



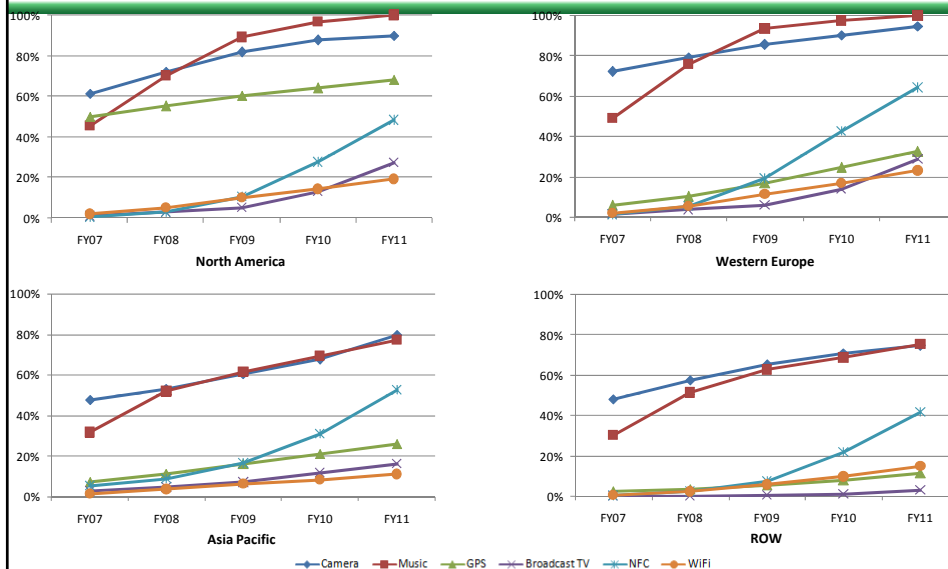


Mobile Device Shipment - Evolution of US Handset Capabilities

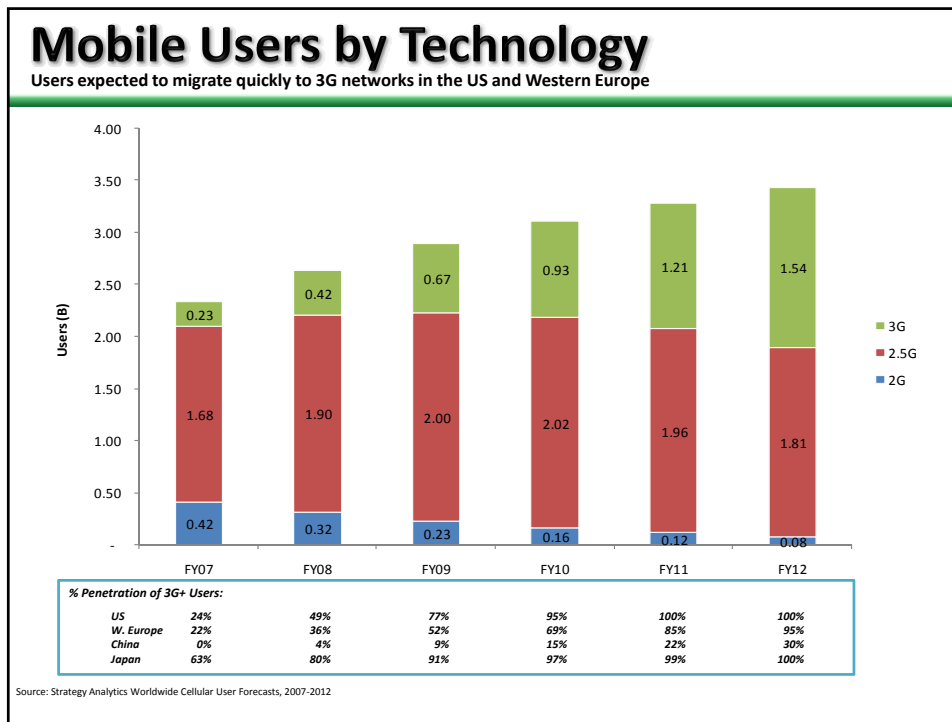
	Camera Equipped	Video Capture Capability	Smart Phone	MMS Capable	Video Support	3G	Sideload Music Capability	OTA Music Capable
1999	0%	0%	0%	0%	0%	0%	0%	0%
2000	0%	0%	3%	3%	0%	0%	0%	0%
2001	0%	0%	6%	7%	0%	0%	1%	0%
2002	7%	1%	14%	27%	10%	0%	8%	0%
2003	27%	9%	13%	54%	30%	0%	8%	0%
2004	52%	34%	16%	77%	52%	5%	15%	1%
2005	68%	49%	14%	78%	69%	23%	31%	11%
2006	74%	53%	15%	87%	70%	29%	52%	16%

Source: m:metrics

Mobile Device Shipments – Key Enabling Technologies and Forecast



Source: Strategy Analytics Global Enabling Technologies Forecast February 2007



## Industry Trends, cont.

- Ongoing tension between network operators and internet-based business models
  - Value chain is very different than the PC
  - Infrastructure is expensive – e.g., 3G licensing – particularly in Europe, and operators need to be able to recoup investment
  - Innovation is arguably more difficult given the operator control over distribution and focus on monetization.
- Voice and audio is becoming just another internet application
- Some users want ability to improve their mobile experience through applications and/or alternate devices
  - iPhone developers willing to risk voiding their warranties to install applications
  - “Unlocking”
- Walled Garden v. Openness in the future?

## **Obstacles to openness, but evolving...**

- Network Operators
  - Separate Requirements
  - Separate APIs
  - Porting to Multiple Handsets, Firmware
  - Billing Infrastructure and Business Models
  - High Cost of Data
- Security Concerns
- Changing? -- Verizon's "Any Apps, Any Device" announcement -- November 2007

## **Platform(s) Overview**

- Multiple Platforms
  - Symbian
  - RIM /Blackberry
  - Windows Mobile
  - PalmOS
  - Linux variations – OpenMoKo, Qtopia
- Different development environments and limited distribution channels have restricted application development
- 2007 – New and Influential Entrants
  - June 2007, Apple – iPhone
  - November 2007 – Google --"Android"

## Standardization Attempts

- Open Source Based: Limo Foundation, Linux Phone Standards (LiPS) Forum
- 2007 -- Open Handset Alliance
- Open Mobile Alliance (“OMA”)

## Regulatory Issue - Network Neutrality

- Network Neutrality Debate Spread to Wireless
  - 2/2007 paper by Tim Wu, Columbia Law Professor
  - Debate– Should “Carterfone” rules apply to wireless? (1968 decision which allowed consumers to hook any device up to a *wired* telephone networks)
  - Skype requests rulemaking from FCC
  - Incidents such as Verizon Wireless blocking of NARAL participation in an SMS opt-in alert program
- New EU Regulations Proposed

## Legal Issues

- Other Regulatory Issues
  - E911 - US
  - Restrictions on device use and driving
    - New York state senator proposes a fine for using a mobile device while crossing the street...
  - Accessibility
- Employment --- is using your mobile device equivalent to “work”?
- Privacy
  - Breakdown in privacy conventions – cameraphone
  - Location Data, Data Protection and Handling

## Legal Issues, cont.

- Patent
  - Royalties
  - Litigation
  - Antitrust -- EU investigation of Qualcomm (10/2007) over pricing of Qualcomm’s CDMA and WCDMA patents.
- Mobile Money
  - Banking
  - Privacy and Security

## Legal Issues, cont.

- Unlocking
  - Copyright law now does not prohibit “unlocking”. The anticircumvention exception (37 CFR Part 201) allows a user to gain access to firmware that enables wireless handsets to connect to a wireless telephone communication network. It does not, however, prohibit an operator from enforcing “locked” handsets.
- Business Models Often Do Not Allow Unlocking
  - SIM locking in the US is prevalent
  - Laws and custom vary internationally

## The Future?

- Emerging Markets
  - Growth over fixed-line subscribers
  - 85% of next billion users will be in emerging markets (Pyramid Research)
- Some Convergence of Phone and other Computing Devices
- New Use Scenarios
  - Mobile banking, ticketing, coupons, retail
  - Location Based Services
- Introduction of a Disruptive Technology, Business Model or Regulation?