

Evolution of the Android Operating System

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Abstract - Android, the world's most widely used mobile operating system is capturing the market with its new and upcoming updates and extensively enriched user interface. Android has come a long way from its first release to almost releasing 19 versions of this mobile operating system. It is an open source and a mobile operating system used by people from all walks of the world.

Key Words: Android, Google, Android versions, Android Inc.

1. INTRODUCTION

We live in an era where every day there is development under process to make our lives more comfortable. Android operating system has almost made our phones work like our personal computers. From attending conference calls to sending mails, from sending money overseas to buying stuff from anywhere which can be delivered to your doorstep, from texting a person to video calling a person who is miles away can be done with a simple palm sized device. We can buy almost anything in the world with a touch of a button. We can transfer money overseas within minutes by just a carrying out just a few tasks. Android has indeed made our lives easier.

1.1 Android's First Phone

T-mobile G1 was the first smartphone to run on Google's Operating system. It was launched with partnership with HTC. It was a phone with a simple UI having a red color power button, back button, home button, menu button and a call button. A trackball was also installed to make the navigation easier. It had a 3MP Camera and didn't have a headphone jack. One needed a dongle to connect headphones. This phone had myspace.com which was the largest social networking site during 2005 to 2008 period. It came up with Android Market where you could shop for apps which is now known as the Google Play store. Google Maps worked just fine in this phone but the pinch to zoom functionality was not available.



Fig-1: T-mobile G1 (Android's first smartphone)

The Android Operating System was founded by a group of four members under the umbrella Android Inc. In 2005, Yahoo acquired Android Inc. which is a subsidiary of Google Inc. and in 2007, the Open Handset Alliance which is an association of firms which develop open standards for mobile devices, publicly announced their first product, Android, a mobile product platform built on Linux kernel version in an alliance with HTC in 2008.

1.2 Growth of Android

Android has come a long way from its humble beginnings as small start-up. Today it is the world's leading operating system with 75% of the market share.

2. VERSIONS OF ANDROID

Android Version 1.0 (Released in 2008)

This version of Android was available on the HTC Dream Smartphone. It included most of Google's current features like Maps, YouTube and Gmail. It also included HTML browser for search, text messaging options. MMS and much more.

Android Version 1.1 (Released in 2009)

Just 4 months after the release of Android's 1.0 version, Google released its version 1.1. The feature added here was users could save attachments and messages. Details and reviews were also made available of businesses on Maps and it introduced longer-in-call screen timeout by default when the user used the speaker phone.

Android Version 1.5 – Cupcake (Released in 2009)

This was the first version to use Google's desert themed naming scheme and the first Samsung Galaxy phone to have an Android version. It had few enhancements which we find in the current versions such as the ability to upload videos on YouTube, automatic screen rotation, support for widgets and the ability to check phone usage history.

Android Version 1.6 – Donut (Released in 2009)

The new feature included in this version was the support for different screen sizes. It also included support for CDMA based networks. CDMA is a network technology which makes it possible for multiple calls and internet to be transmitted in one radio signal.

Android Version 2.0 – Eclair (Released in 2009)

One year later, appeared the second version of Android. This was the first version to support text-to-speech technology. It supported live wallpapers and brought in the feature of the drag and drop unlocking system.

Eclair's 2.1 update brought bug fixes and minor changes to the API.

Android Version 2.2 –Froyo (Released in 2010)

Froyo enabled mobile hotspots and the ability to lock the phone with a PIN.

Android Version 2.3 –Gingerbread (Released in 2010)

First phone with the Gingerbread version was the Nexus S, codeveloped by Google and Samsung. This brought an update in UI design which supported extra-large sizes and resolutions and it also came up with an improved keyboard. Gingerbread also enabled support for NFC function. NFC i.e., Near Field Communication technology allows users to make secured transactions, exchange digital content and connect electronic devices with a touch. The support for front camera was introduced here.

Android Version 3.0 – Honeycomb (Released in 2011)

This version was made to be installed only on tablets and phones with larger screens. The most important function brought by this version was that it eliminated physical buttons like the back, start and menu buttons.

Android Version 4.0 – Ice Cream Sandwich (Released in 2011)

Ice cream sandwich combined many features of Honeycomb version. It also introduced the support for unlocking the phone with the help of camera. UI upgrade brought in this version was sliding gestures to reject notifications or to close already open tabs.

Android Version 4.1 – Jellybean (Released in 2012)

Immediately after the launch of Jellybean 4.1, Google released the 4.2 and 4.3 versions. This version brought the concept of Google Now (now known as Google Assistant). The significant update in this version was improvement of UI performance and functionality through the "Project Butter".

Android 4.4 – Kitkat (Released in 2013)

Kitkat came up with feature of voice commands. Users could access Google Now with the help of the "OK Google" command.

Android 5.0 – Lollipop (Released in 2014)

Lollipop was launched with Nexus 6 which was the first phone to feature Google's "Material Design" philosophy. In this version, VM (Virtual Machine) Dalvik had been replaced with Android Runtime which means that some of the processing power

required for applications was provided before they were opened. A mode was enabled to shut down background applications to save device's battery.

Android 6.0 – Marsh mellow (Released in 2015)

This version is also known as the Android M version and it came up support for biometric fingerprint unlocking, USB Type-C support and an introduction to memory manager. Different volumes for media, device and alarms could be set separately in this version. 32.2% of all Android based devices support this operating system.

Android 7.0 – Nougat (Released in 2016)

This version included improved multitasking features and the split screen mode was introduced and enabled faster switching between applications. Google Now was replaced by Google Assistant here.

Android 8.0 – Oreo (Released in 2017)

This version brought up the possibility to activate/deactivate or sort the notifications according to one's preference or importance.

Android 9.0 – Pie (Released with 2018)

Pie version brought improvements on the visual side. Traditional navigation buttons were removed and it brought improvements to the device's battery life. "Do Not Disturb" mode could be enabled using gestures i.e., the device could be put into DND mode during an incoming call by just turning the phone over to screen.

Android 10

Google announced the rebranding of the operating system and eliminating the naming scheme with the launch of this version. User could enable dark theme for the entire phone and security features like choosing to share the location data with preferred apps and only while one is using them. In this version, users have more control over the permissions for applications.

Android 11

This version brought in-built screen recording option. Users could update apps via Play store. It also brought a major security update by allowing one time or temporary permission to apps.

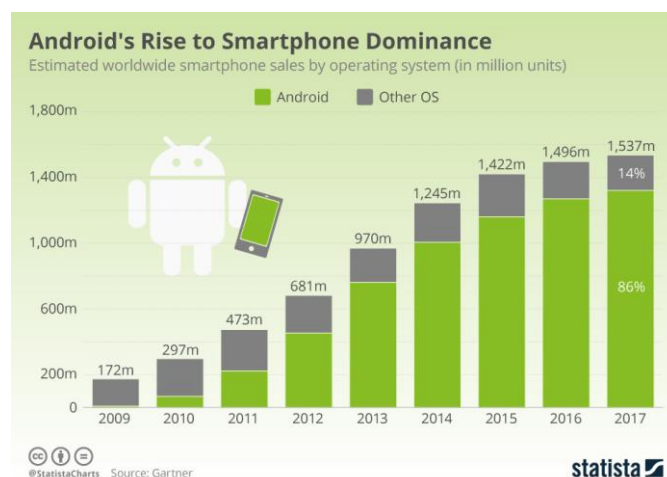


Chart-1: Growth of Android

NFC i.e., Near Field Communication technology which allows users to make secured transactions, exchange digital data and connect devices with a touch.

CDMA i.e., Code-Division Multiple Access is a network technology which makes it possible for multiple calls and internet to be transmitted in one radio signal.



Fig-2: Evolution of Android OS



Fig -3: Versions of Android OS

Android versions have been following an alphabetical order in their naming and upgrades but many users have failed to notice this.

3. CONCLUSION

Google has developed Android ever since it has acquired it. Through this research, we found out that Android is a much more diverse operating system than iOS and Windows Phone Mobile. Android has grown rapidly over the past 4 years becoming the most used smartphone operating system in the world. It is an open-source operating system. It is unique and incomparable to other mobile operating systems.

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Version	Launch Year	Improvements and features
Android 1.0	2008	Included Google's current features like Maps, YouTube, Gmail. HTML browser to search, SMS and MMS options
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