Ice Cream Sandwich

Welcome to Android 4.0!

Android 4.0 delivers a refined, unified UI for phones and tablets and introduces innovative features for users and developers. This document provides a glimpse of the many new features and technologies that make Android 4.0 simple, beautiful, and beyond smart.

- Android 4.0 for Users (#UserFeatures)

- Android 4.0 for Developers (#DeveloperApis)

Android 4.0 for Users

(/sdk/images/4.0/home-lg.png) (/sdk/images/4.0/lock-lg.png)

Simple, beautiful, beyond smart

Android 4.0 builds on the things people love most about Android — easy multitasking, rich notifications, customizable home screens, resizable widgets, and deep interactivity — and adds powerful new ways of communicating and sharing.
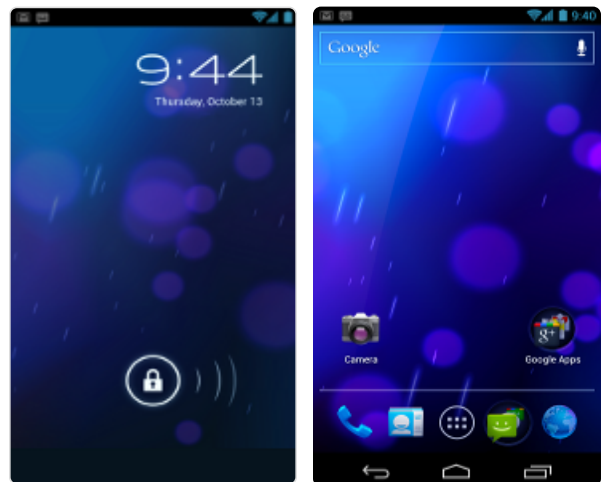
Refined, evolved UI

Focused on bringing the power of Android to the surface, Android 4.0 makes **common actions more visible** and lets users navigate with simple, intuitive gestures. Refined **animations** and feedback throughout the system make interactions engaging and interesting. An entirely **new typeface** optimized for high-resolution screens improves readability and brings a polished, modern feel to the user interface.
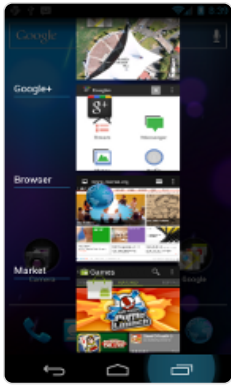
Virtual buttons in the System Bar let users navigate instantly to Back, Home, and Recent Apps. The **System Bar** and virtual buttons are present across all apps, but can be dimmed by applications for full-screen viewing. Users can access each application's contextual options in the **Action Bar**, displayed at the top (and sometimes also at the bottom) of the screen.

Multitasking is a key strength of Android and it's made even easier and more visual on Android 4.0. The Recent Apps button lets users jump instantly from one task to another using the list in the System Bar. The list pops up to show thumbnail images of apps used recently — tapping a thumbnail switches to the app.

Rich and interactive **notifications** let users keep in constant touch with incoming messages, play music tracks, see real-time updates from apps, and much more. On smaller-screen devices, notifications appear at the top of the screen, while on larger-screen devices they appear in the System Bar.
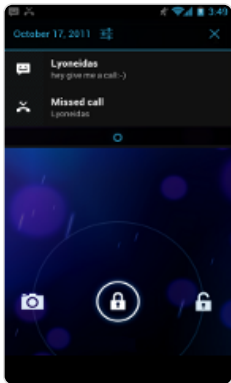
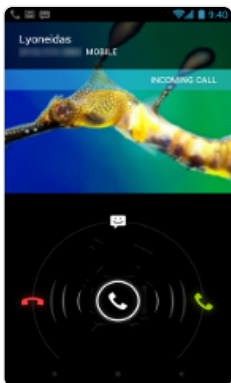**Home screen folders and favorites tray**

(/sdk/images/4.0/tasks-lg.png)
The Recent Apps list makes multitasking simple.

(/sdk/images/4.0/lock-camera-lg.png)
Jump to the camera or see notifications without unlocking.

(/sdk/images/4.0/contact-call-lg.png)
For incoming calls, you can respond instantly by text.

New home screen **folders** offer a new way for users to group their apps and shortcuts logically, just by dragging one onto another. Also, in All Apps launcher, users can now simply **drag an app** to get information about it or immediately uninstall it, or disable a pre-installed app.

On smaller-screen devices, the home screen now includes a customizable **favorites tray** visible from all home screens. Users can drag apps, shortcuts, folders, and other priority items in or out of the favorites tray for instant access from any home screen.

Resizable widgets

Home screens in Android 4.0 are designed to be content-rich and customizable. Users can do much more than add shortcuts — they can embed live application content directly through interactive **widgets**. Widgets let users check email, flip through a calendar, play music, check social streams, and more — right from the home screen, without having to launch apps. Widgets are resizable, so users can expand them to show more content or shrink them to save space.

(/sdk/images/4.0/allapps-lg.png)

(/sdk/images/4.0/calendar-widget-lg.png)
The All Apps launcher (left) and resizable widgets (right) give you apps and rich content from the home screen.
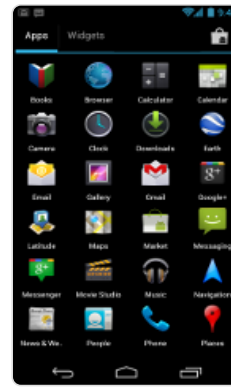
New lock screen actions

The lock screens now let users do more without unlocking. From the slide lock screen, users can **jump directly to the camera** for a picture or **pull down the notifications window** to check for messages. When listening to music, users can even manage music tracks and see album art.

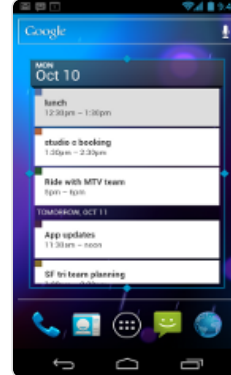### Quick responses for incoming calls

When an incoming call arrives, users can now quickly **respond by text message**, without needing to pick up the call or unlock the device. On the incoming call screen, users simply slide a control to see a list of text responses and then tap to send and end the call. Users can add their own responses and manage the list from the Settings app.

Swipe to dismiss notifications, tasks, and browser tabs

Android 4.0 makes managing notifications, recent apps, and browser tabs even easier. Users can now dismiss individual notifications, apps from the Recent Apps list, and browser tabs with a simple swipe of a finger.

Improved text input and spell-checking

The soft keyboard in Android 4.0 makes text input even faster and more accurate. Error correction and word suggestion are improved through a new set of default dictionaries and more accurate heuristics for handling cases such as double-typed characters, skipped letters, and omitted spaces. Word suggestion is also improved and the suggestion strip is simplified to show only three words at a time.
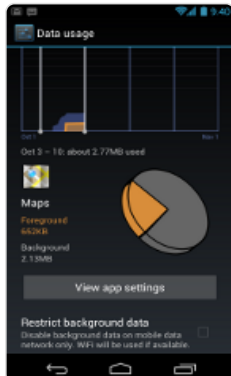
To fix misspelled words more easily, Android 4.0 adds a **spell-checker** that locates and underlines errors and suggests replacement words. With one tap, users can choose from multiple spelling suggestions, delete a word, or add it to the dictionary. Users can even tap to see replacement suggestions for words that are spelled correctly. For specialized features or additional languages, users can now download and install third-party dictionaries, spell-checkers, and other text services.

(/sdk/images/4.0/text-replace-lg.png)
A spell-checker lets you find errors and fix them faster.
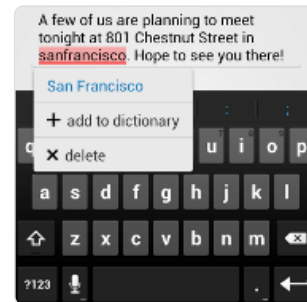
Powerful voice input engine

Android 4.0 introduces a powerful new voice input engine that offers a continuous "open microphone" experience and streaming voice recognition. The new voice input engine lets users dictate the text they want, for as long as they want, using the language they want. Users can **speak continuously** for a prolonged time, even pausing for intervals if needed, and dictate punctuation to create correct sentences. As the voice input engine enters text, it underlines possible dictation errors in gray. After dictating, users can tap the underlined words to quickly replace them from a list of suggestions.
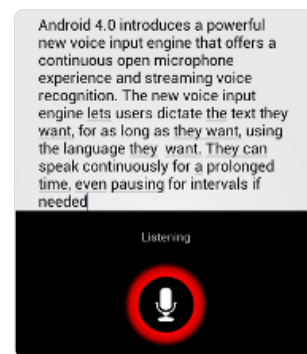

(/sdk/images/4.0/tts-lg.png)
A powerful voice input engine lets you dictate continously.

Control over network data

Mobile devices can make extensive use of network data for streaming content, synchronizing data, downloading apps, and more. To meet the needs of users with **tiered or metered data plans**, Android 4.0 adds new controls for managing network data usage.

In the Settings app, colorful charts show the total data usage on each network type (mobile or Wi-Fi), as well as amount of data used by each running application. Based on their data plans, users can optionally set warning levels or hard limits on data usage or disable mobile data altogether. Users can also manage the background data used by individual applications as needed.

(/sdk/images/4.0/usage-all-lg.png)

Designed for accessibility

A variety of new features greatly enhance the accessibility of Android 4.0 for users who are blind or have visual impairments. Most important is a new **explore-by-touch mode** that lets users navigate without having to see the screen. Touching the screen once triggers audible feedback that identifies the UI component below; a second touch in the same component activates it with a full touch event. The new mode is especially important to support users on new devices

(/sdk/images/4.0/usage-maps-lg.png)

Data usage controls let you monitor total usage by network type and application and then set limits if needed. that use virtual buttons in the System Bar, rather than dedicated hardware buttons or trackballs. Also, standard apps are updated to offer an improved accessibility experience. The **Browser** supports a script-based screen reader for reading favorite web content and navigating sites. For improved readability, users can also increase the default font size used across the system.

The accessibility experience begins at first setup — a simple **touch gesture** during setup (clockwise square from upper left) activates all accessibility features and loads a setup tutorial. Once accessibility features are active, everything visible on the screen can be spoken aloud by the standard screen reader.

Communication and sharing

Designed for the way people live, Android 4.0 integrates rich social communication and sharing touchpoints across the system, making it easy to talk, email, text, and share.
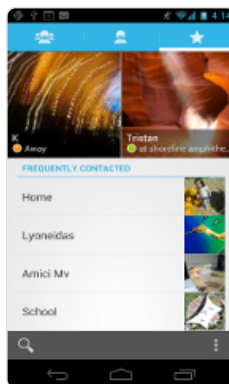
People and profiles

Throughout the system, a user's social groups, profiles, and contacts are linked together and integrated for easy accessibility. At the center is a new **People app** that offers richer profile information, including a large profile picture, phone numbers, addresses and accounts, status updates, events, stream items, and a new button for connecting on integrated social networks.

The user's own contact information is stored in a new **"Me" profile**, allowing easier sharing with apps and people. All of the user's integrated contacts are displayed in an easy to manage list, including controls over which contacts are shown from any integrated account or social network. Wherever the user navigates across the system, tapping a profile photo displays Quick Contacts, with large profile pictures, shortcuts to phone numbers, text messaging, and more.
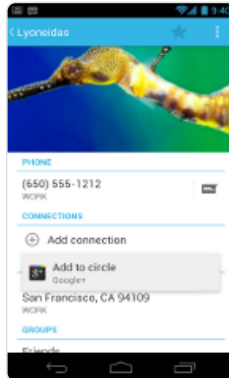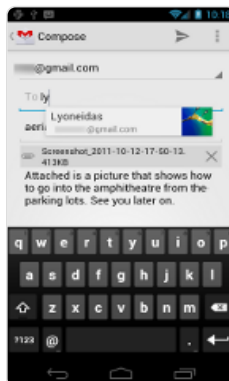
Unified calendar, visual voicemail

To help organize appointments and events, an updated **Calendar app** brings together personal, work, school, and social agendas. With user permission, other applications can contribute events to the calendar and manage reminders, for an integrated view across

(/sdk/images/4.0/contact-faves-lg.png)

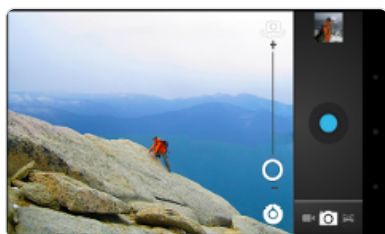(/sdk/images/4.0/contact-connect-lg.png)

(/sdk/images/4.0/contact-email-lg.png)

multiple calendar providers. The app is redesigned to let users manage events more easily. Calendars are color-coded and users can **swipe left or right** to change dates and pinch to zoom in or out agendas.

Contacts and profiles are integrated across apps and social networks, for a consistent, personal experience everywhere — from incoming calls to emails.
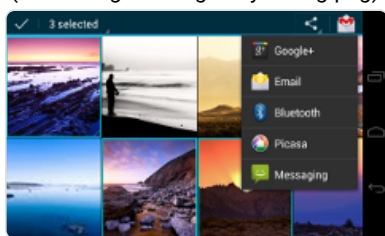
In the phone app, a new **visual voicemail** features integrates incoming messages, voice transcriptions, and audio files from one or more providers. Third-party applications can integrate with the Phone app to add their own voice messages, transcriptions, and more to the visual voicemail inbox.

(/sdk/images/4.0/camera-lg.png)

(/sdk/images/4.0/gallery-edit-lg.png)

(/sdk/images/4.0/gallery-share-lg.png)
Capture the picture you want, edit, and share instantly.

Rich and versatile camera capabilities

The Camera app includes many new features that let users capture special moments with great photos and videos. After capturing images, they can edit and share them easily with friends.

When taking pictures, **continuous focus**, **zero shutter lag exposure**, and decreased shot-to-shot speed help capture clear, precise images. **Stabilized image zoom** lets users compose photos and video in the way they want, including while video is recording. For new flexibility and convenience while shooting video, users can now take **snapshots at full video resolution** just by tapping the screen as video continues to record.

To make it easier to take great pictures of people, built-in **face detection** locates faces in the frame and automatically sets focus. For more control, users can **tap to focus** anywhere in the preview image.

For capturing larger scenes, the Camera introduces a **single-motion panorama** mode. In this mode, the user starts an exposure and then slowly turns the Camera to encompass as wide a perspective as needed. The Camera assembles the full range of continuous imagery into a single panoramic photo.
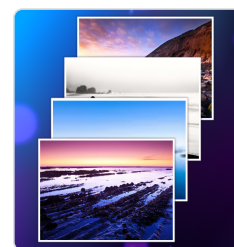
After taking a picture or video, users can quickly share it by email, text message, bluetooth, social networks, and more, just by tapping the thumbnail in the camera controls.

Redesigned Gallery app with photo editor

The Gallery app now makes it easier to manage, show, and share photos and videos. For managing collections, a **redesigned album layout** shows many more albums and offers larger thumbnails. There are many ways to sort albums, including by time, location, people, and tags. To help pictures look their best, the Gallery now includes a powerful **photo editor**. Users can crop and rotate pictures, set levels, remove red eyes, add effects, and much more. After retouching, users can select one or multiple pictures or videos to share instantly over email, text messaging, bluetooth, social networks, or other apps.

A Photo Gallery widget on the home screen.

An improved **Picture Gallery widget** lets users look at pictures directly on their home screen. The widget can display pictures from a selected album, shuffle pictures from all albums, or show a single image. After adding the widget to the home screen, users can flick through the photo stacks to locate the image they want, then tap to load it in Gallery.

Live Effects for transforming video

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