



Mobile Handset Value Chain

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Outline

- **Device Development Trends**
- **3G Technology Evolution Paths**
- **3G Wireless Data Services**
- **3G Growth**
- **Qualcomm's Contributions to 3G**

Yesterday's Phones Were About Voice & SMS



Today, What Were Devices Become Features



Convergence of Computing, Communications and Consumer



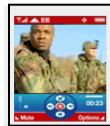
Phone



Mobile Communication



Information



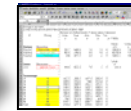
Entertainment/ CE



Rich Communication



User Generated Content/
Social Networking



Computing



Convergence of Services

- Mobility
- Access
- Personalization

Seamless User Experience

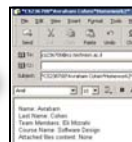


Mobile Internet
Mobile Entertainment
Mobile Broadband

PC



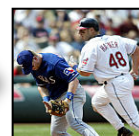
Computing



Simple Communication



Information



Entertainment



Rich Communication



User Generated Content/
Social Networking



Technology Impacts Data Rates

Current Mobile Technologies in the United States

- **CDMA2000 1xEV-DO Rev A**
 - Peak Rate
 - Current Avg. DL Rate
 - Current Avg. UL rate

Verizon Wireless, Sprint Nextel
3.1 Mbps (DL) 1.8 Mbps (UL)
600 kbps – 1.4 Mbps
300 – 600 kbps
- **CDMA2000 1xEV-DO**
 - Peak Rate
 - Current Avg. Rate

Verizon Wireless, Sprint Nextel, Alltel
2.4 Mbps (DL) 153 Kbps (UL)
400 – 700 kbps
- **HSDPA**
 - Peak Rate
 - Current Avg. Rate

Cingular
1.8 Mbps (implemented)
400 – 700 kbps
- **WCDMA (UMTS)**
 - Peak Rate
 - Current Avg. Rate

Cingular
384 kbps
64 – 250 kbps
- **CDMA2000 1X**
 - Peak Rate
 - Current Avg. Rate

Sprint Nextel, Verizon Wireless
153 kbps
50-90 kbps
- **EDGE**
 - Peak Rate
 - Current Avg. Rate

Cingular
130 kbps
60-100 kbps
- **GPRS**
 - Peak Rate
 - Current Avg. Rate

Cingular, T-Mobile
53 kbps
20-30 kbps

*Mobile **broadband** experience*

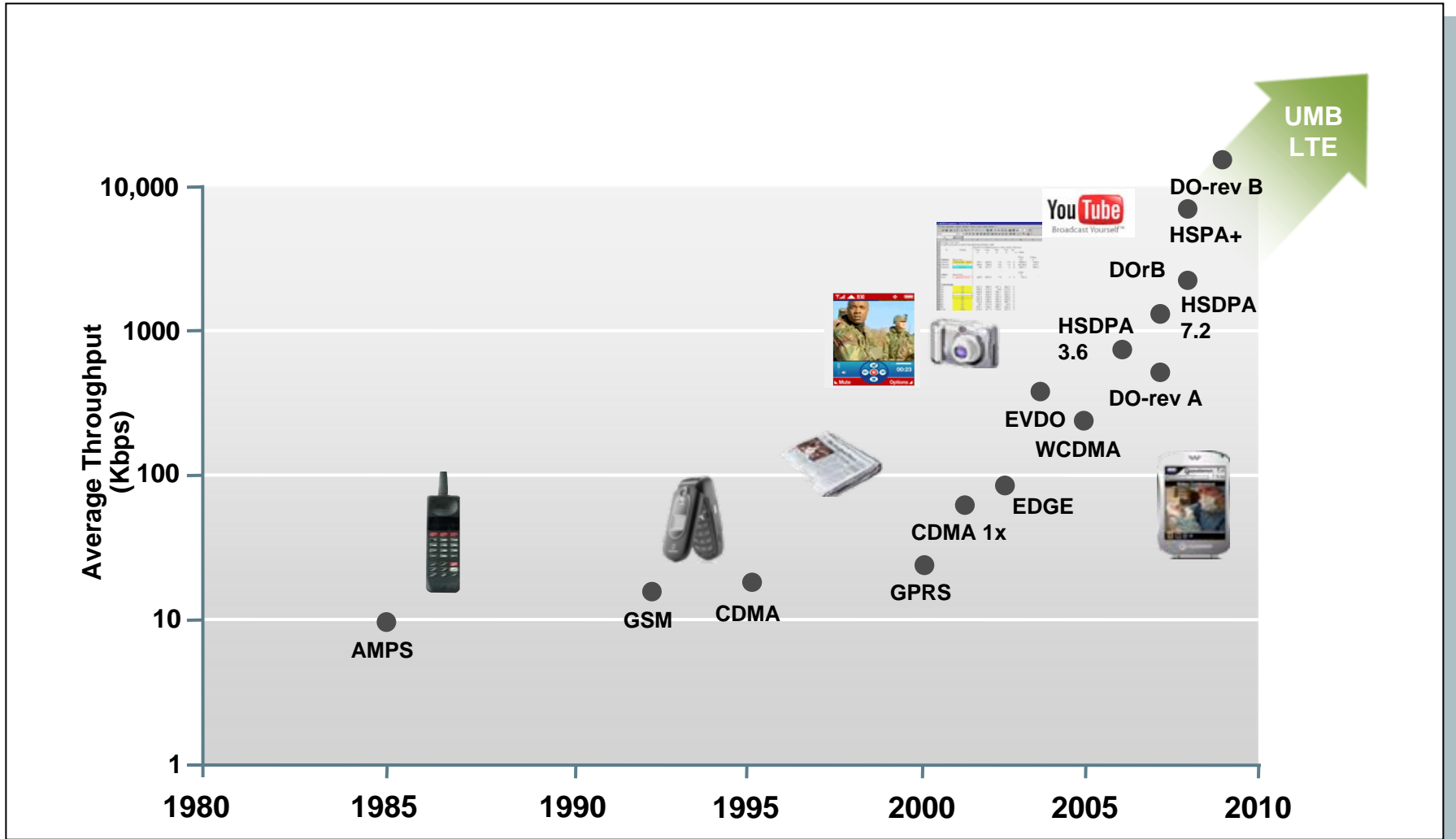
*Short video clips, audio, graphic web browsing, email, file transfer – **faster than dial up***

*Email, text Web access, basic synchronization – **slower than dial up***

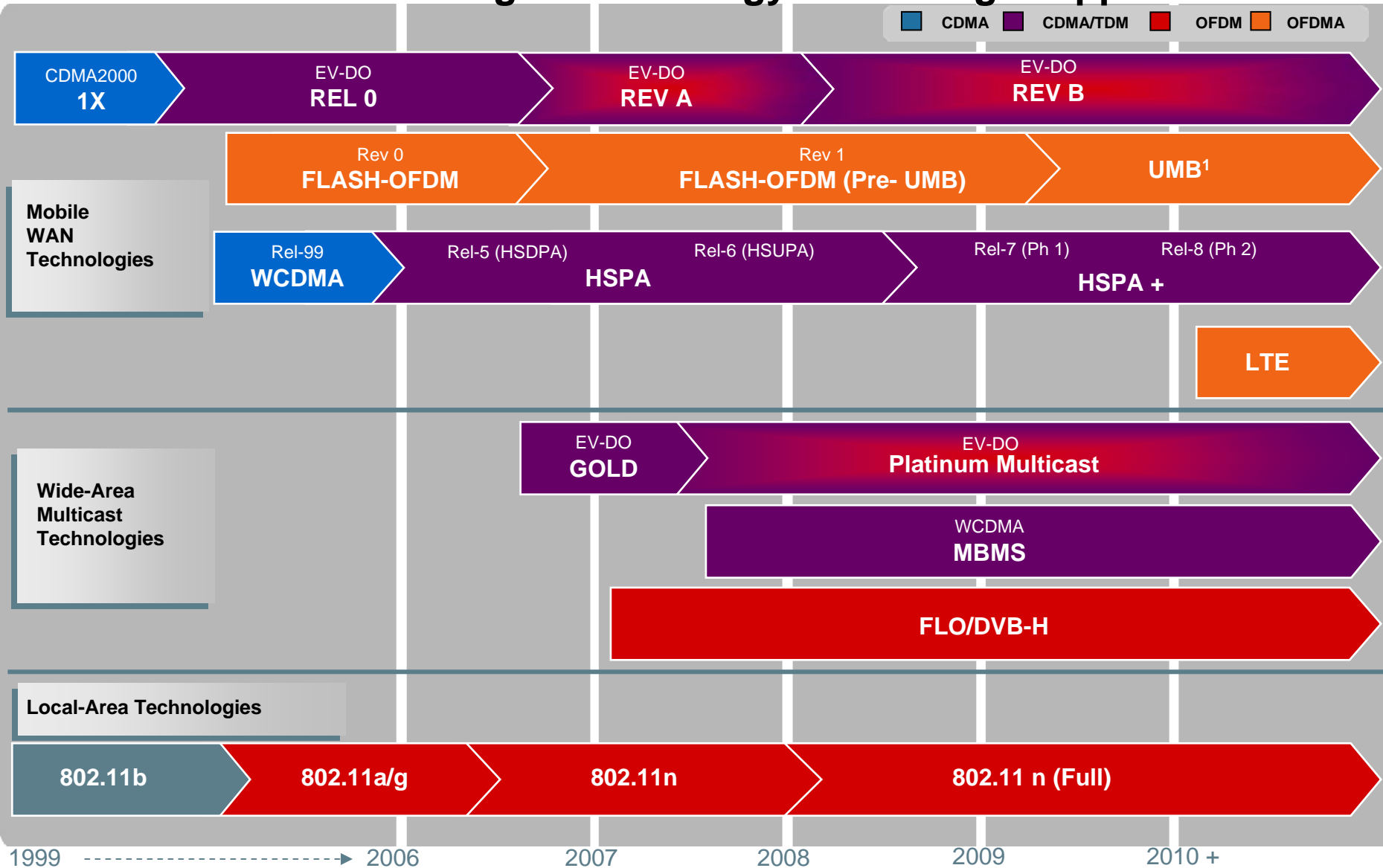


Moving Beyond Voice

More Bandwidth and More Opportunity for Carrier Revenue Growth

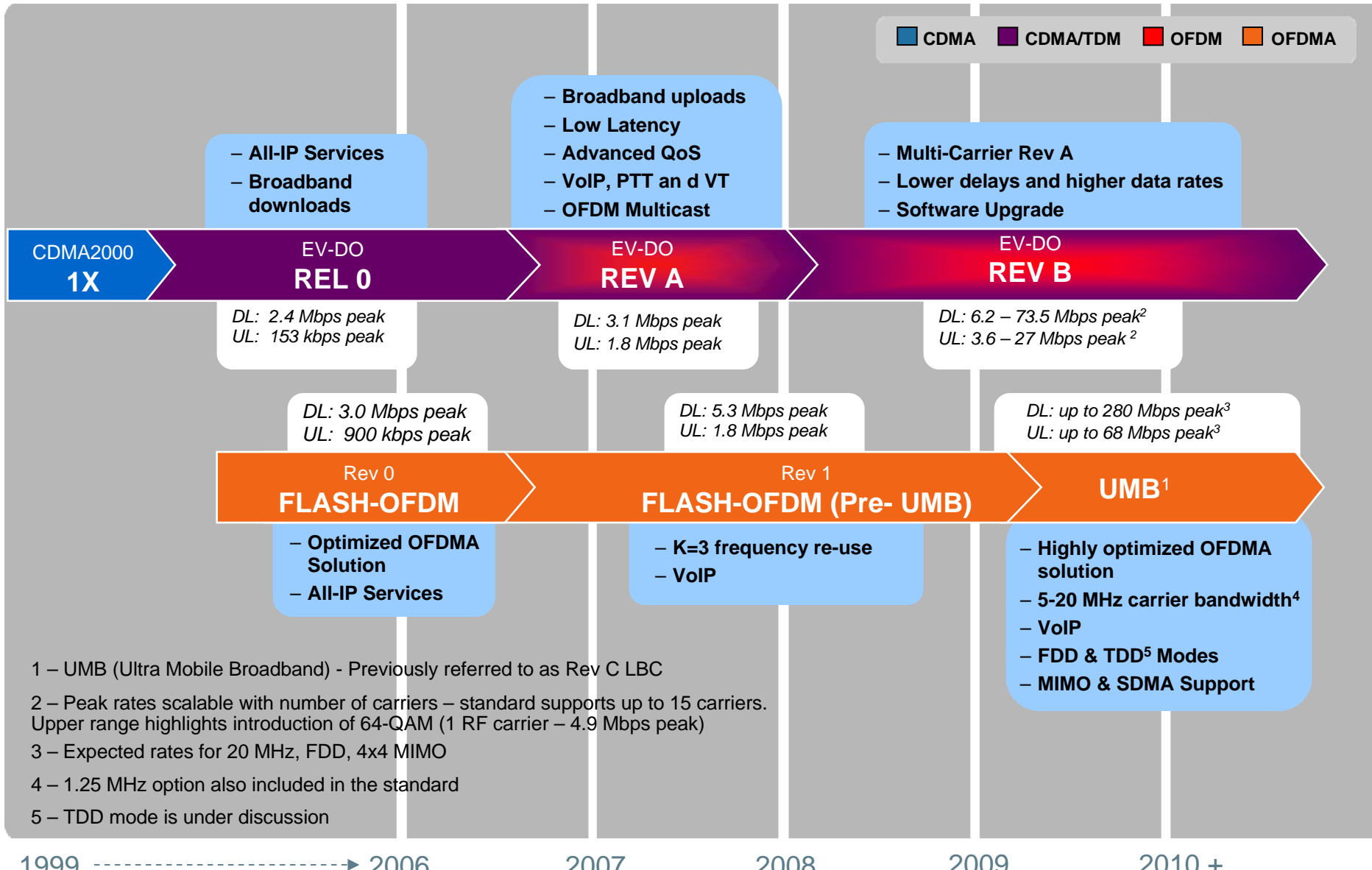


Wireless Evolution: The Right Technology for the Right Application



1-UMB (Ultra Mobile Broadband), previously referred to as Rev C LBC

A Well Established Mobile Broadband Evolution Path



1 – UMB (Ultra Mobile Broadband) - Previously referred to as Rev C LBC

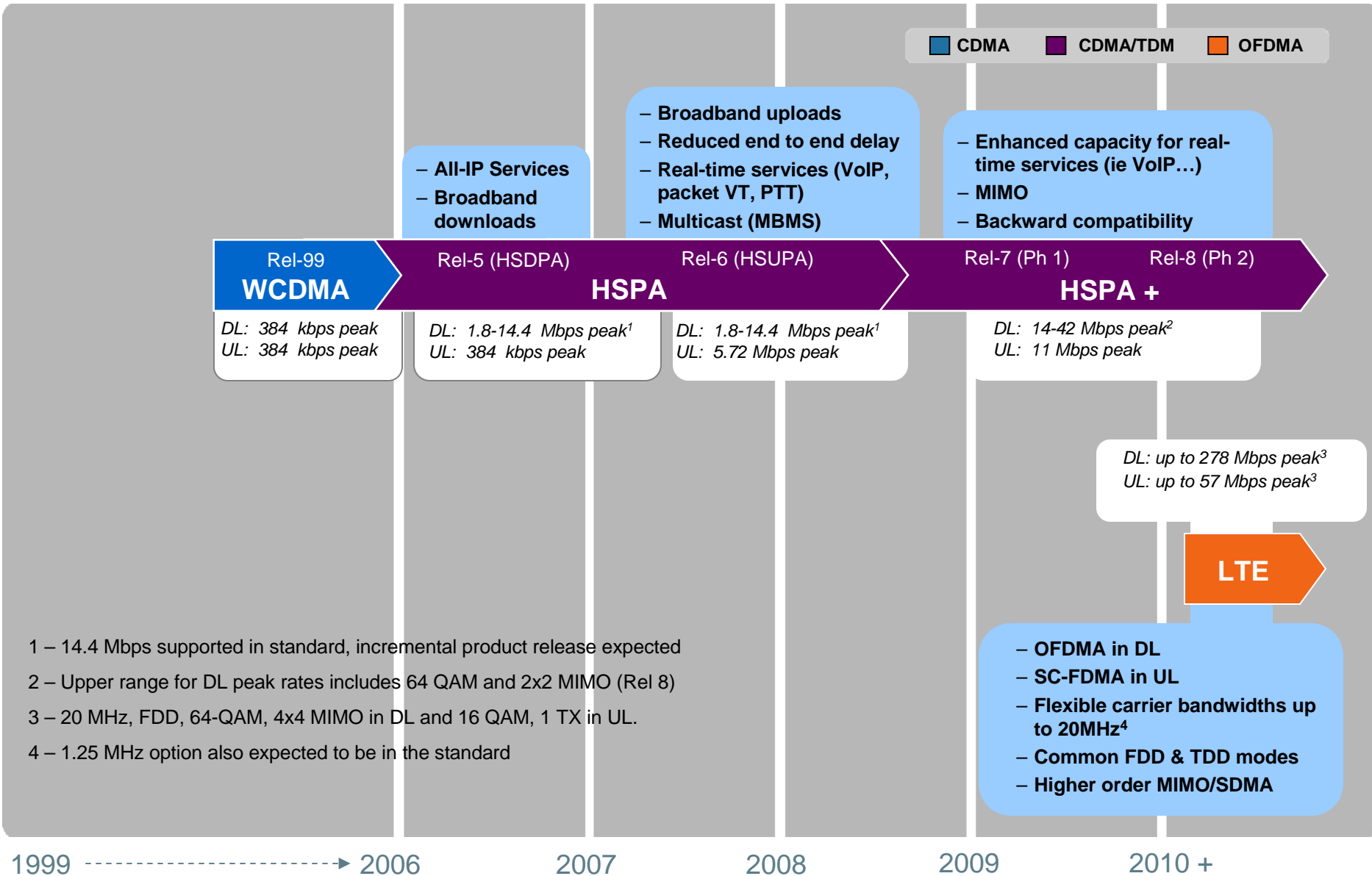
2 – Peak rates scalable with number of carriers – standard supports up to 15 carriers. Upper range highlights introduction of 64-QAM (1 RF carrier – 4.9 Mbps peak)

3 – Expected rates for 20 MHz, FDD, 4x4 MIMO

4 – 1.25 MHz option also included in the standard

5 – TDD mode is under discussion

A Well Established Mobile Broadband Evolution Path



Handset Trends: QUALCOMM Supported High Tier Feature Phone



QUALCOMM Q Phone (1998)

- Technology: cdmaOne-IS-95A, AMPS
- Data rate: up to 14.4 Kbps
- Weight: 5.71 oz
- LCD: 5 line monochrome
- QUALCOMM MSM2300
- Processing power: <20 MIPS
- Memory: 8MB ROM / 2MB RAM
- 135 mins talk time, 30 hrs stand-by*
- Multimedia: sports scores, stock ticker,...
- **Price: ~\$400 ****

HTC Mogul (2007)

- Technology: CDMA2000 1xEV-DO Rev. A
- Data rate: up to 2.4 Mbps
- Weight: 5.8 oz
- LCD: QVGA, 65K colors
- QUALCOMM MSM6500
- Processing power: 312 MHz
- Memory: 256MB ROM / 64MB RAM
 - + miniSD card
- 240 mins talk time, 212 hrs stand-by*
- Multimedia: Video/audio streaming/downloads, 2MP camera, MP3, GPS...
- Price: ~\$300 **

Improvement

- 215X rates**
- 50X+ resolution**
- 20X rates**
- 32X capacity**
- 78% more talk, 7X standby time**
- 25% less expensive**

*For similar battery ** Unsubsidized retail price

2007 1xEV-DO Devices Exceed 1996 Desktop PCs



Intel Pentium based desktop computer

- Date: 1996
- Processor: Intel Pentium
- Speed: 200 MHz
- RAM/Flash: 16 MB
- Drive/Storage: 1.5 GB
- Retail price: \$1,099 monitor not included

LG VX9900 (The “enV”)

- Date: November 2006
- Baseband: MSM6550
- Speed: 225 MHz
- RAM/Flash: 128 MB
- Camera: 2 Mega Pixel
- Drive/Storage: SD Card – up to 2 GB
- Retail price: \$350*



HTC Mogul (6800)

- Date: July 2007
- Baseband: MSM7500
- Speed: 400 MHz
- RAM/Flash: 128 MB
- Camera: 2 Mega Pixel
- Drive/Storage: SD Card – up to 2 GB
- Retail price: \$549*



Plus Connectivity, Multimedia and Authentication

Convergence of Consumer Electronics, Computing, and Wireless Drive “Always On / Always Connected” Services

Computing Devices



Wireless Devices



Consumer Devices



- PC
- Laptop
- PDA

Connected Mobile Computing



Connected Consumer Devices



- Gaming
- Navigation
- Media Players

Connected Device Will Feature Richer User Experience

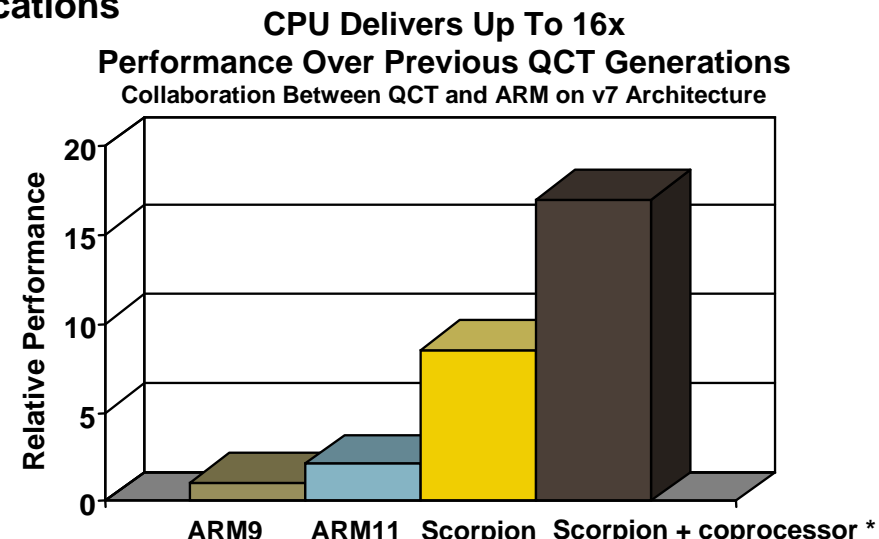
New “Scorpion” Mobile Microprocessor Core

- Scorpion – low power, high performance superscalar CPU developed by QCT
 - **First to develop 1GHz CPU for battery powered wireless applications**
 - **Low power, low leakage, 65-nm process**
 - **Specifically designed and optimized for MSM solutions**
 - **ARM v7 compliant; QCT is an ARM architecture licensee**
- VeNum – low power, high performance multimedia coprocessor
 - **Up to 2X performance boost for multimedia applications**
 - **Example of one of QCT’s new developments**

How Scorpion stacks up

Feature	Cortex-A8	Scorpion
Frequency	>600MHz	1GHz
Performance	1200 DMIPS	2100 DMIPS
Power @ 1200 DMIPS	300 mWatts	240 mWatts

NOTE: in low-power 65nm technologies. Uses Dhrystone 2.1 (DMIPS)






NOTE: Scorpion is based on ARM v7 architecture. VeNum is based on ARM SIMD Neon architecture





* ARM NEON™ based coprocessor

World’s Most Advanced Mobile Microprocessor for Handheld Devices

Technology Leadership – New QUALCOMM Solutions

	<h2>CDMA2000 EV-DO Rev. A in Single Chip</h2> <ul style="list-style-type: none">• Lower cost solution for CDMA2000 mass markets• Drives down the cost of mobile broadband
	<h2>WEDGE and HEDGE in Single Chip</h2> <ul style="list-style-type: none">• Solutions for WCDMA/EDGE and HSDPA/EDGE devices• Lower cost solutions for WCDMA mass market
	<h2>Breaking New Price Barriers</h2> <ul style="list-style-type: none">• Enables more affordable CDMA2000 devices in developing markets• Improves network capacity by ~100%, doubles talk time

Technology Leadership – New QUALCOMM Solutions

	<h2>Industry's first solution for UMB</h2> <ul style="list-style-type: none">• Incorporates benefits of OFDMA, CDMA, and other techniques• Delivers greater capacity/coverage, better experience for future mobile services
	<h2>Industry's first device for HSPA+</h2> <ul style="list-style-type: none">• 28 Mbps broadband speeds• Improves Internet browsing, real-time location services, multimedia sharing
	<h2>Mass-market Smartphones</h2> <ul style="list-style-type: none">• Mass-market mobile broadband EV-DO Rev. A/HSUPA solutions• Breaks price barriers for Smartphone devices
	<h2>Industry's first CDMA2000 EV-DO Rev. B</h2> <ul style="list-style-type: none">• Supporting data speeds of up to 9.3 Mbps in 5 MHz• Enables low latency and high bandwidth applications

What are We Doing About Cost?

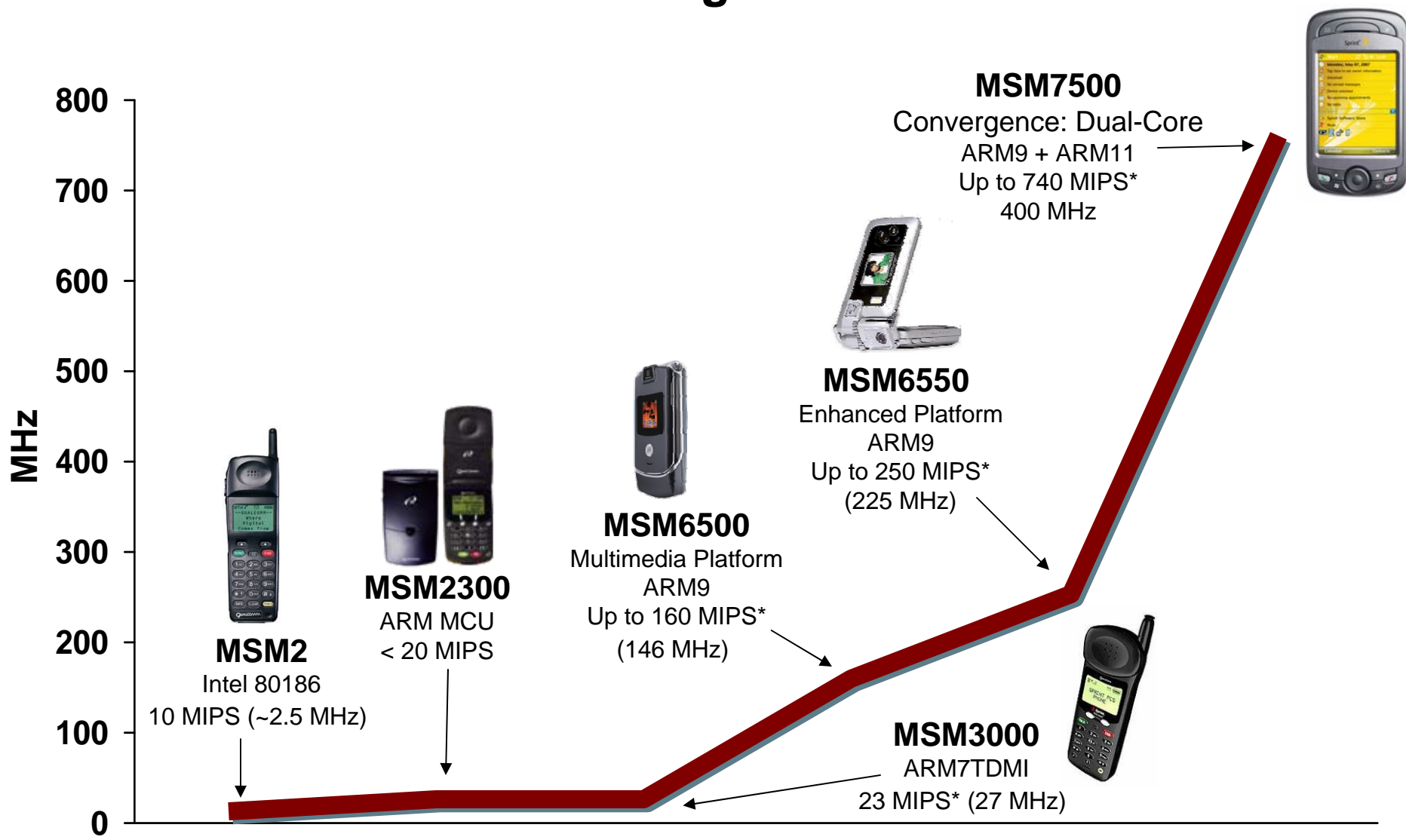
- **Driving Technology Scaling**
 - e.g. 1st Fabless in 65nm and 1st Fabless in 45nm
 - e.g. Investing in Advanced Technology Initiatives
- **Driving Low Cost Processes**
 - e.g. Managing mask counts vs. process features
- **Driving Memory Costs**
 - e.g. Investing in advanced memory technologies
- **Driving DFM Methodologies**
 - Optimizing design for cost
- **Driving Accelerated Yield Ramps**
 - Investing in collaborative debug and analyses



***Collaborative
efforts with
our supply
chain partners***

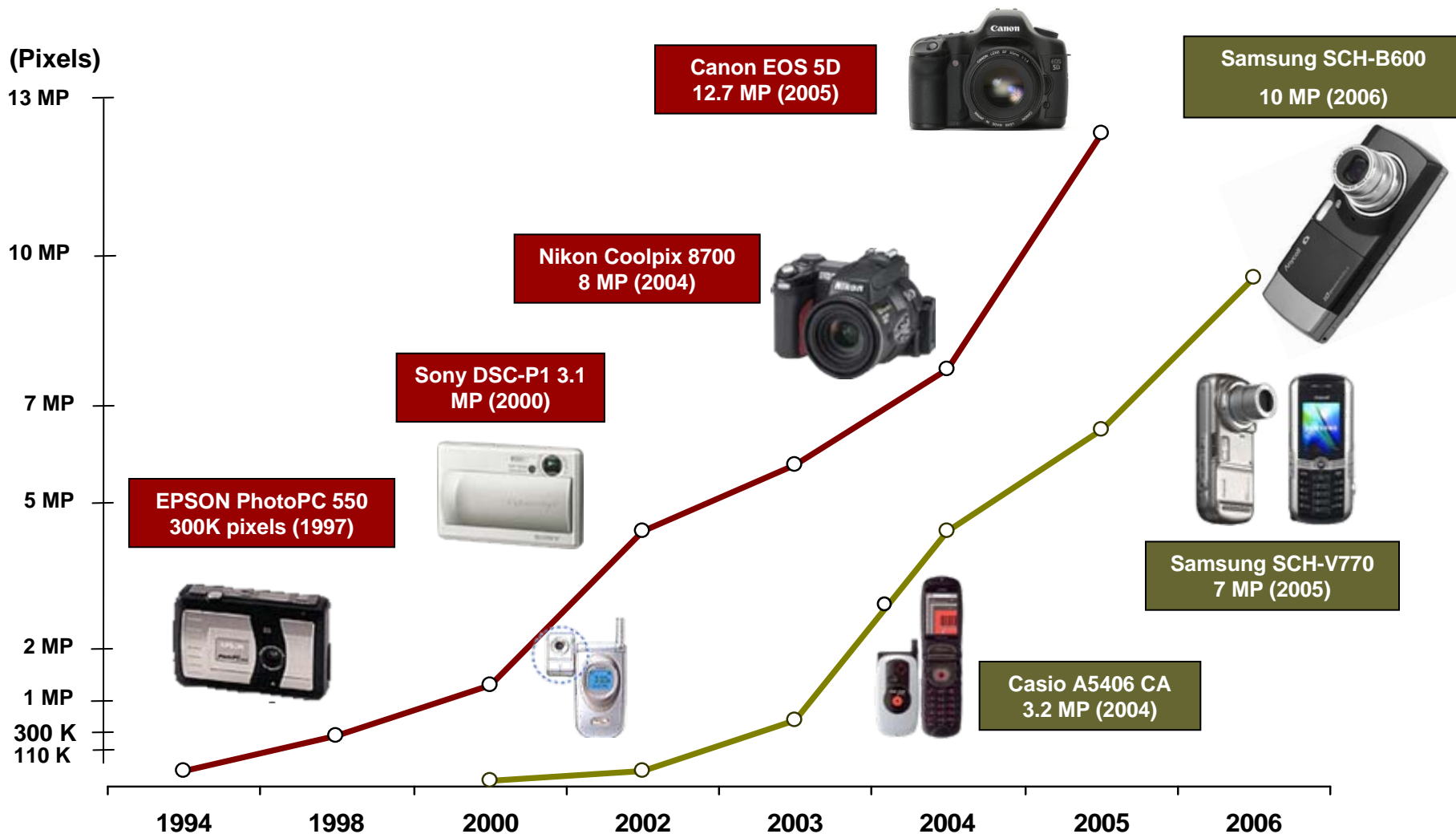
Pursuing all degrees of freedom in technology space to optimize product cost

Increase in Mobile Processing Power Over Time



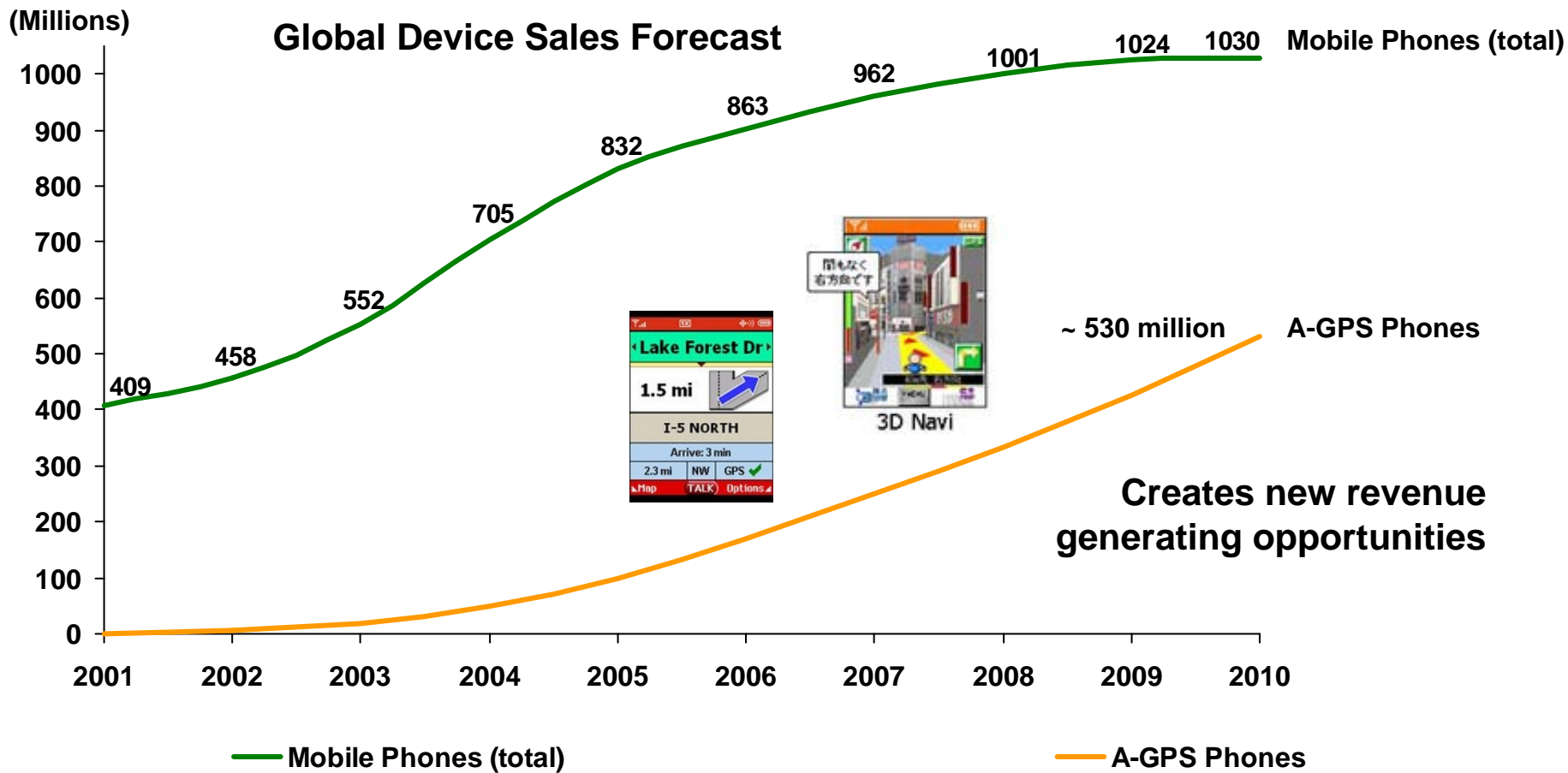
* Dhystone 2.1 1996

2006 3G Camera Phone Resolution Exceeds 2004 Consumer Digital Cameras



Source: Gartner Dataquest and 3G Today (www.3gtoday.com), 2006, www.dpreview.com

The Integration of Location Based Service (LBS) Functionality is Increasing the Utility of Mobile Devices



Sources

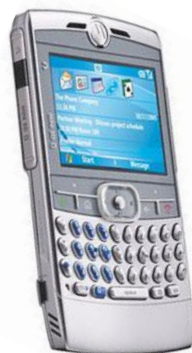
3G Devices: Average of Strategy Analytics (January 2006) and Yankee Group (March 2006) handset forecasts

All other data: Strategy Analytics, 2005 and 2006

More than **469** CDMA2000 1xEV-DO Devices have been Commercialized by **44** Vendors



Samsung SCH-A990
*3.2 Megapixel Camera,
TV Out*



Motorola Q
*Windows Mobile 5
Smartphone Edition*



Samsung u620
*MediaFLO, 1.3MP
Camera*



Samsung SCH-i830
*Windows Mobile 2003,
WorldMode*



Sony Vaio VGN-TXN10
Embedded EV-DO REV A



Toshiba W47T
EV-DO Rev A, BCMCS



OQO 2 Ultra Mobile PC
*EV-DO, WiFi
Windows XP*



LG VX9400
MediaFLO



Casio W21CA
*2.6 inch WQVGA,
2 MP Camera*



**Sierra Wireless
AirCard 595**
EV-DO Rev A

CDMA2000 1xEV-DO Rev A Devices

These Rev A devices offer increased data speeds in both directions

Axesstel PX310L

HTC P4000

HTC S720

Motion Computing LE1700 Tablet PC

Toshiba W47T

Toshiba DRAPE

UTStarcom 5800 (HTC Libra)

Panasonic CF-19 Toughbook

Panasonic CF-30 Toughbook

AnyData ADU500A/H

AnyData ADU510D

AnyData ADU510L

Axesstel MV110/140 USB Modem

Huawei EC 360

Kyocera KCP680

Novatel Wireless Merlin™ PC720

Novatel Wireless USB720

Novatel Wireless V740

Novatel Wireless X720

Pantech PX-500

Sierra Wireless AirCard 595

Sierra Wireless AirCard 597E

Sierra Wireless AirCard 595

Sierra Wireless AirCard 595U

UT Starcom PC5750

AirLink Pinpoint X

AnyData AWR-500A/D/H

Axesstel MV410/420/430/440 3G Broadband Gateway

Cisco WAN High-speed Interface Card

Digi Connect Port WAN

Kyocera Wireless KR1 Mobile Router

LinkSys Wireless G Wi-Fi Router

Novatel Wireless Ovation MCD3000 (U720)

Sierra Wireless MP 595 GPS Ruggedized In-Vehicle Modem

Novatel Wireless Expedite E720 PCI Express

Sierra Wireless MC5725(V) PCI Express

Sony VAIO VGN-TXN10

37 Rev. A devices from 17 suppliers

* CDMA450

More than **650 WCDMA (incl. 311 HSPDA)** Devices have been Commercialized by **26 Vendors**



LG CU500
HSDPA, Bluetooth



Samsung Z560
HSDPA, Bluetooth



Sony-Ericsson W900i
MP3 Player, Walkman



Fujitsu Lifebook Q2010
Embedded HSDPA



Huawei E220
USB Modem



Sanyo SA700iS
*2.2" QVGA, miniSD
GPS, Video Conferencing*



LG U900
*1.3 Megapixel, DVB-H,
Video Conferencing*



Samsung P940
*HSDPA, DVB-H,
Bluetooth*



NEC N601i
*Macromedia Flash,
Bilingual menus*



ZTE MF330
WCDMA / HSDPA

Many Embedded Mobile Broadband Solutions Today

July 2006	July 2007
45	157*
Launched NB Offerings	
24	74
Launched NB Models	
9	18
Notebook Manufacturers	
7	20
3G Embedded Carriers	

*Sum of individual notebooks certified per carrier network



3G Offers a Wide Range of Services

Social Networks & User Generated Content

Photo / Video Blogs

Planet 3 SeeMe TV

cyworld

YouTube

Rabble

Myspace.com a place for friends

Kink

HELIO

TV / Video Streaming & Download / Multicast

MediaFLO™

Sprint POWER VIEW™ sports & entertainment

vodafone

cingular video

June TV

Planet 3.

EZ Channel Plus

EZ News Flash

fimm! Free

CAST

High Speed 3D & Multiplayer Games

RANKING & BATTLE

Ez Game Street!

Sprint

Planet 3.

Game Lobby

GXP

Street Game GPAN

GameArena™

Music Download

EZ 'Chaku Uta Full®' Downloads Exceed 50 Million

NEWMUSIC club

Sprint Music Store

KTF

Billboard mobile

LISMO! LISTEN MOBILE SERVICE

Melon

CAST MUSIC

BigPond Mobile Music

High Speed Data Connectivity

web'n'walk

Sprint Mobile Broadband

NEXT NETWORK

cingular raising the bar...

PacketWIN

Video Calling

T-Mobile Videotelefonie

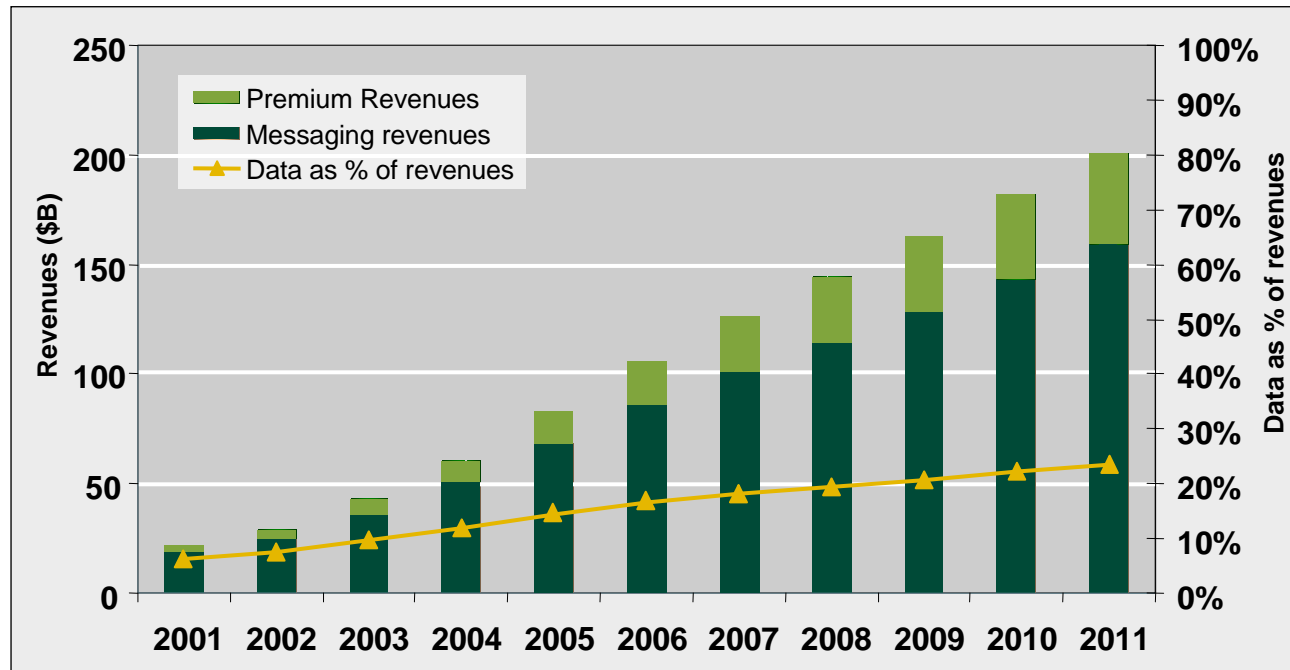
Vodafone live!

NTT DoCoMo

SK telecom

3 VideoCall.

3G Data Services Generating Increasing Revenue for Carriers



- **Wireless data accounted for 17% of service revenues in 2006**
- **Messaging (SMS, MMS, IM, Email) is still a key driver for non-voice services**
- **Share of premium data revenues was 19% (Gaming, Audio, Video) in 2006**

Rich data must be:

- End to end
- Simple to use
- Compelling
- Value priced
- Marketed

Complexity exists in:

- Partnerships/business models
- Changing user behavior
- Service creation

3G Enables Full Music Download Services

Faster Data Rates and Increased Memory Capacity Enhance MP3 Functionality in Mobile Phones



Japanese Mobile Music Market

- Daily mobile music downloads: > 5 million
- Mobile phone music downloads: 99.85% of total music downloads
- Mobile music sales: > US \$1B per year

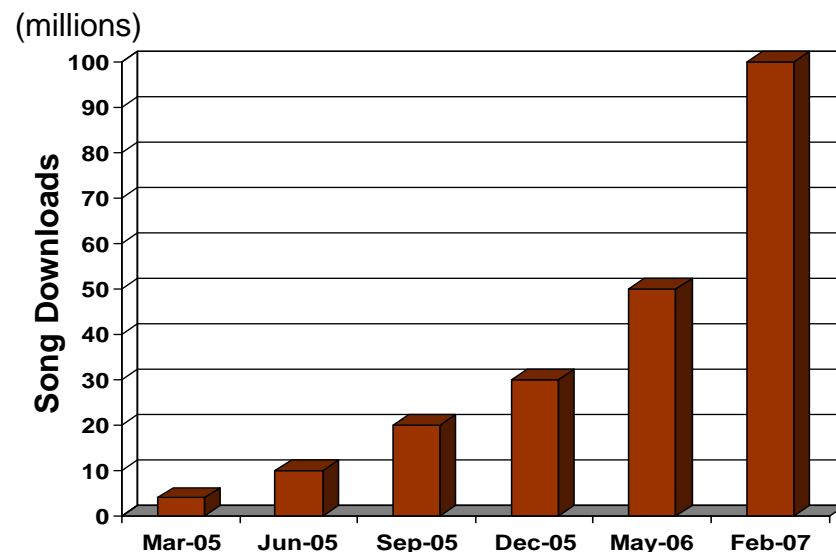
Chaku-Uta

- Download 15-30 second song clips to handset for ringtone (100KB)
- Launched on December 2nd, 2002
- Reached **400 million downloads** on January 31st, 2006

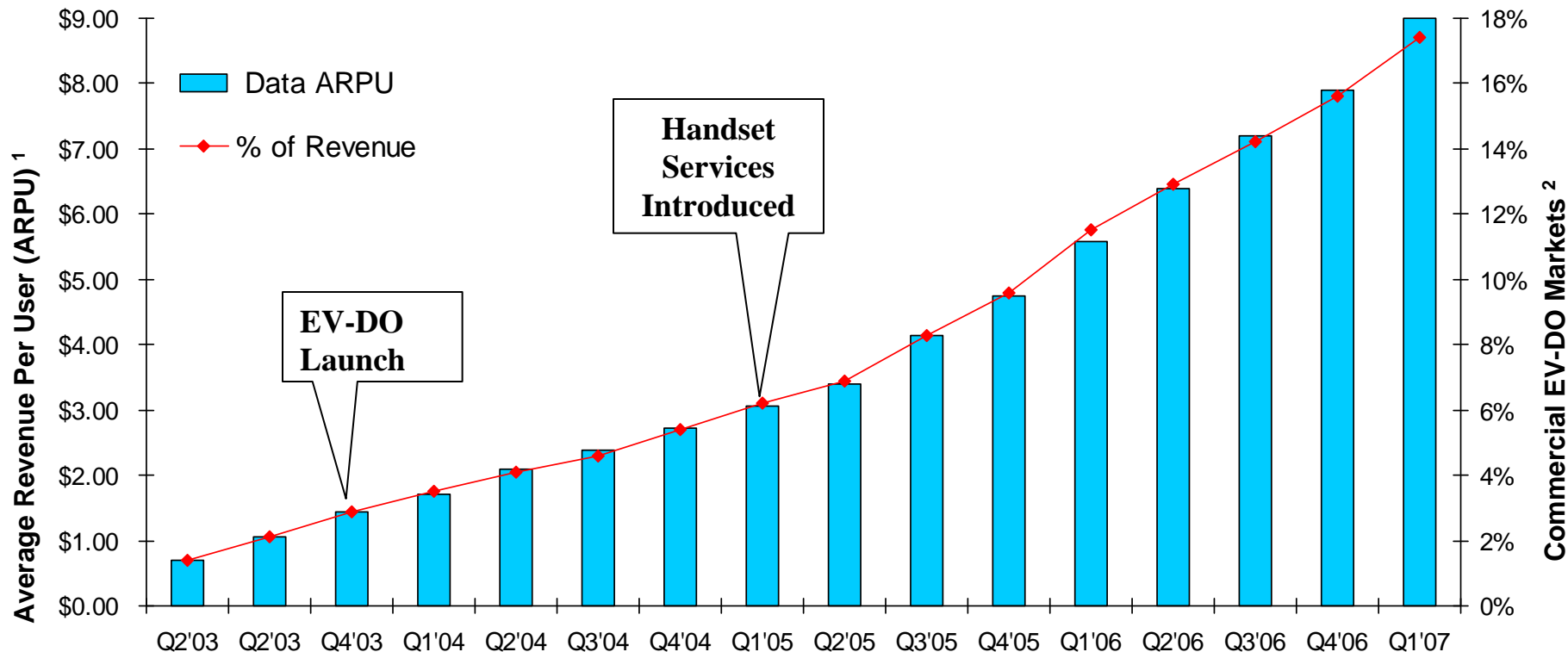
Chaku-Uta Full

- Download entire song to handset (1.5MB – 2.0MB)
- Launched on November 19th, 2004
- Reached **100 million downloads** on February 15th, 2007

Chaku-Uta Full Song Downloads



EV-DO Drives Verizon's Data ARPU & Percentage of Revenue Growth

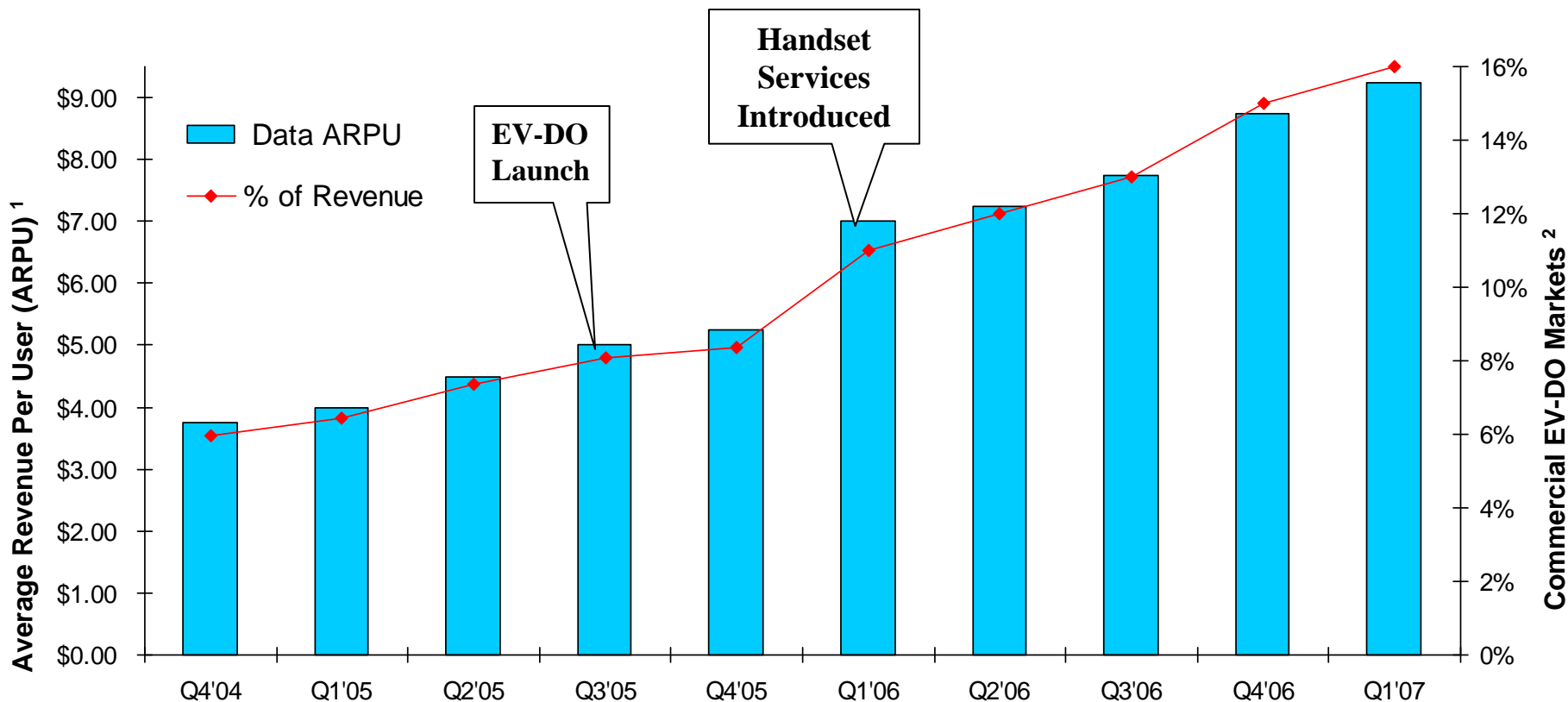


Verizon Wireless data ARPU has grown more than 550% since EV-DO was launched in Q4 2003

¹ Commercial EV-DO market information based on Verizon press releases and other publicly available information

² Verizon Wireless data ARPU calculation: reported quarterly data service revenues ÷ 3 (convert to monthly figure) ÷ total subscribers

EV-DO Drives Sprint's Data ARPU & Percentage of Revenue Growth

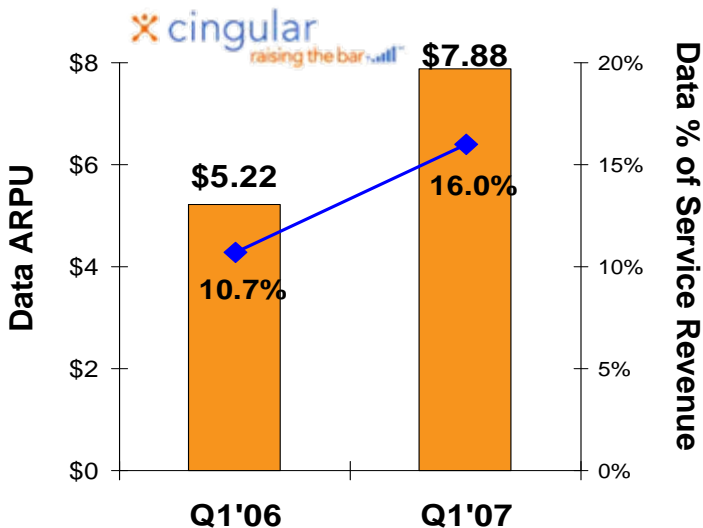
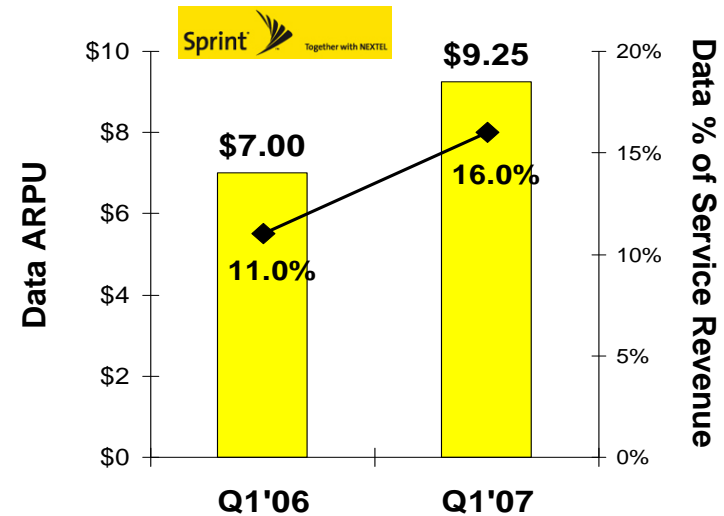
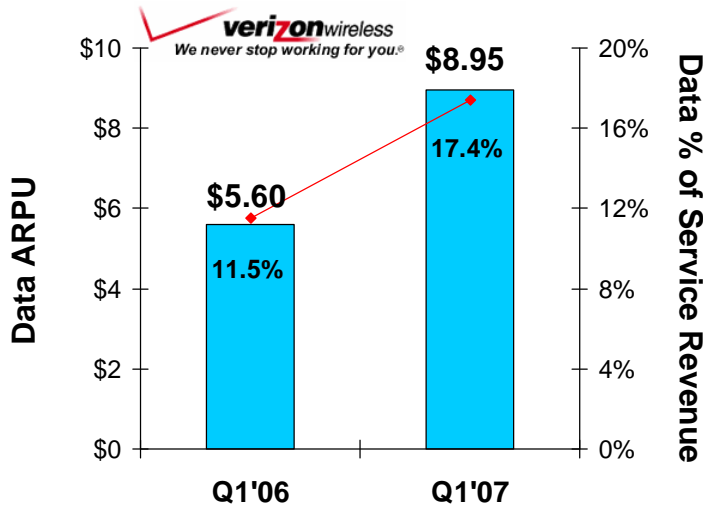


Sprint Nextel's Wireless data ARPU has grown 85% since EV-DO was launched in July 2005.

¹ Commercial EV-DO market information based on Sprint Nextel press releases and other publicly available information

² Sprint Nextel Wireless data ARPU calculation: reported quarterly data service revenues ÷ 3 (convert to monthly figure) ÷ total subscribers

US Operators Show Strong Data YoY Growth



Verizon Wireless

- Total Data service revenue surpassed \$1.6 billion in the first quarter 2007, up 80%

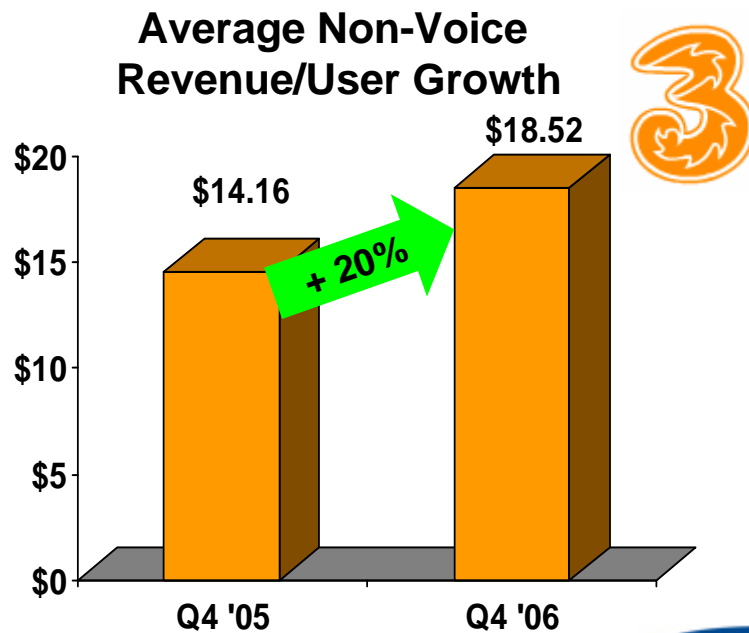
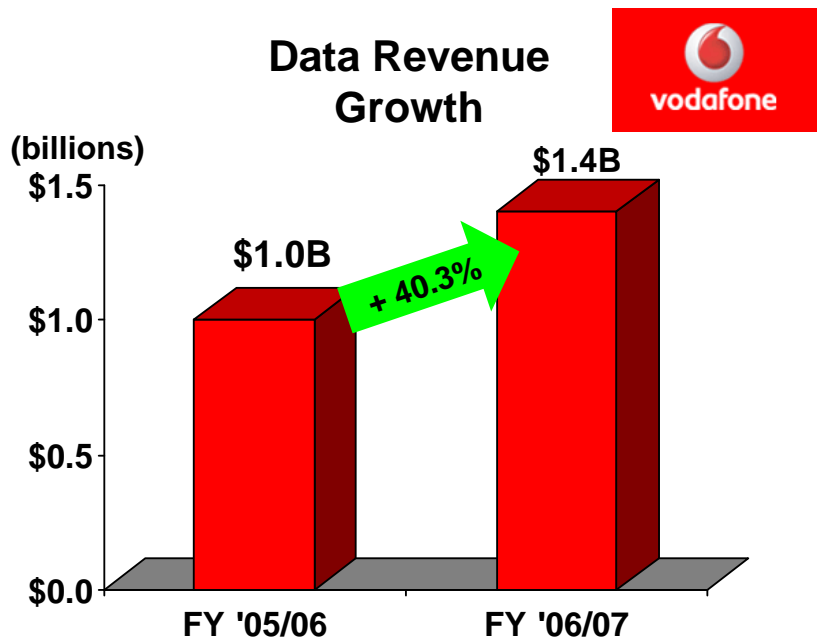
Cingular

- Decreasing voice ARPU is being offset by increasing data ARPU
- WCDMA/HSDPA will drive new data revenue opportunities

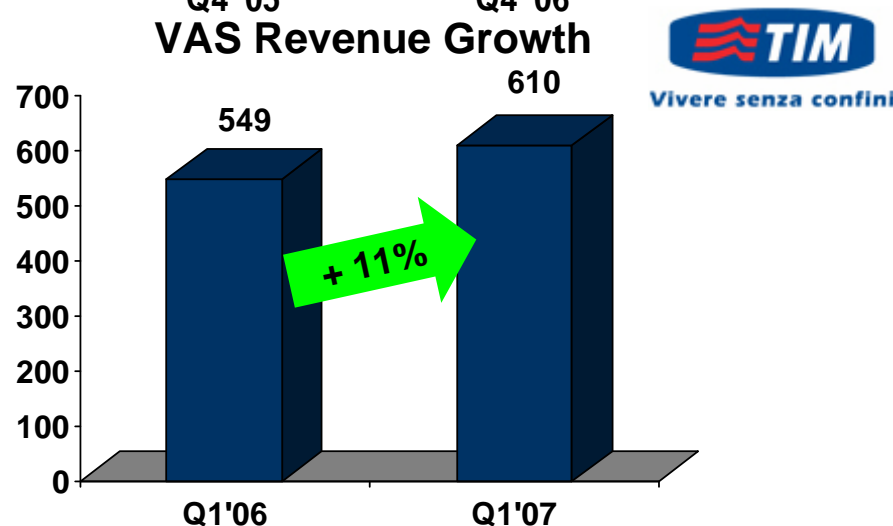
Sprint-Nextel

- CDMA Data ARPU \$12.25
- \$1.2 billion in data service revenues for Q1 2007

European 3G Operators Experience Growth in Data Revenues



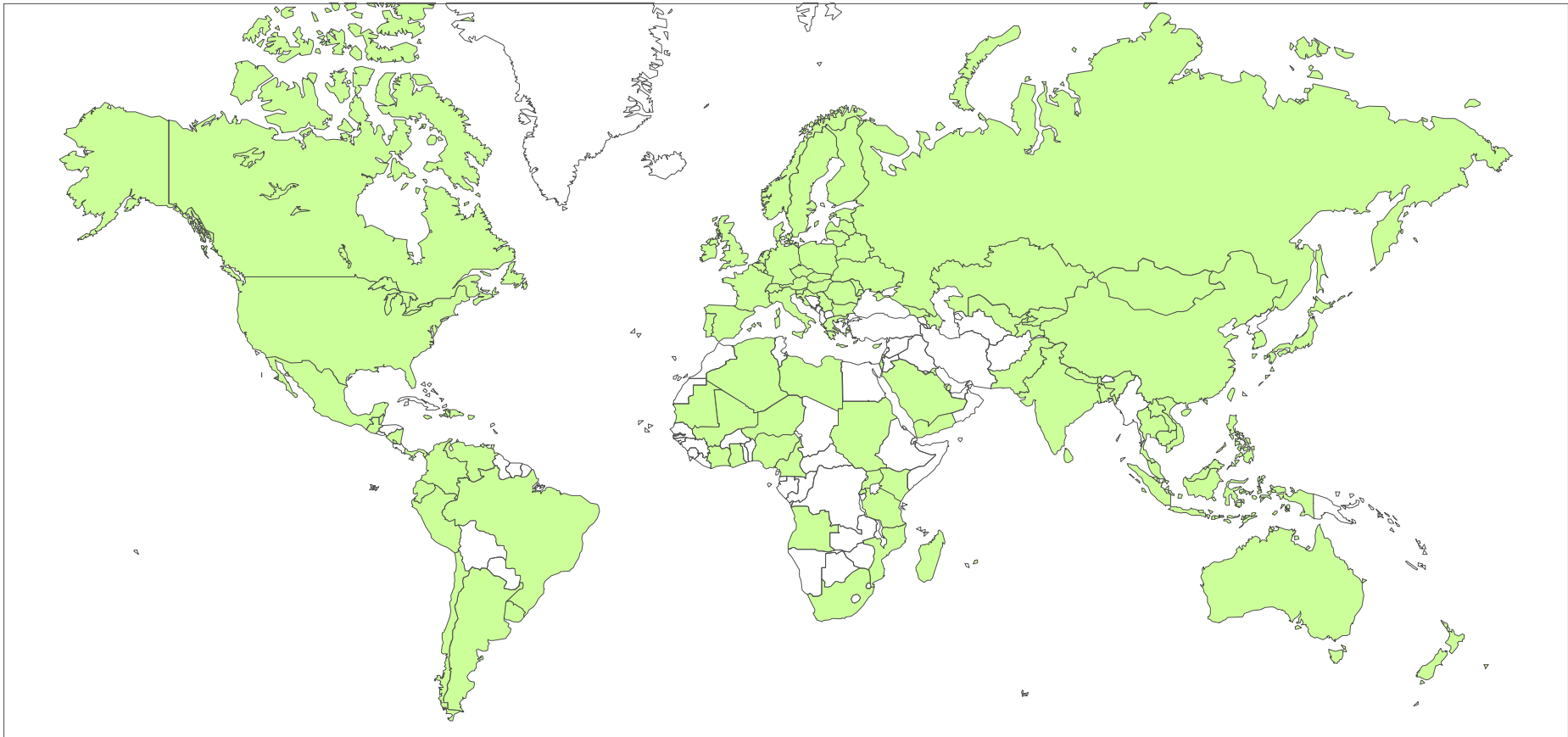
“Non-messaging revenue is up 40% Y/Y driven by Vodafone “live” and laptop connectivity”
Arun Sarin, Vodafone CEO



Source: Vodafone Group (Nov 2006), Hutchison Whampoa, Telecom Italia

Commercial 3G Operators Worldwide

401 Commercial 3G Operators in 135 Countries Worldwide



There Are More Than 486 Million 3G Subscribers

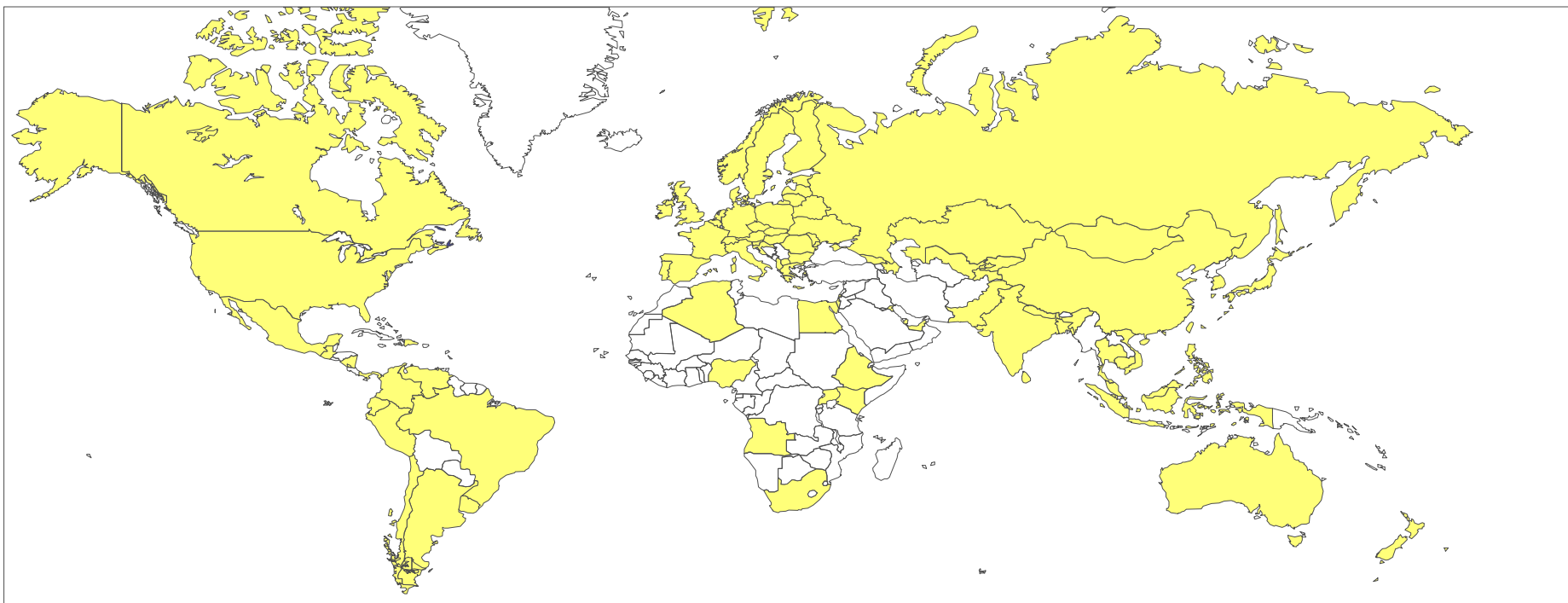
CDMA2000: 227 Commercial Operators

WCDMA: 174 Commercial Operators

Source (Operators): CDG & 3G Americas, June 2007

Source (Subscribers): Wireless Intelligence, July 2007

More Than 1 Billion People Have Access to 197 3G Mobile Broadband Networks Today



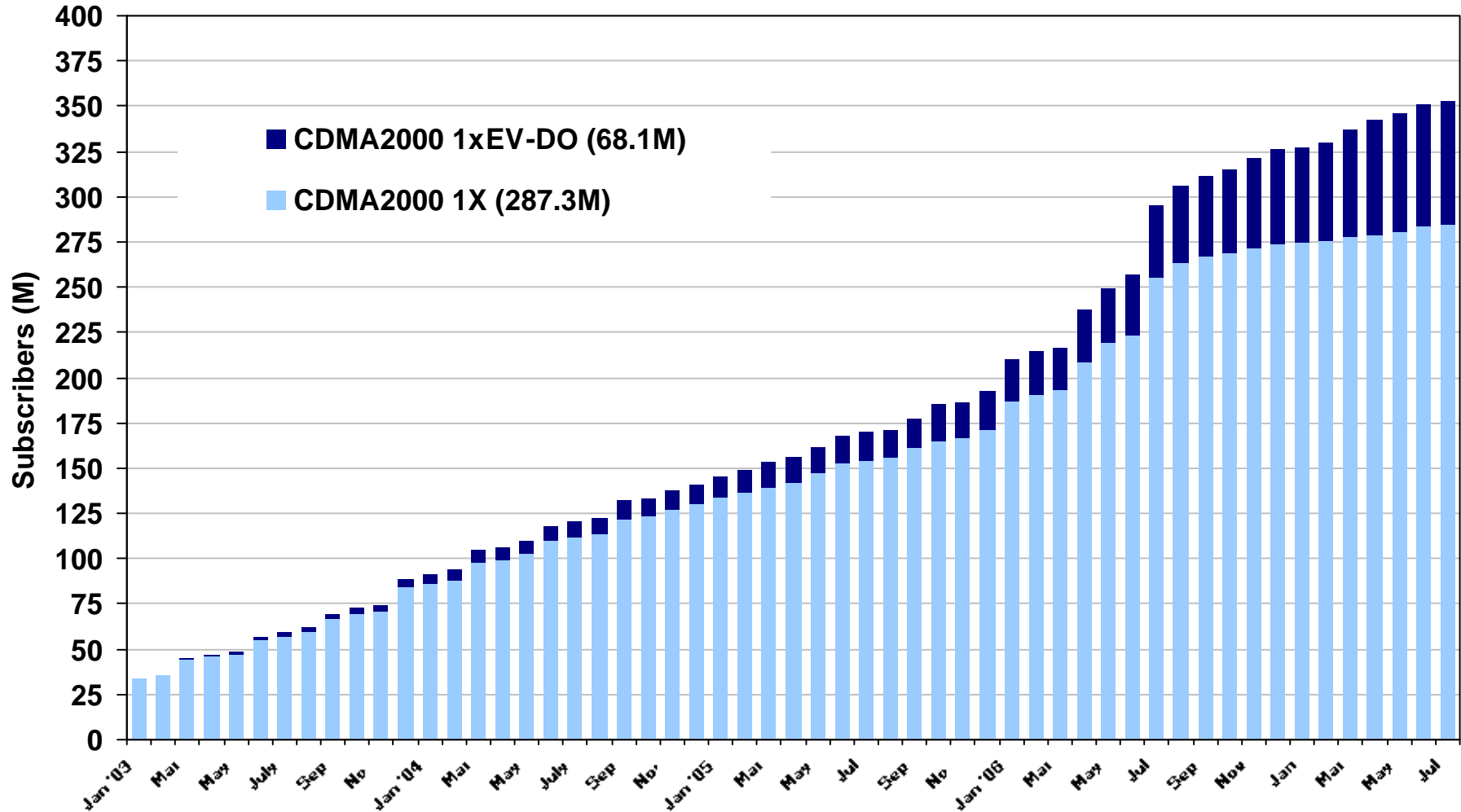
Estimated 172 Million Mobile Broadband Subscribers EOY 2007

EV-DO: 77 Commercial Operators

HSDPA: 120 Commercial Operators

Source: CDG and 3G Americas (June 2007); 1 billion refers to combined estimated POPs coverage.

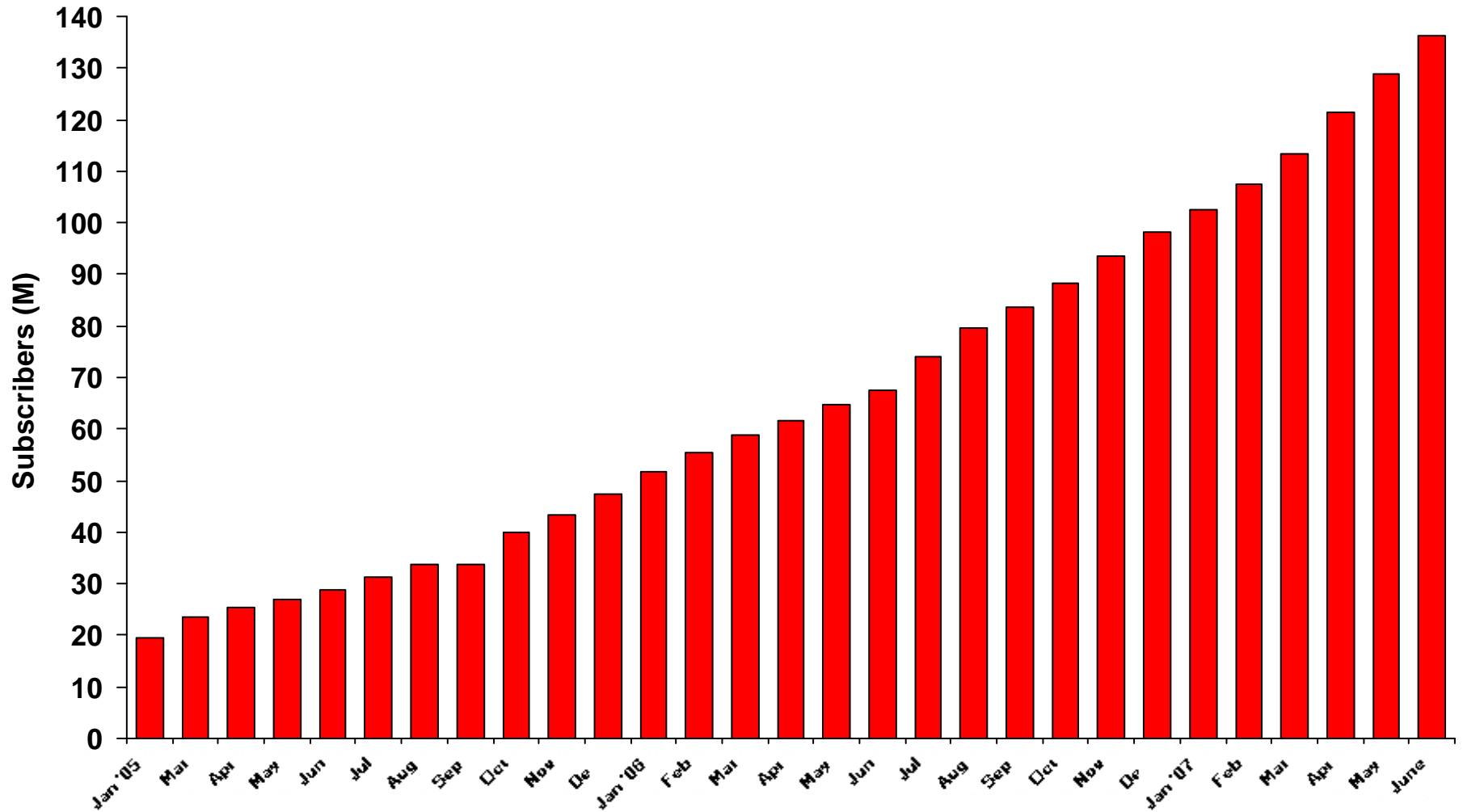
Over **355.4** Million CDMA2000 Reported* Subscribers 3G CDMA Subscribers



(Source: 3Gtoday.com as of July, 2007)

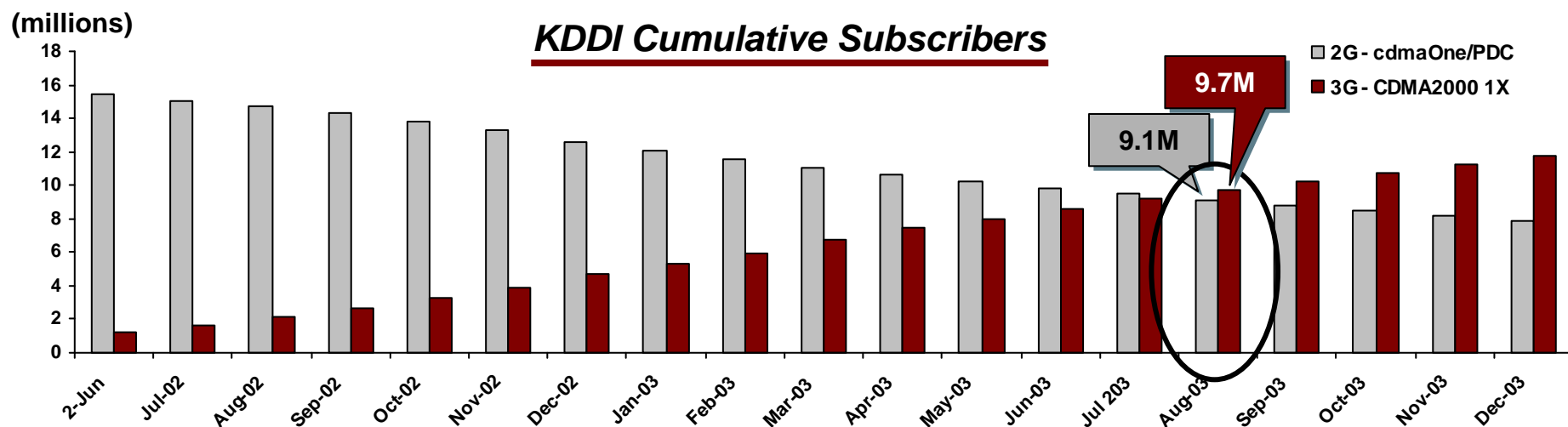
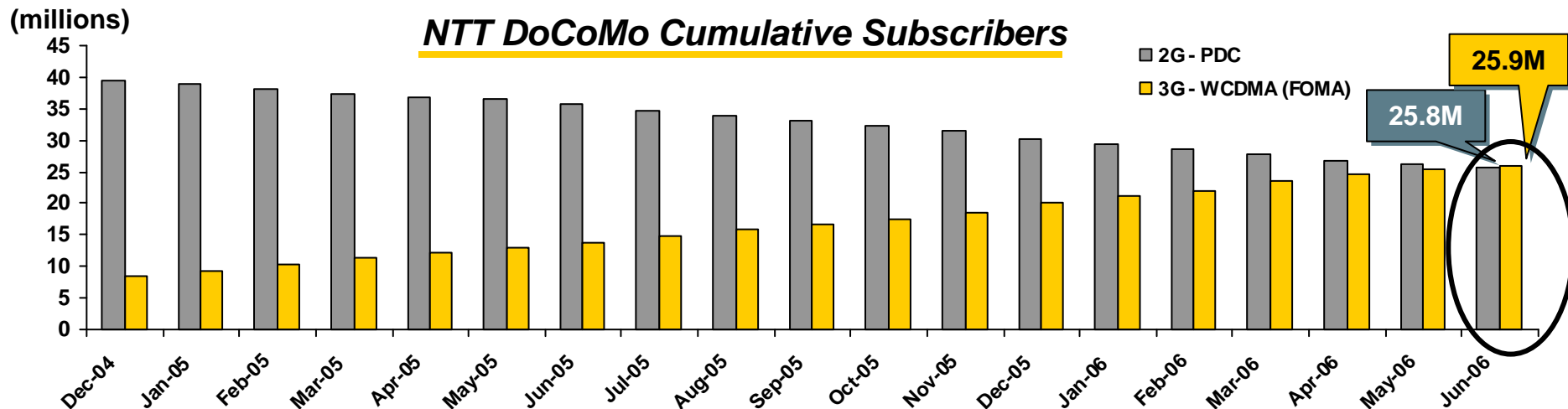
Subscriber figures are usually reported 1 month in arrears.

More than **136 Million** WCDMA Subscribers Worldwide (as of June, 2007)



2G to 3G Migration is Inevitable

Subscribers in Japan Move to 3G CDMA to Take Advantage of Rich Multimedia and High-Speed Data Services

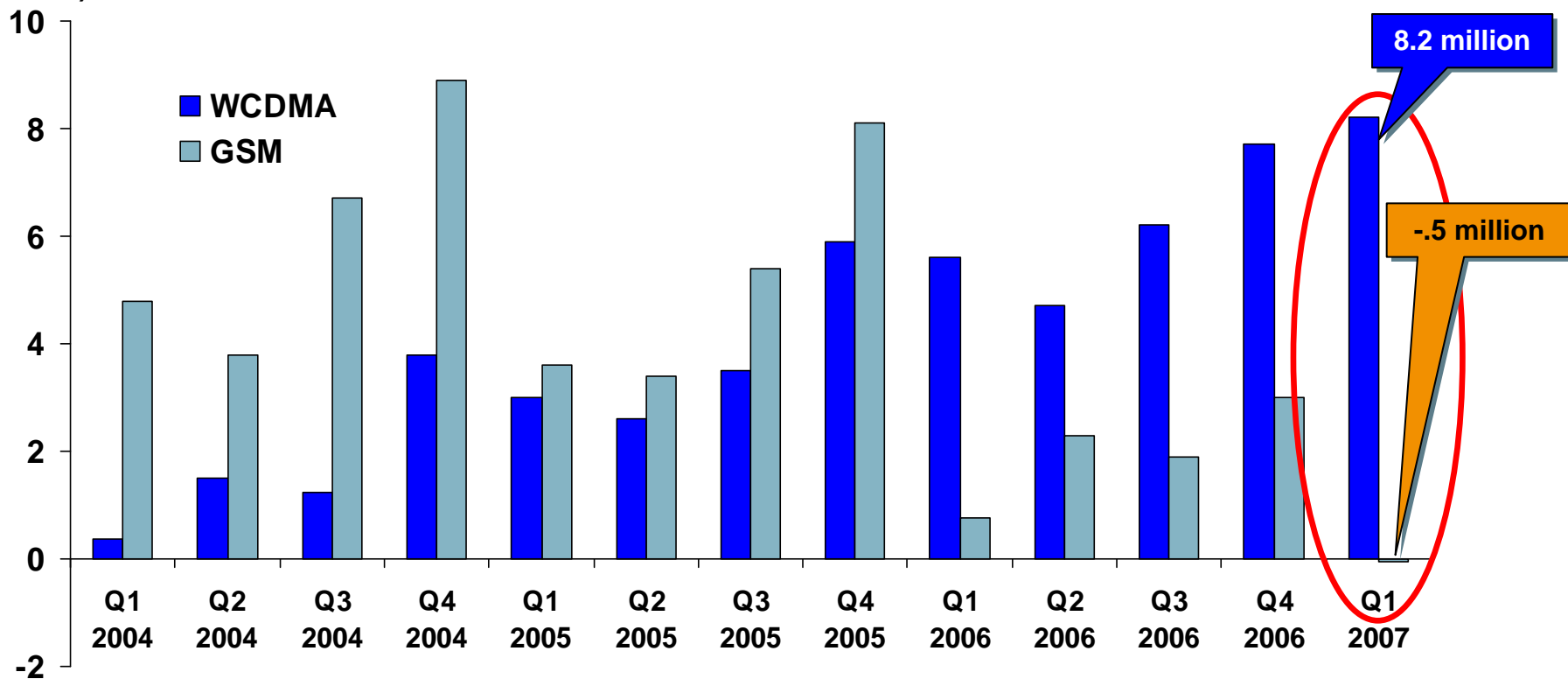


2G to 3G Migration is Inevitable

Western Europe Sees Surge in WCDMA Subscriber Growth

Western Europe Net Subscriber Additions by Quarter

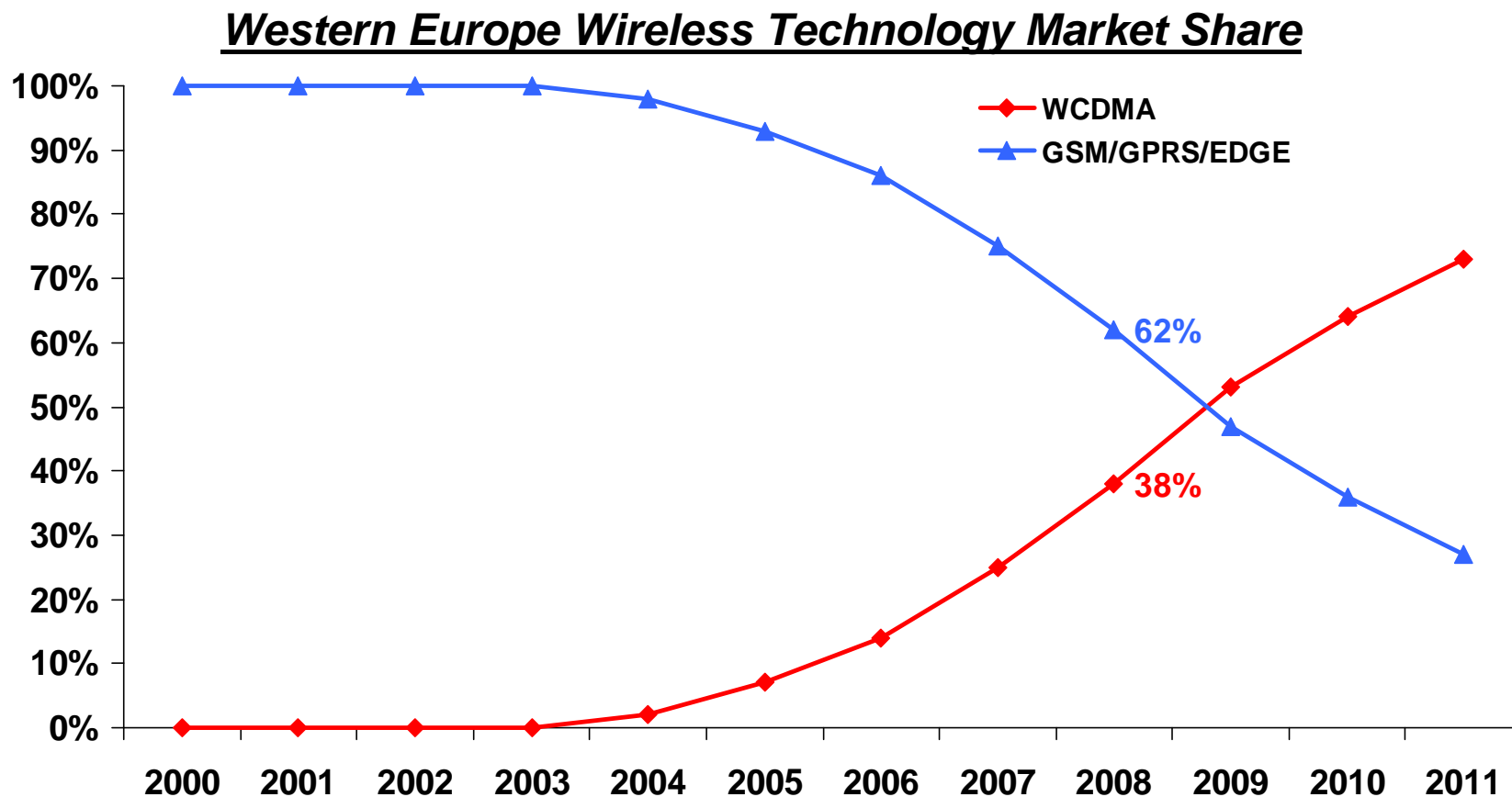
(millions)



Q1 2007 saw the first decline in GSM net additions in Western Europe

GSM Subscribers Continue to Decline in Western Europe

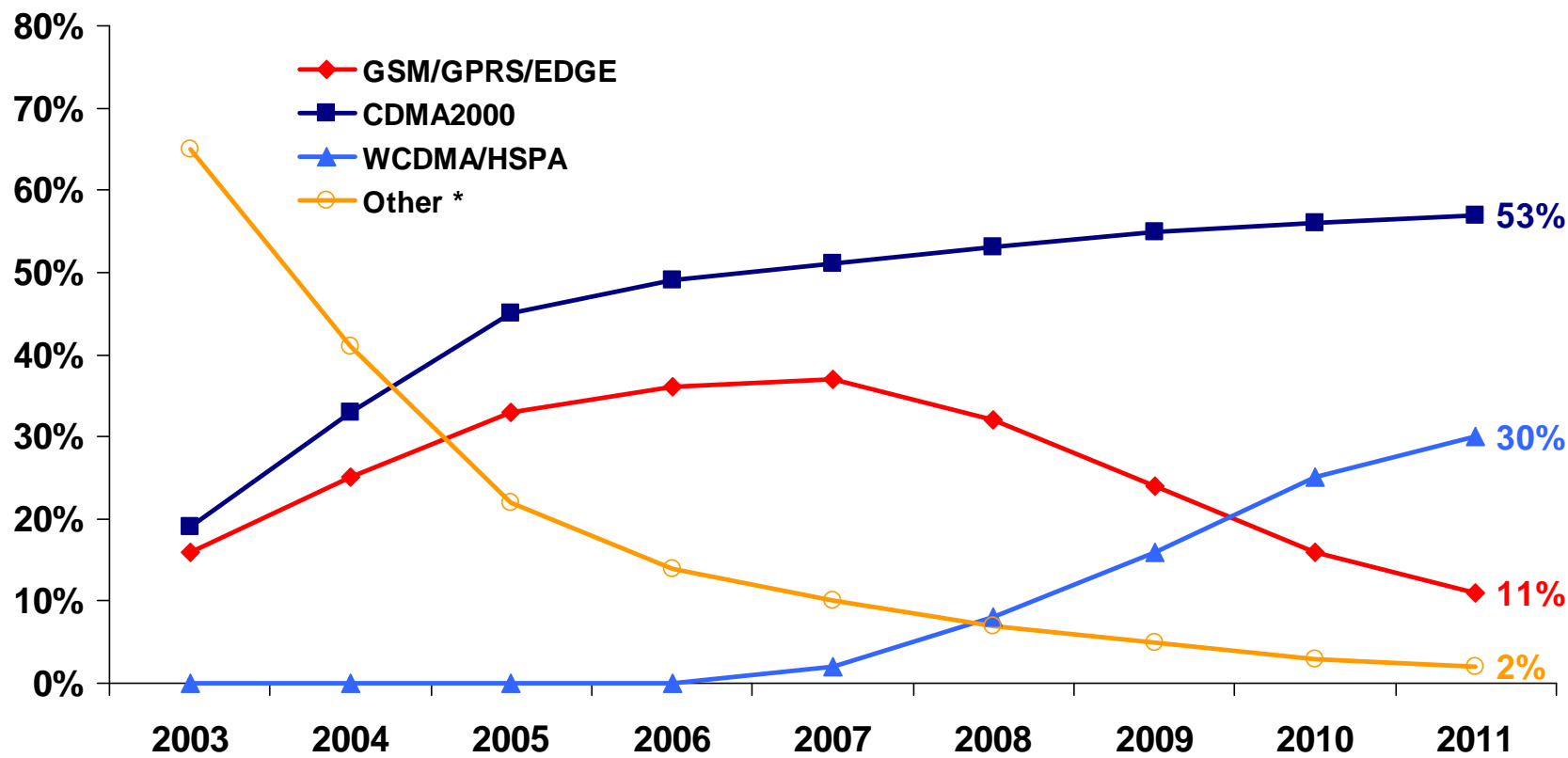
GSM Market Share in Region is Forecast to Drop to 27% by 2011 as Subscribers Rapidly Move to 3G WCDMA for Advanced Services and Higher Data Rates



GSM Subscribers in North America to Decline After 2007

GSM Market Share in Region is Forecast to Drop to 11 percent by 2011 as Subscribers Move to 3G EV-DO and WCDMA/HSPA for Richer Services and Higher Data Rates

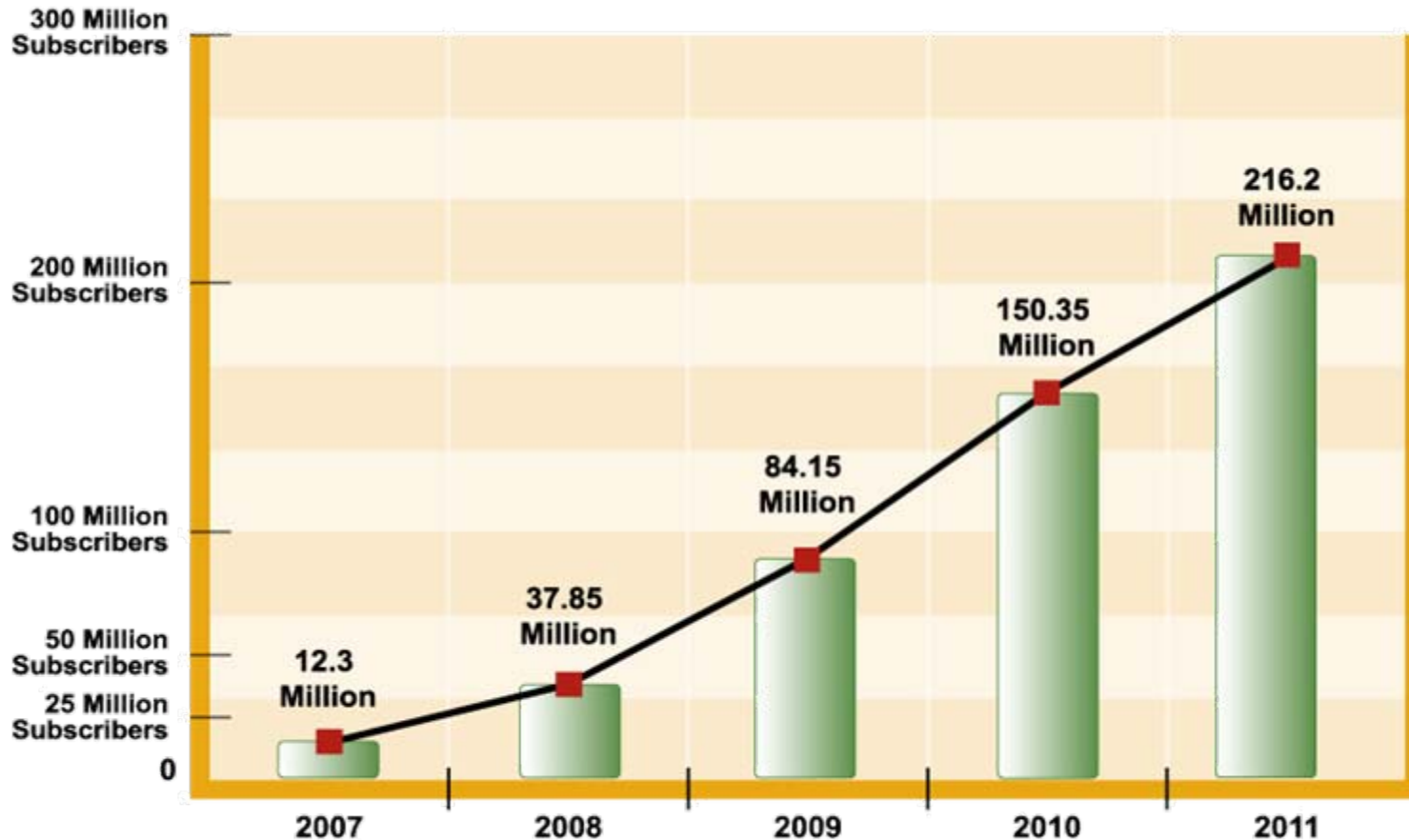
North America Wireless Technology Market Share



* "Other" includes AMPS, cdmaOne, iDEN and TDMA

Source: Average of Strategy Analytics (July 2007) and Yankee Group (July 2007) subscriber forecasts

Forecasts Show Significant Growth for Mobile TV



Worldwide mobile TV subscribers slated to expand

Estimates from ABI, Informa, In-Stat, iSuppli, Datamonitor, NSR, Strategy Analytics, IMS Research, Mobile Youth, eMarketer, and Juniper. Compiled and combined by Robert Hale & Associates, 10/2006.

Current BREW Customers

June 2007

65+

BREW Solution Customers

45+

Device Manufacturers

30+

Countries with BREW Solutions

BREW... Enhancing the Mobile Data Experience

Rich, integrated and dynamic user experiences

Open content delivery platform for operator integrated differentiation

Infrastructure for Location-Based Services (LBS)

– OR –

\$1B+ BREW Publisher/ Developer Earnings*

*Cumulative thru 03/05/07

Launch ready-to-use BREW Signature Solutions



www.brewtoday.com

BREW Success Worldwide

\$1 Billion+
Earned by BREW
publishers and
developers since
November 2001*



*Cumulative through 3/5/2007

uiOne: Enriches User Experience with Personalization

Compelling User Interfaces through uiOne from Major Global Operators



On Demand brings news and weather to the Home Screen



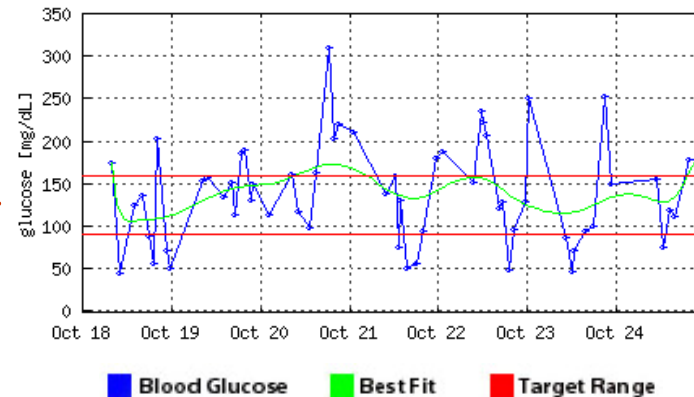
Changes the Face of Wireless Phones with Celltop



Self-branded "Ice" phone using uiOne

LifeCOMM: Integrated Health Services

Example: Diabetes Management Solution



Product Features

- Embedded glucose meter
- “In-hand” assistant
- Ability to interface with other devices
- One-touch live emergency assistance

Service Features

- Portals to access collected data
- Diabetes management services
- Optional emergency assistance

Mobile Commerce - Phone as Multi-Purpose Payments Platform

Remote Payments

- *Prepaid Top-Up*
- *M-Commerce, ticketing*
- *Mobile Banking*
- *Peer-To-Peer Transfers*
- *International Remittances*



Proximity Payments

- *Contactless ticketing*
- *Retail Shopping*
- *Vending*
- *Loyalty, Coupons*



Thank you!