Synchronization Methods

- Microsoft synchronization products
  - OneDrive
  - Outlook.com
  - Office 365
- Third-party synchronization products
  - Vendor-based cloud services
  - Dropbox
- Sync to automobiles.
  - Newer vehicles use head unit to manage entertainment and navigation.
  - Smartphone can be attached to head unit.
  - Apple CarPlay
  - Android Auto

Mutual Authentication for Multiple Service

Single Sign On: (SSO) One service accepts the credentials from another service.

Also known as **federated identity management**.

- Sign in once to authenticate to many services
- Enterprise networks:
  - Email
  - Database
  - Document management system

- Mobile device apps use device sign-in credentials:
  - iPhone with an Apple ID
  - Vendor cloud services

Two-factor Authentication

- Mobile device access control
  - Screen lock via password, PIN, swipe pattern, fingerprint/facial scan
- Secondary authentication to corporate workspace
  - Two-factor authentication and verification
  - Report and verify sign-in via second device or account

Discussing Mobile App Support

- **Which types of data might require mapping between fields when syncing between applications?**

- **ANSWER:**
  - Contacts and Calendar items.

Discussing Mobile App Support

- **Why must a vendor account usually be configured on a smartphone?**

- **ANSWER:**
  - A vendor account, such as an Apple, Google, is required to use the app store.

Discussing Mobile App Support

- **What is sideloading?**

- **ANSWER:**
  - Installing a mobile app without going through the app store.
  - Android supports sideloading through the APK package format.
  - Sideloading is not officially supported on iOS devices.

Discussing Mobile App Support

- **How might an app register users without implementing its own authentication process?**

- **ANSWER:**
  - Through federated identity management

Discussing Mobile App Support

- **What software is used to synchronize data files between an iOS device and a PC and what connection methods can it use?**

- **ANSWER:**
  - iTunes.
  - It can work over USB-to-Apple cable or Wi-Fi.