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How to Use an iPhone

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This wikiHow teaches you how to master the basics of using your iPhone, from simply turning it on or off to using the provided applications.

Part 1 - Your iPhone's Buttons

1



Turn on your iPhone if it isn't already on. To do so, hold down the Lock button until you see a white Apple icon appear on the iPhone's screen.

2



Charge your iPhone if necessary. The charger cable is a long, white cord with a small, flat, rectangular prong on one end and a larger rectangular block on the other end. If your iPhone won't turn on, try plugging it into a wall socket for a few minutes before attempting to turn it on again.

- You'll see a port on the bottom of the iPhone's housing, below the circular button on the screen--this is where the prong end of the charger goes.
- If you have an iPhone 4S or lower charger, the charger end of the cable will have a grey rectangle on one side; this rectangle must face the same way that the iPhone's screen faces.
- Your iPhone should have come with a power adapter (a white cube) that has a two-pronged electrical plug on one side and a rectangular slot on the other side. You can plug this into a wall socket and then plug the end of the charger that isn't attached to your iPhone into the cube's slot.
- If your iPhone was off when you plugged it into a power source, it should begin turning on. You'll see a white Apple icon appear on the screen.

3



Get to know your iPhone's buttons. If you place the iPhone on a flat surface with the screen facing up, all of the iPhone's buttons are arranged like so:

- **Lock button** - Either on the right side of your iPhone (iPhone 6 or up) or on the top of your iPhone (iPhone 5s, SE or down). Pressing it once while the iPhone is on will turn off the screen, while pressing it again will turn back on the screen. You can also press and hold it to turn on an iPhone that's been fully turned off, or to turn off an iPhone that's currently on.
- **Volume +/-** - The bottom two buttons on the left side of your iPhone's housing. The bottom button lowers the volume of music, videos, or the iPhone's ringer, while the top volume button raises the volume.
- **Mute** - The switch on the top of the row of buttons on the left side of your iPhone's housing. Clicking this switch upward will place your phone on audible mode, while clicking it down will mute your iPhone's ringer and place it in vibrate mode. When your iPhone is muted, there will be an orange strip above the **Mute** switch.
- **Home** - This is the circular button at the bottom of the iPhone's screen. You'll click it once to open the iPhone from the lock screen. Additionally, clicking it while using an application will minimize the application, and double-clicking it quickly will show all running applications.

4



Press the Lock button. Doing so will "wake up" the iPhone's screen and display the Lock screen.

5



Press the Home button once the Lock screen displays. This screen will have the time of day at the top of the screen. Pressing Home will bring up the passcode field.

- If you don't have a passcode set, pressing the Home button will bring you to your iPhone's Home Screen, where you can continue getting to know your iPhone's functions.

6



Type in your passcode using the buttons on the screen. As long as this code is correct, doing so will open your iPhone's Home Screen.

- If you have TouchID enabled to unlock your iPhone, scanning your fingerprint will also unlock your phone.

1



Review your iPhone's Home Screen. You'll see several square icons here; these are your iPhone's applications, or "apps" for short. All of your iPhone's "stock" apps, meaning apps that come pre-installed on the phone, are listed here.

- As you add apps to your phone, the Home Screen will gain additional pages. You can scroll through these pages by swiping from the right side of the screen to the

left side of the screen.

2



Familiarize yourself with the native apps. Some of the crucial apps that come installed on a standard iPhone include the following:

- **Settings** - This is a grey app with gears on it. If you want to change anything from the amount of time it takes for your iPhone's display to turn off, to your wireless network settings, you'll find the options to do so in this

app.

- **Phone** - It's a green app with a white phone icon. You can make calls manually (by dialing) or by tapping a contact's name and then tapping the phone icon below their name at the top of the screen.
- **Contacts** - This app has a grey silhouette of a person's head on it. Tapping it will bring up a list of your contacts--the store from which you bought your iPhone should have synchronized your last phone's contacts with your iPhone, but if they didn't, you may want to [import your old contacts to your iPhone](#).
- **FaceTime** - A green app with a white video camera icon on it. You can make face-to-face calls with your contacts using FaceTime.
- **Messages** - A green app with a white speech bubble. This is where you'll send and receive text messages.

- [Mail](#) - The blue app with a white envelope icon on it. You can check your Apple ID email here (it will be called your iCloud account), or you can add an email account to this app.
- [Calendar](#) - This app will display an up-to-date calendar. You can also set events for specific dates and times by tapping the pertinent date and filling in the information fields.
- [Camera](#) - A grey app with a camera icon on it. You can take photos, videos, and different types of visual media (e.g., slow-motion videos) with the Camera app.
- [Photos](#) - This multicolored pinwheel app is where all of your iPhone's photos are stored. Any time you [take a picture](#), the photo will appear here.
- Safari - Safari is a blue app with a compass icon on it. You'll use Safari to browse the web.
- [Clock](#) - The clock-shaped app. You can change or manage your iPhone's saved time zones, set alarms, set a timer, or use a stopwatch with this app.
- Notes - The yellow and white notepad-shaped icon on the Home Screen. This app is useful for writing down quick notes or making a list, though [the Reminders app](#) is also a good choice for lists.
- [Maps](#) - The Maps app allows you to plan trips and will give you step-by-step directions like a GPS if you enter a starting point and a destination.
- [Wallet](#) - You can add credit or debit cards and gift cards to your iPhone's Wallet. Doing so will allow you to use your iPhone to pay for online items as well as at supported retail stores.
- [App Store](#) - This blue app with a white "A" on it is where you'll download new apps.
- [Music](#) - A white app with a musical note on it. This app is where you'll find your iPhone's music library.
- [Tips](#) - This yellow app with a light bulb will provide you with insights that can help you get the most out of your time with your iPhone.

3



Swipe across the screen from left to right. Doing so will open your iPhone's widget page, where you can see things like the current weather forecast, any alarms you have set, and relevant news.

- Swipe up from anywhere on the screen to scroll down this page.
- If you want to search for something specific on your phone, you can tap the "Search" bar at the top of the

page and then type in what you want to see.

4



Swipe left to return to the Home Screen. You can also press the Home button to return to the Home Screen from any page of the Home Screen.

5



Swipe down from the very top of the screen. This will pull down your iPhone's Notifications page, where you can see all recent notifications (e.g., missed calls, incoming text messages, etc.).

6



Press the Home button. Doing so will return you to your iPhone's Home Screen.

7



Swipe down from the middle of the screen. This action will bring up a search bar at the top of the screen as well as a list of your frequently used apps. You can tap **Cancel** in the top-right corner of the screen or simply press the Home button to return to the Home Screen.

8



Swipe the very bottom of the screen up. Doing so will bring up the Control Center, which houses the following options:

- **Airplane Mode** - The airplane icon at the top of the Control Center window. Tapping it will enable Airplane Mode, which prevents any cellular or wireless internet emissions from your iPhone. Tap it (or anything else on this list) again to disable it.
- **Wi-Fi** - The rippling arcs icon. Tapping this will enable wireless internet (if it's blue, Wi-Fi is already enabled) and connect you to the nearest recognized network.
- **Bluetooth** - The center icon at the top of the Control Center window. Tap this to turn on your iPhone's Bluetooth, which will allow you to [connect your iPhone to speakers](#) or other Bluetooth devices.
- **Do Not Disturb** - The moon-shaped icon. Tap this to prevent calls, text messages, and other notifications from causing your phone to ring.
- **Rotation Lock** - The padlock icon with a circle around it. Tapping it while it's red will disable screen lock, meaning you'll be able to rotate your iPhone 90 degrees to view photos and other media in landscape mode.
- The bottom row of options from left to right include [a flashlight](#), a timer, a calculator, and a shortcut to your iPhone's Camera app.

9



Press the Home button. You'll return to the Home Screen. Now that you're familiar with the Home Screen, it's time to start using your iPhone's apps.

Part3 - Apps

1



Tap an app. Doing so will open it. The way you'll interact with each app will vary depending on the app itself, but you'll generally be able to tap items to activate them (e.g., tapping a text field will bring up your iPhone's keyboard).

- You can download new apps from the [App Store app](#).

2



Double-press the Home button. Doing so quickly will zoom out of your currently open app and display all running apps in separate windows.

- Swipe up on an app window to close that app.
- You can also swipe left or right while in this menu to scroll through your currently open apps.

3



Press the **Home button**. You'll return to the Home Screen.

4



Tap and hold an app. It should begin to wiggle after about a second, along with the other apps on your iPhone's Home Screen. From here, you can do a few different things:

- Tap and drag the app to move it. If you drag your app all the way to the right side of the Home Screen, a new screen will appear for you to drop your app onto. You'll be able to access

this page by swiping left on the Home Screen.

- Tap and drag the app onto another app to create a folder that contains those two apps. You'll be able to drag other apps into the folder as well.
- Tap the **X** in the top-left corner of the app's icon to delete the app. You'll need to tap **Delete** when prompted to actually delete the app.

5



Customize your iPhone's Home Screen as you please. Once you've moved, deleted, and organized your iPhone's apps according to your preference, you can make a phone call.

Part4 - Phone Calls

1



Tap the Phone app. It's the green app with a white phone icon on it, most likely located on the Home Screen.

2



Tap the "Keypad" tab. You'll see this option at the bottom of the screen, to the right of the "Contacts" tab.

- Alternatively, you can tap the "Contacts" tab, tap a contact's name, and then tap the "call" icon (a white phone on a blue background) below their name at the top of the screen.

3



Type in a phone number. You'll do this by lightly tapping the corresponding numbers on this page.

4



Tap the green and white "Call" button. It's below the last row of numbers on the screen. Doing so will initiate your call. When your contact picks up their phone, you can speak normally with the phone up to your ear, or you can use one of the following buttons to change the nature of the call:

- **speaker** - Changes your phone's audio output from the earpiece at the top of the screen to your iPhone's speakers. This way, you can speak without holding the phone up to your ear.
- **FaceTime** - Changes the phone call to a FaceTime call wherein you'll be able to see your recipient's face and vice versa. This will only work if your contact also has an iPhone.

Tips

- Don't get discouraged at how complicated the iPhone can be to use--operating your iPhone will be second-nature before you know it!
- You may want to take advantage of more advanced iPhone features such as [Siri](#) or replacing your iPhone's SIM card as well.

No Emulator Needed: How to Mirror Your iPhone Screen on a Computer

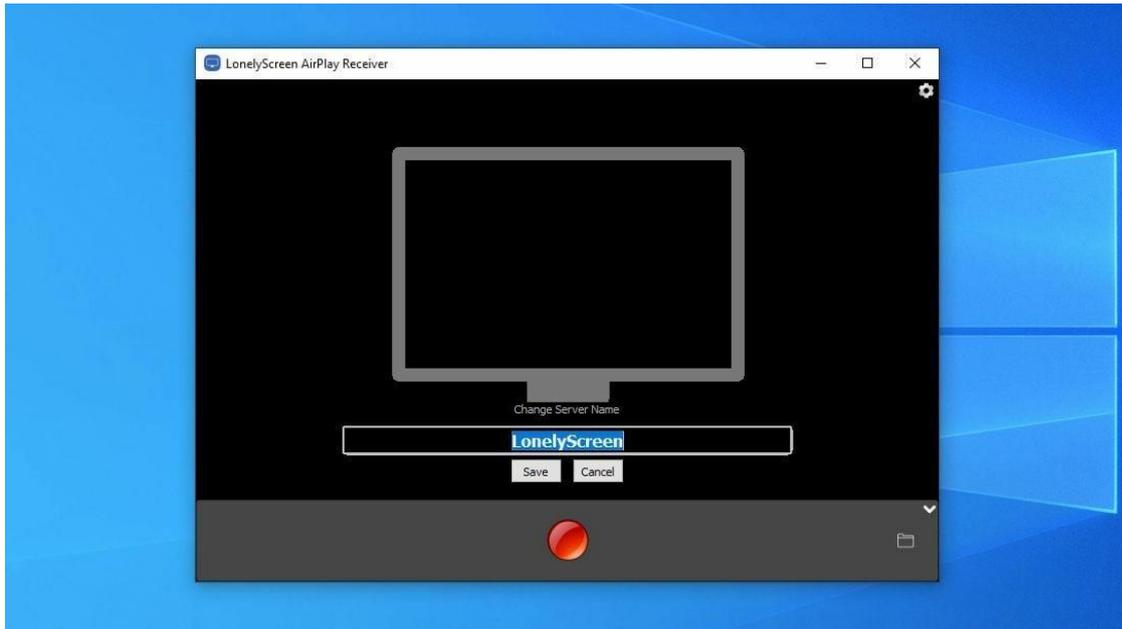
If you want to view your iPhone screen on a laptop or desktop, you can do it with a third-party app or through a built-in secret feature on the Mac.



You can connect an Android device to Windows using the Link to Windows app, but what about iPhone? There may not be an official app to make the connection, but iPhone's screen-mirroring ability does allow you to cast your phone's screen to a laptop or desktop PC over Wi-Fi.

It's an easy process if you want to view your phone screen on a Mac, as long as you know where to look. Connecting to a Windows PC will take a little more work with a few third-party apps. Here's how to get things working.

How to Mirror Your iPhone Screen to a Windows PC



Thanks to Apple's walled garden ecosystem, iPhone users need to download a third-party tool to cast their phone to Windows. There are plenty of tools that offer this functionality, but for simple free casting, check out [LonelyScreen](#). It's a barebones app that does one thing: Tricks your iPhone into thinking your PC is an Apple TV.

Install and launch LonelyScreen, then click the **LonelyScreen** title along the bottom to change the name of the AirPlay server (I used "Whitson's Laptop"). From your iPhone, open Control Center and tap the **Screen Mirroring** button. If you don't see such a button, you may need to add it from the iPhone's Settings.

Once you tap the Screen Mirroring button, select your LonelyScreen laptop from the list, and your iPhone screen will appear on the PC right away. Don't see it? Check out [LonelyScreen's troubleshooting page](#)—it can occasionally be a bit finicky. From there, you can maximize the window for a closer look, and click the arrow in the bottom-right to bring up a Record button that lets you capture video clips.

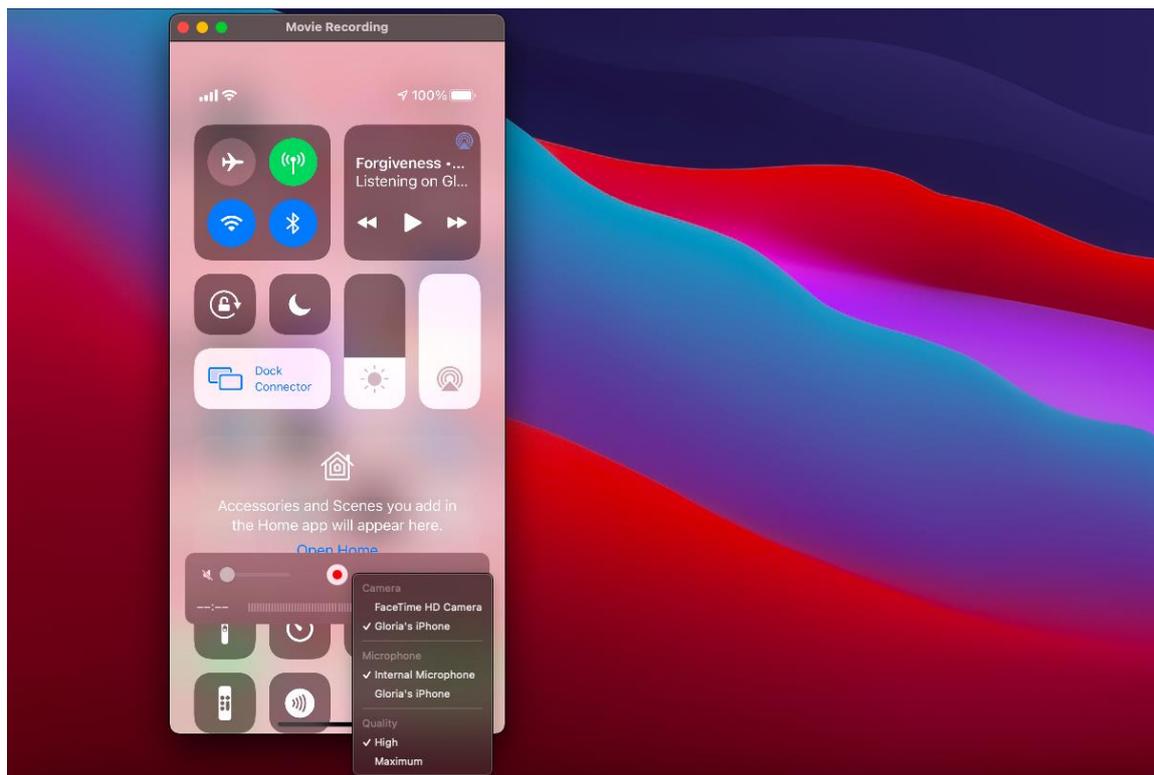
Note that LonelyScreen says it's a free trial, but you can click the nag screen away at any time—it doesn't seem to be a limited trial in our testing (though the screen may re-appear occasionally as you use it).

For quick and dirty mirroring, LonelyScreen should work well for most people. If you need more features, a paid app like [Reflector](#) (\$19.99)

or [AirServer](#) (\$19.99) may offer more configuration options for your video recording and screen mirroring.

**Deals are selected by our partner, [TechBargains](#)*

How to Mirror Your iPhone Screen to a MacBook



Mac users have it easy because this functionality is built right into your laptop in the form of the QuickTime video player. There's only one catch: You have to plug your iPhone in over USB.

Grab a Lightning cable and plug the iPhone into your Mac. If you haven't done this in a while, you may need to tap the Trust prompt that appears on your iPhone before continuing. Once connected, open **Launchpad** and select **QuickTime Player**. Once the app is launched, head to **File > New Movie Recording**. You should see a new window appear.

Click the down arrow next to the Record button in the movie window, and you should see your iPhone appear in the drop-down under **Camera**. If it doesn't appear, try disconnecting the iPhone and reconnecting—it should

show up afterward. Select the phone from the list, and its screen will appear on your Mac. Use this for demonstration purposes, or click the Record button to capture a video of the iPhone screen.

If you want to mirror your iPhone wirelessly, consult the instructions above for Windows PCs—[LonelyScreen](#), [Reflector](#), and [AirServer](#) are all available for macOS as well.



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iOS

From Wikipedia, the free encyclopedia

This article is about the smartphone OS by Apple. For its tablet counterpart, see [iPadOS](#). For the router/switch OS by Cisco Systems, see [Cisco IOS](#). For other uses, see [IOS \(disambiguation\)](#). For the Greek island, see [Ios](#).

iOS

iOS

Commercial logo as used by Apple, since 2017

Screenshot



Developer [Apple Inc.](#)

Written in [C](#), [C++](#), [Objective-C](#), [Swift](#), [assembly language](#)

OS family [Unix-like](#), based on [Darwin \(BSD\)](#), [macOS](#)

Working state	Current
Source model	Closed , with open-source components
Initial release	June 29, 2007
Latest release	15.5 ^[1] (19F77) ^[2] (May 16, 2022) [±]
Latest preview	15.6 RC ^[3] (19G69) ^[4] (July 12, 2022) [±] 16.0 beta 3 Update ^[5] (20A5312j) ^[6] (July 11, 2022) [±]
Marketing target	Smartphones , tablet computers , portable media players
Available in	40 languages ^{[7][8][9][10]}
Update method	OTA (since iOS 5), Finder (from macOS Catalina onwards) ^[11] or iTunes (Windows and macOS pre-Catalina)
Platforms	ARMv8-A (iOS 7 and later) ARMv7-A (iPhone OS 3 – iOS 10.3.4) ARMv6 (iPhone OS 1 – iOS 4.2.1)
Kernel type	Hybrid (XNU)
Default user interface	Cocoa Touch (multi-touch , GUI)
License	Proprietary software except for open-source components
Preceded by	Newton OS
Official website	apple.com/ios/
Support status	
Supported	
Articles in the series	
iOS version history	

iOS (formerly **iPhone OS** or **iPhone Operating System**^[*citation needed*]) is a [mobile operating system](#) created and developed by [Apple Inc.](#) exclusively for [its hardware](#). It is the operating system that powers many of the company's mobile devices, including the [iPhone](#); the term also included the versions running

on [iPads](#) until [iPadOS](#) was introduced in 2019, as well as on the [iPod Touch](#) devices, which were discontinued in mid-2022.^[12] It is the world's second-most widely installed mobile operating system, after [Android](#). It is the basis for three other operating systems made by Apple: iPadOS, [tvOS](#), and [watchOS](#). It is proprietary software, although some parts of it are open source under the [Apple Public Source License](#) and other licenses.^[13]

Unveiled in 2007 for the [first-generation iPhone](#), iOS has since been extended to support other Apple devices such as the [iPod Touch](#) (September 2007) and the [iPad](#) (introduced: January 2010; availability: April 2010.) As of March 2018, Apple's [App Store](#) contains more than 2.1 million iOS applications, 1 million of which are native for iPads.^[14] These [mobile apps](#) have collectively been downloaded more than 130 billion times.

Major versions of iOS are released annually. The current stable version, [iOS 15](#), was released to the public on September 20, 2021.^[15]

Contents

- [1History](#)
- [2Features](#)
 - [2.1Interface](#)
 - [2.2Applications](#)
 - [2.3Home screen](#)
 - [2.3.1System font](#)
 - [2.3.2Folders](#)
 - [2.3.3Notification Center](#)
 - [2.4Accessibility](#)
 - [2.5Multitasking](#)
 - [2.5.1Switching applications](#)
 - [2.5.2Ending tasks](#)
 - [2.5.3Task completion](#)
 - [2.6Siri](#)
 - [2.7Game Center](#)
- [3Hardware](#)
- [4Supported locales](#)
 - [4.1Notes](#)
- [5Development](#)
 - [5.1Update schedule](#)
 - [5.2XNU kernel](#)
 - [5.3Kernel Image](#)
 - [5.4Kernel Map](#)
 - [5.5Attacks](#)
 - [5.6Versions codenames](#)
 - [5.7Jailbreaking](#)
 - [5.8Unlocking](#)
- [6Digital rights management](#)
- [7Security and privacy](#)
 - [7.1Secure Boot](#)
 - [7.2Secure Enclave](#)
 - [7.3Face ID](#)
 - [7.4Passcode](#)
 - [7.5Touch ID](#)
 - [7.6Address Space Layout Randomization](#)

- 7.7Non-executable memory
- 7.8Encryption
- 7.9Keychain
- 7.10App security
 - 7.10.1App Store bypasses
- 7.11Network security
- 7.12Two-factor authentication
- 8Reception
 - 8.1Market share
- 9Devices
- 10See also
- 11References
- 12Further reading
- 13External links

History

See also: [iOS version history](#)



First iOS logotype (2010–2013), using Myriad Pro Semibold font



Second iOS logotype (2013–2017), using Myriad Pro Light font

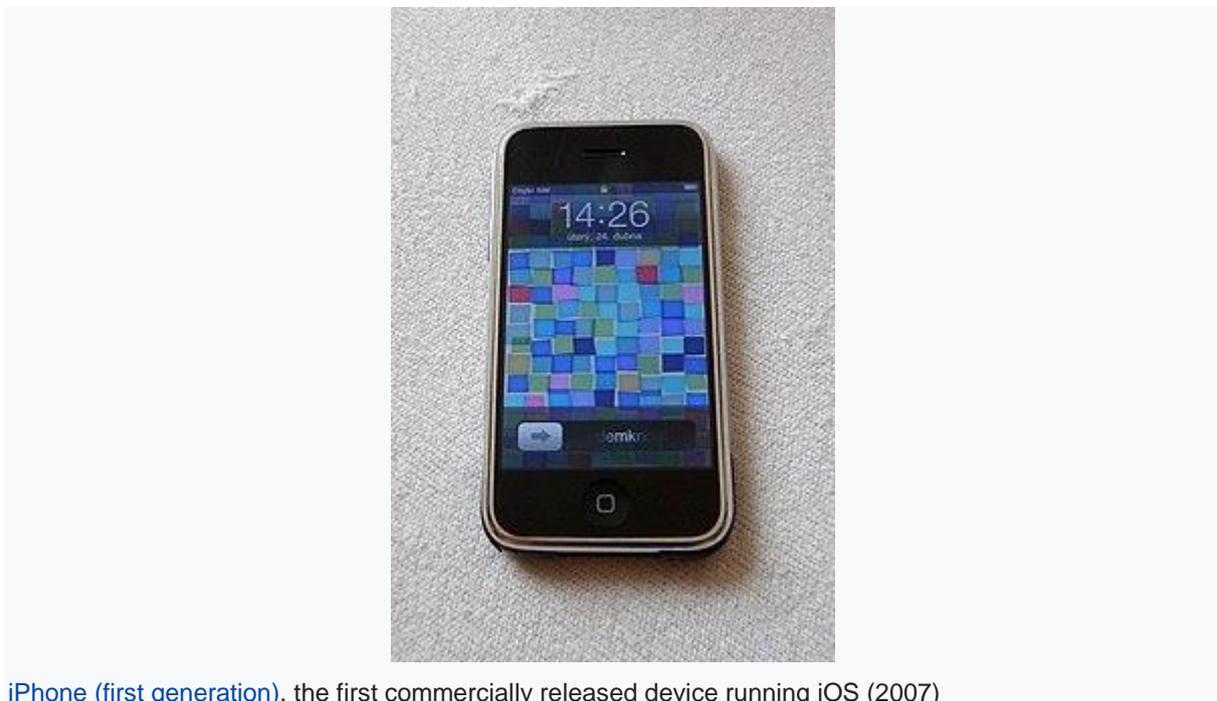


Third iOS logotype (2017–present), using San Francisco Semibold font

In 2005, when [Steve Jobs](#) began planning the [iPhone](#), he had a choice to either "shrink the Mac, which would be an epic feat of engineering, or enlarge the iPod". Jobs favored the former approach but pitted the [Macintosh](#) and [iPod](#) teams, led by [Scott Forstall](#) and [Tony Fadell](#), respectively, against each other in an internal competition, with Forstall winning by creating the iPhone OS. The decision enabled the success of the iPhone as a platform for third-party developers: using a well-known desktop operating system as its basis allowed the many third-party Mac

developers to write software for the iPhone with minimal retraining. Forstall was also responsible for creating a [software development kit](#) for programmers to build iPhone apps, as well as an [App Store](#) within [iTunes](#).^{[16][17]}

The operating system was unveiled with the iPhone at the [Macworld Conference & Expo](#) on January 9, 2007, and released in June of that year.^{[18][19][20]} At the time of its unveiling in January, Steve Jobs claimed: "iPhone runs OS X" and runs "desktop class applications",^{[21][22]} but at the time of the iPhone's release, the operating system was renamed "iPhone OS".^[23] Initially, third-party native applications were not supported. Jobs' reasoning was that developers could build [web applications](#) through [the Safari web browser](#) that "would behave like native apps on the iPhone".^{[24][25]} In October 2007, Apple announced that a native [Software Development Kit \(SDK\)](#) was under development and that they planned to put it "in developers' hands in February".^{[26][27][28]} On March 6, 2008, Apple held a press event, announcing the iPhone SDK.^{[29][30]}



[iPhone \(first generation\)](#), the first commercially released device running iOS (2007)

The [iOS App Store](#) was opened on July 10, 2008, with an initial 500 applications available.^[31] This quickly grew to 3,000 in September 2008,^[32] 15,000 in January 2009,^[33] 50,000 in June 2009,^[34] 100,000 in November 2009,^{[35][36]} 250,000 in August 2010,^{[37][38]} 650,000 in July 2012,^[39] 1 million in October 2013,^{[40][41]} 2 million in June 2016,^{[42][43][44]} and 2.2 million in January 2017.^{[45][46]} As of March 2016, 1 million apps are natively compatible with the [iPad](#) tablet computer.^[47] These apps have collectively been downloaded more than 130 billion times.^[42] App intelligence firm Sensor Tower estimated that the App Store would reach 5 million apps by 2020.^[48]

In September 2007, Apple announced the [iPod Touch](#), a redesigned [iPod](#) based on the iPhone form factor.^[49] On January 27, 2010, Apple introduced their much-anticipated media [tablet](#), the [iPad](#), featuring a larger screen than the iPhone and iPod Touch, and designed for web browsing, media consumption, and reading, and offering multi-touch interaction with multimedia formats including newspapers, e-books, photos, videos, music, word processing documents, video games, and most existing iPhone apps using a 9.7-inch screen.^{[50][51][52]} It also includes a mobile version

of [Safari](#) for web browsing, as well as access to the App Store, [iTunes](#) Library, [iBookstore](#), Contacts, and Notes. Content is downloadable via [Wi-Fi](#) and optional [3G](#) service or synced through the user's computer.^[53] [AT&T](#) was initially the sole U.S. provider of 3G wireless access for the iPad.^[54]

In June 2010, Apple rebranded iPhone OS as "iOS".^{[55][56]} The trademark "IOS" had been used by [Cisco](#) for over a decade for its operating system, [IOS](#), used on its routers. To avoid any potential lawsuit, Apple licensed the "IOS" trademark from Cisco.^[57]

The [Apple Watch smartwatch](#) was announced by Tim Cook on September 9, 2014, being introduced as a product with health and fitness-tracking.^{[58][59]} It was released on April 24, 2015.^{[60][61][62]} It uses [watchOS](#) as its operating system; watchOS is based on iOS, with new features created specially for the Apple Watch such as an activity tracking app.

On November 22, 2016, a five-second video file originally named "IMG_0942.MP4" started crashing iOS on an increasing count of devices, forcing users to reboot. It [gained massive popularity](#) through social media channels and messaging services.^{[63][64]}

In October 2016, Apple opened its first iOS Developer Academy in [Naples](#) inside [University of Naples Federico II](#)'s new campus.^{[65][66]} The course is completely free, aimed at acquiring specific technical skills on the creation and management of applications for the [Apple ecosystem](#) platforms.^[67] At the academy there are also issues of [business administration](#) (business planning and business management with a focus on digital opportunities) and there is a path dedicated to the design of [graphical interfaces](#). Students have the opportunity to participate in the "Enterprise Track", an in-depth training experience on the entire life cycle of an app, from design to implementation, to security, [troubleshooting](#), data storage and cloud usage.^{[68][69]} As of 2020, the academy graduated almost a thousand students from all over the world, who have worked on 400 app ideas and have already published about 50 apps on the iOS [App Store](#). In the 2018–2019 academic year, students from more than 30 countries arrived. 35 of these have been selected to attend the [Worldwide Developer Conference](#), the annual Apple Developer Conference held annually in California in early June.^{[70][71]}



[Steve Jobs](#), Apple's then CEO, introducing the iPad

On June 3, 2019, [iPadOS](#), the branded version of iOS for iPad, was announced at the 2019 WWDC; it was launched on September 25, 2019.^[72]

Features

Interface

The iOS [user interface](#) is based upon [direct manipulation](#), using [multi-touch](#) gestures such as *swipe*, *tap*, *pinch*, and *reverse pinch*. Interface control elements include sliders, switches, and buttons.^[73] Internal [accelerometers](#) are used by some applications to respond to shaking the device (one common result is the [undo](#) command) or rotating it in [three dimensions](#) (one common result is switching between portrait and landscape mode). Various [accessibility](#) described in [§ Accessibility](#) functions enable users with vision and hearing disabilities to properly use iOS.^[74]

iOS devices boot to the homescreen, the primary navigation and information "hub" on iOS devices, analogous to the [desktop](#) found on personal computers. iOS homescreens are typically made up of app icons and [widgets](#); app icons launch the associated app, whereas widgets display live, auto-updating content, such as a [weather forecast](#), the user's email inbox, or a [news ticker](#) directly on the homescreen.^[75]

Along the top of the screen is a status bar, showing information about the device and its connectivity. The status bar itself contains two elements, the [Control Center](#) and the [Notification Center](#). The Control Center can be "pulled" down from the top right of the notch, on the new iPhones, giving access to various toggles to manage the device more quickly without having to open the Settings. It is possible to manage brightness, volume, wireless connections, music player, etc.^[76]

Instead, scrolling from the top left to the bottom will open the [Notification Center](#), which in the latest versions of iOS is very similar to the lockscreen. It displays notifications in chronological order and groups them by application. From the notifications of some apps it is possible to interact directly, for example by replying a message directly from it. Notifications are sent in two modes, the important notifications that are displayed on the lock screen and signaled by a distinctive sound, accompanied by a warning banner and the app badge icon, and the secondary mode where they are displayed in the Notification Center, but they are not shown on the lock screen, nor are they indicated by warning banners, badge icons or sounds.^{[77][78]}

On earlier iPhones with [home button](#), [screenshots](#) can be created with the simultaneous press of the [home](#) and [power buttons](#). In comparison to [Android OS](#), which requires the buttons to be held down, a short press does suffice on iOS.^[79] On the more recent iPhones which lack a physical home button, screenshots are captured using the volume-up and power buttons instead.^[80]

The camera application used a [skeuomorphic](#) closing camera shutter animation prior to iOS 7. Since then, it uses a simple short blackout effect.^[81] Notable additions over time include HDR photography and the option to save both normal and high dynamic range photographs simultaneously where the former prevents ghosting effects from moving objects (since [iPhone 5](#), [iOS 6](#)), automatic HDR adjustment ([iOS 7.1](#)), "live photo" with short video bundled to each photo if enabled ([iPhone 6s](#), [iOS 9](#)), and a [digital zoom](#) shortcut ([iPhone 7 Plus](#), [iOS 10](#)).^{[82][83][84]} Some camera settings such as video resolution and frame rate are not adjustable through the camera interface itself, but are outsourced to the system settings.^[85]

A new feature in [iOS 13](#) called "context menus" shows related actions when you touch and hold an item. When the context menu is displayed, the background is blurred.^[86]

To choose from a few options, a selection control is used. Selectors can appear anchored at the bottom or in line with the content (called date selectors). Date selectors take on the appearance of any other selection control, but with a column for day, month, and optionally year.

Alerts appear in the center of the screen, but there are also alerts that scroll up from the bottom of the screen (called "action panels"). Destructive actions (such as eliminating any element) are colored red.

The official font of iOS is [San Francisco](#). It is designed for small text readability, and is used throughout the operating system, including third-party apps.^[86]

The icons are 180x180px in size for iPhones with a larger screen, usually models over 6 inches, including [iPhone 11 Pro](#) and [iPhone 8 Plus](#), while it's 120x120px on iPhones with smaller displays.^[87]

Applications

See also: [App Store \(iOS\)](#) and [.ipa](#)

iOS devices come with [preinstalled apps](#) developed by Apple including Mail, Maps, TV, Music, FaceTime, Wallet, Health, and many more.

Applications ("[apps](#)") are the most general form of application [software](#) that can be installed on iOS. They are downloaded from the official catalog of the [App Store](#) digital store, where apps are subjected to security checks before being made available to users. In June 2017, Apple updated its guidelines to specify that app developers will no longer have the ability to use custom prompts for encouraging users to leave reviews for their apps.^{[88][89]} iOS applications can also be installed directly from an IPA file provided by the software distributor, via unofficial ways. They are written using [iOS Software Development Kit](#) (SDK) and, often, combined with [Xcode](#), using officially supported programming languages, including [Swift](#) and [Objective-C](#). Other companies have also created tools that allow for the development of native iOS apps using their respective programming languages.

Applications for iOS are mostly built using components of [UIKit](#), a programming framework. It allows applications to have a consistent look and feel with the OS, nevertheless offering customization.

Elements automatically update along with iOS updates, automatically including new interface rules. UIKit elements are very adaptable, this allows developers to design a single app that looks the same on any iOS device. In addition to defining the iOS interface, UIKit defines the functionality of the application.

At first, Apple did not intend to release an SDK to developers, because they did not want third-party apps to be developed for iOS, building [web apps](#) instead. However, this technology never entered into common use, this led Apple to change its opinion, so in October 2007 the SDK for developers was announced, finally released on March 6, 2008.

The SDK includes an inclusive set of development tools,^[90] including an audio mixer and an iPhone simulator. It is a free download for [Mac](#) users. It is not available for [Microsoft Windows](#) PCs. To test the application, get technical support, and distribute applications through [App Store](#), developers are required to subscribe to the Apple Developer Program.

Over the years, the Apple Store apps surpassed multiple major milestones, including 50,000,^[91] 100,000,^[92] 250,000,^[93] 500,000,^[94] 1 million,^[95] and 2 million apps.^[96] The billionth application was installed on April 24, 2009.^[97]

Home screen

Main article: [SpringBoard](#)

The home screen, rendered by [SpringBoard](#), displays [application](#) icons and a dock at the bottom where users can pin their most frequently used apps. The home screen appears whenever the user unlocks the device or presses the physical "Home" button while in another app.^[98] Before iOS 4 on the iPhone 3GS (or later), the screen's background could be customized only through [jailbreaking](#), but can now be changed out-of-the-box. The screen has a status bar across the top to display data, such as time, battery level, and signal strength. The rest of the screen is devoted to the current application. When a passcode is set and a user switches on the device, the passcode must be entered at the Lock Screen before access to the Home screen is granted.^[99]

In iPhone OS 3, [Spotlight](#) was introduced, allowing users to search media, apps, emails, contacts, messages, reminders, calendar events, and similar content. In iOS 7 and later, Spotlight is accessed by pulling down anywhere on the home screen (except for the top and bottom edges that open Notification Center and Control Center).^{[100][101]} In iOS 9, there are two ways to access Spotlight. As with iOS 7 and 8, pulling down on any homescreen will show Spotlight. However, it can also be accessed as it was in iOS versions 3 through 6. This endows Spotlight with Siri suggestions, which include app suggestions, contact suggestions and news.^[102] In iOS 10, Spotlight is at the top of the now-dedicated "Today" panel.^[103]

Since [iOS 3.2](#), users are able to set a background image for the Home Screen. This feature is only available on third-generation devices—[iPhone 3GS](#), third-generation [iPod Touch](#) (iOS 4.0 or newer), and all iPad models (since iOS 3.2)—or newer.

[iOS 7](#) introduced a parallax effect on the Home Screen, which shifts the device's wallpaper and icons in response to the movement of the device, creating a 3D effect and an illusion of floating icons. This effect is also visible in the tab view of Mail and Safari.^[104]

Researchers found that users organize icons on their homescreens based on usage frequency and relatedness of the applications, as well as for reasons of usability and aesthetics.^[105]

System font

iOS originally used [Helvetica](#) as the system font. Apple switched to [Helvetica Neue](#) exclusively for the [iPhone 4](#) and its [Retina Display](#), and retained Helvetica as the system font for older iPhone devices on iOS 4.^[106] With iOS 7, Apple announced that they would change the system font to Helvetica Neue Light, a decision that

sparked criticism for inappropriate usage of a light, thin typeface for low-resolution mobile screens. Apple eventually chose Helvetica Neue instead.^{[107][108]} The release of iOS 7 also introduced the ability to scale text or apply other forms of text accessibility changes through Settings.^{[109][110]} With iOS 9, Apple changed the font to [San Francisco](#), an Apple-designed font aimed at maximum legibility and font consistency across its product lineup.^{[111][112]}

Folders

iOS 4 introduced folders, which can be created by dragging an application on top of another, and from then on, more items can be added to the folder using the same procedure. A title for the folder is automatically selected by the category of applications inside, but the name can also be edited by the user.^[113] When apps inside folders receive notification badges, the individual numbers of notifications are added up and the total number is displayed as a notification badge on the folder itself.^[113] Originally, folders on an iPhone could include up to 12 apps, while folders on iPad could include 20.^[114] With increasing display sizes on newer iPhone hardware, iOS 7 updated the folders with pages similar to the home screen layout, allowing for a significant expansion of folder functionality. Each page of a folder can contain up to nine apps, and there can be 15 pages in total, allowing for a total of 135 apps in a single folder.^[115] In iOS 9, Apple updated folder sizes for iPad hardware, allowing for 16 apps per page, still at 15 pages maximum, increasing the total to 240 apps.^[116]

Notification Center

Main article: [Notification Center](#)

Before iOS 5, notifications were delivered in a [modal window](#) and couldn't be viewed after being dismissed. In iOS 5, Apple introduced [Notification Center](#), which allows users to view a history of notifications. The user can tap a notification to open its corresponding app, or clear it.^[117] Notifications are now delivered in banners that appear briefly at the top of the screen. If a user taps a received notification, the application that sent the notification will be opened. Users can also choose to view notifications in modal alert windows by adjusting the application's notification settings. Introduced with iOS 8, widgets are now accessible through the Notification Center, defined by 3rd parties.

When an app sends a notification while closed, a red badge appears on its icon. This badge tells the user, at a glance, how many notifications that app has sent. Opening the app clears the badge.

Accessibility

iOS offers various accessibility features to help users with vision and hearing disabilities. One major feature, [VoiceOver](#), provides a voice reading information on the screen, including contextual buttons, icons, links and other [user interface](#) elements, and allows the user to navigate the operating system through gestures. Any apps with default controls and developed with a UIKit [framework](#) gets VoiceOver functionality built in.^[118] One example includes holding up the iPhone to take a photo, with VoiceOver describing the photo scenery.^[119] As part of a "Made for iPhone" program, introduced with the release of [iOS 7](#) in 2013, Apple has developed technology to use [Bluetooth](#) and a special technology protocol to let compatible third-party equipment connect with iPhones and iPads for streaming audio directly to a user's ears. Additional customization available for Made for iPhone products include

battery tracking and adjustable sound settings for different environments.^{[120][121]} Apple made further efforts for accessibility for the release of [iOS 10](#) in 2016, adding a new pronunciation editor to VoiceOver, adding a [Magnifier](#) setting to enlarge objects through the device's camera, software [TTY](#) support for deaf people to make phone calls from the iPhone, and giving tutorials and guidelines for third-party developers to incorporate proper accessibility functions into their apps.^[122]

In 2012, Liat Kornowski from [The Atlantic](#) wrote that "the iPhone has turned out to be one of the most revolutionary developments since the invention of [Braille](#)",^[123] and in 2016, Steven Aquino of [TechCrunch](#) described Apple as "leading the way in assistive technology", with Sarah Herrlinger, Senior Manager for Global Accessibility Policy and Initiatives at Apple, stating that "We see accessibility as a basic human right. Building into the core of our products supports a vision of an inclusive world where opportunity and [access to information](#) are barrier-free, empowering individuals with disabilities to achieve their goals".^[124]

Criticism has been aimed at iOS depending on both internet connection (either WiFi or through iTunes) and a working [SIM card](#) upon first activation.^[125] This restriction has been loosened in iOS 12, which no longer requires the latter.^[126]

Multitasking

[Multitasking](#) for iOS was first released in June 2010 along with the release of [iOS 4](#).^{[127][128]} Only certain devices—[iPhone 4](#), [iPhone 3GS](#), and [iPod Touch](#) 3rd generation—were able to multitask.^[129] The [iPad](#) did not get multitasking until iOS 4.2.1 in that November.^[130]

The implementation of multitasking in iOS has been criticized for its approach, which limits the work that applications in the background can perform to a limited function set and requires application developers to add explicit support for it.^{[129][131]}

Before iOS 4, multitasking was limited to a selection of the applications Apple included on the device. Users could however "jailbreak" their device in order to unofficially multitask.^[132] Starting with iOS 4, on third-generation and newer iOS devices, multitasking is supported through seven background [APIs](#):^[133]

1. Background audio – application continues to run in the background as long as it is playing audio or video content^[134]
2. Voice over IP – application is suspended when a phone call is not in progress^[134]
3. Background location – application is notified of location changes^[134]
4. [Push notifications](#)
5. Local notifications – application schedules local notifications to be delivered at a predetermined time^[134]
6. Task completion – application asks the system for extra time to complete a given task^[134]
7. Fast app switching – application does not execute any code and may be removed from memory at any time^[134]

In iOS 5, three new background APIs were introduced:

1. Newsstand – application can download content in the background to be ready for the user^[134]
2. External Accessory – application communicates with an external accessory and shares data at regular intervals^[134]
3. Bluetooth Accessory – application communicates with a bluetooth accessory and shares data at regular intervals^[134]

In iOS 7, Apple introduced a new multitasking feature, providing all apps with the ability to perform background updates. This feature prefers to update the user's most frequently used apps and prefers to use Wi-Fi networks over a cellular network, without markedly reducing the device's battery life.

Switching applications

In iOS 4.0 to iOS 6.x, double-clicking the home button activates the application switcher. A scrollable dock-style interface appears from the bottom, moving the contents of the screen up. Choosing an icon switches to an application. To the far left are icons which function as music controls, a rotation lock, and on iOS 4.2 and above, a volume controller.

With the introduction of iOS 7, double-clicking the home button also activates the application switcher. However, unlike previous versions it displays screenshots of open applications on top of the icon and horizontal scrolling allows for browsing through previous apps, and it is possible to close applications by dragging them up, similar to how [WebOS](#) handled multiple cards.^[135]

With the introduction of iOS 9, the application switcher received a significant visual change; while still retaining the card metaphor introduced in iOS 7, the application icon is smaller, and appears above the screenshot (which is now larger, due to the removal of "Recent and Favorite Contacts"), and each application "card" overlaps the other, forming a [rolodex](#) effect as the user scrolls. Now, instead of the home screen appearing at the leftmost of the application switcher, it appears rightmost.^[136] In [iOS 11](#), the application switcher receives a major redesign. In the iPad, the [Control Center](#) and app switcher are combined. The app switcher in the iPad can also be accessed by swiping up from the bottom. In the iPhone, the app switcher cannot be accessed if there are no apps in the [RAM](#).

Ending tasks

In iOS 4.0 to iOS 6.x, briefly holding the icons in the application switcher makes them "jiggle" (similarly to the homescreen) and allows the user to *force* quit the applications by tapping the red minus circle that appears at the corner of the app's icon.^[137] Clearing applications from multitasking stayed the same from iOS 4.0 through 6.1.6, the last version of iOS 6.

As of iOS 7, the process has become faster and easier. In iOS 7, instead of holding the icons to close them, they are closed by simply swiping them upwards off the screen. Up to three apps can be cleared at a time compared to one in versions up to iOS 6.1.6.^[138]

Task completion

Task completion allows apps to continue a certain task after the app has been suspended.^{[139][140]} As of iOS 4.0, apps can request up to ten minutes to complete a task in the background.^[141] This doesn't extend to background uploads and

downloads though (e.g. if a user starts a download in one application, it won't finish if they switch away from the application).

Siri

Main article: [Siri](#)

Siri (/ˈsɪri/) is an [intelligent personal assistant](#) integrated into iOS. The assistant uses voice queries and a [natural language user interface](#) to answer questions, make recommendations, and perform actions by delegating requests to a set of Internet services. The software adapts to users' individual language usages, searches, and preferences, with continuing use. Returned results are individualized.

Originally released as an app for iOS in February 2010,^[142] it was acquired by Apple two months later,^{[143][144][145]} and then integrated into [iPhone 4S](#) at its release in October 2011.^{[146][147]} At that time, the separate app was also removed from the iOS [App Store](#).^[148]

Siri supports a wide range of user commands, including performing phone actions, checking basic information, scheduling events and reminders, handling device settings, searching the Internet, navigating areas, finding information on entertainment, and is able to engage with iOS-integrated apps.^[149] With the release of [iOS 10](#) in 2016, Apple opened up limited third-party access to Siri, including third-party messaging apps, as well as payments, ride-sharing, and Internet calling apps.^{[150][151]} With the release of [iOS 11](#), Apple updated Siri's voices for more clear, human voices, it now supports follow-up questions and language translation, and additional third-party actions.^{[152][153]}

Game Center

Main article: [Game Center](#)

Game Center is an [online multiplayer](#) "social gaming network"^[154] released by Apple.^[155] It allows users to "invite friends to play a game, start a multiplayer game through matchmaking, track their [achievements](#), and compare their high scores on a [leaderboard](#)." iOS 5 and above adds support for profile photos.^[154]

Game Center was announced during an iOS 4 preview event hosted by Apple on April 8, 2010. A preview was released to registered Apple developers in August.^[154] It was released on September 8, 2010, with iOS 4.1 on [iPhone 4](#), iPhone 3GS, and iPod Touch 2nd generation through 4th generation.^[156] Game Center made its public debut on the iPad with iOS 4.2.1.^[157] There is no support for the [iPhone 3G](#), [original iPhone](#) and the [first-generation iPod Touch](#) (the latter two devices did not have Game Center because they did not get iOS 4).^[158] However, Game Center is unofficially available on the iPhone 3G via a hack.^[159]

Hardware

The main hardware platform for iOS is the [ARM architecture](#) (the [ARMv7](#), [ARMv8-A](#), [ARMv8.2-A](#), [ARMv8.3-A](#)). iOS releases before [iOS 7](#) can only be run on iOS devices with [32-bit](#) ARM processors ([ARMv6](#) and [ARMv7-A](#) architectures). In 2013, [iOS 7](#) was released with full [64-bit](#) support (which includes a native 64-bit

List of locales by iOS version hide

Language	English name	1.0	1.1.2	2.0	2.1	2.2	3.0	3.1	4	5	6	7	8	9	10+
Deutsch (Österreich)	German (Austria)	No	No	No	No	No	No	No	No	No	No	No	Note 2	Yes	Yes
Deutsch (Schweiz)	German (Switzerland)	No	No	No	No	No	No	No	No	No	No	No	Note 2	Yes	Yes
Русский	Russian	No	Note 1	Yes	Yes	Yes									
Português (Brasil)	Portuguese (Brazil)	No	Note 1	Yes	Yes	Yes									
Português (Portugal)	Portuguese (Portugal)	No	No	No	No	No	Yes	Yes	Yes						
Italiano (Italia)	Italian (Italy)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Italiano (Svizzera)	Italian (Switzerland)	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes
한국어	Korean	No	Note 1	Yes	Yes	Yes									
Türkçe	Turkish	No	No	No	Yes	Yes	Yes								
Nederlands (Nederland)	Dutch (Netherlands)	No	Note 1	Yes	Yes	Yes									
Nederlands (België)	Dutch (Belgium)	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes

List of locales by iOS version hide

Language	English name	1.0	1.1.2	2.0	2.1	2.2	3.0	3.1	4	5	6	7	8	9	10+
Čeština	Czech	No	No	No	No	No	Yes								
Català	Catalan	No	No	No	No	No	No	No	Yes						
Slovenčina	Slovak	No	No	No	No	No	Yes								
Українська	Ukrainian	No	No	No	Yes										
Hrvatski	Croatian	No	No	No	No	No	Yes								
Bahasa Melayu	Malay	No	No	No	No	No	Yes								
हिन्दी	Hindi	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes	Yes

Notes

1. The iPod Touch at its launch supported English, French, German, Japanese, Dutch, Italian, Spanish, Portuguese, Danish, Finnish, Norwegian, Swedish, Korean, Simplified Chinese, Traditional Chinese, Russian, and Polish. However, most of these languages were not available in the iPhone until iPhone 2.0.
2. As of iOS 8, users can add more than one locale to use on the device. If one language is not supported, the next one is used instead. The language on the top of the list is the primary one.
3. While these regions are present in iOS 8, they fall back to the generic regions for the system language. This issue has been resolved in iOS 9 and later, when a default region is added.
 - o **de-AT, de-CH:** de
 - o **en-CA, en-US:** en
 - o **es-ES:** es
 - o **es-419:** es-MX
 - o **fr-CH:** fr

4. iOS 9 and above improved the locale handling process, now applying a default region to those that have multiple regions. The region is not displayed in the locale name if the region is the same as the country/region setting, or if only one region is added for a language.
 - **German:** German (Germany)
 - **English:** English (US)
 - **Spanish:** Spanish (Spain)
 - **French:** French (France)
 - **Italian:** Italian (Italy)
 - **Dutch:** Dutch (Netherlands)
 - **Portuguese:** Portuguese (Brazil)
 - **Chinese, Traditional:** Chinese, Traditional (Taiwan)
5. Dutch (Belgium) was previously shown as Flemish in iOS 9 before being fixed in iOS 10, to bring it more in line with other locales.
6. iOS 10 and macOS Sierra were the last versions in which new locales were added for the languages supported by iOS and macOS.
 - **English (US):** United States, Canada
 - **English (UK):** United Kingdom, Ireland, Singapore, South Africa
 - **English (Australia):** Australia, New Zealand
 - **English (India):** India
 - **Chinese, Simplified:** China mainland
 - **Chinese, Traditional (Taiwan):** Taiwan
 - **Chinese, Traditional (Hong Kong):** Hong Kong, Macau
 - **Japanese:** Japan
 - **Spanish (Spain):** Spain
 - **Spanish (Latin America):** Latin America, Argentina, Bolivia, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, Uruguay, US, Venezuela
 - **French (France):** France, Belgium, Switzerland
 - **French (Canada):** Canada
 - **German:** Germany, Austria, Switzerland
 - **Russian:** Russia
 - **Portuguese (Brazil):** Brazil
 - **Portuguese (Portugal):** Portugal
 - **Italian:** Italy, Switzerland
 - **Korean:** South Korea
 - **Turkish:** Turkey
 - **Dutch:** Netherlands, Belgium
 - **Arabic:** Saudi Arabia
 - **Thai:** Thailand
 - **Swedish:** Sweden
 - **Danish:** Denmark
 - **Vietnamese:** Vietnam
 - **Norwegian Bokmål:** Norway
 - **Polish:** Poland
 - **Finnish:** Finland

- **Indonesian:** Indonesia
 - **Hebrew:** Israel
 - **Greek:** Greece
 - **Romanian:** Romania
 - **Hungarian:** Hungary
 - **Czech:** Czechia
 - **Catalan:** Spain
 - **Slovak:** Slovakia
 - **Ukrainian:** Ukraine
 - **Croatian:** Croatia
 - **Malay:** Malaysia
 - **Hindi:** India
7. It is possible to add custom locales in the iOS Simulator by editing the AppleLanguages portion of the .GlobalPreferences.plist file for each simulator.

Development

Main article: [iOS SDK](#)

The iOS SDK ([Software Development Kit](#)) allows for the development of [mobile apps](#) on iOS.

While originally developing [iPhone](#) prior to its unveiling in 2007, Apple's then-[CEO Steve Jobs](#) did not intend to let third-party developers build native apps for iOS, instead directing them to make [web applications](#) for the [Safari web browser](#).^[166] However, backlash from developers prompted the company to reconsider,^[166] with Jobs announcing in October 2007 that Apple would have a software development kit available for developers by February 2008.^{[167][168]} The SDK was released on March 6, 2008.^{[169][170]}

The SDK is a free download for users of [Mac](#) personal computers.^[171] It is not available for [Microsoft Windows](#) PCs.^[171] The SDK contains sets giving developers access to various functions and services of iOS devices, such as hardware and software attributes.^[172] It also contains an iPhone [simulator](#) to mimic the look and feel of the device on the computer while developing.^[172] New versions of the SDK accompany new versions of iOS.^{[173][174]} In order to test applications, get technical support, and distribute apps through App Store, developers are required to subscribe to the Apple Developer Program.^[171]

Combined with [Xcode](#), the iOS SDK helps developers write iOS apps using officially supported programming languages, including [Swift](#) and [Objective-C](#).^[175] Other companies have also created tools that allow for the development of native iOS apps using their respective programming languages.^{[176][177]}

Update schedule

Main article: [iOS version history](#)

Platform usage as measured by the [App Store](#) on May 31th, 2022^[178]

[Apple](#) provides major updates to the iOS operating system annually via [iTunes](#) and, since iOS 5, also [over-the-air](#).^[179] The device checks an XML-based PLIST file on [mesu.apple.com](#) for updates. Updates are delivered as unencrypted ZIP files. On all except the earlier iOS devices, update availability is checked regularly, and the user prompted to permit automatic installation.

Stable version [iOS 15](#) was released on September 20, 2021, available for [iPhone 6S](#) and later, and the [seventh-generation iPod Touch](#).^[180] [iPadOS 15](#) was also released. Apple introduced iOS 15 and iPadOS 15 at its annual [WWDC](#) keynote conference on June 22, 2020.^[181] iPadOS 15 is available on the same devices as iOS 14. Devices supported are [iPad Air 2](#) and later, [iPad fifth-generation and later](#), [iPad Mini 4](#) and later and all versions of the [iPad Pro](#).^[182] The update introduced new features including redesigned notifications, a more informative Weather app, Focus Mode, SharePlay, and Live Text [OCR](#).^[183]

iPod Touch users originally had to pay for system software updates due to accounting rules that designated it not a "subscription device" like iPhone or Apple TV,^{[184][185]} causing iPod Touch owners not to update.^[186] In September 2009, a change in accounting rules won tentative approval, affecting Apple's earnings and stock price, and allowing iPod Touch updates to be delivered free of charge.^{[187][188]}

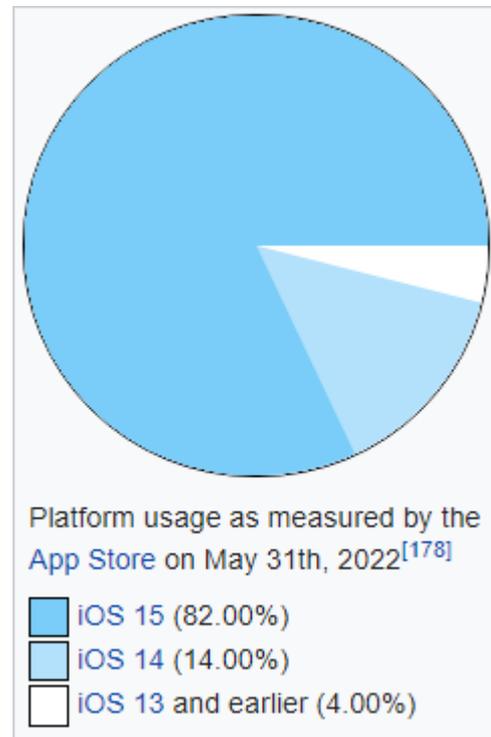
Apple significantly extended the cycle of updates for iOS-supported devices over the years. The [iPhone \(1st generation\)](#) and [iPhone 3G](#) only received two iOS updates, while later models had support for five, six, and seven years.^{[189][190]}

XNU kernel

The iOS kernel is the [XNU](#) kernel of [Darwin](#). The original iPhone OS (1.0) up to iPhone OS 3.1.3 used Darwin 9.0.0d1. iOS 4 was based on Darwin 10. iOS 5 was based on Darwin 11. iOS 6 was based on Darwin 13. iOS 7 and iOS 8 are based on Darwin 14. iOS 9 is based on Darwin 15. iOS 10 is based on Darwin 16. iOS 11 is based on Darwin 17. iOS 12 is based on Darwin 18. iOS 13 is based on Darwin 19.^[191]

In [iOS 6](#) the kernel is subject to [ASLR](#), similar to that of [OS X Mountain Lion](#). This makes exploit possibilities more complex since it is not possible to know the location of kernel code.

Since XNU is based on the BSD kernel, it is [open source](#).^[192] The source is under a 3-clause^[193] BSD license for the original BSD parts, with parts added by Apple under the Apple Public Source License.^[194] The versions contained in iOS are not available; only the versions used in [macOS](#) are available.



iOS does not have [kernel extensions](#) (kexts) in the file system, even if they are actually present. The kernel cache can be decompressed to show the correct kernel, along with the kexts (all packed in the `__PRELINK_TEXT` section) and their plists (in the `__PRELINK_INFO` section).

The kernel cache can also be directly decompressed (if decrypted) using third-party tools. With the advent of iOS 10 betas and default plain text kernelcaches, these tools can only be used after unpacking and applying lzssdec to unpack the kernel cache to its full size.

The kextstat provided by the [Cydia](#) alternative software does not work on iOS because the kextstat is based on `kmod_get_info(...)`, which is a deprecated API in [iOS 4](#) and [Mac OS X Snow Leopard](#). There are other alternative software that can also dump raw XML data.

On developing devices, the kernel is always stored as a statically linked cache stored in `/System/Library/Caches/com.apple.kernelcaches/kernelcache` which is unpacked and executed at boot.

In the beginning, iOS had a kernel version usually higher than the corresponding version of [macOS](#). Over time, the kernels of iOS and macOS have gotten closer. This is not surprising, considering that iOS introduced new features (such as the ASLR Kernel, the default freezer, and various security-strengthening features) that were first incorporated and subsequently arrived on macOS. It appears Apple is gradually merging the iOS and macOS kernels over time. The build date for each version varies slightly between processors. This is due to the fact that the builds are sequential.

The latest version of the Darwin Kernel updated to [iOS 13.6](#) is 19.6.0, dated July 27, 2020, while for [iOS 14](#) beta 4 it is 20.0.0, dated July 27, 2020.

[showKernel Builds](#)

Kernel Image

The kernel image base is randomized by the boot loader ([iBoot](#)). This is done by creating random data, doing a SHA-1 hash of it and then using a byte from the SHA-1 hash for the kernel slide. The slide is calculated with this formula:

```
base=0x01000000+(slide_byte*0x00200000)
```

If the slide is 0, the static offset of 0x21000000 is used instead.

The adjusted base is passed to the kernel in the boot arguments structure at offset `0x04`, which is equivalent to `gBootArgs->virtBase`.

Kernel Map

The kernel map is used for kernel allocations of all types (`kalloc()`, `kernel_memory_allocate()`, etc.) and spans all of kernel space

(0x80000000-0xFFFFFFFF). The kernel based maps are submaps of the `kernel_map`, for example `zone_map`, `ipc_kernel_map`, etc.

The strategy is to randomize the base of the `kernel_map`. A random 9-bit value is generated right after `kmem_init()` which establishes `kernel_map`, is multiplied by the page size. The resulting value is used as the size for the initial `kernel_map` allocation. Future `kernel_map` (and submap) allocations are pushed forward by a random amount. The allocation is silently removed after the first garbage collection and reused. This behavior can be overridden with the "`kmapoff`" boot parameter.

Attacks



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`Kext_request()` allows applications to request information about kernel modules, divided into active and passive operations. Active operations (load, unload, start, stop, etc.) require root access. iOS removes the ability to load kernel extensions. Passive operations were originally (before [iOS 6](#)) unrestricted and allowed unprivileged users to query kernel module base addresses. iOS6 inadvertently removed some limitations; only the load address requests are disallowed. So attackers can use `kKextRequestPredicateGetLoaded` to get load addresses and mach-o header dumps. The load address and mach-o segment headers are obscured to hide the ASLR slide, but mach-o section headers are not. This reveals the virtual addresses of loaded kernel sections.

This information leak has been closed with iOS 6.0.1.

Versions codenames

Main article: [List of Apple codenames § iOS](#)

Internally, iOS identifies each version by a **codename**, often used internally only, normally to maintain secrecy of the project. For example, the codename for [iOS 14](#) is *Azul*.

Jailbreaking

Main article: [iOS jailbreaking](#)

Since its initial release, iOS has been subject to a variety of different hacks centered around adding functionality not allowed by Apple.^[195] Prior to the 2008 debut of Apple's native [iOS App Store](#), the primary motive for jailbreaking was to bypass

Apple's purchase mechanism for installing the App Store's native applications.^[196] Apple claimed that it would not release iOS software updates designed specifically to break these tools (other than applications that perform [SIM unlocking](#)); however, with each subsequent iOS update, previously un-patched jailbreak exploits are usually patched.^[197]

When a device is booting, it loads Apple's own [kernel](#) initially, so a jailbroken device must be exploited and have the kernel patched each time it is booted up.

There are different types of jailbreak. An *untethered* jailbreak uses exploits that are powerful enough to allow the user to turn their device off and back on at will, with the device starting up completely, and the kernel will be patched without the help of a computer – in other words, it will be jailbroken even after each reboot.

However, some jailbreaks are [tethered](#). A tethered jailbreak is only able to temporarily jailbreak the device during a single boot. If the user turns the device off and then boots it back up without the help of a jailbreak tool, the device will no longer be running a patched kernel, and it may get stuck in a partially started state, such as Recovery Mode. In order for the device to start completely and with a patched kernel, it must be "re-jailbroken" with a computer (using the "boot tethered" feature of a tool) each time it is turned on. All changes to the files on the device (such as installed package files or edited system files) will persist between reboots, including changes that can only function if the device is jailbroken (such as installed package files).

In more recent years, two other solutions have been created – *semi-tethered* and *semi-untethered*.

A semi-tethered solution is one where the device is able to start up on its own, but it will no longer have a patched kernel, and therefore will not be able to run modified code. It will, however, still be usable for normal functions, just like stock iOS. To start with a patched kernel, the user must start the device with the help of the jailbreak tool.

A semi-untethered jailbreak gives the ability to start the device on its own. On first boot, the device will not be running a patched kernel. However, rather than having to run a tool from a computer to apply the kernel patches, the user is able to re-jailbreak their device with the help of an app (usually sideloaded using [Cydia](#) Impactor) running on their device. In the case of the iOS 9.2-9.3.3 jailbreak, a Safari-based exploit was available, thereby meaning a website could be used to re-jailbreak.

In more detail: Each iOS device has a bootchain that tries to make sure only trusted/signed code is loaded. A device with a tethered jailbreak is able to boot up with the help of a jailbreaking tool because the tool executes exploits via USB that bypass parts of that "chain of trust", bootstrapping to a [pwned](#) (no signature check) [iBSS](#), [iBEC](#), or [iBoot](#) to finish the boot process.

Since the arrival of Apple's native iOS App Store, and—along with it—third-party applications, the general motives for jailbreaking have changed.^[198] People jailbreak for many different reasons, including gaining filesystem access, installing custom device themes, and modifying SpringBoard. An additional motivation is that it may enable the installation of pirated apps. On some devices, jailbreaking also makes it possible to install alternative operating systems, such as Android and the Linux kernel. Primarily, users jailbreak their devices because of the limitations of iOS.

Depending on the method used, the effects of jailbreaking may be permanent or temporary.^[199]

In 2010, the [Electronic Frontier Foundation](#) (EFF) successfully convinced the U.S. Copyright Office to allow an exemption to the general prohibition on circumvention of copyright protection systems under the [Digital Millennium Copyright Act](#) (DMCA). The exemption allows jailbreaking of iPhones for the sole purpose of allowing legally obtained applications to be added to the iPhone.^[200] The exemption does not affect the contractual relations between Apple and an iPhone owner, for example, jailbreaking voiding the iPhone warranty; however, it is solely based on Apple's discretion on whether they will fix jailbroken devices in the event that they need to be repaired. At the same time, the Copyright Office exempted unlocking an iPhone from DMCA's anticircumvention prohibitions.^[201] Unlocking an iPhone allows the iPhone to be used with any wireless carrier using the same GSM or CDMA technology for which the particular phone model was designed to operate.^[202]

Unlocking

Main article: [SIM lock](#)

Initially most wireless carriers in the US did not allow iPhone owners to unlock it for use with other carriers. However AT&T allowed iPhone owners who had satisfied contract requirements to unlock their iPhone.^[203] Instructions to unlock the device are available from Apple,^[204] but it is ultimately at the sole discretion of the carrier to authorize unlocking the device.^[205] This allows the use of a carrier-sourced iPhone on other networks. Modern versions of iOS and the iPhone fully support LTE across multiple carriers wherever the phone was purchased.^[206] Programs to remove SIM lock restrictions are available, but are not supported by Apple, and most often not a permanent unlock – a soft unlock,^[207] which modifies the iPhone so that the baseband will accept the [SIM](#) card of any GSM carrier. SIM unlocking is not jailbreaking, but a jailbreak is also required for these unofficial software unlocks.

The legality of software unlocking varies in each country; for example, in the US, there is a DMCA exemption for unofficial software unlocking of devices purchased before January 26, 2013.^[208]

Digital rights management

The closed and proprietary nature of iOS has garnered criticism, particularly by [digital rights](#) advocates such as the [Electronic Frontier Foundation](#), computer engineer and activist [Brewster Kahle](#), Internet-law specialist [Jonathan Zittrain](#), and the [Free Software Foundation](#) who protested the iPad's introductory event and have targeted the iPad with their "[Defective by Design](#)" campaign.^{[209][210][211][212]} Competitor [Microsoft](#), via a PR spokesman, criticized Apple's control over its platform.^[213]

At issue are restrictions imposed by the design of iOS, namely [digital rights management](#) (DRM) intended to lock purchased media to Apple's platform, the development model (requiring a yearly subscription to distribute apps developed for the iOS), the centralized approval process for apps, as well as Apple's general control and lockdown of the platform itself. Particularly at issue is the ability for Apple to remotely disable or delete apps at will.

Some in the tech community have expressed concern that the locked-down iOS represents a growing trend in Apple's approach to computing, particularly Apple's shift away from machines that hobbyists can "tinker with" and note the potential for such restrictions to stifle software innovation.^{[214][215]} Former [Facebook](#) developer [Joe Hewitt](#) protested against Apple's control over its hardware as a "horrible precedent" but praised iOS's [sandboxing](#) of apps.^[216]

Security and privacy

See also: [Mobile security](#) and [WARRIOR PRIDE](#)

iOS utilizes many security features in both hardware and software. Below are summaries of the most prominent features.

Secure Boot

Before fully booting into iOS, there is low-level code that runs from the Boot [ROM](#). Its task is to verify that the Low-Level [Bootloader](#) is signed by the Apple [Root CA](#) public [key](#) before running it. This process is to ensure that no malicious or otherwise unauthorized software can be run on an iOS device. After the Low-Level Bootloader finishes its tasks, it runs the higher level bootloader, known as [iBoot](#). If all goes well, iBoot will then proceed to load the iOS kernel as well as the rest of the operating system.^[217]

Secure Enclave

The Secure Enclave is a [coprocessor](#) found in iOS devices part of the A7 and newer chips used for data protection, [Touch ID](#) and [Face ID](#). The purpose of the Secure Enclave is to handle keys and other info such as biometrics that is sensitive enough to not be handled by the Application Processor (AP). It is isolated with a hardware filter so the AP cannot access it. It shares RAM with the AP, but its portion of the RAM (known as TZ0) is encrypted. The secure enclave itself is a flashable 4 MB AKF processor core called the secure enclave processor (SEP) as documented in [Apple Patent Application 20130308838](#). The technology used is similar to [ARM's TrustZone/SecurCore](#) but contains proprietary code for Apple KF cores in general and SEP specifically. It is also responsible for generating the UID key on A9 or newer chips that protects user data at rest.^[218]

It has its own secure boot process to ensure that it is completely secure. A hardware [random number generator](#) is also included as a part of this coprocessor. Each device's Secure Enclave has a unique ID that is given to it when it is made and cannot be changed. This identifier is used to create a temporary key that [encrypts](#) the [memory](#) in this portion of the system. The Secure Enclave also contains an anti-replay counter to prevent [brute force attacks](#).^[217]

The SEP is located in the devicetree under IODevicetree:/arm-io/sep and managed by the AppleSEPManager driver.^[219]

In 2020, security flaws in the SEP were discovered, causing concerns about Apple devices such as iPhones.^[220]

Face ID

Main article: [Face ID](#)

Face ID is a face scanner that is embedded in the notch on iPhone models [X](#), [XS](#), [XS Max](#), [XR](#), [11](#), [11 Pro](#), [11 Pro Max](#), [12](#), [12 Mini](#), [12 Pro](#), and [12 Pro Max](#), and [13](#), [13 Mini](#), [13 Pro](#), and [13 Pro Max](#). It can be used to unlock the device, make purchases, and log into applications among other functions. When used, Face ID only temporarily stores the face data in encrypted memory in the Secure Enclave, as described above. There is no way for the device's [main processor](#) or any other part of the system to access the raw data that is obtained from the Face ID sensor.^[217]

Passcode

iOS devices can have a passcode that is used to unlock the device, make changes to system settings, and encrypt the device's contents. Until recently, these were typically four numerical digits long. However, since unlocking the devices with a fingerprint by using Touch ID has become more widespread, six-digit passcodes are now the default on iOS with the option to switch back to four or use an alphanumeric passcode.^[217]

Touch ID

Main article: [Touch ID](#)

Touch ID is a fingerprint scanner that is embedded in the home button and can be used to unlock the device, make purchases, and log into applications among other functions. When used, Touch ID only temporarily stores the fingerprint data in encrypted memory in the Secure Enclave, as described above. There is no way for the device's [main processor](#) or any other part of the system to access the raw fingerprint data that is obtained from the Touch ID sensor.^[217]

Address Space Layout Randomization

Main article: [Address Space Layout Randomization](#)

Address Space Layout Randomization (ASLR) is a low-level technique of preventing [memory corruption](#) attacks such as [buffer overflows](#). It involves placing data in randomly selected locations in memory in order to make it more difficult to predict ways to corrupt the system and create exploits. ASLR makes app bugs more likely to crash the app than to silently overwrite memory, regardless of whether the behavior is accidental or malicious.^[221]

Non-executable memory

iOS utilizes the [ARM architecture](#)'s [Execute Never \(XN\)](#) feature. This allows some portions of the memory to be marked as non-executable, working alongside ASLR to prevent buffer overflow attacks including [return-to-libc attacks](#).^[217]

Encryption

As mentioned above, one use of encryption in iOS is in the memory of the [Secure Enclave](#). When a passcode is utilized on an iOS device, the contents of the device are encrypted. This is done by using a hardware [AES](#) 256 implementation that is very efficient because it is placed directly between the [flash storage](#) and RAM.^[217]

iOS, in combination with its specific hardware, uses [crypto-shredding](#) when erasing all content and settings by [obliterating](#) all the keys in 'effaceable storage'. This renders all user data on the device cryptographically inaccessible.^[221]

Keychain

The iOS keychain is a [database](#) of login information that can be shared across apps written by the same person or organization.^[217] This service is often used for storing passwords for web applications.^[223]

App security

Third-party applications such as those distributed through the App Store must be code signed with an Apple-issued [certificate](#). In principle, this continues the [chain of trust](#) all the way from the Secure Boot process as mentioned above to the actions of the applications installed on the device by users. Applications are also [sandboxed](#), meaning that they can only modify the data within their individual [home directory](#) unless explicitly given permission to do otherwise. For example, they cannot access data owned by other user-installed applications on the device. There is a very extensive set of privacy controls contained within iOS with options to control apps' ability to access a wide variety of permissions such as the camera, contacts, background app refresh, cellular data, and access to other data and services. Most of the code in iOS, including third-party applications, runs as the "mobile" user which does not have [root privileges](#). This ensures that system files and other iOS system resources remain hidden and inaccessible to user-installed applications.^[217]

App Store bypasses

Companies can apply to Apple for enterprise developer certificates. These can be used to sign apps such that iOS will install them directly (sometimes called "sideloading"), without the app needing to be distributed via the App Store.^[224] The terms under which they are granted make clear that they are only to be used for companies who wish to distribute apps directly to their employees.^[224]

Circa January–February 2019, it emerged that a number of software developers were misusing enterprise developer certificates to distribute software directly to non-employees, thereby bypassing the App Store. Facebook was found to be abusing an Apple enterprise developer certificate to distribute an application to underage users that would give Facebook access to all [private data](#) on their devices.^{[225][226][227]} Google was abusing an Apple enterprise developer certificate to distribute an app to adults to collect data from their devices, including unencrypted data belonging to third parties.^{[228][224]} TutuApp, Panda Helper, [AppValley](#), and TweakBox have all been abusing enterprise developer certificates to distribute apps that offer [pirated software](#).^[229]

Network security

iOS supports [TLS](#) with both low- and high-level [APIs](#) for developers. By default, the App Transport Security framework requires that servers use at least TLS 1.2. However, developers are free to override this framework and utilize their own methods of communicating over networks. When Wi-Fi is enabled, iOS uses a randomized [MAC address](#) so that devices cannot be tracked by anyone [sniffing](#) wireless traffic.^[217]

Two-factor authentication

Main article: [Multi-factor authentication](#)

Two-factor authentication is an option in iOS to ensure that even if an unauthorized person knows an [Apple ID](#) and password combination, they cannot gain access to the account. It works by requiring not only the Apple ID and password, but also a verification code that is sent to an [iDevice](#) or mobile phone number that is already known to be trusted.^[217] If an unauthorized user attempts to sign in using another user's Apple ID, the owner of the Apple ID receives a notification that allows them to deny access to the unrecognized device.^[230]

Reception

Market share

Main article: [Usage share of operating systems](#)



This section needs to be **updated**. Please help update this article to reflect recent events or newly available information. (*May 2022*)

iOS is the second most popular mobile operating system in the world, after [Android](#). Sales of iPads in recent years are also behind Android, while, by web use (a proxy for all use), iPads (using iOS) are still the most popular.^[231]

By the middle of 2012, there were 410 million devices activated.^[232] At [WWDC 2014](#), [Tim Cook](#) said 800 million devices had been sold by June 2014.^[233]

During Apple's quarterly earnings call in January 2015, the company announced that they had sold over one billion iOS devices since 2007.^{[234][235]}

By late 2011, iOS accounted for 60% of the market share for smartphones and tablets.^[236] By the end of 2014, iOS accounted for 14.8% of the smartphone market^[237] and 27.6% of the tablet and two-in-one market.^[238] In February 2015, [StatCounter](#) reported iOS was used on 23.18% of smartphones and 66.25% of tablets worldwide, measured by internet usage instead of sales.^[239]

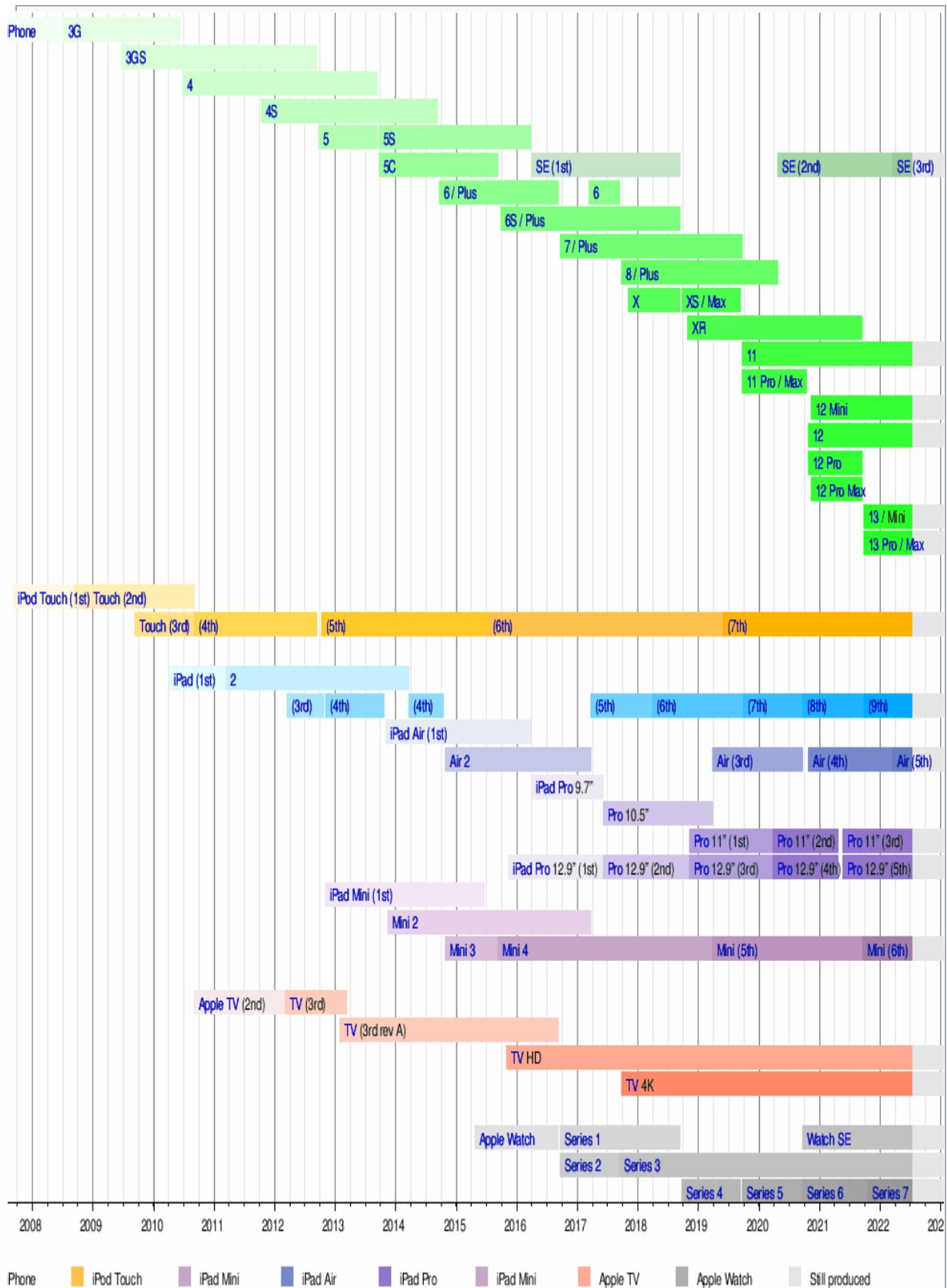
In the third quarter of 2015, research from Strategy Analytics showed that iOS adoption of the worldwide smartphone market was at a record low 12.1%, attributed to lackluster performance in China and Africa. Android accounted for 87.5% of the market, with Windows Phone and BlackBerry accounting for the rest.^{[240][241]}

Devices

Main article: [List of iOS devices](#)

Timeline of iOS devices: iPhone, iPod, iPad, and Apple TV (2G) models

- [y](#)
- [t](#)
- [e](#)



Sources: [Apple Newsroom Archive](#),^[242] [MacTracker](#) Apple Inc. model database^[243]
 See also: [Timeline of iPod models](#), [iOS version history](#), and [iPod & Timeline of iPod models](#)

See also

- [Comparison of mobile operating systems](#)
- [Android \(operating system\)](#)
-  [Computer programming portal](#)
-  [Telephones portal](#)

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External links



Wikimedia Commons has media related to [iOS \(Apple Inc.\)](#).

- [Official website](#)
- [Official website](#) Dev Center at [Apple Developer Connection](#)
- [iOS Reference Library](#) – on the Apple Developer Connection website

Using iOS – Beginners guide

- [iPhone – The Complete Beginners Guide - YouTube](#)

11 useful iOS 15 features every iPhone user should know



iOS 15 offers a slate of features that can simplify tasks in your everyday life. Dave Johnson

- **1. Unlock your iPhone with a face mask on**
- **2. Share your screen in FaceTime with SharePlay**
- **3. Let Windows and Android users join a FaceTime call**
- **4. Use Live Text to copy text from photos**
- **5. Filter your notifications with Focus**
- **6. Drag and drop between apps**
- **7. Use tab groups in Safari**
- **8. Find out how your apps are spying on you**
- **9. Change the size of text in any app**
- **10. Get AR walking directions in Maps**
- **11. Put the Safari address bar back at the top**
- New iOS 15 features include the ability to unlock your iPhone while wearing a face mask and the option to copy text from photos with Live Text.
- iOS 15 is the latest release of Apple's iPhone operating system, and its subsequent iterations come with a variety of important updates to previous features.
- Here are 11 of the most important features in iOS 15 that you should know about.
- Visit Insider's Tech Reference library for more stories.

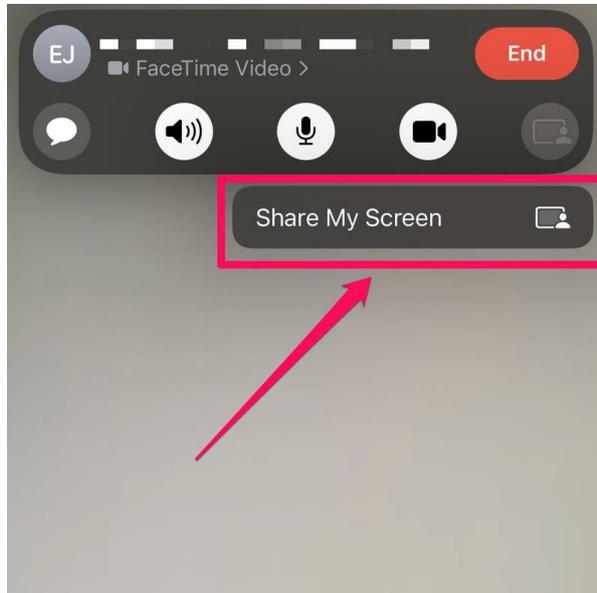
Roughly once a year, Apple releases a new version of the iPhone's operating system, and each year we get a collection of new and refined features. In the early days of iOS, it was easy to impress since the first version of the iPhone didn't even include copy and paste.

Managing to build on previous iOS generations in several compelling ways, iOS 15 includes a collection of new capabilities and some polish on existing features. Here are 11 features in iOS that every iPhone user should know.

1. Unlock your iPhone with a face mask on

The latest iPhone software update, iOS 15.4, includes a feature that helps Face ID recognize your face while you're wearing a face mask. Note that the feature only works to unlock iPhone 12 and 13 models that are updated to iOS 15.4.

2. Share your screen in FaceTime with SharePlay



You can share your screen in FaceTime thanks to iOS 15. Dave Johnson

One of the most compelling new features in iOS 15 is the ability to do more than conduct a face-to-face meeting in FaceTime. Now you can share your screen and media, like music and video, with SharePlay. To do that, just start a FaceTime call and then tap the **SharePlay** button at the top right of the screen. In the pop-up, tap **Share My Screen**.

Anyone else on the call can now see your screen, but if you want to share media like music, photos or video, swipe up from the bottom of the screen to go to the iPhone's home screen, and then start the app you want to share. You can play music in the Music app, start streaming video in a video app, or show images in the Photos app.

Quick tip: If you are sharing subscription content, it will only be shared if the other party in the call has a subscription to that app or service as well.

3. Let Windows and Android users join a FaceTime call

For the first time, non-iOS users can take part in FaceTime calls. To get users on those other devices into a call, start **FaceTime** and then tap **Create Link** at the top of the page. When the **Share** pop-up appears, send the link to your recipients any way you like — such as via email or text message. The recipients simply need to click or tap the link and you'll get a notification on your iPhone that someone wants to join your FaceTime call.

4. Use Live Text to copy text from photos

New Message



Using the Scan Text button in the pop-up toolbar, you can insert text using your camera. Dave Johnson

To:

Cc/Bcc, From:

Subject:

This is the restaurant I was referring to:

|

You can now hold your camera up to text in the real world, such as text in a book, on a road sign, or in a restaurant menu, and paste it into a document. It won't simply be a picture of the text, but fully editable text.

To use the Live Text feature, open the app where you want the text to appear, such as an email, and tap and hold where you want to place the text. The toolbar pop-up should appear. Tap the **Scan Text** button, which looks like lines of text enclosed in brackets. The camera viewfinder will now appear at the bottom of the screen. Position the camera to capture the text you want to insert — you should see a bracket surrounding the text. Tap **Insert** and the text should appear in the document.



You can also simply open any image in your **Photos** app with text, **tap on text** in the image, **drag the highlighted field** to encompass all the text you need, and **tap the**

highlighted field then tap **Copy** in the pop-up menu.

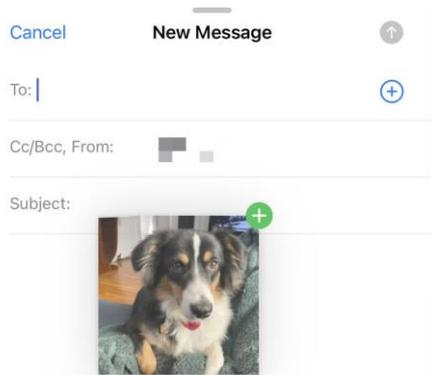
5. Filter your notifications with Focus

With iOS 15, Apple introduces the concept of Focus, which lets you filter your notifications based on your activity and how much distraction you're willing to tolerate. The **Sleep** filter might limit all notifications, for example, while **Personal** might allow through notifications from specific apps and phone calls from important contacts.

To get started with Focus, swipe down from the top right of the screen and tap **Focus** in the **Control Center**. There are a half-dozen default Focus filters to choose from, and if it says **Get Started**, tap it to configure what notifications you will allow when it's on. If it's already configured, tap the **three dots** and then **Settings** to modify it.

When you want to concentrate, just tap the Focus filter you want to enable. To turn it off again, open the **Control Center** and tap the active Focus button to disable it.

6. Drag and drop between apps



It takes two hands and a little practice, but you can drag and drop between apps now. Dave Johnson

You can now drag content from one app to another. For example, you can drag a photo from the Photos app and drop it into a message in the Messages app. Unfortunately, doing this takes a little practice and finger dexterity.

Suppose you want to insert a photo into a message. Open the **Photos** app and find the photo you want to share. Tap and hold the photo, then start to drag it until it moves a bit within the app. Now, without lifting that finger, use a different finger to swipe the app up to return to the home page. Open the **Messages** app (while continuing to hold the

photo down with your original finger) and finally release the photo in the message you want to paste it into (you should see a **green plus sign** at the top right of the photo when it's safe to let go).

7. Use tab groups in Safari

The browser on your laptop has had tab groups for years, so it's about time you could create a tab group in Safari for iOS as well. To create a tab group, start **Safari** and then tap the **Open Tabs** button at the bottom right. Tap the **menu** at the bottom center that indicates how many tabs you have open and tap **New Empty Tab Group**. Name the group and save it.

Any new tabs you open will belong to this group, though you can repeat the process to create separate tab groups, each with their own collection of tabs.

8. Find out how your apps are spying on you

Apple is doubling down on privacy protection, and now you can access an informative App Privacy Report that shows you how the apps on your phone are using the permissions you've allowed, such as location, camera, microphone, and other services.

You need to opt into the App Privacy Report. To do that, start the **Settings** app and tap **Privacy**, then scroll to the bottom and tap **App Privacy Report**. Tap **Turn on App Privacy Report** and it'll start collecting information about your apps. Return here any time to see the report.

9. Change the size of text in any app

You can change the size of text globally or only for the current app. Dave Johnson



You probably know that you have some control over the size of text in iOS, so if you want larger text you can scale it up everywhere on your iPhone at once. But thanks to iOS 15, you can change the text size on an app-by-app basis.

Start the **Settings** app and tap **Control Center**. Tap the **plus sign** next to **Text Size** to add this to the Control Center. Now when you're in an app and want the text to be larger, pull down the **Control Center** from the top right of the screen and tap the **Text Size** icon. Make sure the toggle at the bottom is set to the current app rather than **All Apps**, and drag the **sizing slider** up or down until you're satisfied.

10. Get AR walking directions in Maps

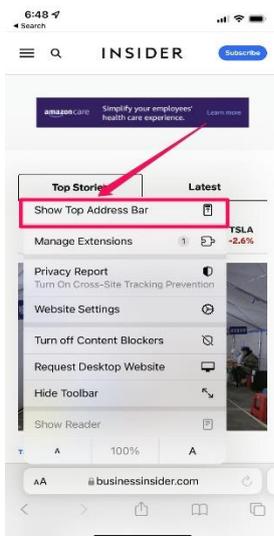


Apple Maps can now offer walking directions in augmented reality. Dave Johnson

Apple Maps has always been playing a bit of catch-up with Google Maps, but with iOS 15 it has leapfrogged ahead in a few important ways. One of the most intriguing updates is that you can get walking directions in augmented reality. As you walk, hold the phone up so it can see nearby buildings, and Maps will overlay street names and your walking instructions over live video of your route.

To get your AR walking directions, plan a route in the usual way and select walking instructions after you tap the route button. Tap **Go**, and then tap the **AR cube** button on the right side of the map.

11. Put the Safari address bar back at the top



You can now put the address bar at the top or bottom of the screen in Safari. Dave Johnson

Here's a feature you might want to try simply to restore Safari to the way it was before the iOS 15 update. You might have noticed that Safari's address bar and menu is now located at the bottom of the screen (in principle, to make it easier to reach). But it looks a little weird down there, and if you can't quite get used to seeing it at the bottom, it's easy to put back on top. Tap the **AA** button at the left side of the **address bar** and then, in the menu, tap **Show Top Address Bar**.

Android Operating System vs. Apple iOS

Differences between the android operating system and apple iOS include the following.

Android	iOS
The developer of Android was mostly Google & Open Handset Alliance	The developer of iOS was Apple Inc.
The initial release was Sep23, 2008	The initial release was July 29, 2007
The latest version is Android 11	Latest version of iOS is 14.1 & iPadOS 14.1
It is an open-source model	The source model is closed including open source components.
As compared to iOS, file transfer is easy	File transfer is more difficult in iOS but transferring media files can be done through the iTunes desktop app.
The browser used in Android is Google Chrome	The browser used in iOS is Safari
Web mapping used in this is Google maps	Web mapping used in this is Apple maps
Available languages are nearly 100	Available languages are nearly 40
Video calling can be possible through different apps.	For video calling, face time & other third-party apps are used.
Google assistant is used as a virtual assistant	Siri is used as a virtual assistant
This OS supports different smartphones like Samsung, Xiaomi, OnePlus, Honor, Vivo, etc	This OS supports only Apple products like iPad, iPhone, iPod Touch & Apple TV
Battery life is good	Battery life is not good as compared to Android
Biometric Authentication used in Android OS is Fingerprint or Face recognition	Biometric Authentication used in iOS is Fingerprint or Face recognition
OS family is Linux	OS family is Linux OS X, UNIX

Comparison of mobile operating systems

From Wikipedia, the free encyclopedia

This is a comparison of [mobile operating systems](#). Only the latest versions are shown in the table below, even though older versions may still be marketed.

Contents

- [1About OS](#)
- [2Advanced controls](#)
- [3Accessibility features](#)
- [4App ecosystem](#)
- [5Basic features](#)
- [6Browser](#)
- [7Communication and connectivity](#)
- [8Language and inputs](#)
- [9Maps and navigation](#)
- [10Media playback and controls](#)
- [11Peripheral support](#)
- [12Photo and video](#)
- [13Productivity](#)
- [14Ringtones and alerts](#)
- [15Security and privacy](#)
- [16Sound and voice](#)
- [17Other features](#)
- [18See also](#)
- [19References](#)

About OS

About OS										
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch	Mobi an^[a]	Plasm a Mobil e	Pure OS	Postma rketOS	KaiOS
Developed by	Google , Open Handset Alliance	Apple Inc.	Linux Foundation , Tizen Association , Samsung , Intel	Sailfish Alliance , Mer , Jolla and Sailfish community contributors	UBports and Ubuntu community contributors (previously Canonical Ltd.)	Debian on Mobile Team	KDE and Blue Systems	Purism	PostmarketOS community	KaiOS Technologies Inc.(TCL)

Market share ^{[2][3]}	71.90%	27.33%	0.22%	N/A	N/A	N/A	N/A	N/A	N/A	0.14%
License	Base system is Free and open-source . Closed-source drivers are often needed for hardware support.	Proprietary , open source kernel and core	Partial; both proprietary and open-source components, assorted licenses	Free and open-source , but the UI and the SDK are proprietary and closed source	Free and open-source , mainly the GPL ^[4]	Free and open-source , mainly the GPL	Free and open-source , mainly the GPL	Free and open-source , mainly the GPL	Free and open-source , GPL	Proprietary except for open source kernel patches (formerly the MPL 2.0 B2G OS)
Current version	12L	15.5	4.0.0.7	4.3.0.15	16.04 OTA-22	2021 0516	5.24.3	10.0	21.12 Service Pack 3	2.6.0
Development version	13	16.0	6.0 M2	Unknown	Unknown	2022 0612	Unknown	Unknown	N/A	
Current version release dates	March 7, 2022; 4 months ago	May 16, 2022; 59 days ago	May 30, 2020; 2 years ago ^[5]	February 16, 2022; 4 months ago ^[6]	February 18, 2022; 4 months ago	May 16, 2021	March 8, 2022; 4 months ago	October 2, 2021; 9 months ago	March 13, 2022; 4 months ago	
OS family	Modified Linux kernel based	Darwin	Linux (based on a combination of Linux MeeGo and Samsung Bada)	Linux	Linux (based on Ubuntu)	Linux (based on Debian)	Linux (mainly based on KDE neon)	Linux (based on Debian)	Linux (based on Alpine Linux)	Firefox OS / Open Web (based on Linux kernel)
Supported CPU architecture	ARM (32-bit ARMv7-A and 64-bit ARMv8-A only), x8	64-bit ARMv8-A only	ARM , x86 , x86-64	ARM , x86-64	ARM , x86-64	ARM	ARM , ?	Convergent operating system	ARM, ARM64, x86, x86-64	ARM

	6, x86-64^[7]									
Program med in	C, C++, Java, Kotlin	C, C++, Objective-C, Swift	C++, Xamarin.Forms (.NET C#, F#, VB ^[8])	C++, QML, Python	Apps: HTML5, QML, Go, JavaScript, C++ System: C, C++, QML	C, C++	C++, QML		Python install tool and shell script packages	HTML5, JavaScript
Public issues list	Yes ^[9]	3rd party ^[10]	Yes ^[11]	Yes ^[12]	Yes ^[13]	No ^[citation needed]	Yes ^[14]	Yes ^[15]	Yes ^[16]	No ^[citation needed]
DRM-free^[17]	No ^[18] since Android 4.1 ^[19] and Android 4.3 ^[20] and more restrictions on Android 4.4 ^[21]	No – FairPlay	Yes	Yes	Yes	Yes	Yes ^[citation needed]	Yes ^[citation needed]	Yes	?
Device independent system updates	Partial system updates since Oreo ^[22] 3rd party software like LineageOS ^[23]	Yes ^[24]	No	Yes	Yes ^[25]	?			Yes, ^[26] Intended for use on old mobile devices	For feature phones , not smart phones
Wireless system updates	Yes	5+ ^[27]	No	Yes	Yes	?				
GPU accelerated GUI	3+ ^[28]	Yes	Yes	Yes	Yes	?				
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch	MobiAn ^[1]	Plasma	Pure OS	PostmarketOS	KaiOS

							Mobile			
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Advanced controls [\[edit\]](#)

Advanced controls					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch
While-in-use permissions	10+	11+: Location only ^[29]	No	No	Yes
Per-app Internet access	No, ^[30] 3rd party software ^[31]	7+: Cellular only; ^[32] 3rd party software on jailbroken devices ^[33]	No	No	No
Per-app identity access	8+ ^[34]	6+ ^{[35][36]}	No	No	Yes
Per-app user data access	6+ ^[37]	6+ ^[38]	No	No	Yes
Per-app background execution	No, ^[39] 3rd party apps available ^[40]	7+ ^[41]	No	No	Background execution not allowed
Per-app notifications	4.1+ ^[42]	5+ ^{[43][44]}	No	No	Yes
Per-app location access	6+ ^[37]	4+ ^[45]	No	No	Yes
Per-app camera access	6+ ^[37]	8+ ^[46]	No	No	Yes

Per-app microphone access	6+[37]	7+[47]	No	No	Yes
Per-app shared files access	6+[37]	8+[48]	No	No	Yes
Per-app network data usage auditing	4+[49]	Yes[50]	?	No[51]	No
Fine grained storage usage	Yes[52]	5+[53]	?	No	Yes
Parental controls	4.3+ or 3rd party software[54]	Yes[55]	?	No	No
Screen orientation lock	Yes[56]	Yes[57]	?	1.0.4+[58]	Yes
File manager	6.0+[59]	11+[60]	3rd party software[61]	Yes[62]	Yes
File manager write access to external storage	6+ Or 3rd party software like LineageOS	13+	Yes	Yes	Yes
Multi-user	4.2+, including phones 5+[63][64]	9.3+: Education use only on iPad[65]	No	3.4.0+	No
Guest mode	5+[66]	6+[67]	No	3.4.0+	No
Guided Access	No	Yes[68]	No	No	No
Do not disturb mode	5+[69]	6+[70]	No	No	No

App groups	Yes	4+ ^[74]	?	1.0.7+ ^[72]	Yes
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Accessibility features [\[edit\]](#)

Accessibility features					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch
System wide base text size	Yes	Yes ^{[73][74][75]}	?	2.1.0+: Set text size ^[76]	3rd party software ^[77]
Monaural output	Yes	Yes	No	No	No
Always visible scrollbar	No	No	No	No	No
Reduced Animations	Yes	Yes	No	No	No

App ecosystem [\[edit\]](#)

App ecosystem					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch
Official app store	Google Play	App Store	Tizen Store	Jolla Store	OpenStore
Non-discriminatory stores	No, Some apps like Ad blockers are censored on Google Play ^{[78][79]} but developers can	No, Apple discriminates based on country ^[80] and own Apple policies ^[81]	?	Openrepos. ^[82] Developers can distribute apps from their own sources, supports multiple app stores	Yes

	distribute apps from their own sources				
Common APIs for smartphones, tablets, and PCs	Yes ^[83]	Smartphone and tablet only ^[84]	No	Yes	Yes
Official SDK platform(s)	Linux, macOS and Windows ^[85]	macOS using iOS SDK	Linux, Windows, macOS ^[86]	Windows, macOS and Linux ^[87]	Yes
Cost to develop for the mobile OS	Free	No, Requires Apple hardware. ^[88]	Free	Free	Free
Cost to publish app to official store	US\$25 once to offer it on Google Play ^[89]	US\$99/year	Free	Free ^[90]	Free

Basic features [\[edit\]](#)

Basic features					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch
Cut, copy, and paste	Yes ^[91]	3+ ^[92]	Yes ^[93]	Yes	Yes
Multi-Device clipboard	Chrome OS ^[94]	10+ ^[95]	No	No	No
Undo	No ^[96]	3+ ^[97]	No	No ^[98]	Yes

Custom home and lock screen wallpaper	Yes	4+ ^[57]	Yes	Yes (incl. Ambience)	Yes
Desktop sync	No, ^[99] but available using the vendor's companion/PC suite application such as Samsung Smart Switch & HTC Sense ^[100]	Yes	Yes	?	Yes
Local full backup	Yes, via external computer ^[101]	Yes, using external computer or iCloud ^[102]	No ^[103]	Yes	Yes
Core data missing sync	Bookmarks ^[104] (before 4), SMSs and Settings ^[105]		?	?	?
Notification center	Yes	5+ ^[106]	2+ ^[107]	Yes	Yes
Push notifications	Yes ^[108]	Yes (Apple Push Notification Service)	2+ ^[109]	Yes	Yes
Screenshot	4+ also available on earlier versions with customized firmware, such as Cyanogen Mod and on older Samsung Galaxy smartphones ^[110]	Yes ^{[57][111]}	Yes	2.0.2+ ^[112]	Yes
iCalendar import	No, ^[113] but 3rd party app available ^[114]	Yes ^[115]	?	1.1.6+ ^[116]	No
Text/document support (read only; creating using third-party apps)	Microsoft Office, PDF, TXT/RTF	Microsoft Office, ^{[117][118][119]} iWork, PDF, Images, TXT/RTF, VCF	Read only: text files, PDF, HTML,	Microsoft Office, OpenDocument , PDF, Text	Yes

			Multiple office formats		
Printer support	4.4+ using Google Cloud Print ^[120] but not over USB unless proprietary vendor solutions such as HP Print Service are used ^[121]	Yes (AirPrint) ^[122]	No	yes, cups package is available	Beta
Show remembered Wi-Fi connections	Yes	No, 3rd party software on jailbroken devices ^[123]	?	Yes	Yes

Browser [\[edit\]](#)

Browser					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch
Default web browser/engine	Blink	WebKit	WebKit	Gecko ^[124]	Qt WebEngine (based on Blink)
Major web browsers available ^[125]	Chrome for Android, Opera, Firefox, Microsoft Edge, Samsung Internet	Safari, Chrome for iOS, Opera Touch, Firefox, Microsoft Edge	Tizen Browser (Based on UC Browser)	Sailfish Browser (Gecko), Webcat (WebKit), Web Pirate (WebKit), others via Android (Firefox, Chrome, Opera)	Morph Browser
Browser can use its own engine	Yes	No ^[126]	Yes	Yes	Yes

Browser extensions	No ^[127] 3rd party software ^[128]	8+ ^[129]	No	No	No
Browser direct Internet connection (increased resilience to outages)	Yes	Yes	Yes	?	?
Browser undo close tab	Google Chrome for Android ^[130]	8+ ^[131]	No	No	No
Browser keeps windows open on shutdown or crash	2.3+ Google Chrome ^[132] but not on the deprecated AOSP browser ^[133]	Yes	No	Yes	Yes
Browser keeps windows open when cleaning cookies	Yes	3rd party software ^[134]	?	Yes	Yes
Browser search engine options	Many ^[135]	Bing , Google , Yahoo! Search , DuckDuckGo , Ecosia	Bing , Google , Yahoo! Search	Bing, Google, Yahoo, Yandex , Baidu, DuckDuckGo, StartPage, Searx , ixquick, Swisscows, Qwant, Seznam, Hulbee via openrepos ^[136]	Baidu , Bing, DuckDuckGo, Ecosia , Google, lilo, Peekier, Qwant , Wikipedia , Yahoo ^[137]
Browser find on page	1.5+ ^[138]	Yes ^[139]	Yes	1.1.2+ ^[140]	Yes

Browser–email save images	Yes	Yes ^[144]	?	Yes	Yes
Browser–email save PDFs	Yes	Yes ^[57]	Yes	Yes	Yes
Browser save audio/video	Yes, but only links, not embedded media	13+; ^[142] 5+: 3rd party software ^[143]	Yes	Yes	Yes
Browser save page	Yes, Google Chrome 55+ ^[144]	6+: Offline Reading List; ^[145] 3rd party software ^[146]	Yes	4.0.1.48+	Yes
Browser save any file	Yes, Chrome for Android.	13+; ^[142] 5+: When an app that can handle/open the filetype is installed (excluding audio/video – requires 3rd party software ^[147]); ^[148]	?	Yes	Yes
Browser force enable zoom	Yes, Chrome for Android	Yes ^[149]	?	?	?
Browser text reflow ^[150]	No, removed on Android 4.4 ^{[151][152]}	5+: Only on pages with reader mode available ^{[153][154]} 3rd party browsers on prior versions ^[155]	No	No	No
Browser Reader Mode	No, ^[156] 3rd party software ^{[157][158]}	5+ ^{[153][154]}	Yes	No ^[159]	No
Browser open PDFs	No	Yes	No	No	No

without storing					
Browser file upload	2.2+ ^[160]	9+; 6–8: Limited	Yes	1.0.7+ ^[161]	Yes
Browser form navigation	Next button ^[162]	Previous, Next, AutoFill, and Done buttons ^[163]	?	?	?
Browser private browsing mode	3.0+ with AOSP browser ^[164] or with Chrome for Android	5+ ^[165]	Yes	1.1.6+ ^[166]	Yes
Offline web apps	Yes ^[167]	Yes ^{[168][169][170]}	No	?	Yes
HTTP Live Streaming	3+ ^[171]	3+ ^[172]	No	? ^[173]	Yes
WebRTC	Yes ^[174]	11+ ^[175]	No	No	Yes

Communication and connectivity [\[edit\]](#)

Communication and connectivity					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch
Unified Inbox	No, ^[176] but 3rd party apps available ^[177]	Yes	Yes	Yes	?

Email sync protocols supported	POP3, IMAP, MAPI	POP3 , IMAP , MAPI , ActiveSync ^[178]	POP3, IMAP	POP3, IMAP, ActiveSync	?
Non-carrier-based integrated messaging	Google Hangouts	5+ (iMessage) ^[179]	?	3rd party software	3rd party software
Visual voicemail	2.1+ ^[180]	Yes	?	?	?
Call log duration	Yes ^[181]	Yes ^[182]	?	Yes	Yes
Multiple mobile phones per contact	Yes	Yes	?	Yes	Yes
Contact groups	4+ ^[183] or 3rd party software ^[184]	Via iCloud or 3rd party software ^[185]	Yes	No ^[186]	?
Voice over IP	Yes (SIP) ^[187] or 3rd party software ^[188]	FaceTime ; 3rd party software ^[189]	No ^[190]	3rd party software	3rd party software
NFC payment software	Available on any device that supports the hardware. Android Pay for NFC payments available in Play Store. ^[191]	8+: iPhone 6/6 Plus and later (iPhone 5 and later if used with Apple Watch), via Apple Pay	Samsung Pay	No	No

Tethering	Mobile Wi-Fi Hotspot, USB, Bluetooth	4.3+: Personal Hotspot (Wi-Fi, Bluetooth, USB; carrier dependent)	microUSB, Bluetooth 3.0, Mobile Wi-Fi Hotspot	Mobile Wi-Fi Hotspot, USB, Bluetooth	Mobile Wi-Fi Hotspot
<u>USB On-The-Go</u>	3.1+ ^{[192][193]}	13+; ^[194] 9+: Only for connecting cameras	No	Yes	Yes
Direct file transfer over <u>Wi-Fi Direct</u>	4+ ^[49] and selected devices ^{[195][196]}	No, 3rd party software on jailbroken devices	No, was available on <u>bada</u> 2+ ^[197] but removed on <u>Tizen</u>	No ^[198]	No
DHCP v4	Yes	Yes	?	?	?
DHCP v6	No	Yes	?	?	?
Direct file transfer over <u>Bluetooth</u>	2+ ^[199]	<u>AirDrop</u> : 7+: Between iOS only; 8+: Between Mac/iOS only. (Note: AirDrop utilizes Wi-Fi as well)	No, was available on <u>bada</u> ^[200] but removed on <u>Tizen</u>	Yes ^[201] but limited to images, videos and contacts	No
Direct file transfer over <u>NFC</u>	No, removed on Android 10	No	2+ ^[197]	No	No

Language and inputs [\[edit\]](#)

Language and inputs					
Feature	<u>Android</u>	<u>iOS</u>	<u>Tizen</u>	<u>Sailfish OS</u>	<u>Ubuntu Touch</u>
Non-English languages support	Partial ^[202]	Yes ^{[203][204][205]}	Limited (Search is not diacritical mark-insensitive)	Yes	Yes

Underlining spell checker	2.3+ ^{[206][207]}	Yes ^[208]	No	?	No
Built-in system-wide dictionary	Built into keyboard app. Available on every device. ^[209]	5+ ^[210]	No	Yes	Yes
Autoexpanding text replacements	Yes	5+ ^[211]	?	?	?
Keyboard next word prediction	No, ^[212] 3rd party software ^[213]	8+ ^[214]	No	Yes	Yes
Keyboard cursor controller	Google Keyboard; ^{[215][216]}	12+; ^[217] 9-11: Only on devices with 3D Touch ; ^[218]	No	No	Yes
Optical character recognition input method	No ^[219]	15+; ^[220] 11+: Notes app; ^[221] 8+: Only for inputting credit card details ^[222]	No	No	No
Third party input methods	Yes ^[223]	8+	?	?	?
Gesture text input	4+ ^[224]	13+; ^[225] 8+: 3rd party software like SwiftKey	?	No ^[226]	No
Emoji support	4.4+ ^[227]	Yes ^[228]	?	2.2.0+ ^[229] 3rd party software ^[230]	Yes

Maps and navigation [[edit](#)]

Maps and navigation					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch
Safe driving mode	3rd party software	11+ ^[231]	?	?	?
Turn-by-turn navigation	2+ ^[232]	6+ ^[233]	?	Yes	3rd party software
Offline maps	3rd party software Google Maps , ^[234] Here WeGo	6+ ^[235]	?	3rd party software	3rd party software
Alternative routes in maps	Yes ^[236]	5+ ^{[237][238]}	?	3rd party software	3rd party software

Media playback and controls [\[edit\]](#)

Media playback and controls					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch
Audio playback	AAC LC/LTP 3GPP, HE-AACv1 (AAC+), HE-AACv2 (enhanced AAC+) AMR-NB, AMR-WB, MP3, MIDI (Type 0 and 1, DLS versions 1 and 2), Ogg Vorbis, PCM/WAVE, FLAC , WAVE, Opus ^[239]	AAC, protected AAC (from iTunes Store), HE-AAC, MP3, MP3 VBR, Audible (formats 2, 3, 4, Audible Enhanced Audio, AAX, and AAX+), Apple Lossless, AIFF, WAV ^[240]	AAC, AAC+, eAAC+, AMR-NB, AMR-WB, MP3, Vorbis, WAV ^[241]	MP3, FLAC, AAC, eAAC, eAAC+, ALAC, AC3, DTS, Opus, Vorbis	?

Video playback	H.263 , H.264 (up to Baseline Profile), H.265 HEVC, MPEG-4 SP, DivX, XviD, VP8, VP9 ^[239] (WMV on 3rd party software like VLC media player)	H.264 (up to High Profile), MPEG-4, M-JPEG ^[240]	H.263, H.264, MPEG-4 Part 2 ^[241]	MPEG-4, H264, H263, ^[242] although h audio in recorded videos is out of sync ^[243]	?
Wired video out	4K on 6+ ^[244]	Up to 1080p via HDMI ^[245] or VGA, ^[246] 576p/480p via component ^[247] or composite ^[248]	No	No ^[249]	Yes
Wired digital audio output	5+ USB Audio ^[250]	7+: USB Audio ^[251]	No	No	Yes
Wireless video/audio streaming to set top boxes/TVs/speakers	4.2+ Miracast ^[252] but DLNA ^[253] only available on selected devices	AirPlay ^[254]	DLNA ^[255]	?	Yes
Media player on-device playlist creation	Yes ^[256]	Yes ^[57]	?	Yes	Yes
Media player video scrubbing	Yes	Yes	?	?	?
Media player audio scrubbing	Yes	Yes	?	?	?
Media player fine scrubbing	No, ^[257] 3rd party software like VLC media player , basic fine scrubbing removed on 4+ ^[258]	Yes ^[259]	?	?	?
Media player double speed playing	6+ ^[260]	Only Podcasts ^[261]	?	?	?

Peripheral support [\[edit\]](#)

Peripheral support					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch
Bluetooth keyboard	2.3+; ^[262] previous versions via 3rd party software ^[263]	Yes ^[264]	No	Yes ^{[265][266]}	Yes
USB keyboard	3.1+ ^[262]	With Camera Connection Kit ^[267]	No	Yes	Yes
Interchangeable external memory cards	Yes ^[268]	Only for photo/video import with an optional accessory	Yes ^[269]	Yes	Yes

Photo and video [\[edit\]](#)

Photo and video					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch
Camera focus at specified point	2.3+ ^[270]	Yes ^[57]	?	1.0.4+ ^[271]	Yes
Camera exposure metering from specified point	No, ^[272] available on some phones. ^{[273][274]}	Yes ^[275]	No	?	No
On device picture info (including Exif data)	Only date and location; more with 3rd party software ^[276]	Only date and location; more with 3rd party software ^[277]	No	?	Yes

On device picture categorization	No ^[278] 3rd party software like TouchWiz ^[279]	5+ ^[280]	No	?	No
On device picture description and search	No ^[281]	10+: Items/objects in picture; ^[282] 7+: Only date and location ^[283]	No	?	No
Turn off shutter sound	In silent mode ^[284]	In silent mode ^[285]	In silent mode	In silent mode ^[286]	No
Picture crop	Yes	5+ ^[287]	No	Yes	Yes
Photo rotation	Yes	5+ ^[287]	No	Yes	Yes
Photo red-eye reduction	2.3+ ^[288]	5+ ^[287]	No	No ^[289]	No
HDR photos option	4.2+, some manufacturers earlier ^[290]	Yes ^[291]	No	No ^[292]	Yes
Photo/video import from memory cards	Yes	With Camera Connection Kit ^[267]	Yes	Yes	Yes
Video trim	2.3+	Yes	No	?	No

Productivity [\[edit\]](#)

Productivity					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch

Multitasking	Yes	7+; ^[293] 4–6: Limited ^[294]	2+ ^[109]	Yes	Yes
Quick app switching	7+ ^[295]	9+: via 3D Touch ; ^[296] 5+: only on iPad ^[297]	No	No	Yes
Document-centric multitasking	5+ ^[298]	13+: can open different views of same app side by side ^[299]	No	No	No
Split-screen app usage	7+, some manufacturers earlier ^[300]	9+: only on iPad with 2 GB RAM or more ^[301]	Yes ^[302]	No ^[303]	Tablet-only
Desktop interactive widgets	Yes	10+: App icons via 3D Touch and/or dedicated widget screen ^[304]	No	Yes	No
Lock screen widgets	Yes (Notifications and settings). Full Widgets on Android 4.2–4.4 only. ^{[305][306]}	Media player, voicemail, camera; ^[307] 5+: Notifications ; 7+: Control Center 8+: Interactive Notifications ^[308] 10+: Full widgets ^[304]	Media player; Notifications (SMS, call)	Yes	No
Notification view widgets	4.1+: Google Now and possible with 3rd party apps	8+	No	Yes	No
Quick settings toggles	2+ ^[309]	7+ ^[310]	No	Via the Patchmanager app ^[311]	Yes

Search multiple internal apps at once	Yes	Yes	Yes	No ^[312]	Yes
Settings search	5+ or 3rd party software like LineageOS ^[313]	9+ ^[314]	No	No	Yes
Search all fields of internal objects	Only search Contacts name field but not any other field ^[315]	6+ ^[316]	Only searches contacts by name	First name, last name, nickname, also the multiple field called "Details" ^[317] ?	
Core apps missing search	Calendar ^[318] (available since 3+ and HTC Sense)	Bookmarks ^[319]	?	?	?
Phone number links to dialer	Available in stock Android, but not all devices enable it. ^[320]	Yes	Yes, but not in browser	Yes	Yes
Addresses links to maps	In Contacts, but not in Calendar ^[321] nor in Gmail ^[322]	Yes ^[323]	?	Yes	?
Dates links to calendar	No	Yes ^[324]	Yes	Yes	?

Ringtones and alerts [\[edit\]](#)

Ringtones and alerts					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch
Custom ringtones	Yes	Yes ^[325]	Yes	Yes	Yes

Custom SMS/MMS tones	Yes ^[326]	5+ ^[327]	?	Yes	No
Custom vibrate alert patterns	No, ^[328] possible on some Samsung devices such as Galaxy S III, but limited ^[329]	5+ ^[330] ^[331]	?	API available for 3rd party apps	No
Dismiss repeating alarm clock before trigger	4.4+ ^[332]	No ^[333]	No	?	Yes
Tap to snooze ^[334]	3rd party apps ^[335]	Yes	No	Swipe down	Yes

Security and privacy [\[edit\]](#)

Security and privacy					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch
Proxy server	3.1+ ^[336] but only global, not per connection ^[337] and only works for the browser ^[338] 3rd party apps available ^[339]	Yes	Yes	Yes ^[340]	No
On-device encryption	3+ ^[341] but insecure on Qualcomm devices ^[342]	Yes ^[343] (3rd party software may attempt brute-force attacks on password ^[344])	No	3.3.0+ ^[345]	No
External storage encryption	6+	External storage not available	No	Yes	No

Zero knowledge encryption ^[346]	No, data is accessible by Google ^[347] and shared with the American PRISM surveillance program . ^[348]	No, data stored on iCloud is accessible by Apple ^[349] and shared with the American PRISM surveillance program . ^[348]	?	?	No
Privacy of synchronization ^[350]	3rd party software like ownCloud ^[351]	When synchronizing locally and not using iCloud	?	?	?
Sync to cloud communication encryption	2.3.4+ ^[352]	Yes ^[353]	?	?	?
Wireless anti-tracking ^[354]	Developer Options (9+) ^[355]	8+ ^[356]	No	?	No
Remote device location tracking	Yes ^[357]	Yes ^[358]	?	?	No
Remote device locking and/or data wipe	2.2+ ^[359]	Yes ^[358]	?	?	No
End-to-end encrypted push notifications	Possible, notifications are handled by the app that can decrypt it ^[108]	Possible since iOS 7, where the app can handle the notification and decrypt it ^[360]	?	?	Yes
SSH Client	Yes	Yes ^{[361][362]}	?	Yes	Yes
VPN	Yes ^[363]	Yes ^[364]	?	Yes	Yes
OpenVPN	No, but possible with 3rd party firmware ^[365]	Yes ^[366]	?	Yes	Yes ^[citation needed]

WPA PEAP	Yes ^[367]	Yes ^[368]	?	In developer mode ^[369]	Yes ^[citation needed]
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Sound and voice [\[edit\]](#)

Sound and voice					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch
Separate volume for ringtone and media	Yes	Yes	?	Yes	Yes
Voice commands	Yes ^[370]	5+ (Siri)	?	3rd party software, such as Saera ^[371]	No
Offline voice commands	6+ ^[372]	Yes ^[373]	?	No	No
Voice recognition	Yes	5+ (Siri)	?	No	No
Offline voice recognition	4.1+ ^[374]	15+; ^[375]	No	No	No
Non-English voice recognition	Yes	Yes ^[205]	?	No	No
Sound recorder	Very limited (Doesn't work in background ^[376] and not voice controlled)	3+: Limited (Not voice controlled) ^{[377][378]}	Partial	3rd party software ^[379]	3rd party software

Call recorder	Yes, Phone by Google, ^[380] but also possible with 3rd party firmware ^[381]	3rd party software ^[382]	No	Disabled by default, must be interactively switched on during a call when enabled / 3rd party software ^[383]	?
Sound trim	No, ^[384] but 3rd party software available ^[385]	Yes ^[386]	?	?	?

Other features [\[edit\]](#)

Other features					
Feature	Android	iOS	Tizen	Sailfish OS	Ubuntu Touch
Non-intrusive incoming calls	5+ ^[387] or 3rd party software ^[388]	14+ ^[389]	No	No ^[390]	?
Non-intrusive notifications	Yes ^[391]	5+ ^[106]	?	?	?
Move apps to external storage	2.2+ ^[392]	External storage not allowed for apps	No	No	No
Remote Frame Buffer (RFB) protocol	Yes ^[393]	3rd party software ^[394]	?	?	?
Screencast on device	11+ ^[395]	9+ ^[396]	No	No	Yes
Screencast over USB	4.4+ over USB, ^[120] for prior versions root	8+: on OS X ^[398]	No	?	No

	required for 3rd party app ^[397]				
Screen share	On select devices using vendor's implementation ^{[399][400][401]}	3rd party software ^[402]	No	No	No

See also [\[edit\]](#)

- [List of custom Android firmware](#)
- [List of GPS software for mobile phones](#)

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