**Release notes**



[Beta 3](https://developer.android.com/about/versions/13/release-notes#beta-3)

Release date: June 8, 2022  
Build: TPB3.220513.017  
Emulator support: x86 (64-bit), ARM (v8-A)  
Security patch level: June 2022  
Google Play services: 22.18.19  
API diff:

* [API 32 → API 33](https://developer.android.com/sdk/api_diff/33/changes)
* [Beta 2 → API 33](https://developer.android.com/sdk/api_diff/33-incr/changes)

**About Android 13 Beta 3**

Beta 3 is now available, with the latest features and changes to try with your apps. Beta 3 also marks the [Platform Stability](https://developer.android.com/about/versions/13/overview#timeline) milestone, which means that Android 13 has reached final internal and external APIs and final app-facing behaviors. [Update your environment](https://developer.android.com/about/versions/13/setup-sdk) and start your final [compatibility testing](https://developer.android.com/about/versions/13/migration#compat) now so you can publish any necessary compatibility updates ahead of the final release.

As with previous versions, Android 13 includes behavior changes to help improve performance, battery life, security, and privacy. In some cases, these changes can affect apps until they are updated to support Android 13, so you might see impacts ranging from minor issues to more significant limitations. In general, most apps will work as expected, as will most APIs and features, but **please review the known issues listed on this page** to get a better idea of what to expect.

**How to get Beta 3**

You can install this release on any of the following Google Pixel devices:

* Pixel 4 and 4 XL
* Pixel 4a and 4a (5G)
* Pixel 5 and 5a
* Pixel 6 and 6 Pro

If you’re already running a Developer Preview or Beta build, you will automatically receive an over-the-air (OTA) update to Beta 3. Otherwise, see [Get Android 13](https://developer.android.com/about/versions/13/get) for details on how to get started.

Remember to update your SDK and the Android Emulator as well before you try out the latest features and changes. The best way to do this is using the SDK Manager in the [latest preview version of Android Studio](https://developer.android.com/studio/preview).

Depending on your development and testing needs, you can also get Android 13 in the following ways:

* Get Android 13 [on the Android Emulator](https://developer.android.com/about/versions/13/get#on_emulator)
* Get Android 13 [on a partner device](https://developer.android.com/about/versions/13/get#on_partner)
* Get a [generic system image (GSI)](https://developer.android.com/about/versions/13/get#on_gsi)
* Get Android 13 [on an ADT-3 device](https://developer.android.com/about/versions/13/get#on_androidtv) (TV testing)

**General advisories**

Be aware of these general notes about the release:

* This release might have various **stability, battery, or performance issues** on supported devices.
* For users with accessibility needs, this release might not be appropriate for daily use.
* **Some apps might not function as expected** when running on this release. This includes Google’s apps as well as other apps.
* Android 13 Beta builds **are not**[**Compatibility Test Suite (CTS)-**](https://source.android.com/compatibility/cts/) approved, but they have passed preliminary testing and provide a stable set of pre-release APIs for developers. Apps that depend on CTS-approved builds or use SafetyNet APIs might not work normally on Android 13 Developer Preview builds.

**Get support**

Two primary support channels are available to you when developing and testing with the Android 13 Beta. The channel you should use to get support depends on where you are encountering your issue.

**Support for device-specific issues, system issues, and issues with Google apps**

Use the Android Beta Issue Tracker to create new issues and to view and track issues that you and other developers have submitted. Before creating your own issue, check the known issues listed on this page and search the lists of [top open issues](https://developer.android.com/about/versions/13/top-issues) and [recently created issues](https://developer.android.com/about/versions/13/recent-issues) to see if someone else has already reported it. You can subscribe and vote for an issue by clicking **star this issue** .

See [Where to report issues](https://developer.android.com/about/versions/13/feedback#templates) to find an issue template that best matches the type of issue that you are encountering.

**Support for issues with other apps**

Contact the app developer directly.

To discuss issues or ideas with other developers working with the Android 13 Beta, join the [android\_beta community on Reddit](https://developer.android.com/about/versions/13/dev-community).

**What's new in Beta 3**

Android 13 Beta 3 includes the following new features and changes to try out:

* [Copy and paste improvements](https://developer.android.com/about/versions/13/features/copy-paste)

**Top resolved issues**

The following issues have been resolved in Android 13 Beta 3:

* Fixed an issue where unlocking the phone with a fingerprint while Always On Display was active would sometimes cause the entire screen to be tinted green temporarily.
* Fixed an issue on Pixel devices where swiping on the all apps search result page would sometimes cause the Pixel Launcher to crash.

**Top open issues**

See [top open issues](https://developer.android.com/about/versions/13/top-issues) for the latest list of top open issues that have been reported by developers.

**Other known issues**

Based on our testing, you might encounter the following issues when using Android 13 Beta 3. These issues are already known, so there’s no need to file additional reports for similar issues.

**Android platform**

* When a user checks for system updates by navigating to **Settings > System > System update**, the system incorrectly reports Android 12 as the device's Android version, even when the device was already successfully updated to an Android 13 build. To work around this issue, check the device's Android version by navigating to **Settings > About phone**.
* In some situations, the system shows a [runtime permissions](https://developer.android.com/about/versions/13/changes/notification-permission) dialog out of context, asking the user to grant the notification permission on behalf of another app.
* On some devices, bright sunlight prevents the fingerprint reader from authenticating the user.
* Apps using OpenSSL version 1.1.1b through 1.1.1h may not work on some ARMv9 devices. This issue is also present on some ARMv9 devices running Android 12.
* On Pixel 6 and Pixel 6 Pro devices, the Now Playing page sometimes gets stuck on *Downloading song database*.
* On some devices, paired Bluetooth devices can be observed to rapidly connect and disconnect from the device.

**Apps**

* In some cases, the Android Beta Feedback app may not be available on Android 13 Beta 3. This issue mainly affects new beta users, and users can still file bugs directly using the [issue tracker](https://developer.android.com/about/versions/13/feedback#issue_tracker).

If you’re an existing beta user running an Android 13 beta build, you can try the following workaround: Update to the latest version of the Android Beta Feedback App (either 2.25-betterbug.external\_20220328\_RC02 or 2.26-betterbug.external\_20220531\_RC00) from the Google Play Store before installing Beta 3.

* The camera app crashes occasionally on Pixel 6 and Pixel 6 Pro devices.
* On some devices, the photo picker UI in the Messages app doesn't display a list of recent photos taken on the device.

**Android Auto**

* Some Android Auto users may experience an issue with black screen on the phone after ending Android Auto. A fix for this issue has been implemented and will be included in a future milestone.
* Some users may experience issues with Bluetooth connectivity when using Android Auto. A fix for this issue has been implemented and will be included in a future milestone.
* Some users may experience issues with Android Auto Wireless connectivity.

**Android TV**

* When Bluetooth headphones are connected, AV playback on some apps does not work.
* In some cases when trying to pair Bluetooth devices, pressing the side button on the ADT-3 device does not activate a Bluetooth device search. If remote pairing is lost, you can work around this by using ADB commands to simulate remote input. Alternatively, you can reflash the unit.
* Remote control buttons can't be reconfigured using the **Remote & Accessories** menu.
* The option to change HDMI-CEC control is currently missing from the **Remote & Accessories** menu.
* When casting to 4k TVs, only the top left quarter of the image is shown.
* In some cases when the ADT-3 device is connected to an LG TV, the remote control does not work.
* When using the Google Play Movies app, 4K playback is corrupted by a gray screen and noise.
* For iOS devices, the Google Home app fails to connect to the ADT-3 device. To work around this issue, use the Google Home app on an Android device or the ADT-3 remote control.

**Previous preview releases**

**Android 13 Beta 2.1 and Beta 2**

[Beta 2.1](https://developer.android.com/about/versions/13/release-notes#beta-2.1)[Beta 2](https://developer.android.com/about/versions/13/release-notes#beta-2)

Release date: May 26, 2022  
Build: TPBB.220414.018  
Emulator support: x86 (64-bit), ARM (v8-A)  
Security patch level: May 2022  
Google Play services: 22.14.13  
API diff:

* [API 32 → Beta 2](https://developer.android.com/sdk/api_diff/t-beta2/changes)
* [Beta 1 → Beta 2](https://developer.android.com/sdk/api_diff/t-beta2-incr/changes)

**Android 13 Beta 2.1 (May 2022)**

If you’re already running a Developer Preview or Beta build, you will automatically receive an over-the-air (OTA) update to Beta 2.1.

This minor update to Android 13 Beta 2 includes stability improvements as well as the following fixes:

* Fixed an issue where typing in the search bar resulted in a blank list of suggestions.
* Fixed an issue where devices would crash and restart when turning on hotspot.
* Fixed an issue where a continuous call dialing sound could be heard in the background during a phone call.
* Fixed an issue where devices would crash and restart after disconnecting from Android Auto.

**Note:** The [known issues listed for the Beta 2 release](https://developer.android.com/about/versions/13/release-notes#ki-beta2) still apply to Beta 2.1.

**What's new in Beta 2**

Android 13 Beta 2 includes the following new features and changes to try out:

* [Predictive back gesture](https://developer.android.com/about/versions/13/features/predictive-back-gesture)
* [Resource files for specifying supported app languages](https://developer.android.com/about/versions/13/features/app-languages#use-localeconfig)
* [New permission to use exact alarms](https://developer.android.com/about/versions/13/features#use-exact-alarm-permission)

**Top resolved issues**

The following issues have been resolved in Android 13 Beta 2:

**Developer-reported issues**

* Fixed an issue where some devices were unable to connect to the wireless carrier network after installing Android 13 Beta 1. ([Issue #230538853](https://issuetracker.google.com/issues/230538853))
* Fixed an issue where QR code scanning would sometimes not work when selected from the Quick Settings tile. ([Issue #230513882](https://issuetracker.google.com/issues/230513882))
* Fixed an issue where app icons would occasionally fail to appear after the user unlocked the device. ([Issue #230851024](https://issuetracker.google.com/issues/230851024))

**Other resolved issues**

* Fixed an issue where Bluetooth headsets would sometimes fail to accept calls or play call audio.
* Fixed an issue where Pixel 6 and Pixel 6 Pro devices would crash and reboot if more than 300 apps were installed.
* Fixed an issue where Pixel 6 and Pixel 6 Pro devices would reboot constantly when Bluetooth was enabled.
* Fixed a regression in Android Key store that caused some apps to crash on launch.
* Fixed an issue where in some cases the system would incorrectly display an empty notification group from an app.
* Fixed an issue where long-pressing Bluetooth from the settings drawer caused the UI to crash.
* Fixed an issue where devices would sometimes get stuck at the Google logo during startup after receiving an OTA update.
* Fixed an issue where suspending the device while a USB-C headset was plugged in would cause the device to crash and restart.

**Other known issues**

Based on our testing, you might encounter the following issues when using Android 13 Beta 2. These issues are already known, so there’s no need to file additional reports for similar issues.

**Android platform**

* On some devices, unlocking the phone with a fingerprint while the Always On Display option is active causes the entire screen to be tinted green temporarily.
* When a user checks for system updates by navigating to **Settings > System > System update**, the system incorrectly reports Android 12 as the device's Android version, even when the device was already successfully updated to an Android 13 build. To work around this issue, check the device's Android version by navigating to **Settings > About phone**.
* In some situations, the system shows a [runtime permissions](https://developer.android.com/about/versions/13/changes/notification-permission) dialog out of context, asking the user to grant the notification permission on behalf of another app.
* On some devices, bright sunlight prevents the fingerprint reader from authenticating the user.
* Apps using OpenSSL version 1.1.1b through 1.1.1h may not work on some ARMv9 devices. This issue is also present on some ARMv9 devices running Android 12.
* In some cases, typing in the Search bar results in a blank list of suggestions.
* On Pixel devices, swiping on the all apps search result page can sometimes cause the Pixel Launcher to crash.
* On Pixel 6 and Pixel 6 Pro devices, the Now Playing page sometimes gets stuck on *Downloading song database*.

**Apps**

* To help app developers test their apps with the Beta 2 release, the system lists [per app language preferences](https://developer.android.com/about/versions/13/features/app-languages) for all apps by default. Because of this, the list of available languages that is displayed for an app might not reflect the languages that an app actually supports. App developers can adjust which languages are listed for their app [using a locales\_config.xml resource file](https://developer.android.com/about/versions/13/features/app-languages#use-localeconfig), or they can provide an empty locales\_config.xml file to test the system settings without their app listed.

Starting in Beta 3, an app must specify which languages it supports using locales\_config.xml before the system will list per-app language preferences for the app in the system settings. For more information about this and other known issues with the new per-app language system settings, see the [Known issues](https://developer.android.com/about/versions/13/features/app-languages#known-issues) section in the per-app language preferences guide.

* The camera app crashes occasionally on Pixel 6 and Pixel 6 Pro devices.

**Android Auto**

* In some cases, Maps on Android Auto might not be able to access the user's location. If this happens, you can restore location access by opening the Android Auto settings.
* For some users, wireless projection initiation might get stuck at the *Looking for Android Auto...* notification. If you encounter this issue, please reboot your phone.

**Android TV**

* When Bluetooth headphones are connected, AV playback on some apps does not work.
* In some cases when trying to pair Bluetooth devices, pressing the side button on the ADT-3 device does not activate a Bluetooth device search. If remote pairing is lost, you can work around this by using ADB commands to simulate remote input. Alternatively, you can reflash the unit.
* Remote control buttons can't be reconfigured using the **Remote & Accessories** menu.
* The option to change HDMI-CEC control is currently missing from the **Remote & Accessories** menu.
* When casting to 4k TVs, only the top left quarter of the image is shown.
* In some cases when the ADT-3 device is connected to an LG TV, the remote control does not work.
* When using the Google Play Movies app, 4K playback is corrupted by a gray screen and noise.
* For iOS devices, the Google Home app fails to connect to the ADT-3 device. To work around this issue, use the Google Home app on an Android device or the ADT-3 remote control.

**Android 13 Beta 1**

[Beta 1](https://developer.android.com/about/versions/13/release-notes#beta-1)

Release date: April 26, 2022  
Build: TPB1.220310.029  
Emulator support: x86 (64-bit), ARM (v8-A)  
Security patch level: April 2022  
Google Play services: 22.09.20  
API diff:

* [API 32 → Beta 1](https://developer.android.com/sdk/api_diff/t-beta1/changes)
* [T DP2 → Beta 1](https://developer.android.com/sdk/api_diff/t-beta1-incr/changes)

**What's new in Beta 1**

Android 13 Beta 1 includes several new features and changes to try out:

* [Granular media permissions](https://developer.android.com/about/versions/13/behavior-changes-13#granular-media-permissions)
* [Media controls derived from PlaybackState](https://developer.android.com/about/versions/13/behavior-changes-13#playback-controls)
* [Legacy copy of speech service implementation removed](https://developer.android.com/about/versions/13/behavior-changes-all#speech-service)
* [Better error reporting in Keystore and KeyMint](https://developer.android.com/about/versions/13/features#keystore-keymint)
* [Anticipatory audio routing](https://developer.android.com/about/versions/13/features#audio-routing)

**Top resolved issues**

The following issues have been resolved in Android 13 Beta 1:

**Developer-reported issues**

* Fixed an issue where Android Studio failed to find the POST\_NOTIFICATIONS permission in the app manifest. ([Issue #222811934](https://issuetracker.google.com/issues/222811934))

**Other resolved issues**

* Fixed an issue with the Camera app where switching to Lens mode caused the camera preview to display a black screen.

**Other known issues**

Based on our testing, you might encounter the following issues when using Android 13 Beta 1. These issues are already known, so there’s no need to file additional reports for similar issues.

**Android platform**

* Long-pressing Bluetooth from the settings drawer causes the UI to crash.
* On some devices, unlocking the phone with a fingerprint while the Always On Display option is active causes the entire screen to be tinted green temporarily.
* In some cases after receiving an OTA update, devices get stuck during startup at the Google logo. To work around this issue: once the device is stuck, restart the device by holding the power button down for 30 seconds.
* When a user checks for system updates by navigating to **Settings > System > System update**, the system incorrectly reports Android 12 as the device's Android version, even when the device was already successfully updated to an Android 13 build. To work around this issue, check the device's Android version by navigating to **Settings > About phone**.
* In some cases, suspending the device while a USB-C headset is plugged in causes the device to crash and restart.
* In some situations, the system shows a [runtime permissions](https://developer.android.com/about/versions/13/changes/notification-permission) dialog out of context, asking the user to grant the notification permission on behalf of another app.
* On some devices, bright sunlight prevents the fingerprint reader from authenticating the user.
* Apps using OpenSSL version 1.1.1b through 1.1.1h may not work on some ARMv9 devices. This issue is also present on some ARMv9 devices running Android 12.

**Apps**

* In some cases, the system incorrectly displays an empty notification group from an app.
* A regression in Android Keystore causes some apps to crash on launch.
* There are multiple known issues with the new per-app language system settings. For more information, see the [Known issues](https://developer.android.com/about/versions/13/features/app-languages#known-issues) section in the per-app language preferences guide.

**Android TV**

* When Bluetooth headphones are connected, AV playback on some apps does not work.
* In some cases when trying to pair Bluetooth devices, pressing the side button on the ADT-3 device does not activate a Bluetooth device search. If remote pairing is lost, you can work around this by using ADB commands to simulate remote input. Alternatively, you can reflash the unit.
* Remote control buttons can't be reconfigured using the **Remote & Accessories** menu.
* The option to change HDMI-CEC control is currently missing from the **Remote & Accessories** menu.
* When casting to 4k TVs, only the top left quarter of the image is shown.
* In some cases when the ADT-3 device is connected to an LG TV, the remote control does not work.
* When using the Google Play Movies app, 4K playback is corrupted by a gray screen and noise.
* For iOS devices, the Google Home app fails to connect to the ADT-3 device. To work around this issue, use the Google Home app on an Android device or the ADT-3 remote control.

**Android 13 Developer Preview 2**

[DP2](https://developer.android.com/about/versions/13/release-notes#dp2)

Release date: March 17, 2022  
Build: TPP2.220218.010  
Emulator support: x86 (64-bit), ARM (v8-A)  
Security patch level: March 2022  
Google Play services: 22.06.15  
API diff:

* [API 32 → T DP2](https://developer.android.com/sdk/api_diff/t-dp2/changes)
* [T DP1 → T DP2](https://developer.android.com/sdk/api_diff/t-dp2-incr/changes)

**What's new in Developer Preview 2**

Android 13 Developer Preview 2 includes several new features and changes to try out:

* [Foreground Services (FGS) Task Manager](https://developer.android.com/about/versions/13/changes/fgs-manager)
* [Improve prefetch job handling using JobScheduler](https://developer.android.com/about/versions/13/behavior-changes-all#prefetch-job-handling)
* [Battery Resource Utilization](https://developer.android.com/about/versions/13/changes/battery)
* [Runtime permission for notifications](https://developer.android.com/about/versions/13/changes/notification-permission)
* [BODY\_SENSORS\_BACKGROUND permission](https://developer.android.com/about/versions/13/behavior-changes-13#body-sensors-background-permission)
* [Safer exporting of context-registered receivers](https://developer.android.com/about/versions/13/behavior-changes-13#runtime-receivers)
* [Improved Japanese text wrapping](https://developer.android.com/about/versions/13/features#japanese-wrapping)
* [Improved line heights for non-latin scripts](https://developer.android.com/about/versions/13/features#line-height)
* [Text Conversion APIs](https://developer.android.com/about/versions/13/features#text-conversion)
* [Color vector fonts](https://developer.android.com/about/versions/13/features#color-vector-fonts)
* [Bluetooth LE Audio](https://developer.android.com/about/versions/13/features#btle-audio)
* [MIDI 2.0](https://developer.android.com/about/versions/13/features#midi-2-0)
* [Developer downgradable permissions](https://developer.android.com/about/versions/13/features#developer-downgradable-permissions)
* [APK Signature Scheme v3.1](https://developer.android.com/about/versions/13/features#apk-signature-scheme)

**Top resolved issues**

The following issues have been resolved in Android 13 Developer Preview 2:

**Developer-reported issues**

* Fixed an issue causing degraded touch performance on Pixel 6 and Pixel 6 Pro devices. ([Issue #220740874](https://issuetracker.google.com/issues/220740874))
* Fixed an issue where Pixel 6 Pro devices could get stuck in a reboot loop after updating to Android 13. ([Issue #218885172](https://issuetracker.google.com/issues/218885172))
* Fixed an issue where eSIMs could not be enabled or disabled properly. ([Issue #218908359](https://issuetracker.google.com/issues/218908359))

**Other resolved issues**

* Fixed an issue where the **Android system intelligence** process consumed a large amount of battery power in some cases.

**Other known issues**

Based on our testing, you might encounter the following issues when using Android 13 Developer Preview 2. These issues are already known, so there’s no need to file additional reports for similar issues.

**Android platform**

* In some cases after receiving an OTA update, devices get stuck during startup at the Google logo. To work around this issue: once the device is stuck, restart the device by holding the power button down for 30 seconds.
* When a user checks for system updates by navigating to **Settings > System > System update**, the system incorrectly reports Android 12 as the device's Android version, even when the device was already successfully updated to an Android 13 build. To work around this issue, check the device's Android version by navigating to **Settings > About phone**.
* In some cases, suspending the device while a USB-C headset is plugged in causes the device to crash and restart.
* In some situations, the system shows a [runtime permissions](https://developer.android.com/about/versions/13/changes/notification-permission) dialog out of context, asking the user to grant the notification permission on behalf of another app.
* On some devices, bright sunlight prevents the fingerprint reader from authenticating the user.
* Apps using OpenSSL version 1.1.1b through 1.1.1h may not work on some ARMv9 devices. This issue is also present on some ARMv9 devices running Android 12.

**Android Studio and tools**

* When using Android Studio Bumblebee or Android Studio Chipmunk, developers can't generate a signed APK using the Android 13 Preview SDK with their compileSdkPreview and targetSdkPreview set to the normal value, "Tiramisu".

To get a signed version of the APK, switch to using the latest version of Android Studio Dolphin available on the canary channel. You can also continue using Android Studio Bumblebee or Android Studio Chipmunk with unsigned APKs.

**Apps**

* In the Camera app, switching to Lens mode causes the camera preview to display a black screen.
* There are multiple known issues with the new per-app language system settings. For more information, see the [Known issues](https://developer.android.com/about/versions/13/features/app-languages#known-issues) section in the per-app language preferences guide.

**Android 13 Developer Preview 1**

[DP1](https://developer.android.com/about/versions/13/release-notes#dp1)

Release date: February 10, 2022  
Build: TPP1.220114.016  
Emulator support: x86 (64-bit), ARM (v8-A)  
Security patch level: February 2022  
Google Play services: 21.48.16  
API diff:

* [API 32 → T DP1](https://developer.android.com/sdk/api_diff/t-dp1/changes)

**Known issues**

Based on our testing, you might encounter the following issues when using Android 13 Developer Preview 1. These issues are already known, so there’s no need to file additional reports for similar issues.

**Android platform**

* In some cases, suspending the device while a USB-C headset is plugged in causes the device to crash and restart.
* On some devices, bright sunlight prevents the fingerprint reader from authenticating the user.
* In some cases, the **Android system intelligence** process consumes a large amount of battery power.
* Apps using OpenSSL version 1.1.1b through 1.1.1h may not work on some ARMv9 devices.

**Android Studio and tools**

* When using Android Studio Bumblebee or Android Studio Chipmunk, developers can't generate a signed APK using the Android 13 Preview SDK with their compileSdkPreview and targetSdkPreview set to the normal value, "Tiramisu".

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**Apps**

* In the Camera app, switching to Lens mode causes the camera preview to display a black screen.