

Mobile Computing



Introduction

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Mobile Computing

- Definition:-
 - taking a computer and all necessary files and software out into the field - ~wikipedia~



- Generic Definition:-
 - **Mobile computing** is human–computer interaction by which a computer is expected to be transported during normal usage. - ~wikipedia~

- A few classes of mobile computing items:
 - **portable computers:** compacted lightweight units primarily intended as hosts for software that may be parametrized, as laptops, notebooks, notepads, etc.
 - **mobile phones:** including a restricted UI primarily intended but not restricted to for vocal communications, as cell phones, smart phones, phone pads, etc.
 - **wearable computers:** mostly limited to functional keys and primarily intended as incorporation of software agents, as watches, wristbands, necklaces, keyless implants, etc.

Mobile Technologies



Cellular Networks

- The first successful public commercial mobile phone network:
 - The Autoradiopuhelin (ARP) network in Finland, launched in 1971 – 0G
- Analog cellular networks – 1G (1979)
 - Used a Frequency-division multiple access (FDMA)
 - Easy to eavesdropping (no encryption)
- Digital cellular networks – 2G (1990)
 - Two standards: GSM in Europe, CDMA in US
 - Introducing SMS
 - GPRS (2.5G)
- Mobile broadband data - 3G
 - packet switching rather than circuit switching
 - HSDPA 3G+
 - HSPA 3.5G
- Native IP networks – 4G
 - To address the growth of bandwidth-intensive applications like streaming media
 - Two standards: WiMAX and LTE
- Tactile Internet – 5G



Wireless Communication Technologies

- Infrared (IR) Communication
- Bluetooth
- Wifi
- Near Field Communication (NFC)
- Wifi Direct
- Android Beam
- S-Beam
- Global Positioning

Mobile Operating Systems

- Symbian
- Windows Mobile
- Palm OS
- webOS
- Maemo
- MeeGo
- LiMo/ Tizen

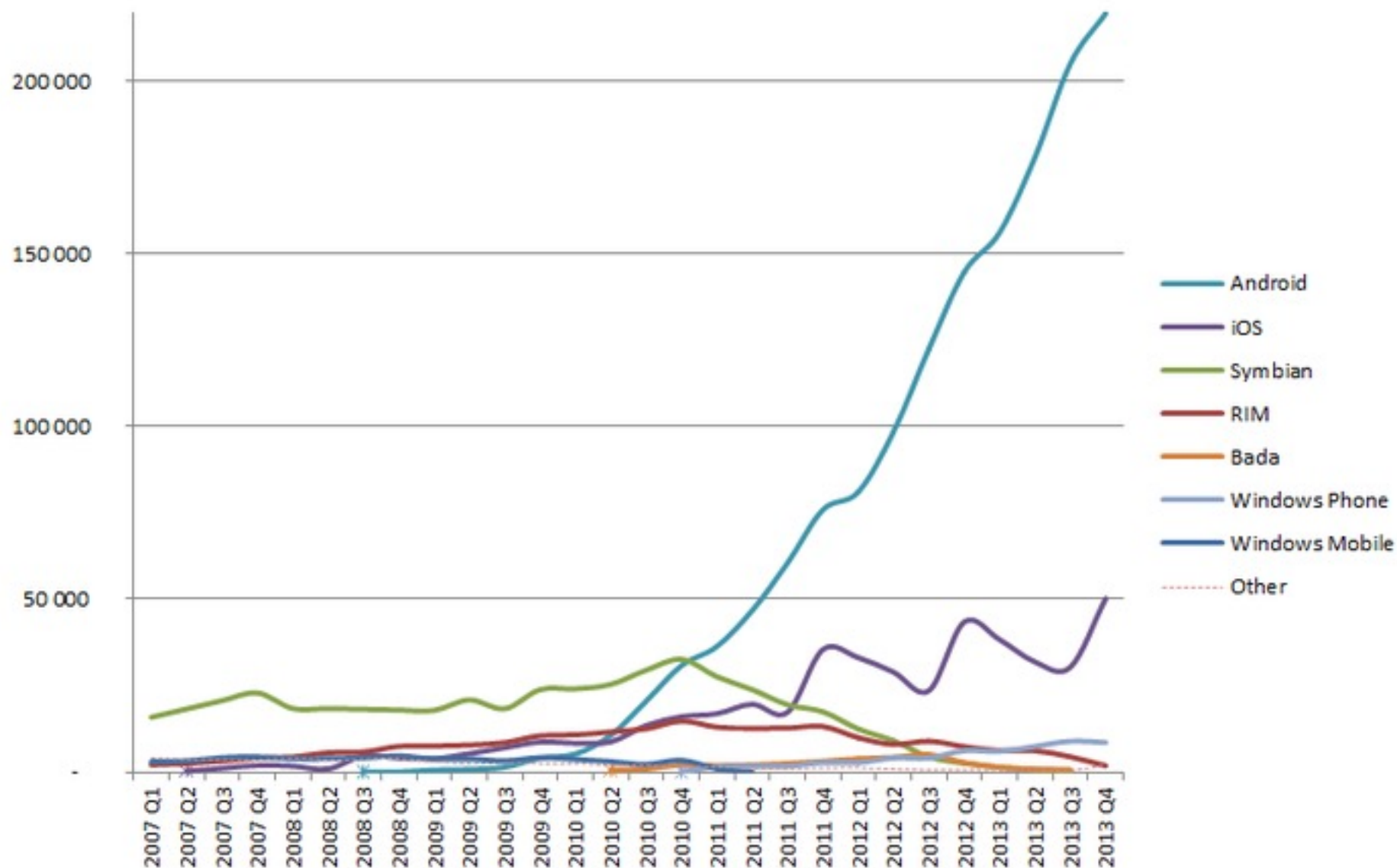


Mobile Operating Systems

- Android
 - A Linux Kernel based OS
 - Currently Developed by Google
- iOS
 - Power-up and optimized for Apple i-Devices
- Windows Phone
 - Developed by Microsoft
 - Power-up smart mobiles from various brands including Nokia
- Blackberry
 - Developed by BlackBerry Ltd.
 - Power-up Blackberry smartphones
- Firefox OS
 - A Linux kernel based Open-Source OS
 - Developed by Mozilla
- Sailfish OS
 - Uses Linux kernel
- Ubuntu Touch OS
 - mobile version of the Ubuntu operating system



World-Wide Smartphone Sales (Thousands of Units)



Mobile Hardware Technologies

- Processor Technology
 - Smaller
 - Low power consumption and less heat generation
 - Prefers System On a Chip (SOC) approach to processor design
 - processors that incorporate as many functions as possible in a single package
 - Trending multi-core processor technology
 - Ex:-
 - NVIDIA's Tegra, Samsung's Orion

Mobile Hardware Technologies

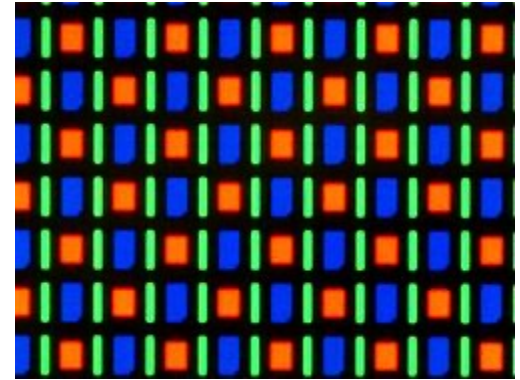
- Display Hardware

- Trending features

- Resolution
 - Contrast
 - Power Efficiency

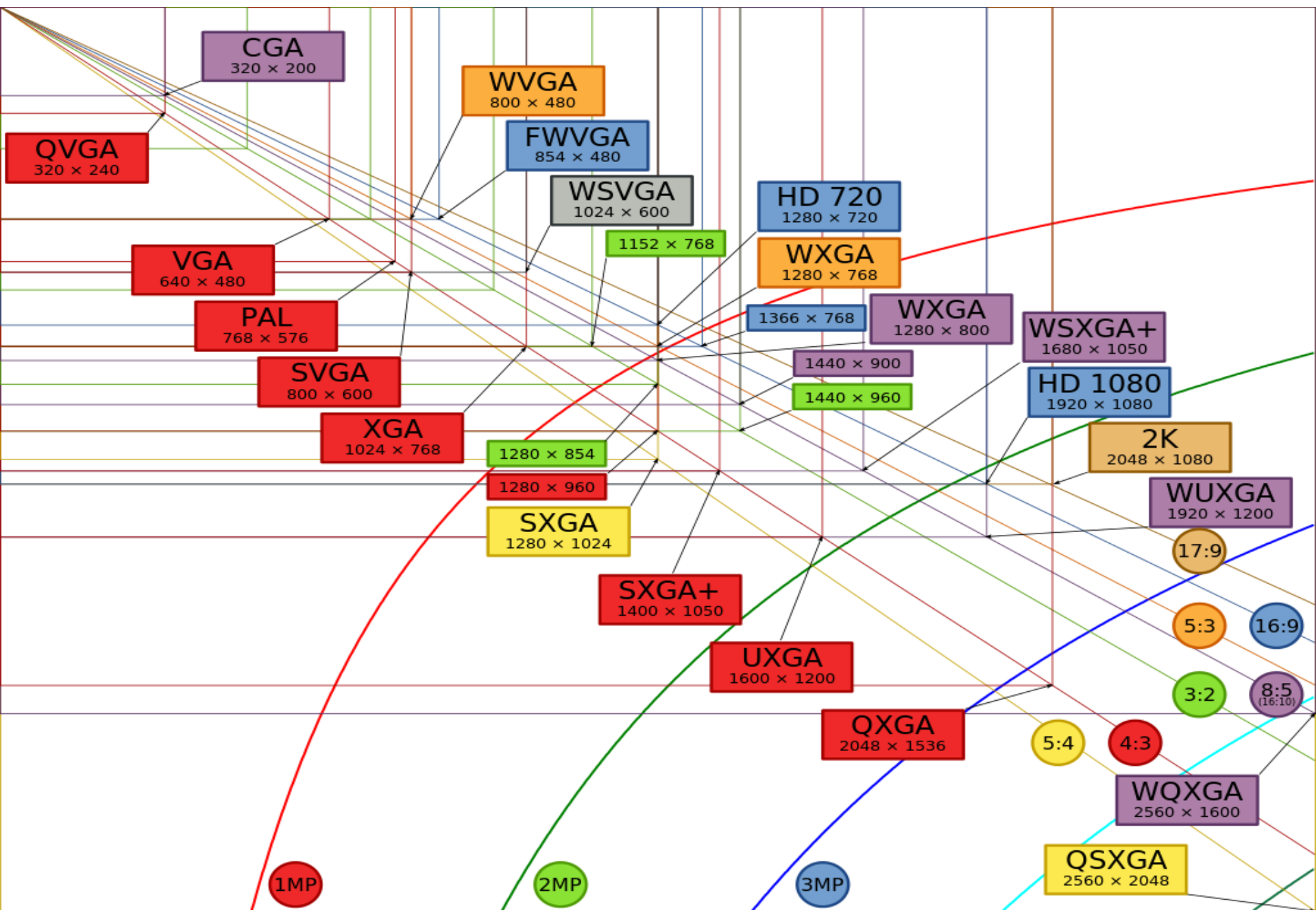
- Primitive Display Technologies

- LCD – Liquid Crystal Display
 - AMOLED – Active Matrix Organic Light Emitting Diode
 - Low power consumption and vivid colors
 - IPS (in plane switching) and Retina
 - A premium LCD technology
 - Wide viewing angle and clear picture (High Resolution)
 - “Retina Display” is based on IPS technology
 - Full HD Super AMOLED
 - Featured on the Samsung Galaxy S4 Samsung Galaxy Note 3
 - The broadest color gamut of any mobile display



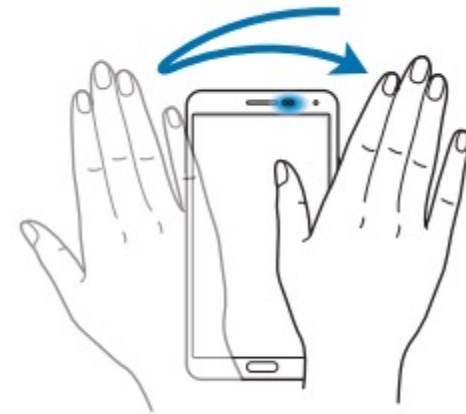
AMOLED

Aspect Ratio & Resolution Chart



Mobile Hardware Technologies

- Digitizers Technologies
 - Touch Screens
 - Resistive Touch Technology
 - Capacitive Touch Technology
 - Multi-touch Technology
 - Touch Gestures
 - Stylus
 - Capacitive Stylus
 - S-Pen
 - Air Gestures



Mobile Hardware Technologies

- Common Sensors
 - Proximity Sensor
 - Detect call answering
 - Air gesture detection
 - RGB Light Sensor
 - Adapt Display Color and Intensities
 - Gyro Sensor
 - Detect Mobile Phone Orientation Based on 3-axis
 - Smart Rotation
 - Accelerometer
 - Detect movement states of mobile based on 3-axis
 - Health apps and Movement gestures
 - Geomagnetic Sensor
 - Compass
 - Barometer
 - Measure atmospheric pressure
 - Calculate the altitude
 - Temperature/Humidity Sensor
 - Check Comfort level



Mobile Software Development Technologies

- Android SDK
 - Usually developed in Java programming language
 - Development Environments:
 - Any modern Linux distribution
 - Android itself
 - Mac OSX
 - Windows XP and later
 - Officially supported IDE: Eclipse with Android Development Tools (ADT)
 - A Native development kit available

Mobile Software Development Technologies

- IOS SDK
 - Usually developed in Objective-C
 - Development Environments:
 - Mac OSX
 - Officially supported IDE: Xcode IDE

Applications of Mobile Computing

- Banking and Financial Institutions
- Hospitality Industries
- Distribution Industries
- Airline, Railway and Taxi industry
- Manufacturing Industries
- Transportation Industry
- Sales and Marketing Industries
- Accessibility Products
- Social Networking
- Health and Fitness Assistance