3G CDMA and WiMAX

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Global Technology Marketing

Launchpad Applications
BREWapi
BREW Distribution System
gpsOne
CDMA Chipsets
Homeland Security Initiatives
Fleet Management Solutions
CDMA2000 1X
CDMA2000 1xEV-DO
CDMA2000 1xEV-DV
WCDMA/UMTS
Application Solutions
Mobile Processors
Base Station Processors
Radio Processors
CDMA University
Network Optimization
Software Tools
Development Tools
QCTest Tools
Client Software
Digital Cinema
Advanced Security Solutions

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QUALCOMM CDMA Technologies
QUALCOMM Technology Licensing
QUALCOMM Wireless and Internet Group
QUALCOMM Strategic Initiatives

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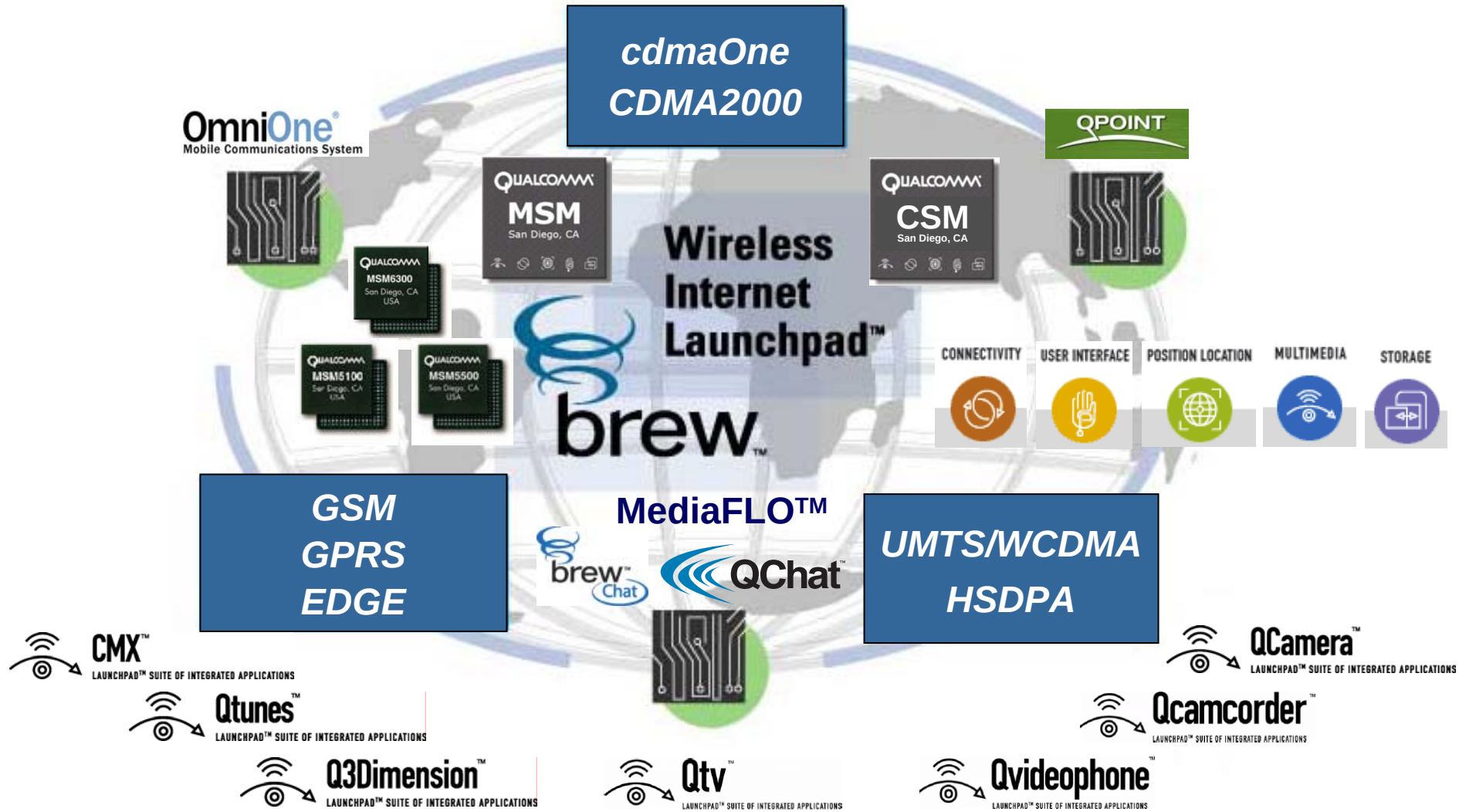
A little bit About Us

One World, Many Solutions



From the largest non-fab supplier of chips & embedded software in the world

QUALCOMM's 3G Position

We Support all Flavors of CDMA

- **QUALCOMM is interested in the success of all 3G CDMA technologies:**
  - **QUALCOMM has invested over $2 billion in developing 3G CDMA**
  - **Strong IPR position for all CDMA standards**
    - Licensed cdmaOne & CDM2000 to over 120 companies worldwide
    - Licensed over 60 companies for WCDMA
    - Licensed over 60 companies for TD-SCDMA
    - 3G CDMA royalty rates are the same as cdmaOne
  - **Strong ASIC position for CDMA2000 & WCDMA markets**
    - 12 MSM "current-generation" products target CDMA2000
    - 8 MSM products target WCDMA

Intellectual Property is highly valued at QUALCOMM

Complete list of licensees: http://www.qualcomm.com/technology/licensing.html

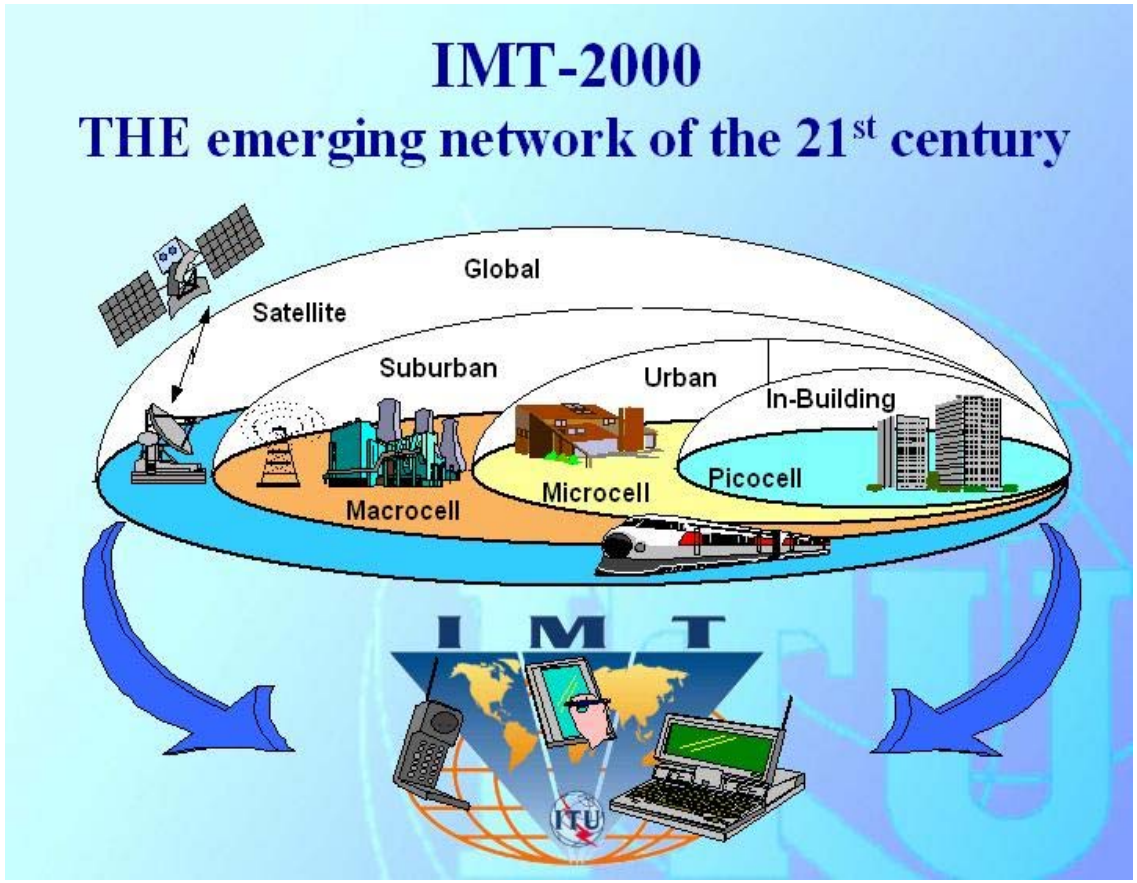
QUALCOMM®

Assessment of WiMAX and 1xEV-DO

A "Telecom-Centric" Industry Perspective

IMT-2000 Wireless Network Technologies

The Global Standard for Wireless Communications



Anywhere, Anytime Communications

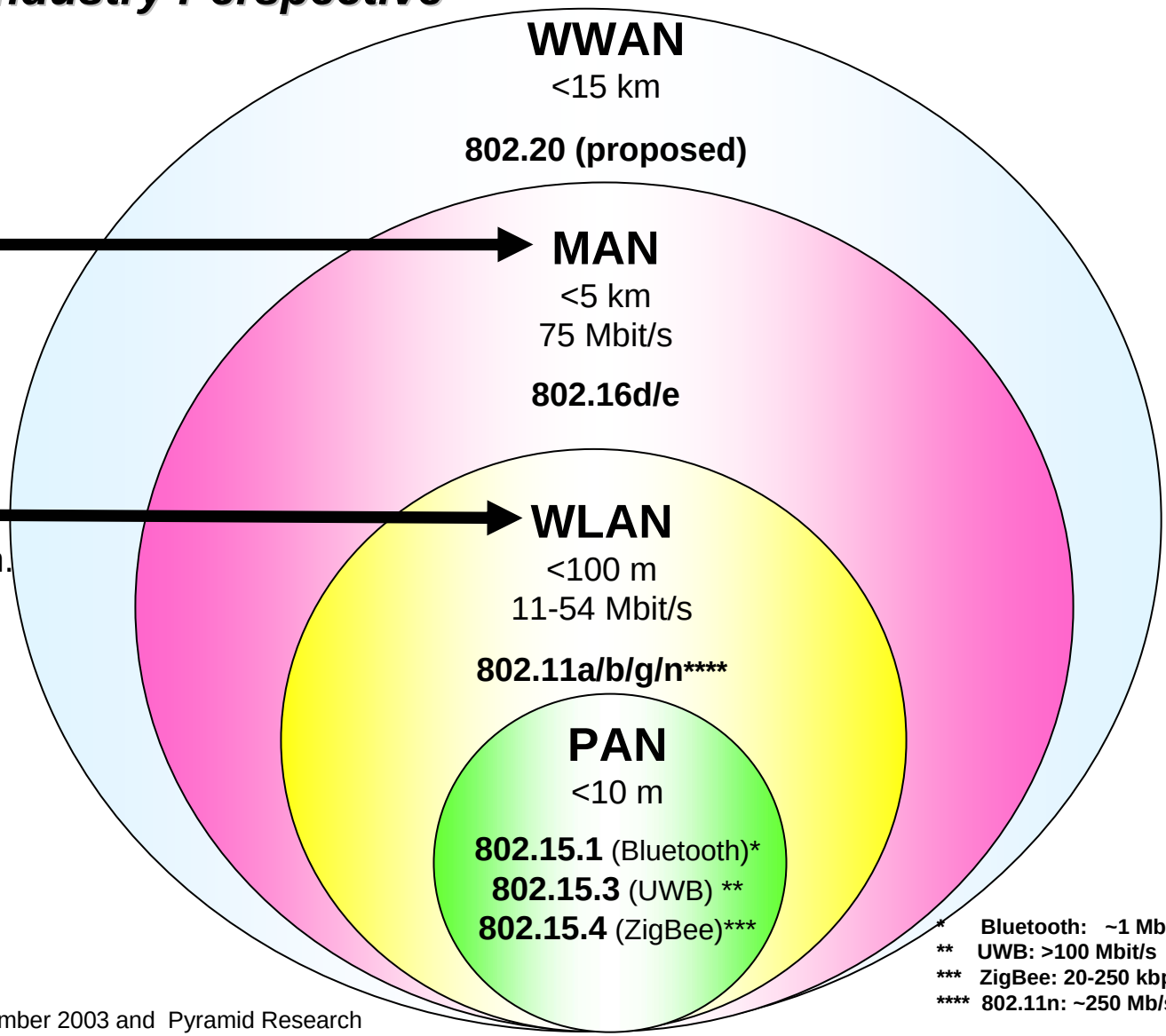
Source: International Telecommunications Union (ITU-R, August 31, 2000)

IEEE View of Wireless Network Technologies

A "Net-Centric" Industry Perspective

WiMAX
New standard for fixed broadband wireless. Doing for MAN what Wi-Fi did for LAN.

Wi-Fi®
Includes 802.11a/b/g/n. Products must be approved for interoperability by the Wi-Fi Alliance.

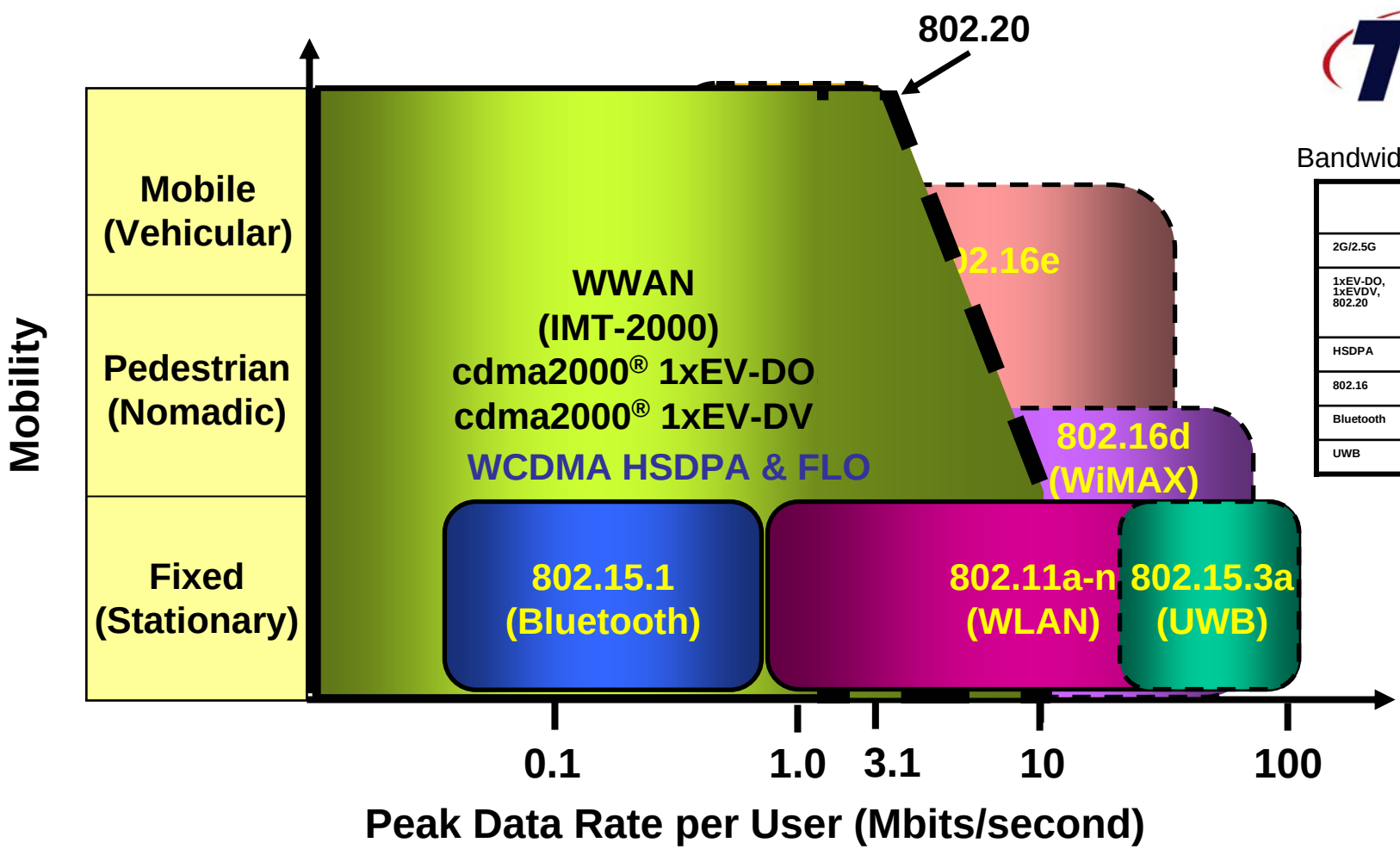


* Bluetooth: ~1 Mbit/s
** UWB: >100 Mbit/s
*** ZigBee: 20-250 kbps
**** 802.11n: ~250 Mb/s

Source: ITU, "Birth of Broadband", September 2003 and Pyramid Research

Peak Data Rates Per User

"Evolved 3G" may satisfy the need for 4G or other broadband technologies



Bandwidth Assumptions

	Bandwidth (MHz)
2G/2.5G	1.25
1xEV-DO, 1xEVDV, 802.20	1.25
HSDPA	5
802.16	20
Bluetooth	79 x 1 MHz
UWB	> 500

Source: Telecommunications Industry Association,, International Telecommunications Union and WiMAX Forum

The Buzz About WiMAX

- **WiMAX or "Worldwide Interoperability for Microwave Access" was initially conceived to:**
  - Provide **"last-mile"** or **"backhaul"** connectivity using microwave access (10-66 GHz)
  - "Last-mile" refers to the connection from a major trunk to a business or residential user
- **Currently targets the Mobile Wide Area Network (WAN) market**
  - WiMAX positioned as a Metro Area Network (MAN) solution (using licensed/unlicensed bands up to 11 GHz)
  - The standards were then "morphed" towards becoming a full-fledged mobile WAN solution
- **The visibility of WiMAX began with the aggressive backing from Intel and its experience with WiFi**
- **WiMAX proponents fond of highlighting it as an alternative to the alleged '3G failure/delays/expense'**
  - Covered in several hundred press releases, white papers, and research papers a year
  - Missing serious consideration of competitive factors and a viable business case

WiMAX is the latest way for IT vendor "have-nots" to get into the high growth lucrative mobile wireless market

WiMAX – An Assessment

The commercial viability of WiMAX will depend upon a myriad of factors

- WiMAX hype is built on unrealistic promises
- WiMAX may end up working in a fixed environment in certain markets; robust operation in a mobile environment is key, but will take years
- WiMAX proponents are hunting for globally acceptable and commercially viable frequency bands
- Support of affordable, toll-quality, voice communications, in a variety of consumer devices, will be a key determining factor in the adoption of WiMAX mobility
- Availability of test equipment, interoperability, affordable devices, ubiquitous coverage, differentiated mobile services, etc., will impact/delay the adoption of WiMAX

3G CDMA – The Better Alternative

3G CDMA industry is generating billions of dollars of revenue today

- 3G CDMA WAN technologies satisfy global demand for mobile voice and broadband data services
- Compared to WiMAX, CDMA2000 1xEV-DO (Rel A) offers better spectral efficiency, data throughput and coverage in a mobile environment
- 3G is globally available today in the 450, 850, 1700, 1900 and 2100 MHz frequency bands, exploiting legacy spectrum allocations
- By the time WiMAX is available for use in a mobile environment, “evolved 3G” solutions will have already satisfied most of the market demand

Targeted Market Segments For WiMAX

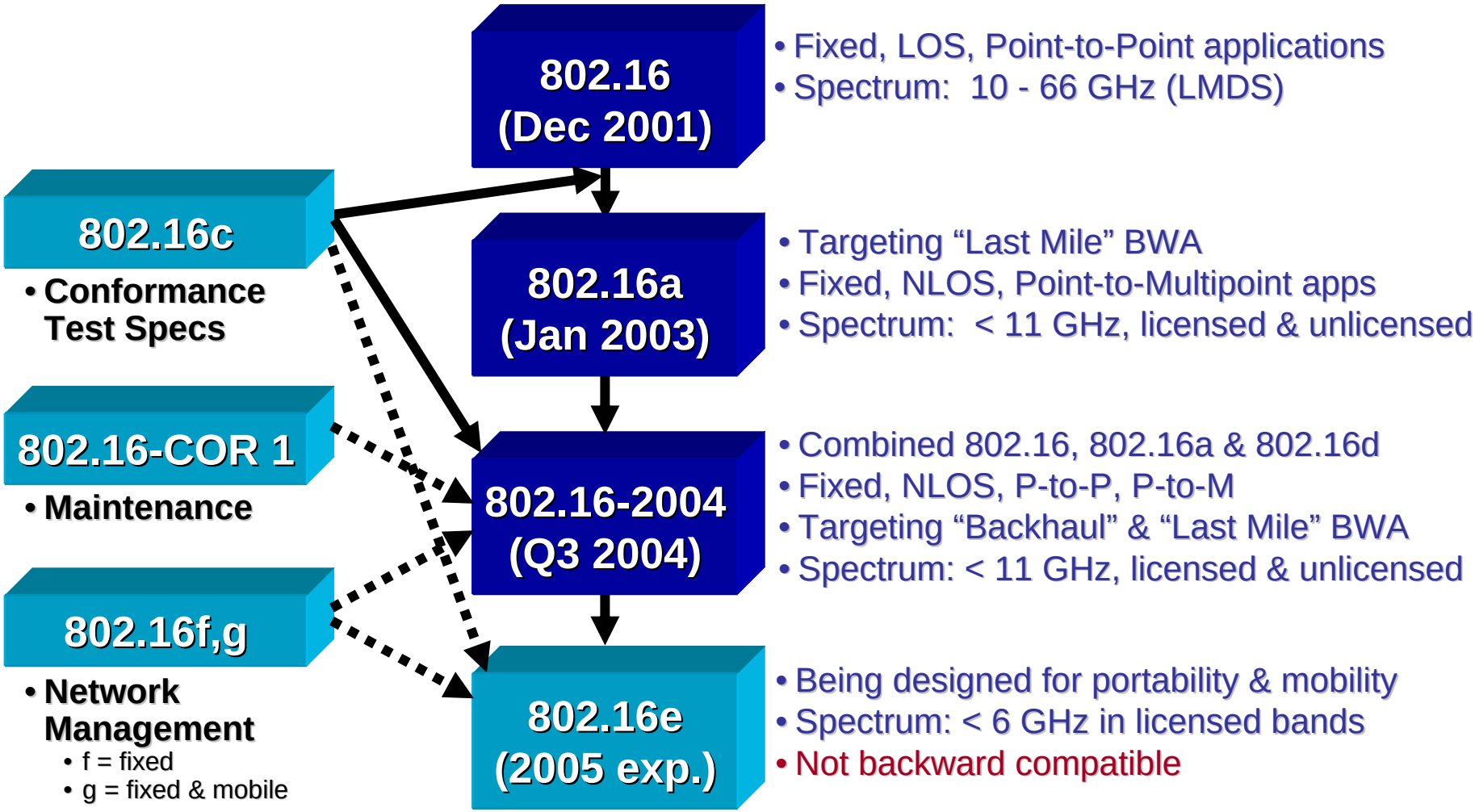
- **The WiMAX Forum promotes 802.16 standards to target two distinct market opportunities:**

  - **802.16-2004: Fixed Broadband Wireless Access (FBWA)**
    - Wireless backhaul, LOS & NLOS
    - Competitive broadband offering to DSL, cable, etc.
    - OFDM technology
    - Uses a variety of bandwidths (3 MHz up to 20 MHz)
    - Targeted for bands extending to 11GHz
    - Claiming max. data speeds up to 75 Mbps over 30 miles
    - Standard now published, but 100's of corrigendum items still outstanding

  - **802.16e: Portable & Mobile BWA**
    - Portable notebooks and mobile handsets, NLOS
    - OFDMA technology
    - Uses a variety of bandwidths, initially 5 MHz
    - Targeting bands extending to 6 GHz

"WiMAX is the latest, and *most hyped*, generation of fixed wireless technology in years." Source: Pyramid Research

WiMAX Related Standards – IEEE 802.16

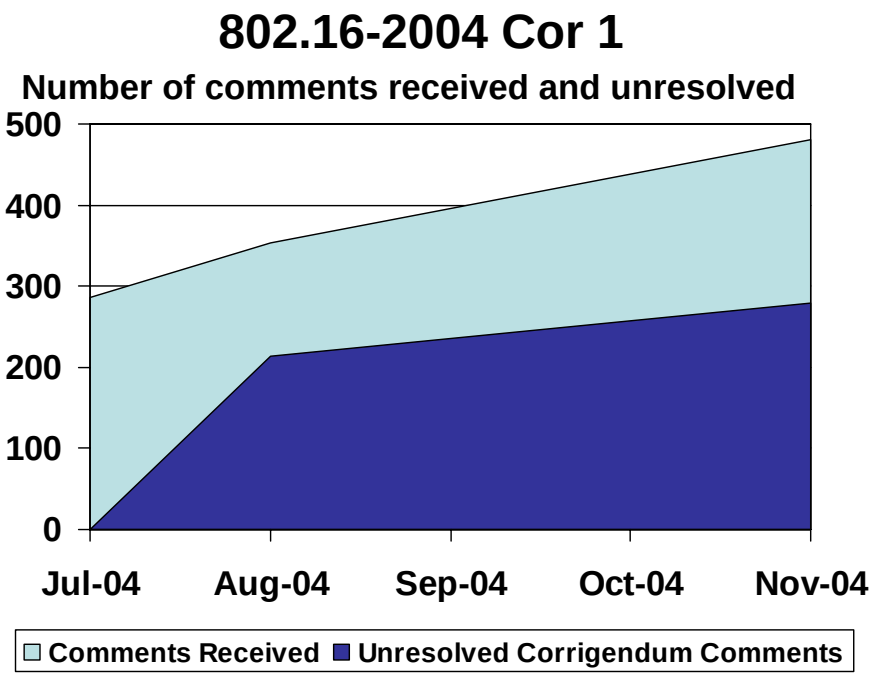


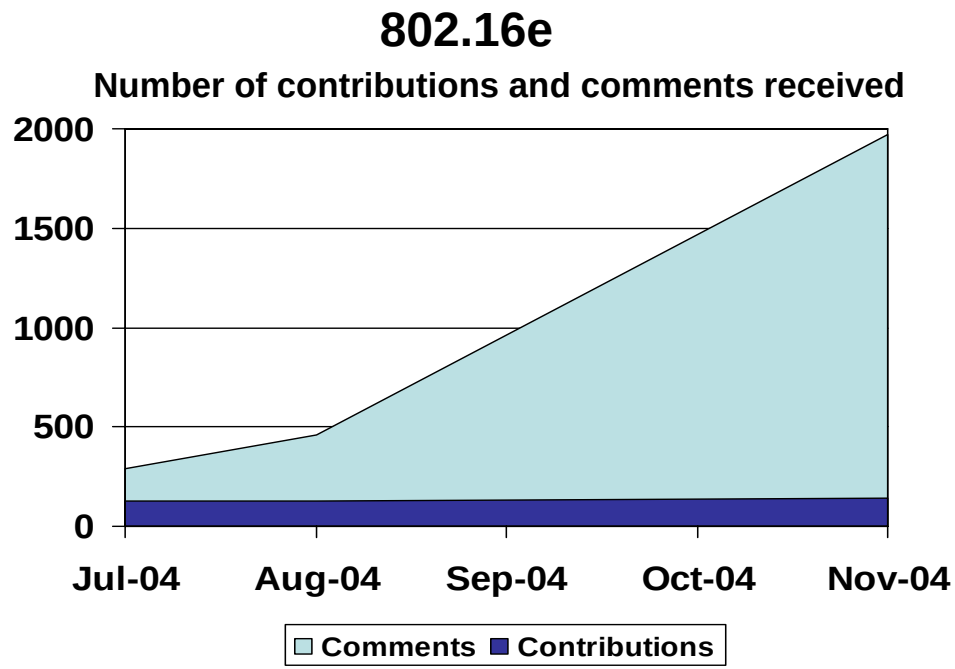
These standards will not support backward compatibility

Progress of IEEE 802.16 Standards

A Standard is Not Necessarily Complete when it's Published

- Rigorous standards processes, simulations and field trials are required for creating a robust standard and viable technical solution
- This rigor is missing in the IEEE processes, unlike in TIA/ETSI/3GPP/3GPP2

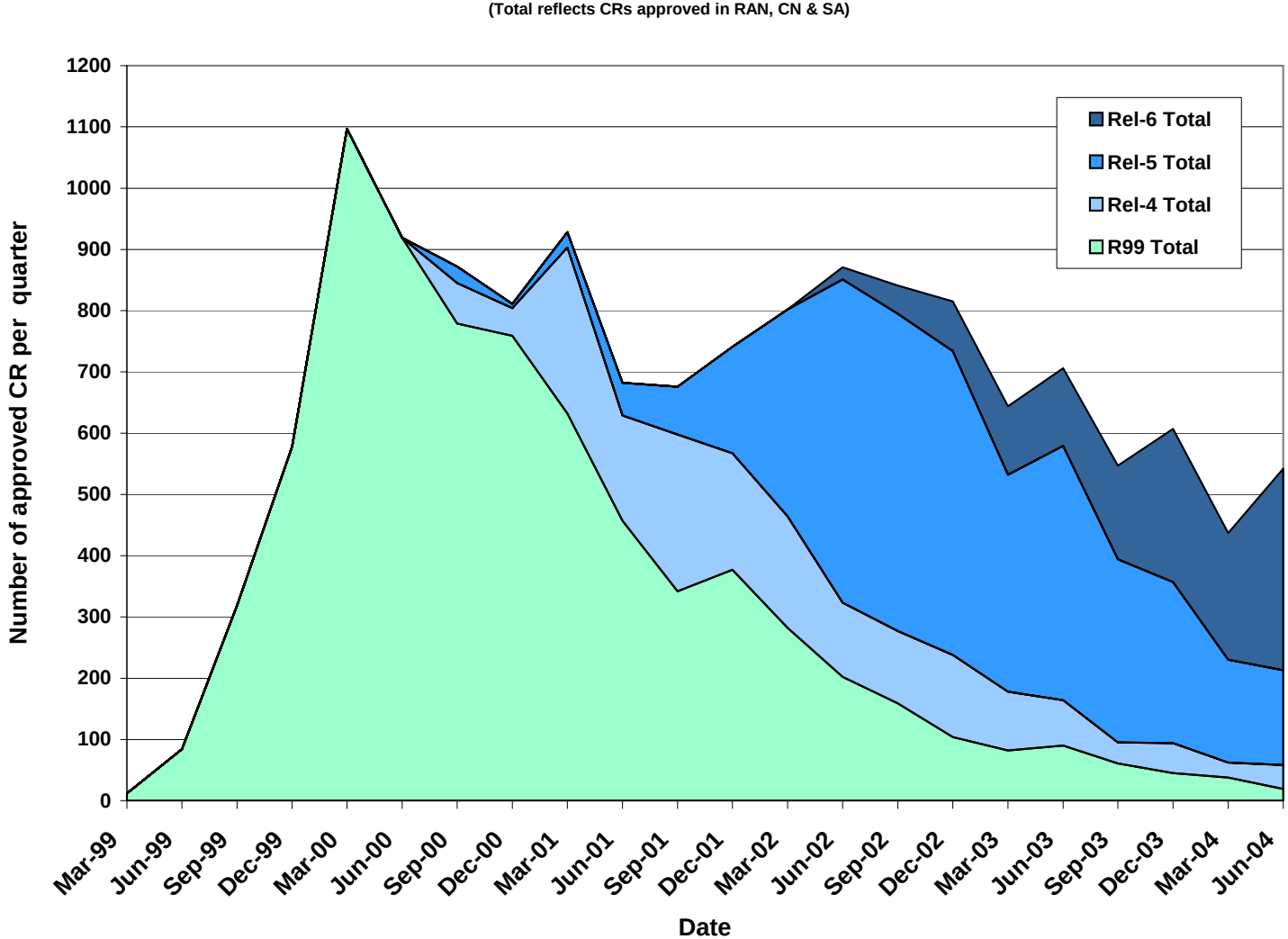




A large number of unresolved comments exist with the Specification; Less than 2 minutes are spent in 'resolving' each 802.16e contribution!

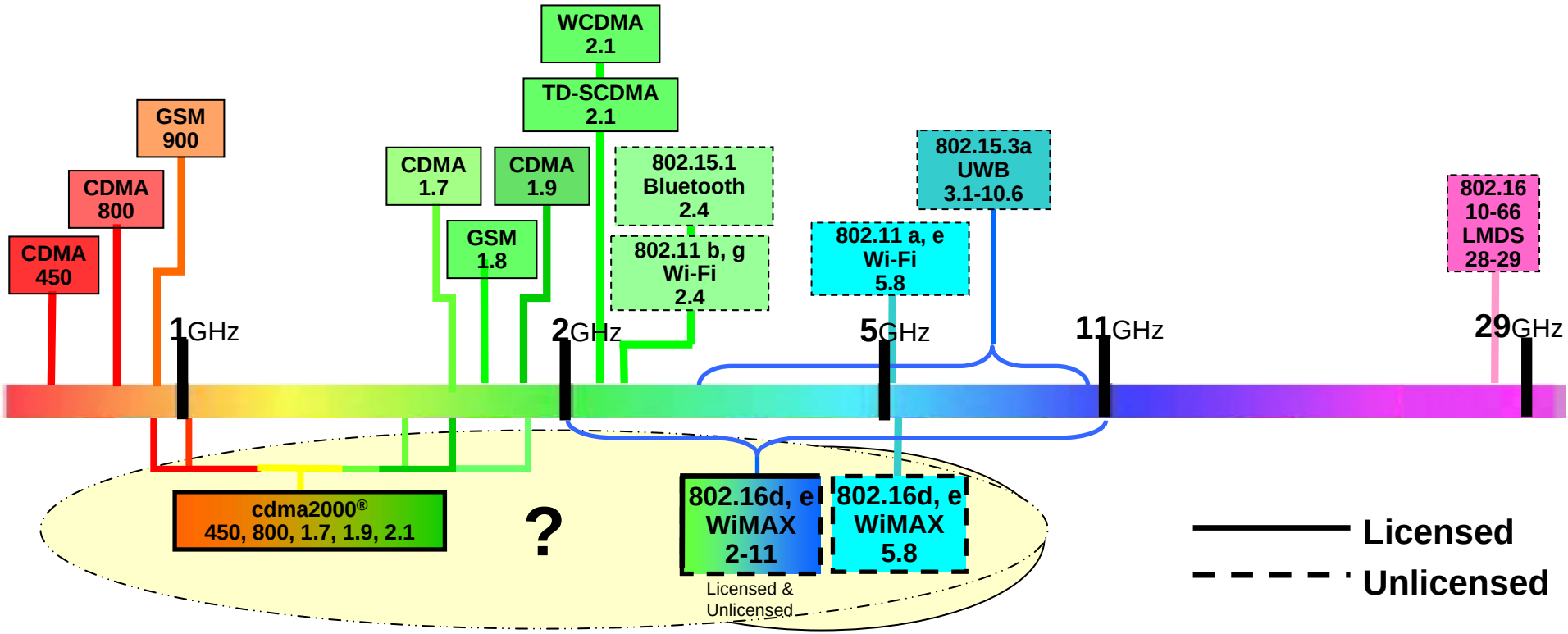
Wireless Standards Take Time to Become Commercially Viable

Example: WCDMA (3GPP); Releases & Corrections



What Spectrum will WiMAX Use?

The hunt for commercially viable WiMAX spectrum continues



The lower frequency bands (below 2.5 GHz) are better for commercial use:

- Greater range (larger coverage areas), less cell sites, better in-building penetration, better mobile performance, less power consumption, higher average data throughputs in an NLOS environment

The lack of globally accepted frequency bands for WiMAX is impacting availability and economics

WiMAX 802.16 Technology Weaknesses (1)

- **802.16e is poorly designed for mobility**
  - **Slow message-based power control**
    - As opposed to bit-based power control used by 3G systems
  - **Slow message-based data rate control**
    - Higher overhead than 3G systems
  - **Limited support for handoffs**
    - Recently introduced 802.16 handoffs are primarily hard handoffs
  - **Poorer link budget**
    - ~3 dB less than 3G systems, due to CDMA soft handoff advantage
- **Limited number of simultaneous users can be supported**
  - **High scheduling overhead**
  - **Inefficient sleep mode**
- **No Upper layer specifications are addressed by IEEE standards body**
  - **Standard only specifies PHY and MAC layers**
  - **Service interoperability needs to be worked outside 802.16, which will lead to poor interoperability and delay deployments**

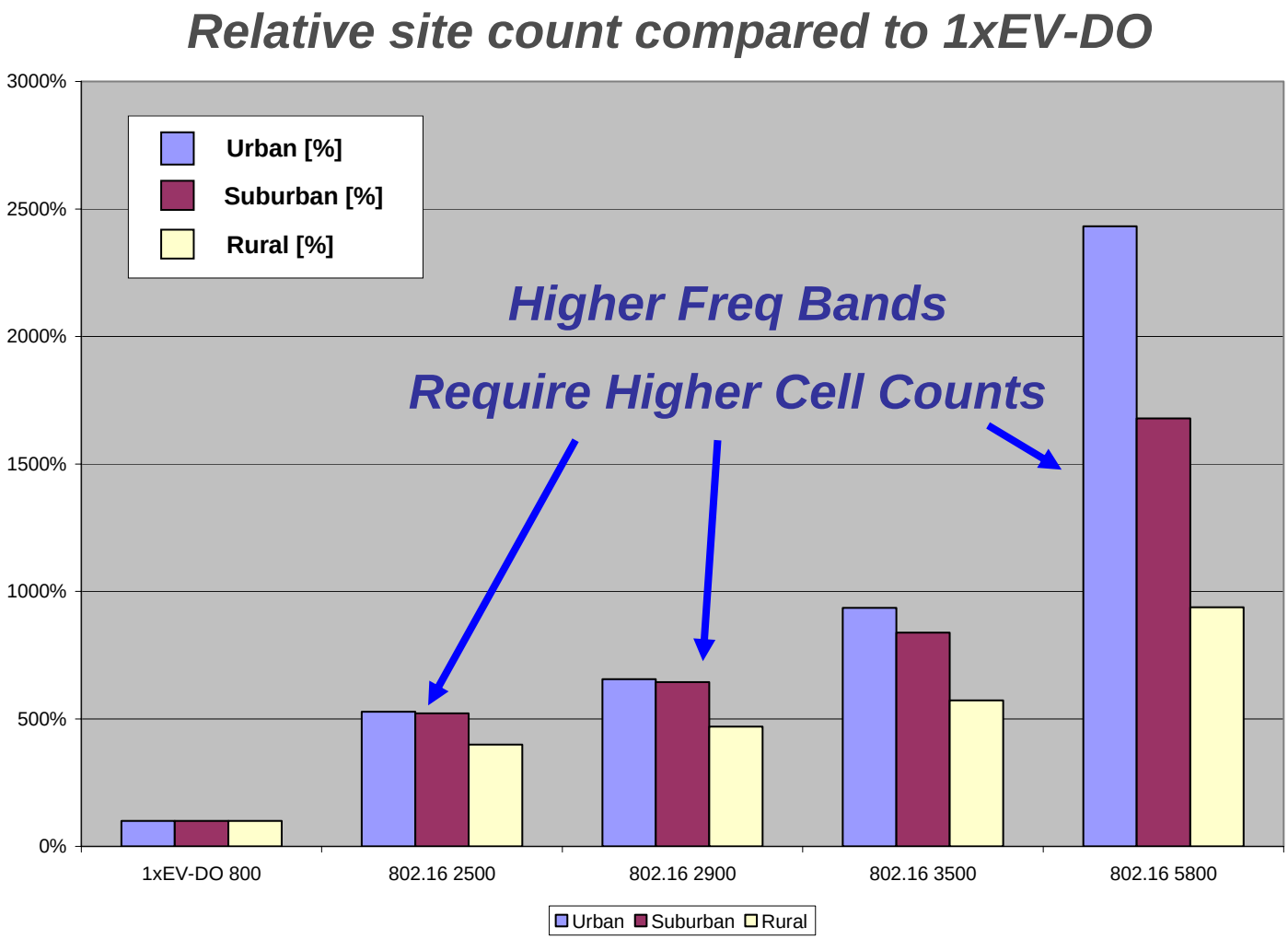
WiMAX 802.16 Technology Weaknesses (2)

- **Network and air-interface interoperability**
  - **Expect to see proprietary network interfaces to enable interoperability**
    - Service providers will have to ensure vendor interoperability
- **802.16 claims to have a significant performance advantage: 75 Mbps in 20 MHz, i.e., 3.75 bits/sec/Hz**
  - **Numbers not pegged to a specific frequency band of operation**
  - **Too far from reality**
  - **Recent simulations show that 802.16 OFDM technology can deliver at best ~1.0 b/s/Hz in a fixed Line-of-Sight scenario and < 0.75 b/s/Hz for most Non-Line-of-Sight and mobility scenarios ***
- **802.16 claims to support broadband data rates up to a coverage area of 30 miles**
  - **Coverage in Urban/Suburban use is expected to be 1 to 3 miles**
  - **Rural coverage will have larger range**
  - **Data rates reduce drastically as distances increase**

Pre-WiMAX, WiMAX-like and WiMAX-ready products are being sold before fully-tested standards compliant "WiMAX Certified" process in place

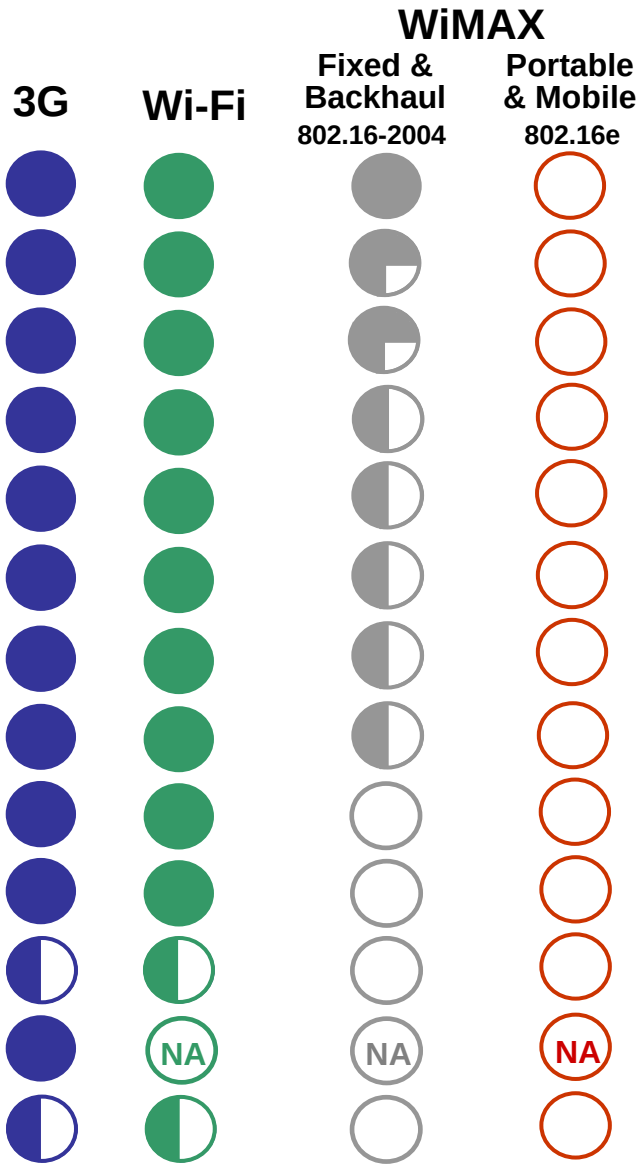
*** Source: Qualcomm, Nov 2004**

WiMAX Coverage vs. Frequency Bands



WiMAX Link budget is estimated to be ~3 dB poorer than 1xEV-DO

When Will WiMAX be Deployed?



3G enjoys at least a 4 year advantage for portable and mobile access

- Build and test prototype system (optional)
- Establish standard specifications for system and devices
- Revise and stabilize the standard and begin chipset design and software development
- Test performance of standard releases
- Optimize system and device performance
- Develop engineering prototypes of chips/software for initial launch
- Test interoperability of devices and infrastructure
- Test interoperability of multimode/multiband systems
- Pre-commercial launch
- Finalize chips and software for full commercial launch
- Full deployment
- Rich features for multimedia, …
- Ramp volumes, reduce manufacturing costs

WiMAX will not get to market in time to compete with "evolved" 3G WWANs

WiMAX Market Claims

The WiMAX "Fixed" and "Mobile" Business Models are Unproven

- **Market estimates vary widely**
  - Forecasts vary from 2 - 15 M subscribers by Y2008
    - Small compared to the 3G subscriber base
  - To date, proprietary fixed wireless BWA solutions could only amass <1M subscribers worldwide
    - 802.16 is counting on building upon this subscriber base
  - CDMA is the dominant FWA technology being upgraded with EV-DO for BWA
- **Revenues from broadband wireless services - mostly based on WiMAX - are being projected to top $2.1 billion annually by Y2008**

"WiMAX will not be commercially viable until 2007"
Source: The Complete WiMAX Handbook, Telephony

Sources: Pyramid Research LCC of Cambridge, MA, Wi-Fi and WiMAX:*Unwiring* the World Sizing the Opportunity, Analyzing the Players, Demystifying the Hype, by John Yunker, November 2003. ABI Research, 2003. Visant Stategies, 2003. Strategy Analytics, May 2003.

WiMAX Economics

WiMAX will not offer significant cost savings in a mobile environment

- **WiMAX Cost of Coverage**
  - As a mobile service, WiMAX will require the same network components used in today's 3G networks
    - Cell Sites, Towers, RAN Equipment, Backhaul, Routers, Interconnect, etc.
    - Typical U.S. nationwide cellular network has ~20,000 Cell Sites
  - The higher WiMAX frequencies increase the capital and operating costs of coverage
    - Typical WiMAX spectrum will require more than four times the number of WiMAX cell sites needed for coverage compared to the cellular bands, and nearly twice the cell sites needed for UMTS band.
- **WiMAX Cost of Devices**
  - WiMAX devices will utilize the same components as 3G devices:
    - Display, battery, antenna, memory, capacitors, connectors, etc.
  - By the time WiMAX mobile devices hit the market, low-cost 3G CDMA devices will be priced below $50 (wholesale)

WiMAX – Reality falling short of the hype

Operators should not be swayed by the claims

- **The performance claims of WiMAX are unrealistic**
  - The WiMAX Forum is mixing their performance claims across multiple environments, frequency bands, modes, etc., creating unrealistic expectations in the market
  - Not all parameters can be maximum at the same time - Claims like *"75 Mbps over 30 miles range"* are theoretical and only apply to the fixed LOS mode, not mobile!

- **Currently there are no "WiMAX certified" products available!**
  - Only proprietary, pre-WiMAX (e.g. WiMAX-class), fixed wireless access products are available
  - WiMAX mobility products will not be commercially available for many years

- **The 802.16e standard for mobility is incomplete and questionable**
  - Very little technical evidence is available to back-up mobility performance claims
  - Issues such as interference, power control, hand-off, etc. have not been adequately addressed

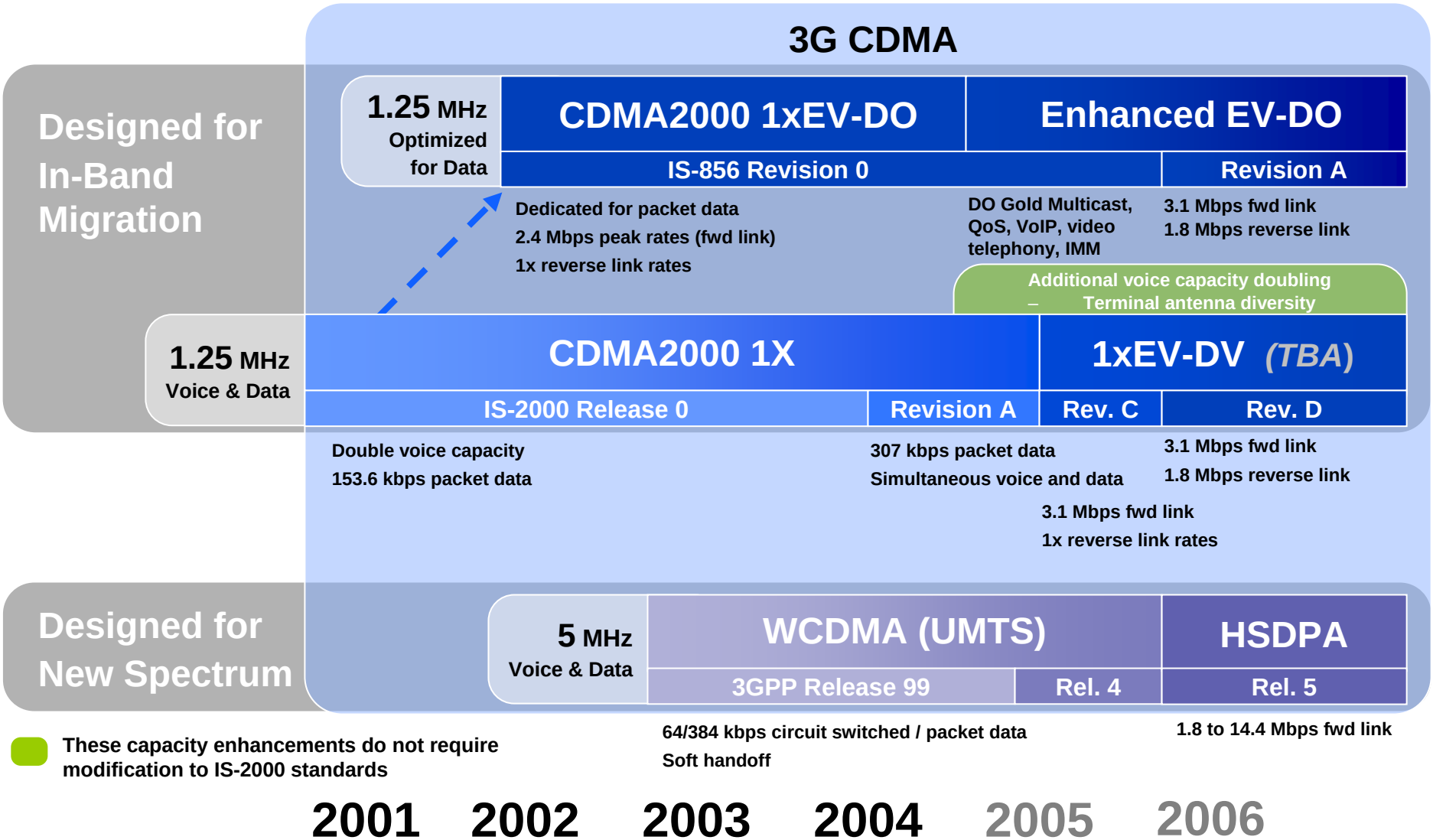
- **The economics of 802.16e is unclear**
  - The site count required for 802.16e in the higher frequency bands will be *far greater* than 3G mobile
  - The cost of 802.16e devices will not be competitive with entry-level 3G devices in the out years

- **The massive number of WiMAX options will lead to a lack of interoperability**
  - The variety of WiMAX options, modes and applications is creating confusion and a lack of uniform standards:
    - Fixed vs portable vs mobile, licensed vs unlicensed, LOS vs NLOS, FDD vs TDD, a large variety of frequencies, bandwidths, OFDMA sizes, etc.
  - Backward compatibility is not guaranteed
  - WiMAX will certify equipment based on a given set of physical layer profiles. These profiles and conformance procedures are yet to be finalised

"They (WiMAX) mush together all the claims for all the different frequencies from 2 GHz to 10 GHz, licensed and unlicensed, into the projections of their roadmap for the next 8 years."
Robert Berger, Internet Bandwidth Development, LLC

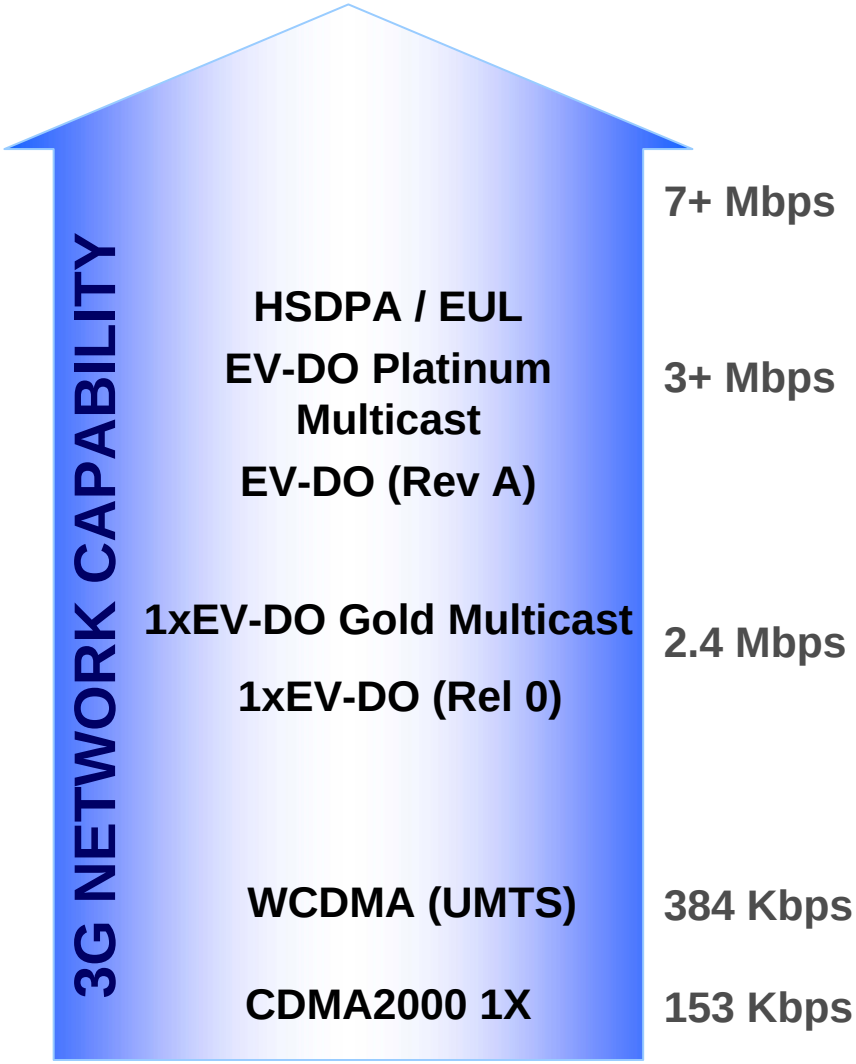
Worldwide 3G Overview

3G CDMA – Today and Tomorrow

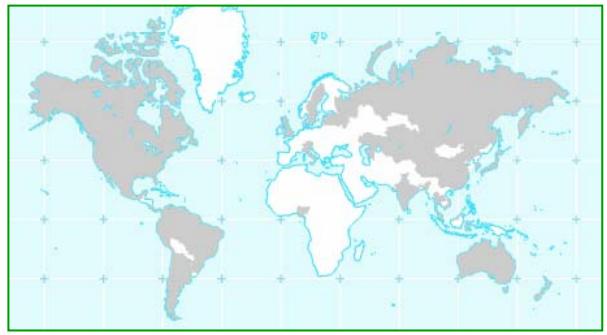


3G Capacity Evolution

The Foundation for Future Wireless Growth: 3G Networks



Strong Global Demand *



- Over 125 3G CDMA operators
- Over 150M 3G subscribers
- Over 610 3G mobile devices
- Over 55 mobile device vendors

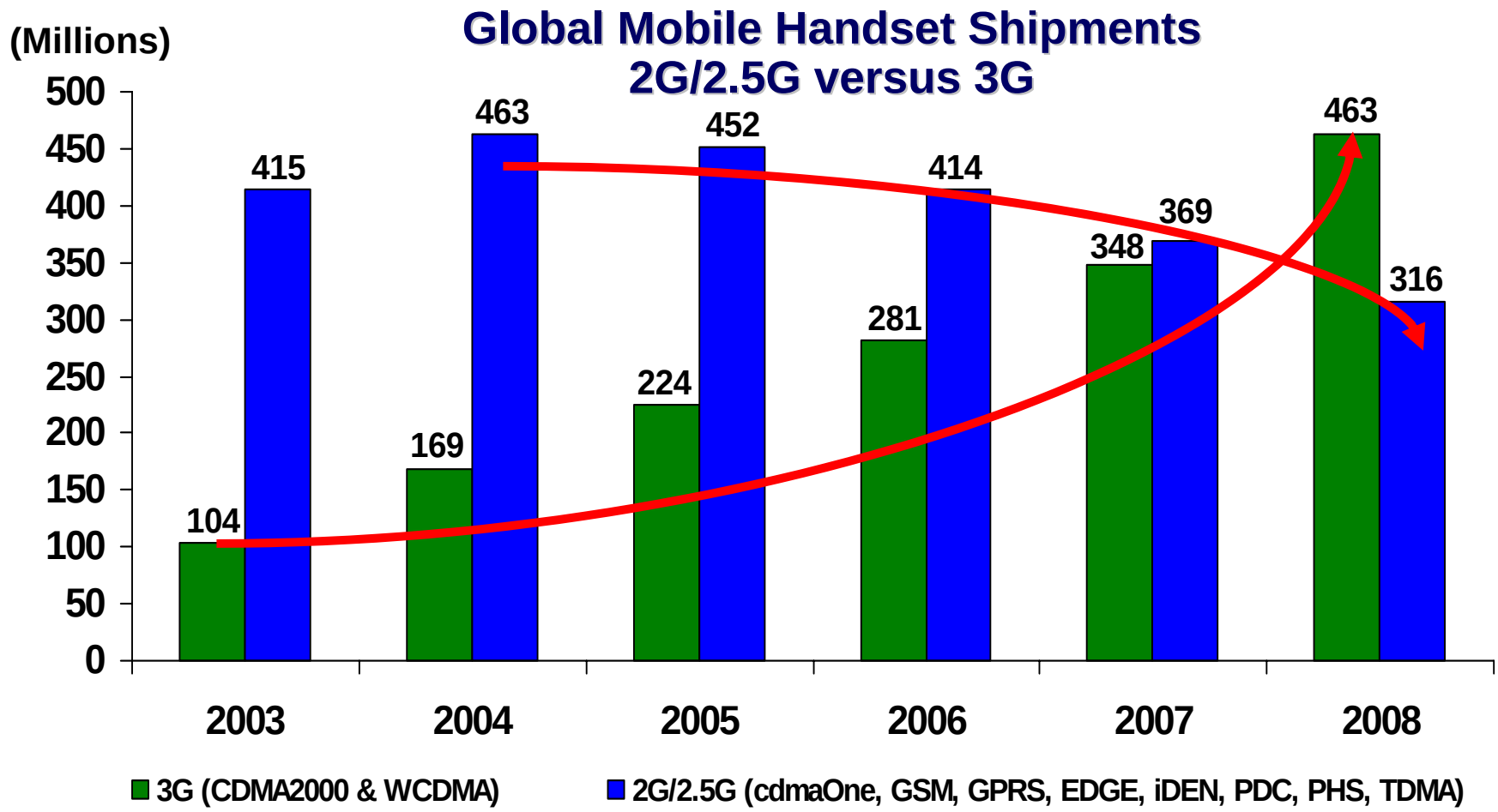
3G networks set the foundation

- Increased voice penetration
- Compelling applications
- Increased earnings opportunity

*Source: www.3Gtoday.com, as of January 2005

Global Demand: 2.1 billion mobile subscribers by 2008

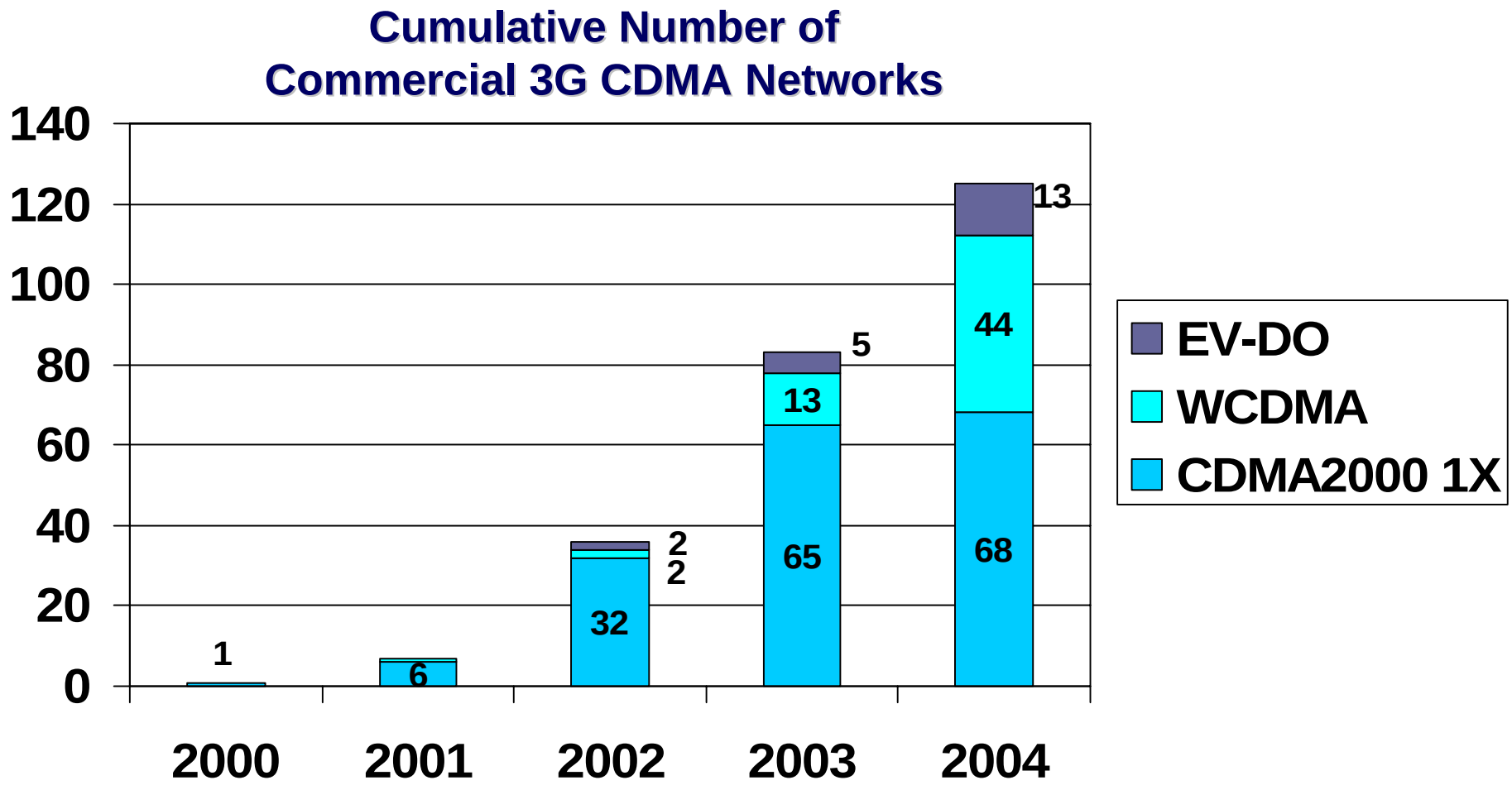
Currently CDMA accounts for 15% of Worldwide Wireless Subscribers
In 2004, more than 25% of all (total) handset shipments worldwide were CDMA



Source: Average of In-Stat/MDR and Signals Research Group's forecasts, August 2004

3G CDMA Operator Growth

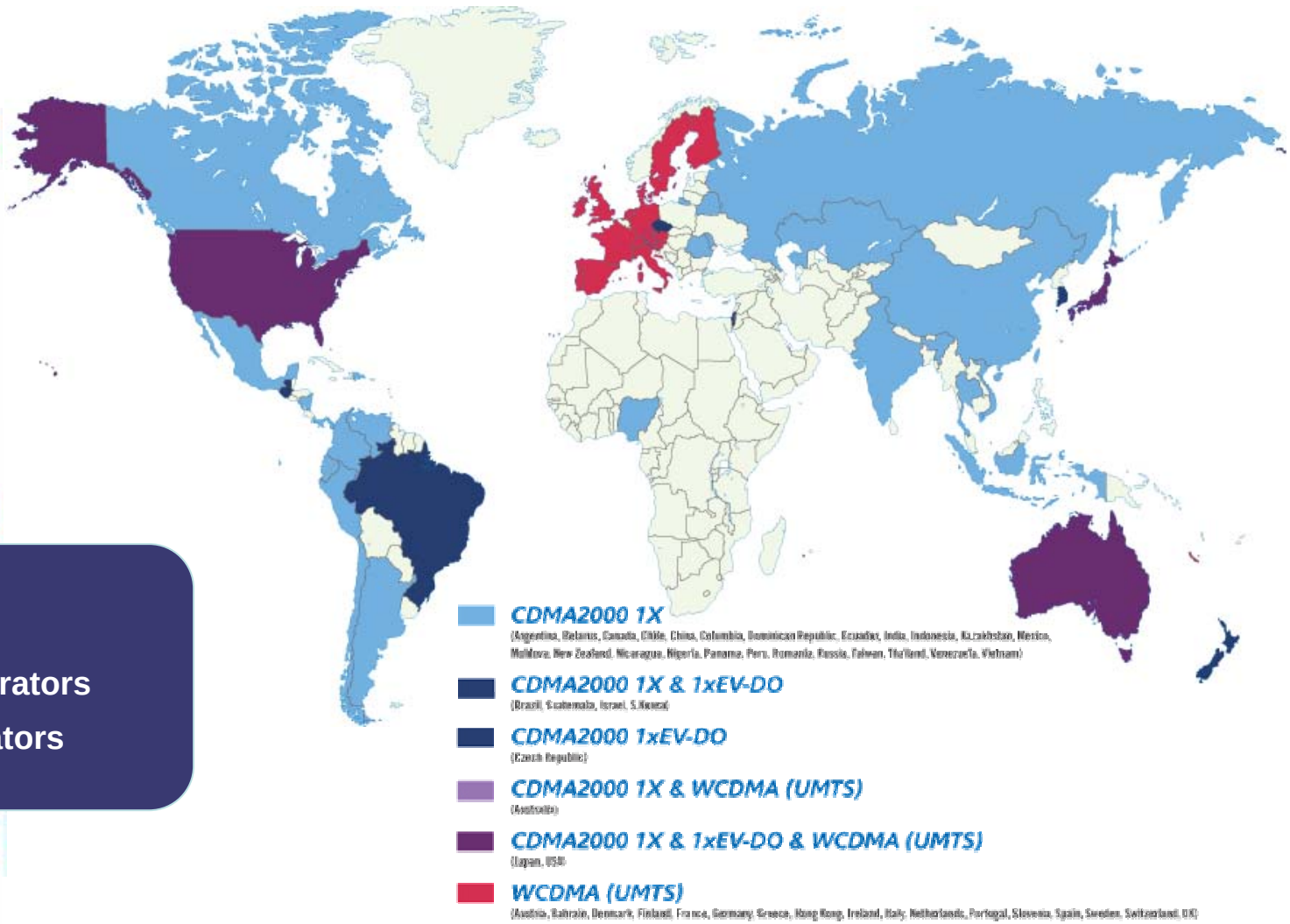
Operators have recognized the potential for 3G mobile services



Source: www.3GToday.com, as of January 2005

Commercial 3G Operators: 125 in 50 Countries

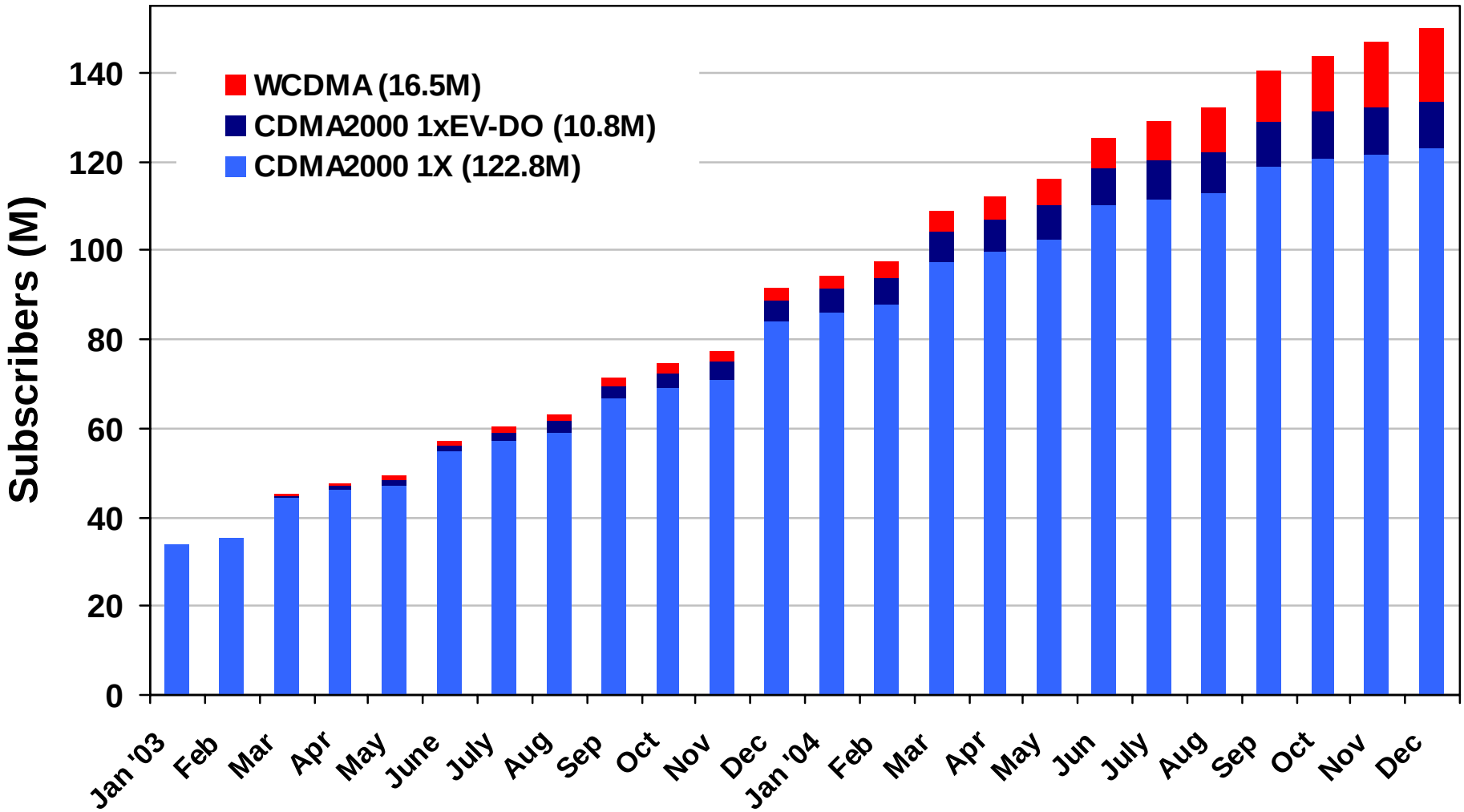
- CDMA2000:
  - 1X: 68 operators
  - 1xEV-DO: 13 operators
- WCDMA: 44 operators



Worldwide 3G CDMA Commercial Networks
Source: 3Gtoday.com *(as of December 2004)*

Over 150 Million 3G CDMA Reported* Subscribers

(As of December 31, 2004)



**80 of the 125 operators have reported 3G CDMA subscriber totals at some point. Forty-five of those operators have updated their 3G CDMA subscriber totals for December 2004.*

Source: 3Gtoday.com

3G CDMA is Firing on All Cylinders

Satisfying the demand for Voice and Wireless Broadband today!

- Toll-quality Voice communications (equal or better than landline)
- High-speed Data transmissions (multiples greater than ISDN speeds)
- Secure transmissions (including DRM, anti-spam, fraud control, etc.)
- Excellent coverage (with in-building, multimode & robust hand-off services)
- Commercially available devices (more than 706 devices from 61 vendors)
  - Small and attractive form factors
  - Data-enabled devices based on IETF (TCP/IP) standards
  - Operating systems based on “open” execution environment standards
  - Low battery power consumption
- Commercial-grade infrastructure (switching, billing, authentication, etc.)
- Thousands of applications (multimedia, multi-casting, messaging, etc.)
- Low cost per minute, megabyte or message (due to high spectral efficiency)
- More than 150 million paying subscribers worldwide and growing (~4M/month)!

3G is a mature industry that is generating billions of dollars of revenue!

CDMA2000 1x and 1xEV-DO

What is CDMA2000 1X?

First IMT-2000 Standard

More Voice Capacity (more than 6 times capacity of GSM):

- 26 to 29 Erlangs/sector/1.25 MHz (35 to 38 TCH/sector/1.25 MHz)
- Capacity gains are directly attributed to:
  - Fast forward link power control
  - Lower vocoder rates (rate 1/4 code can be used)
  - Coherent reverse link

Always On Packet Data Rates:

- 153.6 kbps peak data rate (Release 0)
- 307.2 kbps peak data rate (Release A)

Offers a 50% increase in standby time:

- Attributed to Quick Paging channel

Backward compatible with cdmaOne

Voice quality rated as excellent

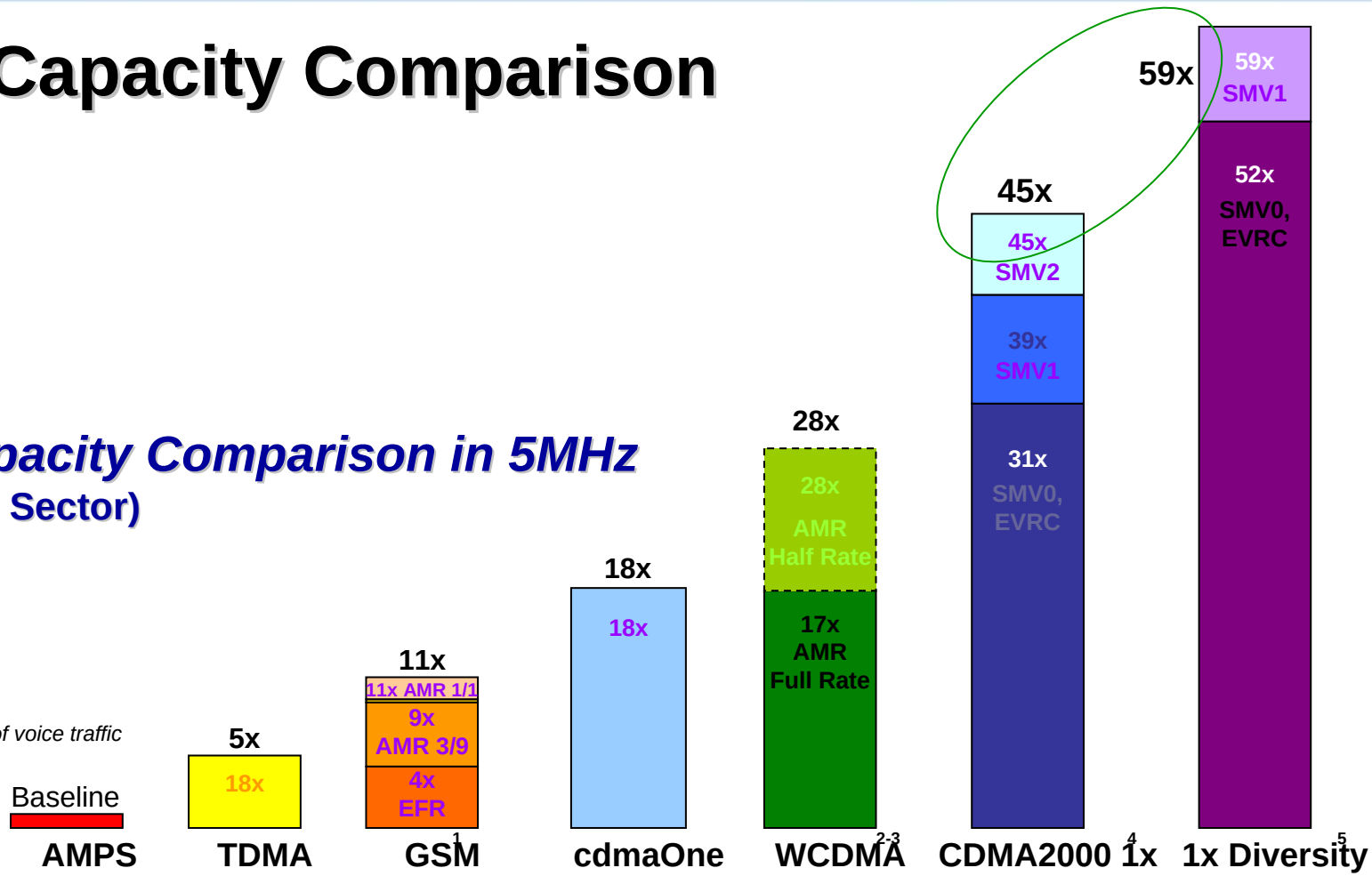
Improved coverage:

- 1X provides better coverage due to improved link budget

Note: Compiled with input from three CDMA operators

Voice Capacity Comparison

Voice Capacity Comparison in 5MHz
(Erlangs per Sector)



Notes:
Assumes 100% loading of voice traffic
2% GOS for all calculations

	AMPS	TDMA	GSM	cdmaOne	WCDMA	CDMA2000 1x	1x Diversity
Erlangs/Sector	3.0	15.8	13.2 – 32.8	52.5	51.5 – 83.1	92.8 – 133.9	154.5 – 175.3
Users/Sector	8	23	20 – 43	63	62-95	105-147	168-189
Re-use	7/21	7/21	3/9 – 1/1	1/1	1/1	1/1	1/1

1 Source: "GSM AMR VOCODERS: FACTS ABOUT INCREASED VOICE CAPACITY" QUALCOMM Internal Paper: Rao Yallapragada
2 Source: "WCDMA for UMTS" , Radio Access for Third Generation Mobile Communications, John Wiley & Sons, LTD., copyright 2000
3 Source: "The Rise of the 3G Empire", Deutsche Banc Alex Brown, September 2001
4 Source: "SMV Capacity Increases", Andy Dejaco (QUALCOMM) - reference: CDG-C11-2000-1016010, October 16, 2000. Assumes EVRC = 35users and 2dB power control factor
5 Source: "Further Capacity Improvements in CDMA Cellular Systems", QUALCOMM Inc, Roberto Padovani (Calculations based on 1% Blocking)

What is CDMA2000 1xEV-DO?

An IMT-2000 Standard

A high-performance and cost-effective wireless broadband solution

Complimentary to CDMA2000 1X

Up to 2.4 Mbps peak data rate in 1.25 MHz

- **Increasing to 3.1 Mbps in next release (Rel A)**
- **Enhancements through Multicast and FLO technologies**

Average data throughputs: 700kbps – 1Mbps

- Both mobile and fixed environments

Note: All figures are based on per sector or 1.25MHz

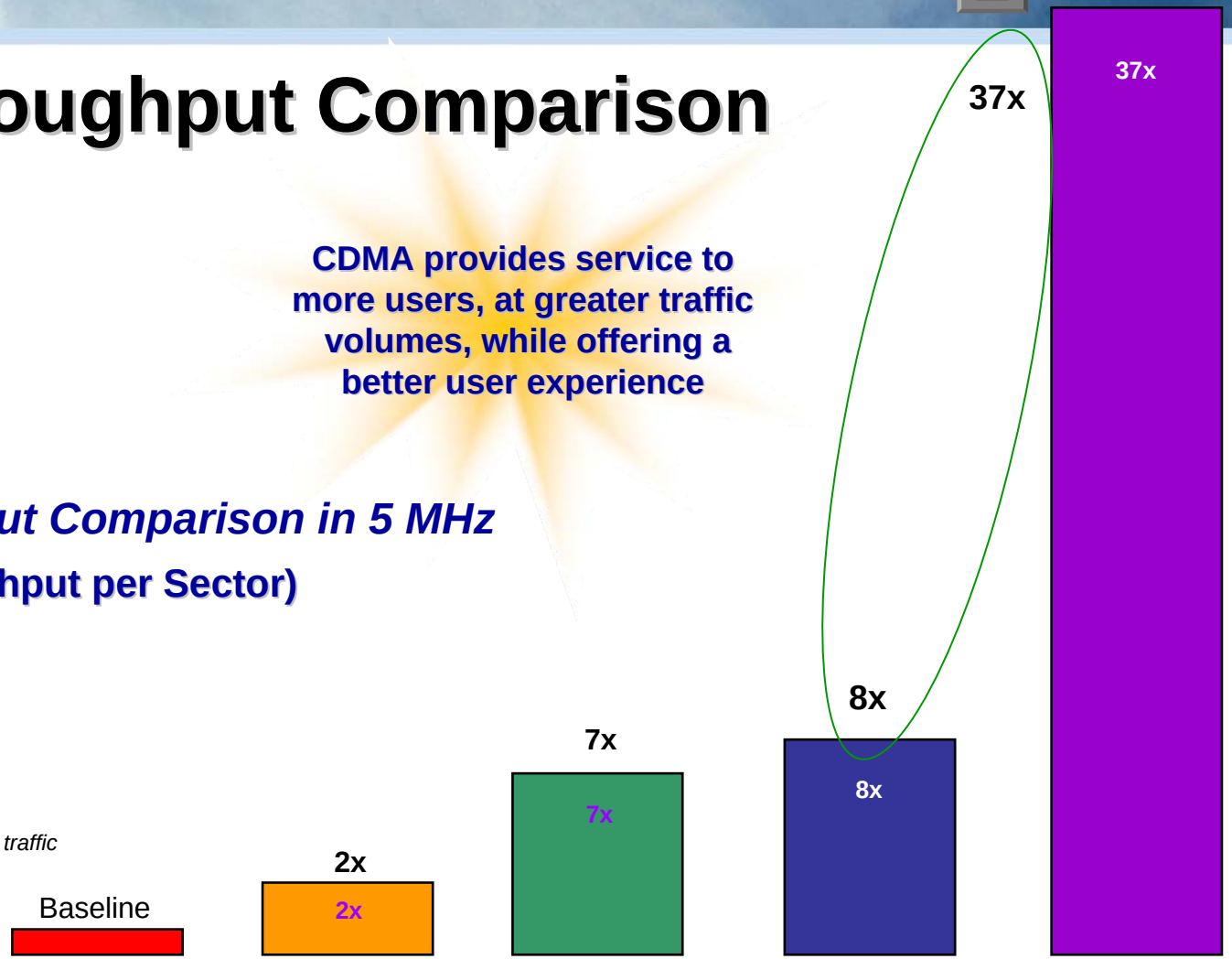
Data Throughput Comparison

CDMA provides service to more users, at greater traffic volumes, while offering a better user experience

Data Throughput Comparison in 5 MHz

(Average Throughput per Sector)

Note:
Assumes 100% loading of data traffic
Pedestrian Mobility

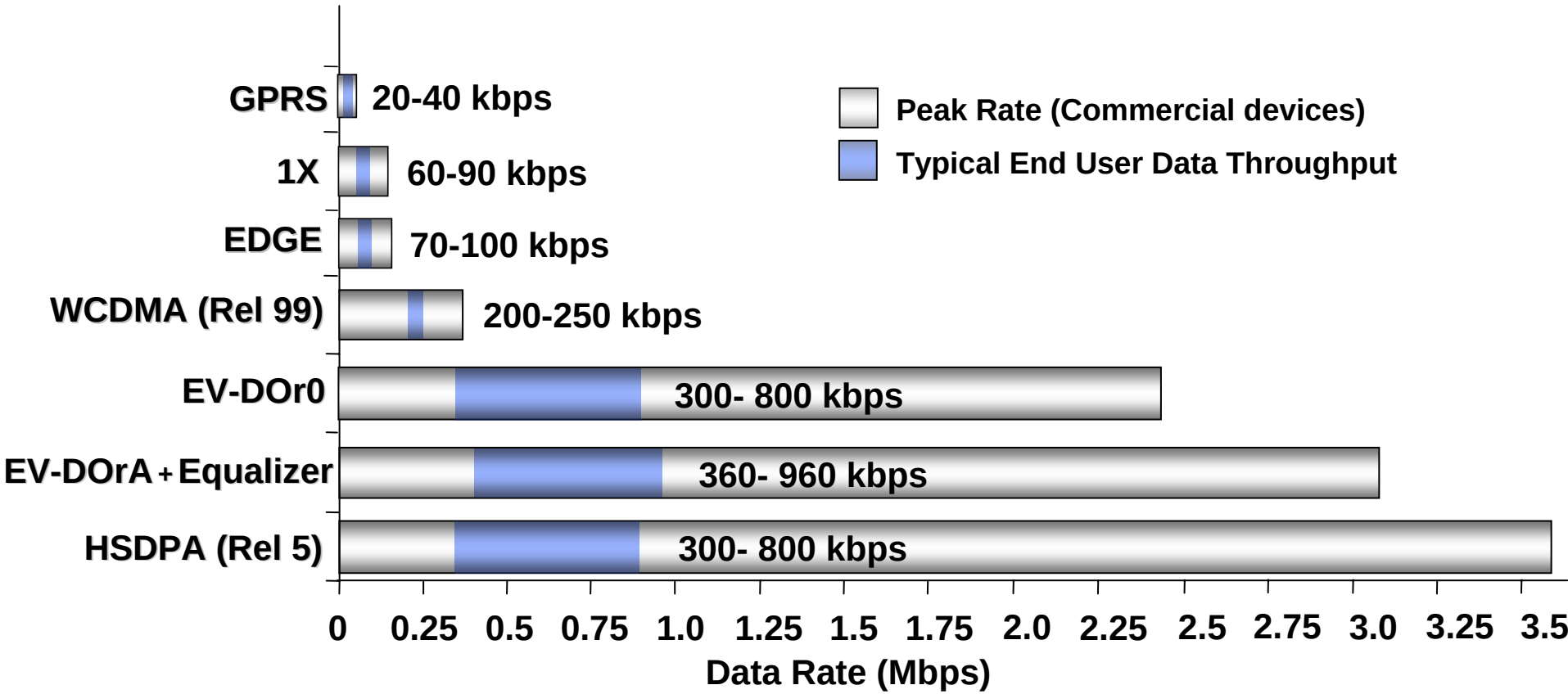


	GPRS [1]	EDGE [2]	WCDMA [3]	CDMA2000 1X [4]	1xEV-DO [5]
Average Throughput	128 kbps	270 kbps	900 kbps	1,050 kbps	4740 kbps
Re-use	3/9	1/3	1/1	1/1	1/1

1 Assumes 4 time slots @ 12kbps per slot, 3/9 reuse, CS-3 coding scheme maximum (average C/I of 12dB)
2 Source: "EDGE Performance Evaluation", Alecsander Eitan and Amir Gazit, Qualcomm Israel Ltd., March 2003
3 Source: "Understanding the Capacity - Coverage Trade-off" Peter Muszynski, Senior Research Manager, Nokia Networks - The GSM World Congress 2000
4 QUALCOMM Simulations
5 QUALCOMM Simulations

End User "Mobile" Data Rate Comparison

3G CDMA is Leading the Way in Providing Wireless Broadband

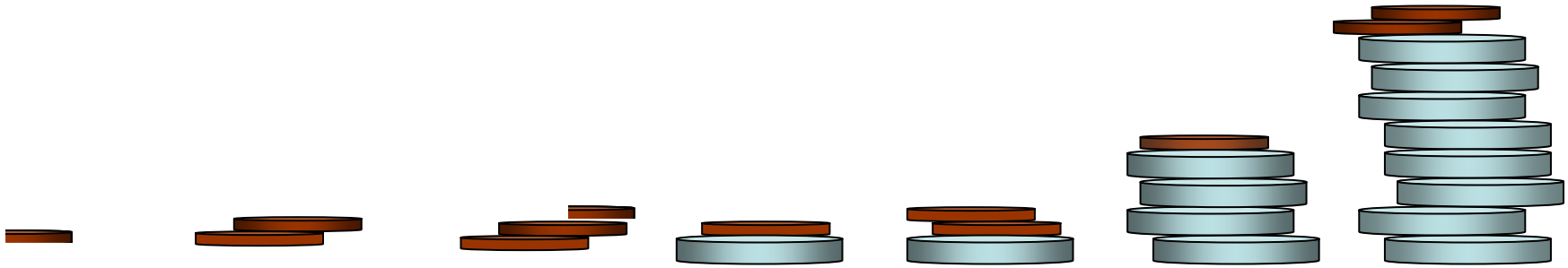


3G CDMA is already standardized – future enhancements are ongoing

Notes: 1. Peak and typical average end-user forward link data rates based on actual commercial implementations of each standard.
2. 1X and 1xEV-DO data rates are achieved in a 1.25 MHz carrier bandwidth, WCDMA and HSDPA (Category 12) rates are achieved in a 5 MHz carrier.
3. 1xEV-DO (Rev A) or 1xEV-DOrA data rate includes the implementation of an "equalizer" and reverse link peak data rate enhancement to 1.8 Mbps

Cost per Megabyte Comparison

Spectral Efficiency affects cost



EV-DO (Platinum)	EV-DO	HSDPA	1X	WCDMA	EDGE	GPRS
$0.005	$0.02	$0.026	$0.06	$0.07	0.11	$0.42

Cost = “Greenfield” Network Operations Expenses + Depreciation on Capital

Operators Prefer Mobile Broadband Technologies that are Affordable & Evolutionary

Source: The Economics of Wireless Data, http://www.qualcomm.com/main/whitepapers/WirelessMobileData.pdf
Assumptions: On demand Traffic: a) 15% of traffic demand occurs at the busy hour, b) 7,600 kbps / sq km at busy hour, c) 5MHz
Multicast Traffic: a) 2,000 subscribers / cell, b) 30 live streaming minutes / day at 128kbps data rate, c) 1.25MHz

CDMA2000 1xEV-DO Roadmap

VoIP
1X-like spectral efficiency/
voice capacity/quality

Low Latency
30ms

Rev A – Higher Data Rates
3.1 Mbps DL
1.8 Mbps UL
Avg 600-1300 Kbps DL

Quality of Service (QoS)
Multiple QoS concurrent flows
Selected by user or
application

Release 0
2.4 Mbps DL
153Kbps UL
Avg 300-600 Kbps DL

Video Telephony
Packet voice and video

Push To Talk
Instant Messaging
Instant Multi-media
Audio and video
<750ms PTT

Gold Multicast
Platinum Multicast
High rate media delivery

Equalizer
Interference Cancellation
Voice/data capacity gains

Multi-carrier
Significantly enhanced
peak data rates per user

CDMA2000 Commercial Launches

Operator	Country	Launch Date	Technology
SK Telecom	S. Korea	Oct. 01, 2000	CDMA2000 1X
KTF	S. Korea	May 01, 2000	CDMA2000 1X
LG Telecom	S. Korea	May 01, 2000	CDMA2000 1X
Monet Mobile	USA	Oct. 24, 2001	CDMA2000 1X
Zapp Mobile (Telemobile)	Romania	Dec. 07, 2001	CDMA2000 1X
Leap Wireless (Cricket)	USA	Dec. 10, 2001	CDMA2000 1X
Brasilcel (Vivo)	Brazil	Dec. 12, 2001	CDMA2000 1X
Verizon Wireless	USA	Jan. 28, 2002	CDMA2000 1X
SK Telecom	S. Korea	Jan. 28, 2002	CDMA2000 1xEV-DO
Metro PCS	USA	Feb. 01, 2002	CDMA2000 1X
Bell Mobility	Canada	Feb. 12, 2002	CDMA2000 1X
KDDI	Japan	Apr. 01, 2002	CDMA2000 1X
Centennial Wireless	Puerto Rico	Apr. 04, 2002	CDMA2000 1X
KTF	S. Korea	May 08, 2002	CDMA2000 1xEV-DO
Telus Mobility	Canada	Jun. 03, 2002	CDMA2000 1X
Telecom New Zealand	New Zealand	Jul. 22, 2002	CDMA2000 1X
Smartcom PCS	Chile	Jul. 26, 2002	CDMA2000 1X
Sprint PCS	USA	Aug. 12, 2002	CDMA2000 1X
Cellular South	USA	Sep. 09, 2002	CDMA2000 1X
Pelephone	Israel	Sep. 30, 2002	CDMA2000 1X
Interdnestrcom	Moldova	Sep. 30, 2002	CDMA2000 1X
EPM Bogota	Colombia	Oct. 02, 2002	CDMA2000 1X
Monet Mobile	USA	Oct. 29, 2002	CDMA2000 1xEV-DO
Tata Indicom	India	Nov. 09, 2002	CDMA2000 1X
US Cellular	USA	Nov. 12, 2002	CDMA2000 1X
Telcel	Venezuela	Nov. 13, 2002	CDMA2000 1X
Kiwi PCS	USA	Nov. 14, 2002	CDMA2000 1X
Movilnet	Venezuela	Nov. 20, 2002	CDMA2000 1X
Aliant Mobility	Canada	Nov. 25, 2002	CDMA2000 1X
MTS Canada	Canada	Nov. 27, 2002	CDMA2000 1X
Telstra	Australia	Dec. 02, 2002	CDMA2000 1X
BellSouth	Ecuador	Dec. 04, 2002	CDMA2000 1X
BellSouth	Panama	Dec. 04, 2002	CDMA2000 1X
Skylink (Delta Telecom)	Russia	Dec. 04, 2002	CDMA2000 1X
Alltel	USA	Jan. 23, 2003	CDMA2000 1X
IUSACELL	Mexico	Jan. 24, 2003	CDMA2000 1X
Verizon Wireless (P.R.)	Puerto Rico	Feb. 04, 2003	CDMA2000 1X
Belcel	Belarus	Feb. 10, 2003	CDMA2000 1X
Hutchison CAT	Thailand	Feb. 27, 2003	CDMA2000 1X
Bell South	Nicaragua	Mar. 26, 2003	CDMA2000 1X
Centennial Dominicana	Dom. Republic	Mar. 27, 3003	CDMA2000 1X
China Unicom	China	Mar 28, 2003	CDMA2000 1X
Sasktel Mobility	Canada	Apr. 10, 2003	CDMA2000 1X
BellSouth	Colombia	Apr. 15, 2003	CDMA2000 1X
Reliance	India	May 01, 2003	CDMA2000 1X
Vesper (Giro)	Brazil	May 01, 2003	CDMA2000 1xEV-DO
Bell South	Guatemala	May 20, 2003	CDMA2000 1X
Midwest Wireless	USA	Jun. 16, 2003	CDMA2000 1X
S-Phone	Vietnam	Jul. 01, 2003	CDMA2000 1X
PCS	Guatemala	Jul. 15, 2003	CDMA2000 1X
APBW	Taiwan	Jul 29, 2003	CDMA2000 1X
BellSouth	Chile	Aug. 11, 2003	CDMA2000 1X
Cellular One	Bermuda	Oct. 17, 2003	CDMA2000 1X
Skylink	Russioa	Nov. 01, 2003	CDMA2000 1X
Starcomms	Nigeria	Nov. 01, 2003	CDMA2000 1X
Telefonica	Peru	Nov. 28, 2003	CDMA2000 1X
KDDI	Japan	Nov. 28, 2003	CDMA2000 1xEV-DO
Alegro PCS (Telesca)	Ecuador	Dec. 02, 2003	CDMA2000 1X
Codetel	Dominican Rep.	Dec. 03, 2003	CDMA2000 1X
BellSouth (Peru)	Peru	Dec. 05, 2003	CDMA2000 1X
Dalacom (Alatel)	Kazakhstan	Dec. 09, 2003	CDMA2000 1X
Movicom (BellSouth)	Argentina	Dec.15, 2003	CDMA2000 1X
Mandara Selular	Indonesia	Apr. 19, 2004	CDMA2000 1X
ACS Wireless	USA	May 24, 2004	CDMA2000 1X
ACS Wireless	USA	Jun. 15, 2004	CDMA2000 1xEV-DO

68 commercial CDMA2000 carriers in 33 Countries

Source: Carrier Press Releases

Operators are Expanding Services with 1xEV-DO

13 Commercial Operators

Over $1 billion EV-DO national rollout over next 2 years
Currently expanding into 14 markets

Over 8M EV-DO subscribers as of August 2004

Launched Nov. 2003
Expecting 18.5M subs by March 2005

Coming Soon

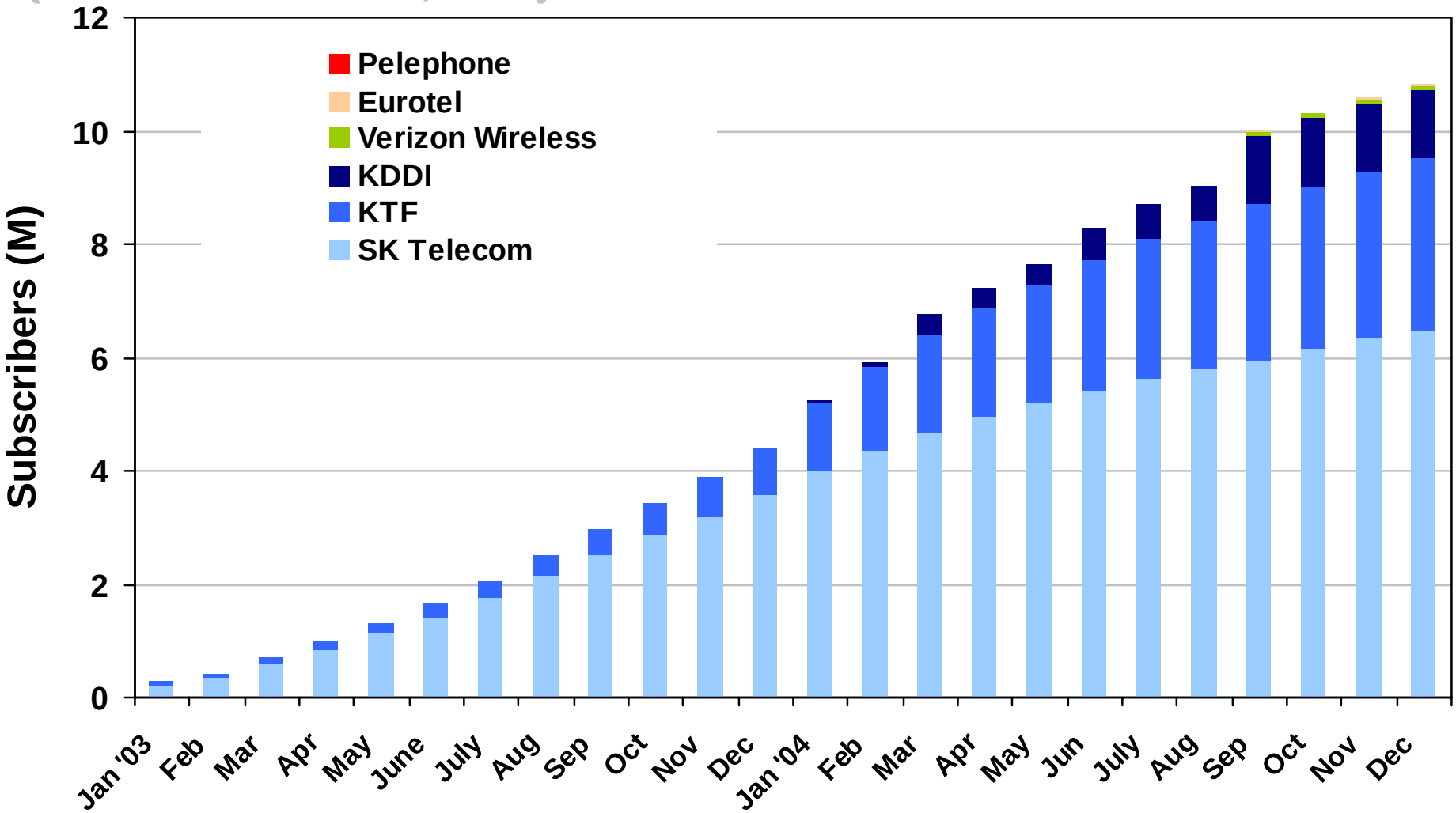
(Telecsa Ecuador)

Over 87% of addressable CDMA subscriber base will have access to EV-DO service within the next year!

QUALCOMM 5500 San Diego, CA USA	QUALCOMM 6500 San Diego, CA USA	QUALCOMM 6550 San Diego, CA USA	QUALCOMM 6800 San Diego, CA USA	QUALCOMM 7500 San Diego, CA USA
2.4 Mbps gpsOne ARM 7	**2.4 Mbps** gpsOne ARM 9	**2.4 Mbps** Higher resolution video/graphics Camera to 4 megapixel	**3.1 Mbps** Camera to 4 megapixel	**3.1 Mbps** Dual-CPU Convergence Platform

10.8 Million 1xEV-DO Reported* Subscribers

(As of December 31, 2004)



**Six of the 13 operators have reported 1xEV-DO subscriber totals at some point. Three of those operators have updated their 1xEV-DO subscriber totals for December 2004.*

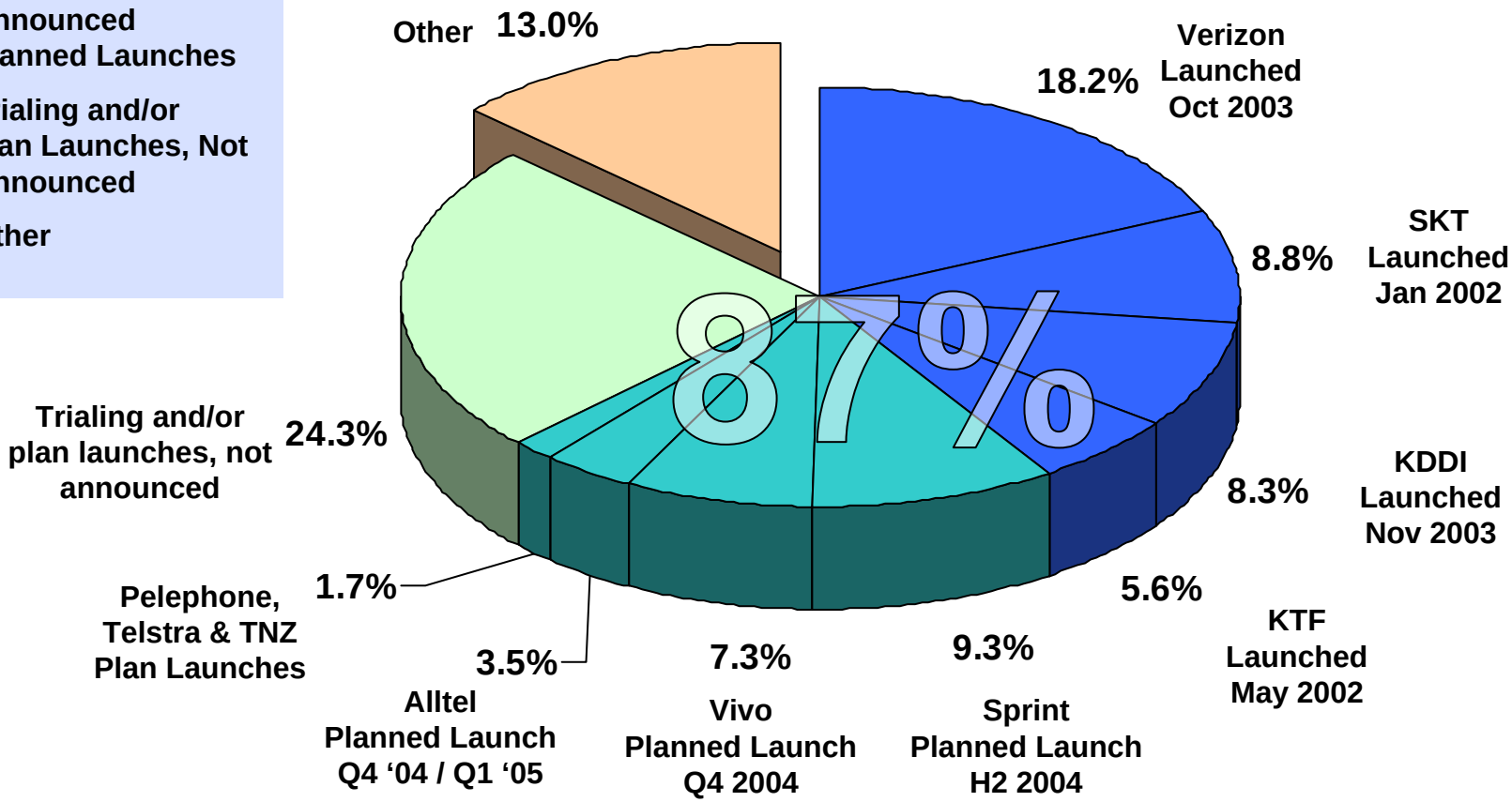
Source: 3Gtoday.com

1xEV-DO Commercialization by CDMA Operators

Operators representing over 85% of the CDMA base have launched, trialed or plan to launch

- Launched
- Announced Planned Launches
- Trialing and/or plan Launches, Not Announced
- Other

cdmaOne / CDMA2000 Market : 212 Million Subscribers*



*Source: CDG, EMC June 2004 and Operator Estimates

WCDMA (UMTS)

What is WCDMA?

An IMT-2000 Standard - 3G mobile wireless solution (also known as UMTS)

Complimentary to GSM/GPRS/EDGE services

More Voice Capacity (more than 2.5 times capacity of GSM):

- 51 to 83 Erlangs/sector/5 MHz (62 to 95 TCH/sector/5 MHz)

Always On Packet Data Rates:

- Up to 2.0 Mbps peak data rate in downlink (Release 99)
- **Increasing to 10 Mbps with HSDPA (Release 5)**

Average data throughputs: 200 – 250 kbps

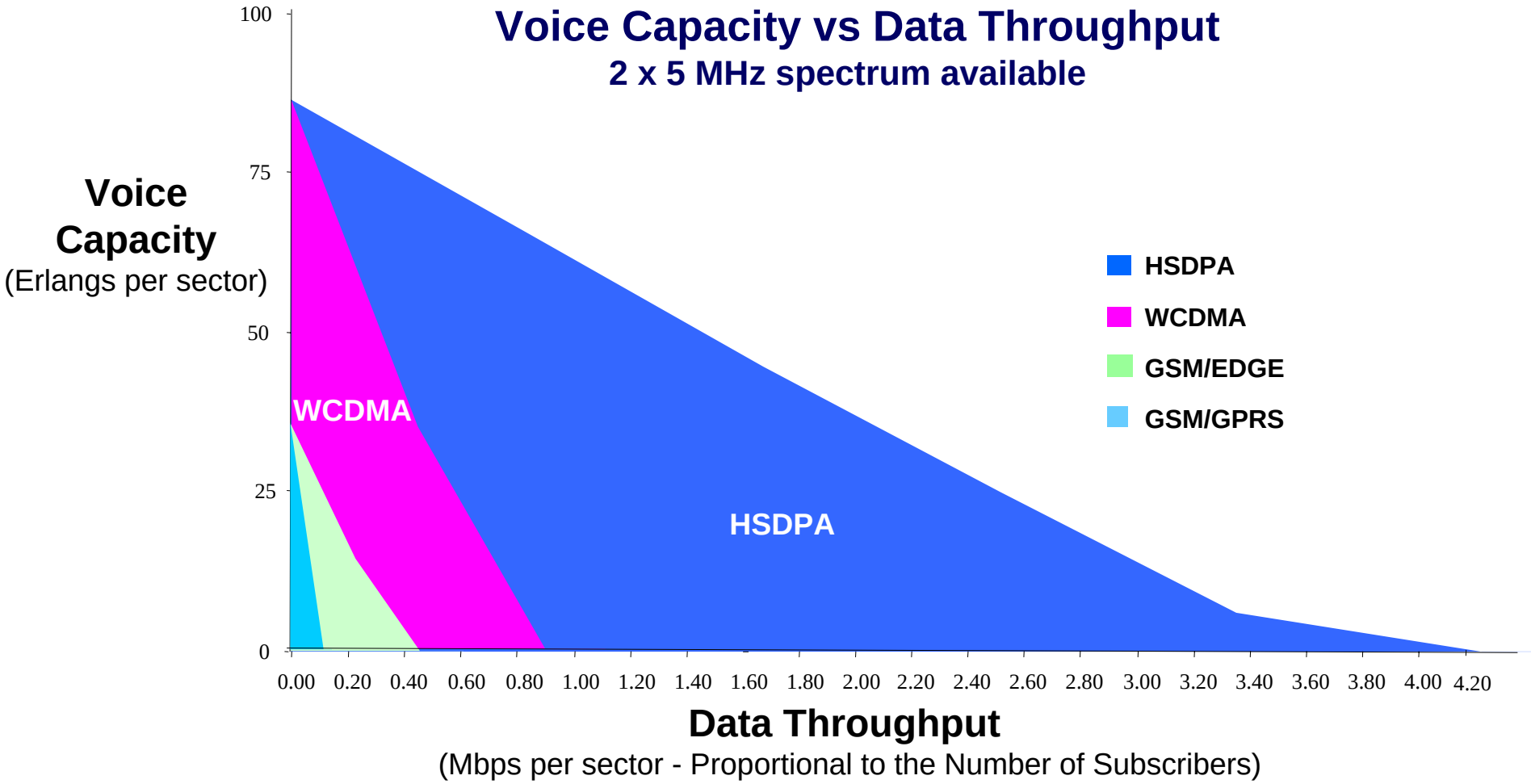
- Downlink throughput: 200 – 250 kbps
- Uplink: throughput: 100 – 150 kbps

Voice quality rated as excellent

Source: UMTS Forum and IMT-2000

WCDMA Spectral Efficiency

Greater Voice Capacity & Data Throughput is driving the demand for WCDMA



WCDMA Commercial Launches

Operator	Country	Launch Date	Technology
NTT DoCoMo	Japan	Oct. 01, 2001	J-WCDMA
J-Phone	Japan	Dec. 20, 2002	WCDMA
3 (Hutchison)	United Kingdom	Mar. 03, 2003	WCDMA
3 (Hutchison)	Italy	Mar. 03, 2003	WCDMA
3 (Hutchison)	Australia	Apr. 15, 2003	WCDMA
Mobilkom	Austria	Apr. 25, 2003	WCDMA
3 (Hutchison)	Austria	May 05, 2003	WCDMA
3 (Hutchison)	Sweden	May 05, 2003	WCDMA
3 (Hutchison)	Denmark	Oct. 13, 2003	WCDMA
3 (Hutchison)	Hong Kong	Dec. 15, 2004	WCDMA
Etisalat	United Arab Emirates	Dec. 24, 2004	WCDMA
MTC (Vodafone)	Bahrain	Dec. 28, 2004	WCDMA
Connect (One)	Austria	Dec. 18, 2004	WCDMA
Vodafone	Greece	Jan. 23, 2004	WCDMA
Mobitel (Debitel)	Slovenia	Feb. 11, 2004	WCDMA
T-Mobile	United Kingdom	Feb. 16, 2004	WCDMA
Vodafone	Sweden	Feb. 23, 2004	WCDMA
TeliaSonera	Sweden	Mar. 10, 2004	WCDMA
Vodafone	United Kingdom	Apr. 02, 2004	WCDMA
TMN (Portugal Telecom)	Portugal	Apr. 21, 2004	WCDMA
Vodafone	Portugal	May 04, 2004	WCDMA
Vodafone	Germany	May 04, 2004	WCDMA
T-Mobile	Germany	May 05, 2004	WCDMA
T-Mobile	Austria	May 10, 2004	WCDMA
Telefonica Moviles	Spain	May 24, 2004	WCDMA
Telefonica Moviles	Italy	May 24, 2004	WCDMA
Vodafone	Italy	May 25, 2004	WCDMA
Vodafone	Spain	May 25, 2004	WCDMA
Cosmote	Greece	May 26, 2004	WCDMA
Tele 2 AB	Sweden	Jun. 01, 2004	WCDMA
Optimus	Portugal	Jun. 03, 2004	WCDMA
Cellcom	Israel	Jun. 06, 2004	WCDMA
SFR	France	Jun. 16, 2004	WCDMA
Vodafone	Netherlands	Jun. 16, 2004	WCDMA
E-Plus	Germany	Jun., 18, 2004	WCDMA
Vodafone	Ireland	Jun., 29, 2004	WCDMA
mmO2	Germany	Jul., 01, 2004	WCDMA
Orange	United Kingdom	Jul. 19, 2004	WCDMA
AT&T Wireless	United States	Jul. 20, 2004	WCDMA
Orange	France	Sep. 07, 2004	WCDMA
Swisscom	Switzerland	Sep. 09, 2004	WCDMA
Sonera	Finland	Oct. 13, 2004	WCDMA
Vodacom	South Africa	Dec. 20, 2004	WCDMA
CSL	Hong Kong	Jan. 01, 2005	WCDMA

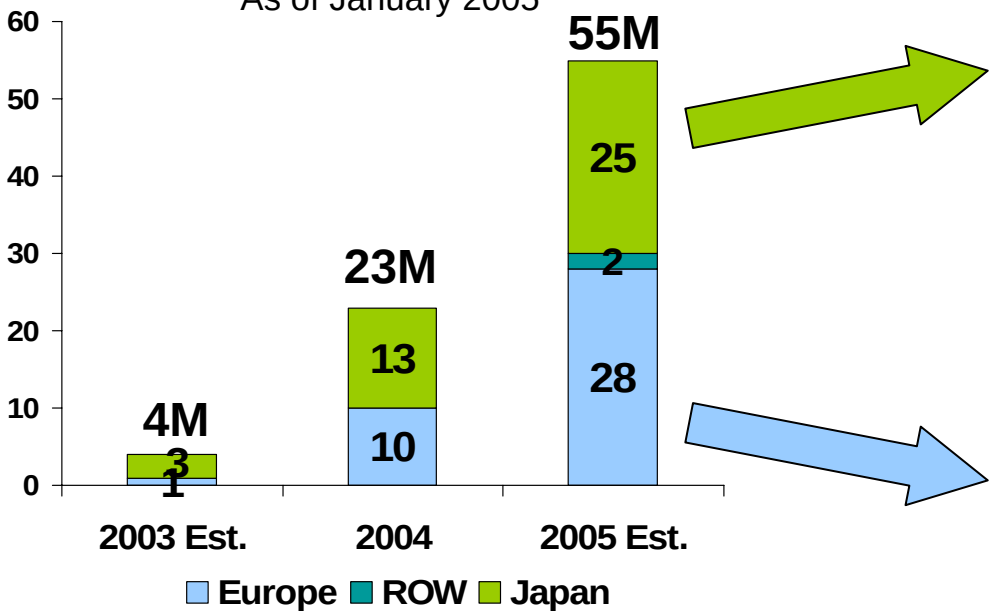
44 commercial WCDMA carriers in 23 countries

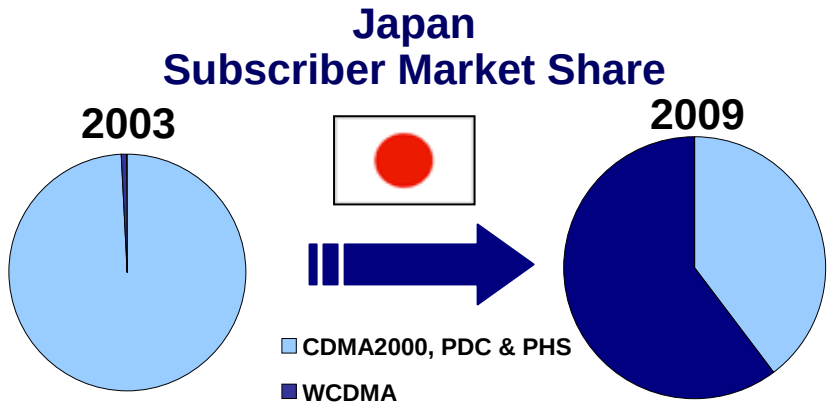
Source: Carrier Press Releases.

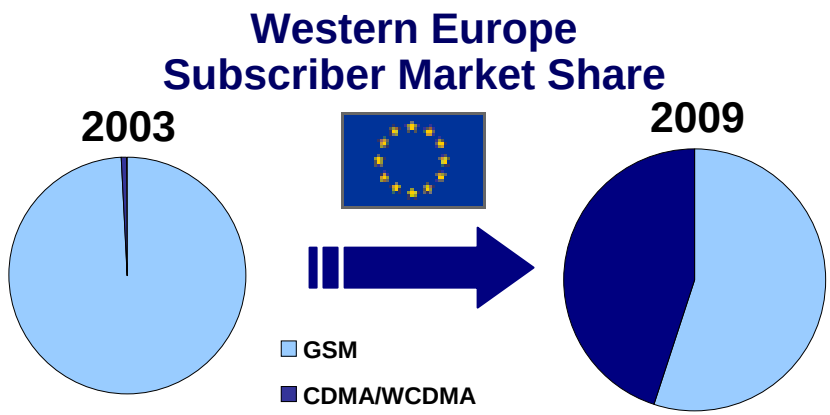
Note: Other sources may indicate that there are more carriers than shown above; yet, most are in a commercial trial phase awaiting phones. Carrier must offer mobile device subscription s to be considered commercial by QUALCOMM.

WCDMA Growth By Region

Initial WCDMA growth coming from Japan and Europe





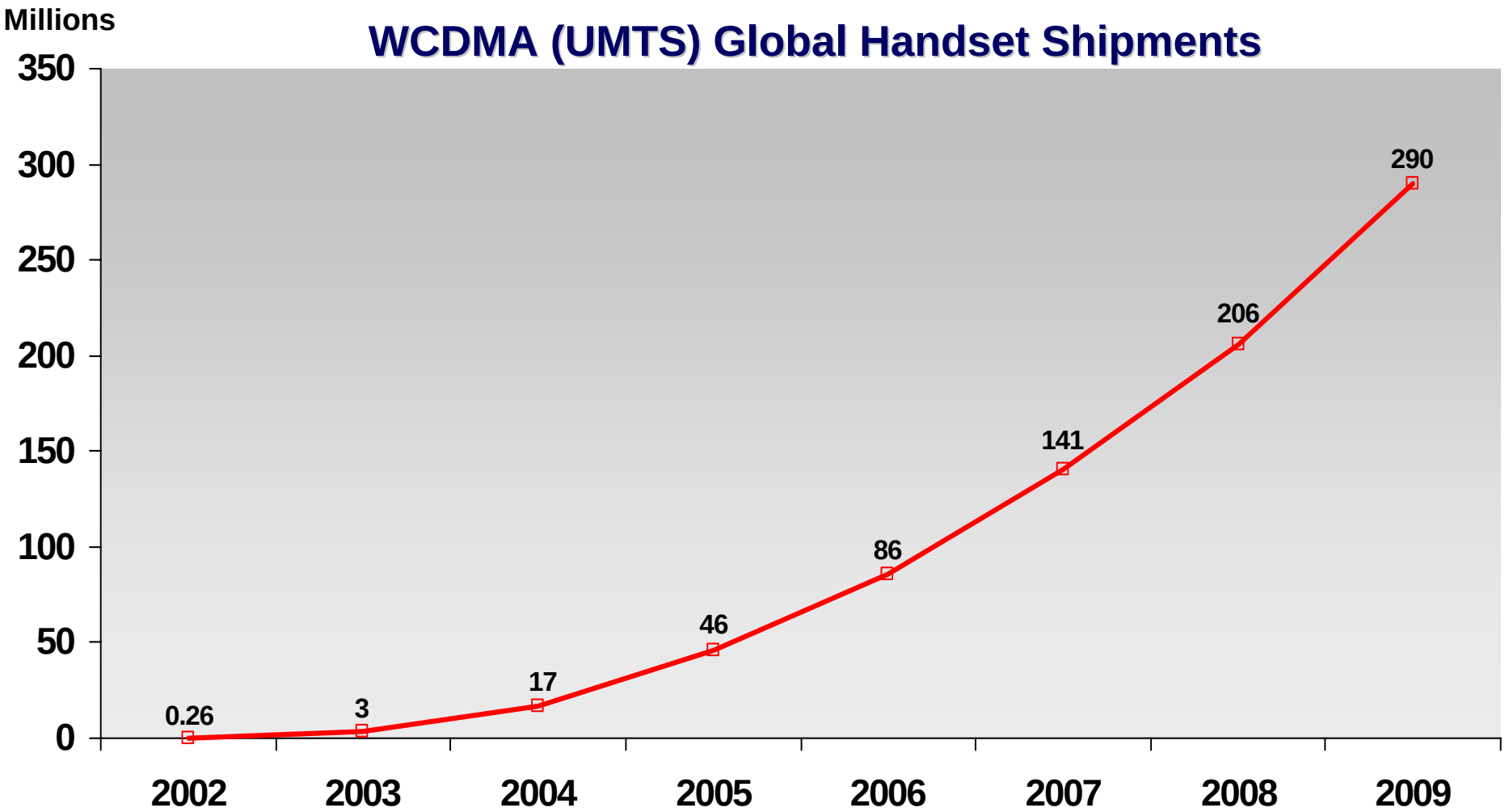


Japan and Europe are moving ahead with several WCDMA deployments

Source: Various industry sources, EMC & QUALCOMM calendar year estimates, January 2005.

WCDMA Handset Shipments Forecast

WCDMA handset shipments should exceed 200 million by the end of 2008



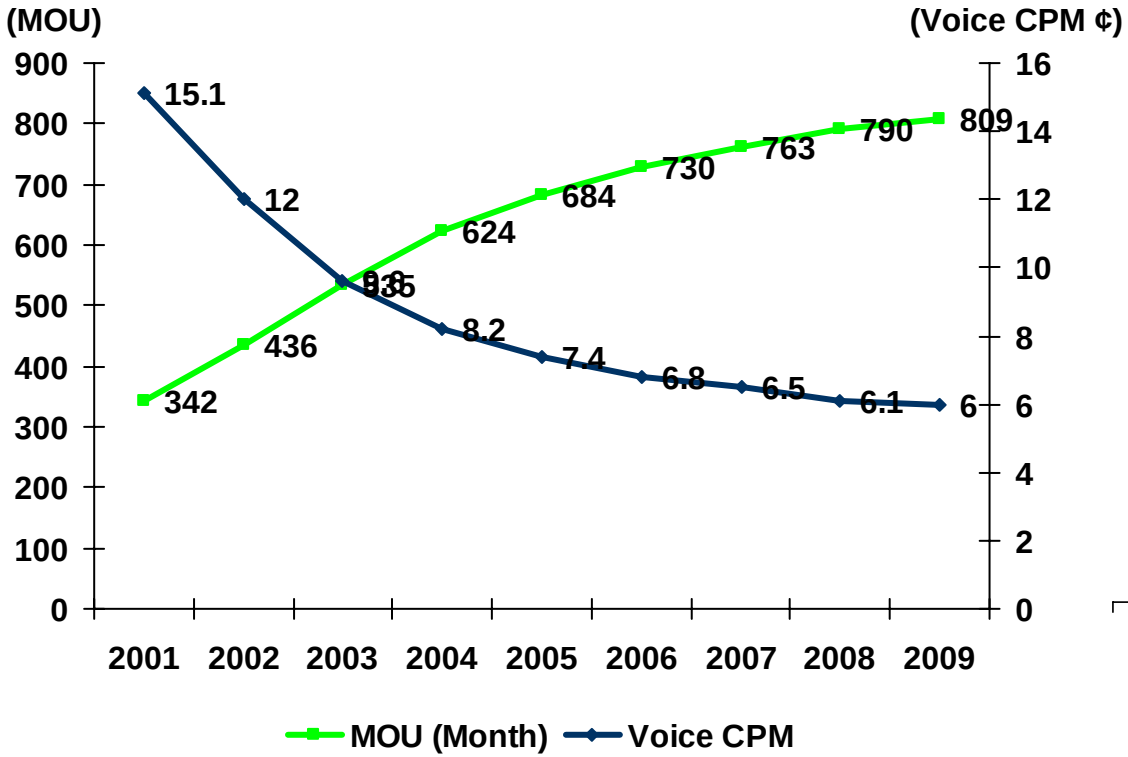
Source: Gartner (Aug'04), IDC (Aug'04), InStat/MDR (Aug'04), Ovum (Aug'04), Shosteck (Sep'04), Strategy Analytics (Mar'04), Yankee (Jan'05), Signals Research (Aug'04) and ABI (Dec'04)

3G CDMA Market Adoption

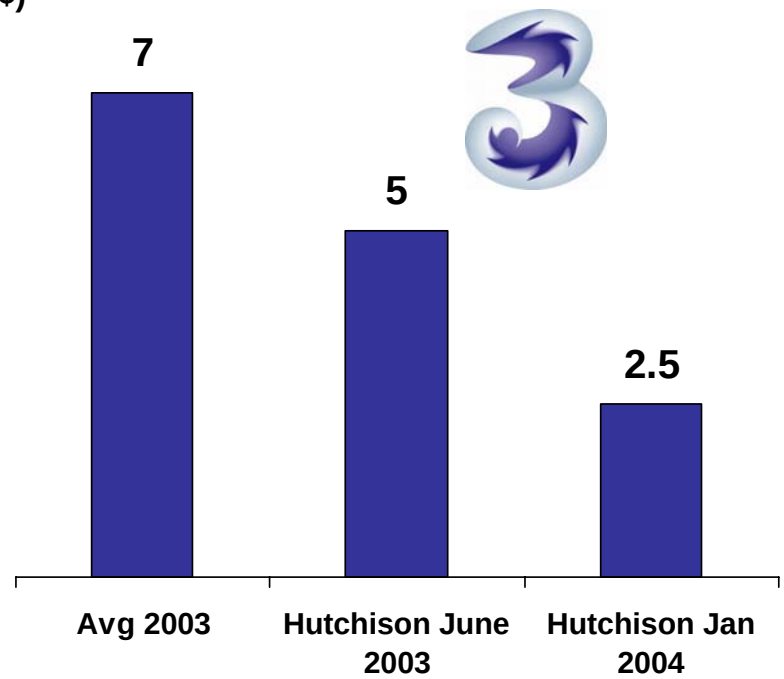
3G CDMA Enables Increased Voice Capacity

While Preserving Earnings with Increased Subscriber Growth and MoUs

U.S. Minutes of Use (MOU) and Voice Pricing



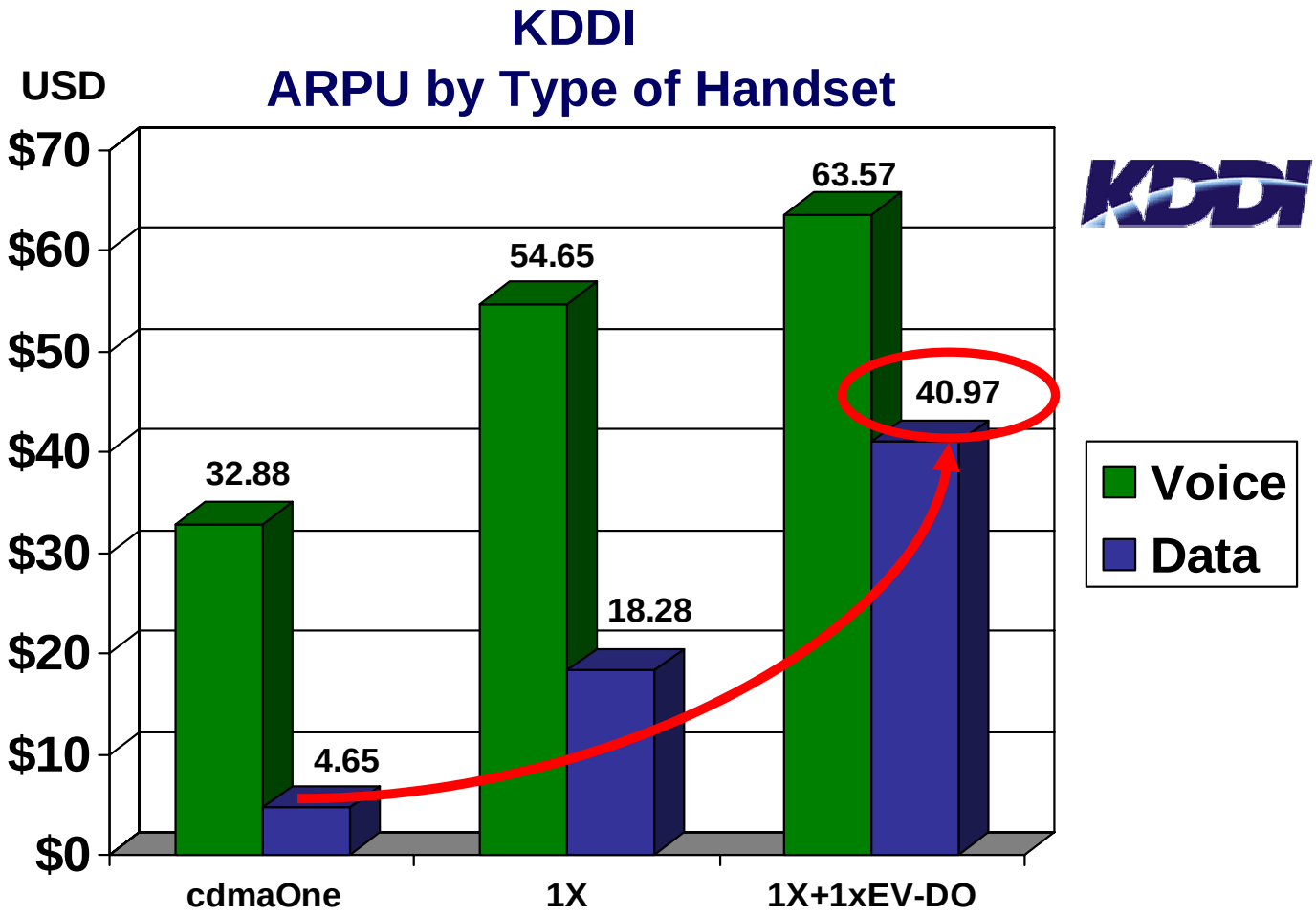
Voice Rates per Minute (p)



Source: Strategy Analytics US Wireless Market Outlook 2004-2009, April 2004; CPM=Cost Per Minute; Shosteck Group September 2004; Wall Street Journal "European telecom firms face price war from 3G cell phones" August 13, 2003

3G CDMA Enables Increased Data ARPU

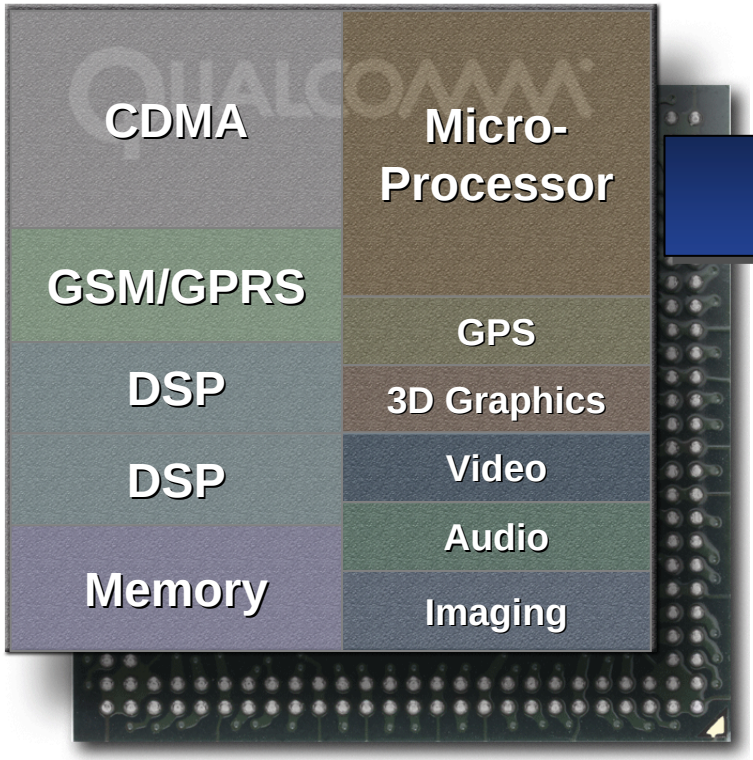
Korean, Japanese and U.S. Operators are Increasing ARPU with 3G



Source: KDDI FY2004 Earnings Release, April 28, 2004.
Note: ARPU figures are for Q4 2004. cdmaOne ARPU is a blended average of cdmaOne and 1X ARPU.

3G CDMA Chipset Roadmap

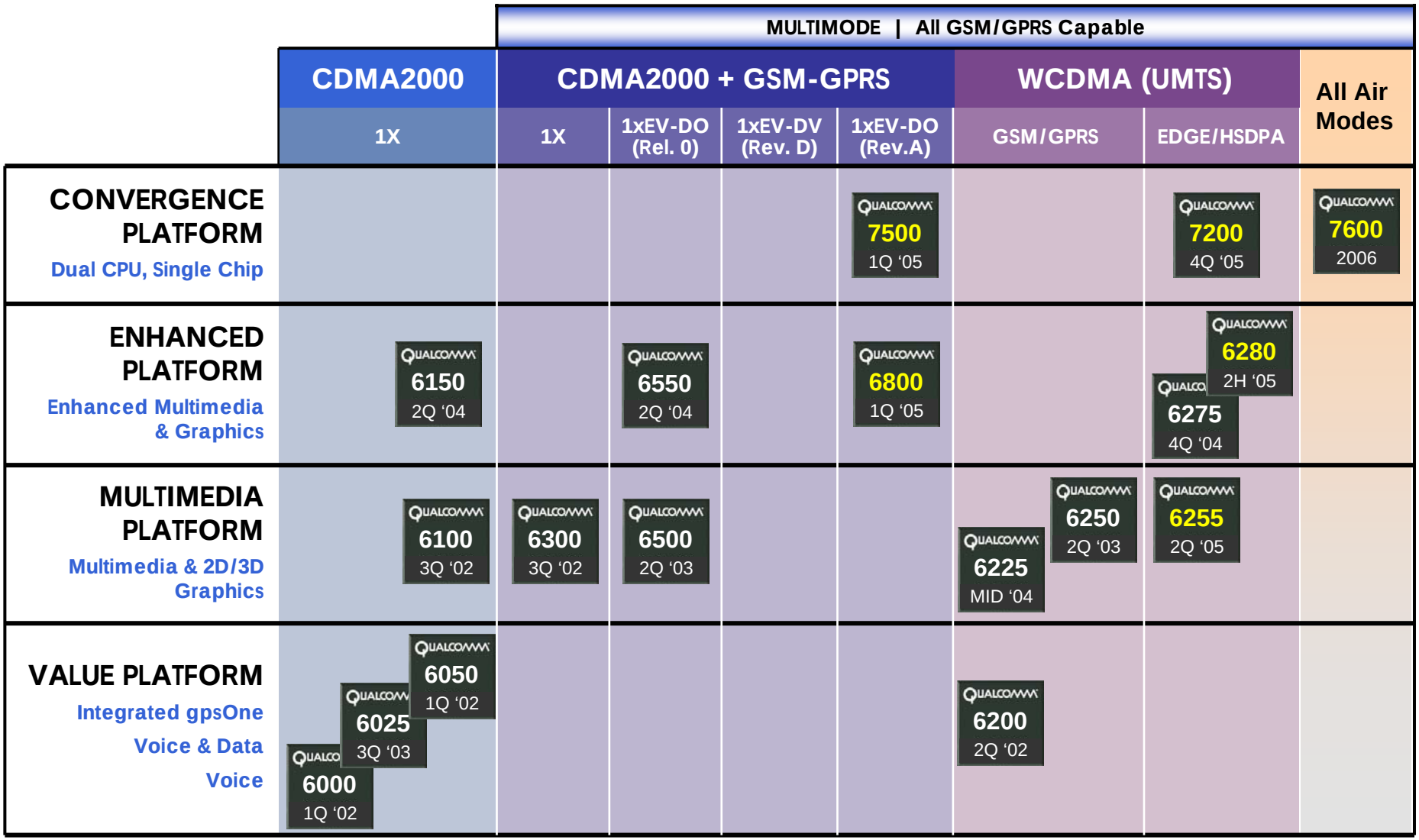
What's in a QUALCOMM Chipset?



- Smaller Form Factor
- Enhanced System Performance
- Highly Integrated Applications
- Greater Quality & Reliability
- Reduced Power Consumption
- Lower Overall Costs
- Faster Time to Market

Qualcomm is a Leader in delivering Wireless Solutions
Always striving to achieve Semiconductor Excellence

MSM Roadmap

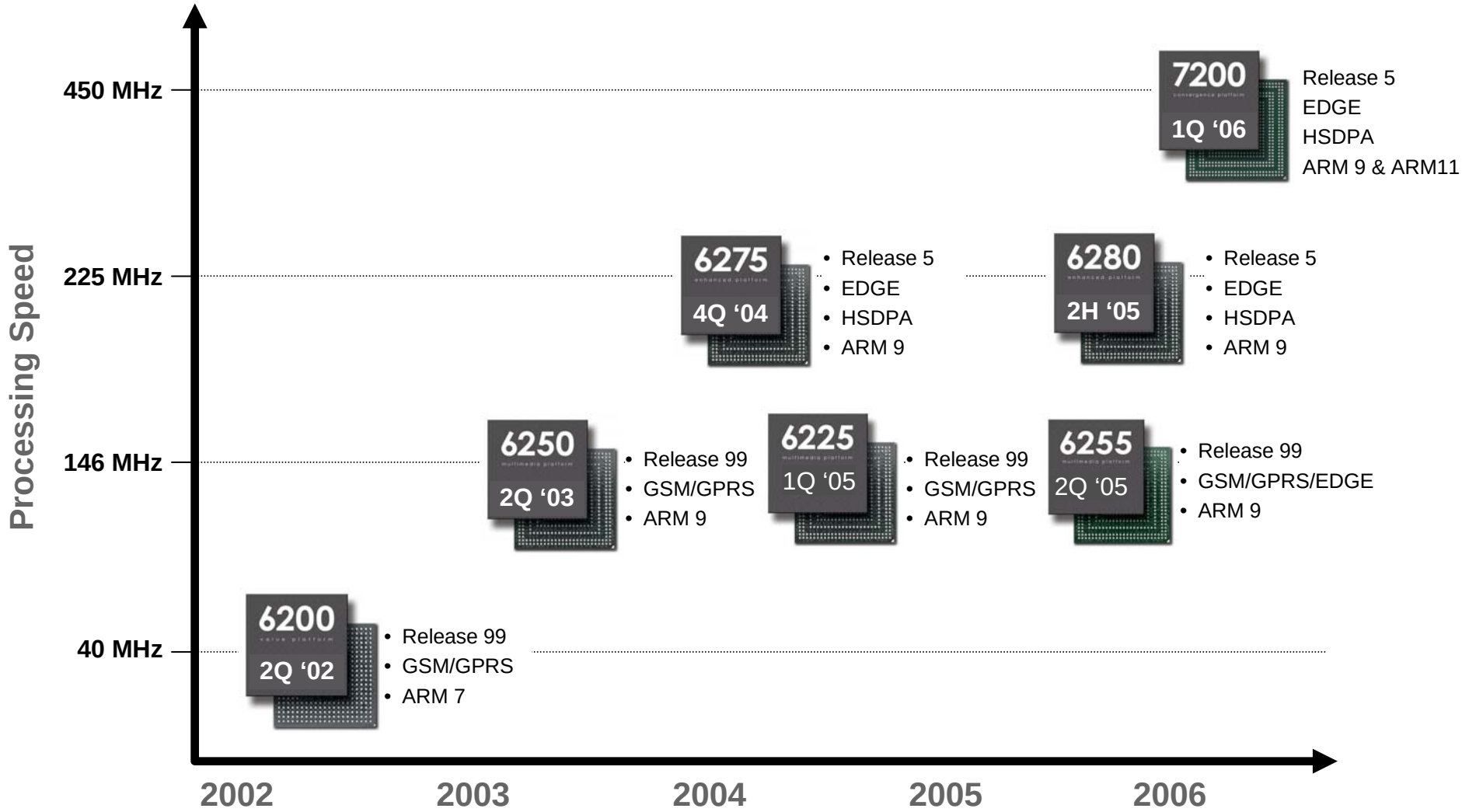


Note: Engineering Sample Dates are shown

= future release

WCDMA MSM Roadmap

Approaching PC & laptop CPU processing speeds



Note: Engineering Sample Dates are shown

UMTS MSM Chips (MSM6xxx Series)

A Tiered Platform Approach for UMTS Mobile Devices

enhanced throughput Platform

Faster data throughputs

6280 — San Diego, CA USA — Q2 2006

- **HSPDA – 7.2 Mbps** peak data rate
- QVGA, CIF & 4.0 MP image sensors
- Pin compatible with MSM6275

enhanced Platform

Enhanced multimedia applications platform

6275 — San Diego, CA USA — Q2 2005

- UMTS, **HSDPA – 1.8 Mbps**, **EDGE**, GPRS, GSM
- **QVGA**
- 3D graphics – **100k triangles/sec**
- **4.0 MP** digital camera
- MPEG4: 15fps record & 30fps playback @ CIF

multimedia Platform

Multimedia platform, for devices arriving today

6250 — San Diego, CA USA — Q2 2004

6255 — San Diego, CA USA — Q2 2005

- Pin compatible with MSM6225 – 384/64 kbps PS data
- **QCIF** display
- 2.0 MP digital camera
- MPEG4: 15fps record & 30fps playback, QCIF
- 3D Graphics – **50k triangles/sec**
- Launchpad features: gpsOne, BREW, Java, Qcamera

value Platform

Existing phones, existing content, real customers today

6200 — San Diego, CA USA — Q3 2003

- UMTS, GPRS, GSM - 14.4kbps CS & **384/64 kbps** PS data
- Sub-QCIF display
- **2.0 MP** digital camera
- MPEG4: 15fps record & **30fps** playback
- Limited Launchpad features

entry level Platform

Affordable data & voice-centric solution

6225 — San Diego, CA USA — Q2 2005

- UMTS, GPRS, GSM – **384/384 kbps** PS data
- QVGA display
- BREW, MIDI, MP3, AAC, MMS, 3D graphics
- JPEG & low frame rate MPEG4 playback
- Mega pixel camera

Time → Commercial sample dates

UMTS MSM Chips (MSM7xxx Series)

A Tiered Platform Approach for UMTS Mobile Devices

A powerful Consumer Electronic (CE) devices that is "always with you" and "useable almost everywhere"

In 2007

- **UMTS, HSDPA, EDGE, GPRS, GSM**
- **CDMA2000 1X, 1xEV-DO (Rev A), 1xEV-DV (Rev D)**
- VGA
- Dual CPU: ARM 9/11
- Dual RUIM
- 802.11b
- BREW & 3rd party OS support
- Samples: In 2006

Enhanced applications platform

Q2 2006

- UMTS, HSDPA, EDGE, GPRS, GSM
- VGA video
- 3D graphics – **4 M triangles/sec**
- **6.0 MP** digital camera
- 1 GHz CPU & DSPs
- MPEG4: **30fps encode** & decode
- Connectivity: USB, 802.11, Bluetooth, MDDI, **TV-interface**
- DRM, gpsOne
- BREW & leading 3rd party OS support
- Samples: 4Q 2005

Time → Commercial sample dates

Global Roaming Chipsets

Satisfying the demand for Global Roaming

ARM 11/QDSP4000

cdmaOne
CDMA2000 1X
CDMA2000 1xEV-DO (Rel A)
GSM/GPRS
Q1 2005

ARM 11/QDSP4000

cdmaOne
CDMA2000 1X
CDMA2000 1xEV-DO (Rel 0)
CDMA2000 1xEV-DV
GSM/GPRS
TBA

ARM 9/QDSP4000

cdmaOne
CDMA2000 1X
GSM/GPRS
Q3 2002

Samsung
SCH-A790 / W109

Motorola
840

LG
W800

cdmaOne
CDMA2000 1X
CDMA2000 1xEV-DO (Rel A)
CDMA2000 1xEV-DV (Rel D)
WCDMA/HSDPA
GSM/GPRS
Future

Dual CPU (ARM 9 + ARM11/multi-MAC QDSP5000)

cdmaOne
CDMA2000 1X
CDMA2000 1xEV-DO (Rel A)
GSM/GPRS
Q1 2005

Dual CPU (ARM 9 + ARM11/multi-MAC QDSP5000)

ARM 9/QDSP4000

cdmaOne
CDMA2000 1X
CDMA2000 1xEV-DO (Rel 0)
GSM/GPRS
Q2 2004

ARM 9/QDSP4000

cdmaOne
CDMA2000 1X
CDMA2000 1xEV-DO (Rel 0)
GSM/GPRS
Q2 2003

*Production Date
Chips are not drawn to scale

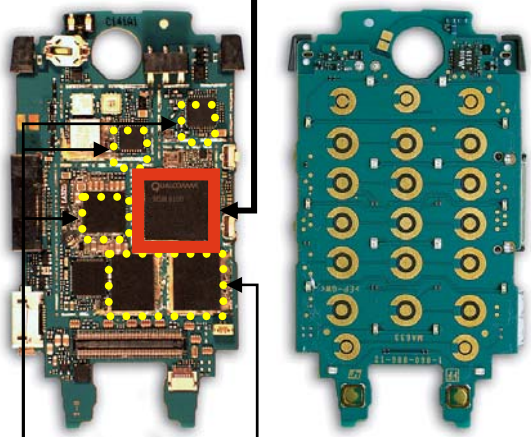
QDSP is integrated into MSM and supports EVRC, MP3, MIDI, CMX, VR, etc.

What's New in 2005?

Extending Integration Program to Create Single-chip Solutions

radioOne™

Base Band with integrated co-processor



Power Mgmt.

RF

Memory

Multimedia Integration

Video ASIC

Ringer Chip

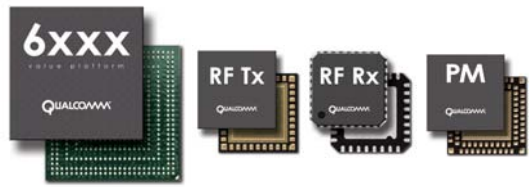
3D Gaming ASIC

Apps Co-proc.

Camera Module with DSP

Single-chip Solution

Baseband + RF Rx & Tx + PMIC | 4 Packages



Single Chip

Baseband + RF + PMIC | 1 Package

3G CDMA Devices

Plenty of Commercial CDMA2000 Devices

*More than **706** commercial 3G CDMA devices from **61** different device vendors*

Please see

www.3Gtoday.com

for more info

70+ commercial 1xEV-DO devices have been introduced from 11 vendors

GTRAN DotSurfer 6000
35 grams

CDMA2000 1xEV-DO

GTRAN DotSurfer 6210
35 grams

CDMA2000 1xEV-DO

GTRAN GPC-6420
grams

CDMA2000 1xEV-DO

LG LG-SV110 (CYON)
90 grams

CDMA2000 1xEV-DO

LG LG-KV1100 (CYON)
90 grams

CDMA2000 1xEV-DO

LG LG-KV1300/LG-SV130
110 grams

CDMA2000 1xEV-DO

Pantech&Curitel PS-E100
91 grams

CDMA2000 1xEV-DO

Pantech&Curitel PG-S1200, K1200, L1200
92 grams

CDMA2000 1xEV-DO

Pantech&Curitel PG-K6000V
110 grams

CDMA2000 1xEV-DO

Hitachi W11H
125 grams

CDMA2000 1xEV-DO

Hitachi W21H
108 grams

CDMA2000 1xEV-DO

Hitachi 2GHz DO CARD
50 grams

CDMA2000 1xEV-DO

LG LG-KV1400
111 grams

CDMA2000 1xEV-DO

LG LG-SD350
145 grams

CDMA2000 1xEV-DO

LG LG-KP3000
131 grams

CDMA2000 1xEV-DO

Pantech&Curitel PS-E200
75 grams

CDMA2000 1xEV-DO

Pantech&Curitel S4
128 grams

CDMA2000 1xEV-DO

Samsung SPH-V3000
128 grams

CDMA2000 1xEV-DO

KTF E2000
79 grams

CDMA2000 1xEV-DO

KTF E2500
79 grams

CDMA2000 1xEV-DO

Kyocera W11K
128 grams

CDMA2000 1xEV-DO

LG LG-KV5100
120 grams

CDMA2000 1xEV-DO

Motorola V740 (Appeal TT800)
80 grams

CDMA2000 1xEV-DO

Motorola MS-100
80 grams

CDMA2000 1xEV-DO

Samsung SPH-E1000
91 grams

CDMA2000 1xEV-DO

Samsung SCH-E100
89 grams

CDMA2000 1xEV-DO

Samsung SCH-V300
110 grams

CDMA2000 1xEV-DO

Kyocera W01K
55 grams

CDMA2000 1xEV-DO

Kyocera W21K
115 grams

CDMA2000 1xEV-DO

LG LG-KH5000
110 grams

CDMA2000 1xEV-DO

Motorola MS-150
82 grams

CDMA2000 1xEV-DO

Motorola V741
80 grams

CDMA2000 1xEV-DO

Motorola MS-280
110 grams

CDMA2000 1xEV-DO

Samsung SCH-E110
95 grams

CDMA2000 1xEV-DO

Samsung SCH-V310
129 grams

CDMA2000 1xEV-DO

Samsung SCH-E120
81 grams

CDMA2000 1xEV-DO

Source: 3Gtoday.com

WCDMA Commercially Available Mobile Devices

44 commercial WCDMA devices from 11 different device vendors

Motorola
E1000
3, Vodafone
$188 (Vod)

Motorola
A835
3
$85 (3)

Motorola
C975
3, Orange
$122 (3)

LG
U8150
Orange
$245 (Orange)

NEC
e313/c313
3
$85 (3)

NEC
e616V
3
$85 (3)

NEC
e616/c616
3
$85 (3)

Samsung
Z107V
Vodafone, Orange
$282 (Orange)
$132 (Vod)

LG
U8110/U8120
3
$280 (3)

Sanyo
S750
Orange
$94 (Orange)

LG
U8130
3
$375 (3)

LG
U8138
3
$469 (3)

Sony-Ericsson
V800
Vodafone
$471 (Vod)

Motorola
V980 (702MO)
Vodafone
$132 (Vod)

Nokia
7600
3, O2, TeliaSonera
$563 (3)

Sony-Ericsson
Z1010
3, Orange, TeliaSonera,
Cellcom, Mobitel
$282 (Orange)

NEC
e228
3
$85 (3)

NEC
338
3
$160 (3)

Nokia
6630 (702NK)
Vodafone, Orange
$377 (Orange)
$283 (Vod)

Sharp
902SH
Vodafone,
Swisscom
$565 (Vod)

Option
3G/GPRS Card
Vodafone, Swisscom
$375 (Vod)

Novatel
Merlin U530
3, O2, TMN,
Cellcom, Orange
$282 (Orange)

Note: Retail handset prices provided for UK monthly (pay as you go) plans.

QUALCOMM's WCDMA Mobile Device Partners

Over 26 companies are using our WCDMA multi-mode, multi-band, chipsets

BenQ
LG Electronics
Hisense
HUAWEI
MITSUBISHI ELECTRIC
OPTION
PANTECH & CURITEL
NOVATEL WIRELESS
SHARP

SAMSUNG
SANYO
SEIKO
SIEMENS
SIERRA WIRELESS
teleca
TOSHIBA
VITELCOM
ZTE中兴

Models by Country:

China (4)
Europe (3)
Japan (5)
Korea (4)
Taiwan (4)
USA (2)

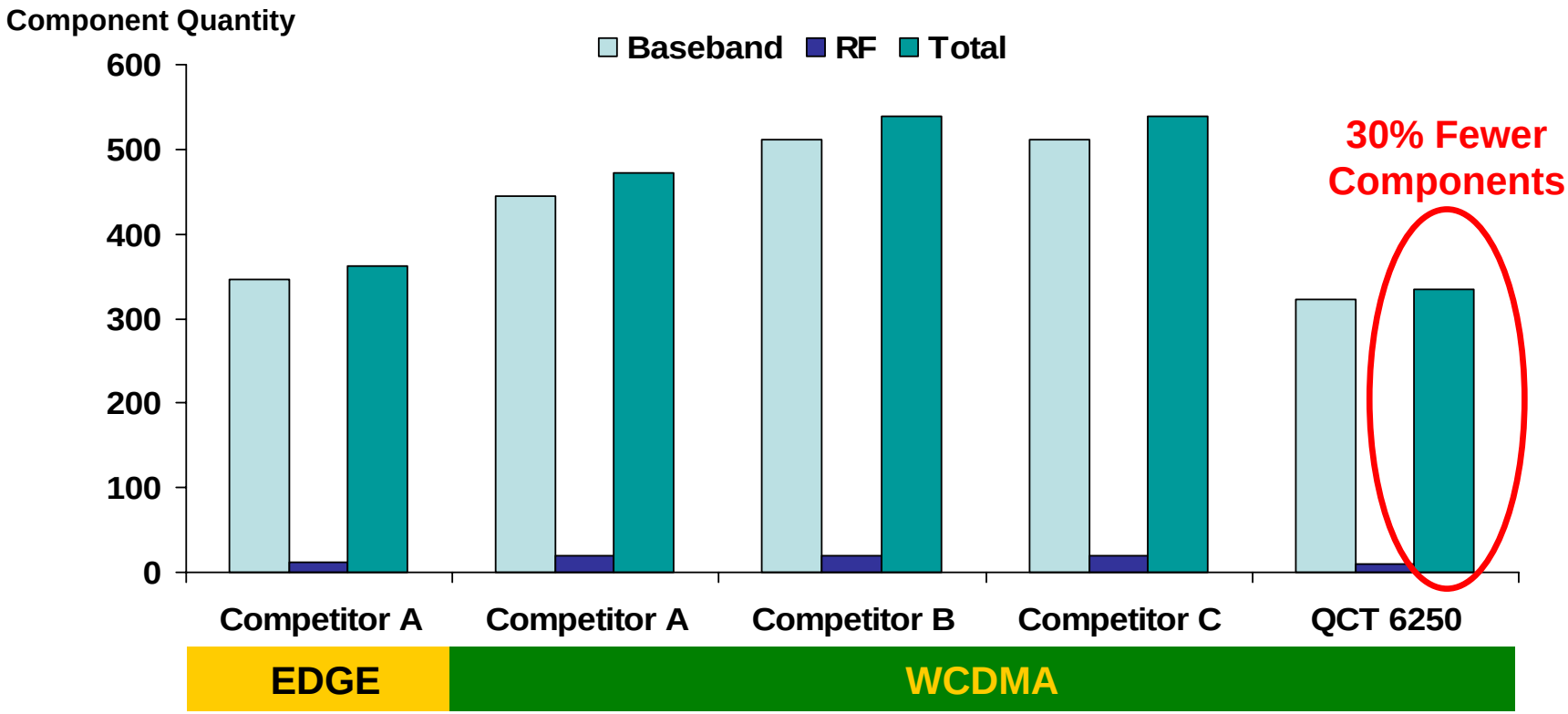
QUALCOMM 6200 San Diego, CA USA

More than 10 models

QUALCOMM 6250 San Diego, CA USA

EDGE & UMTS Handset Components

Qualcomm packs more into a UMTS device – with fewer components

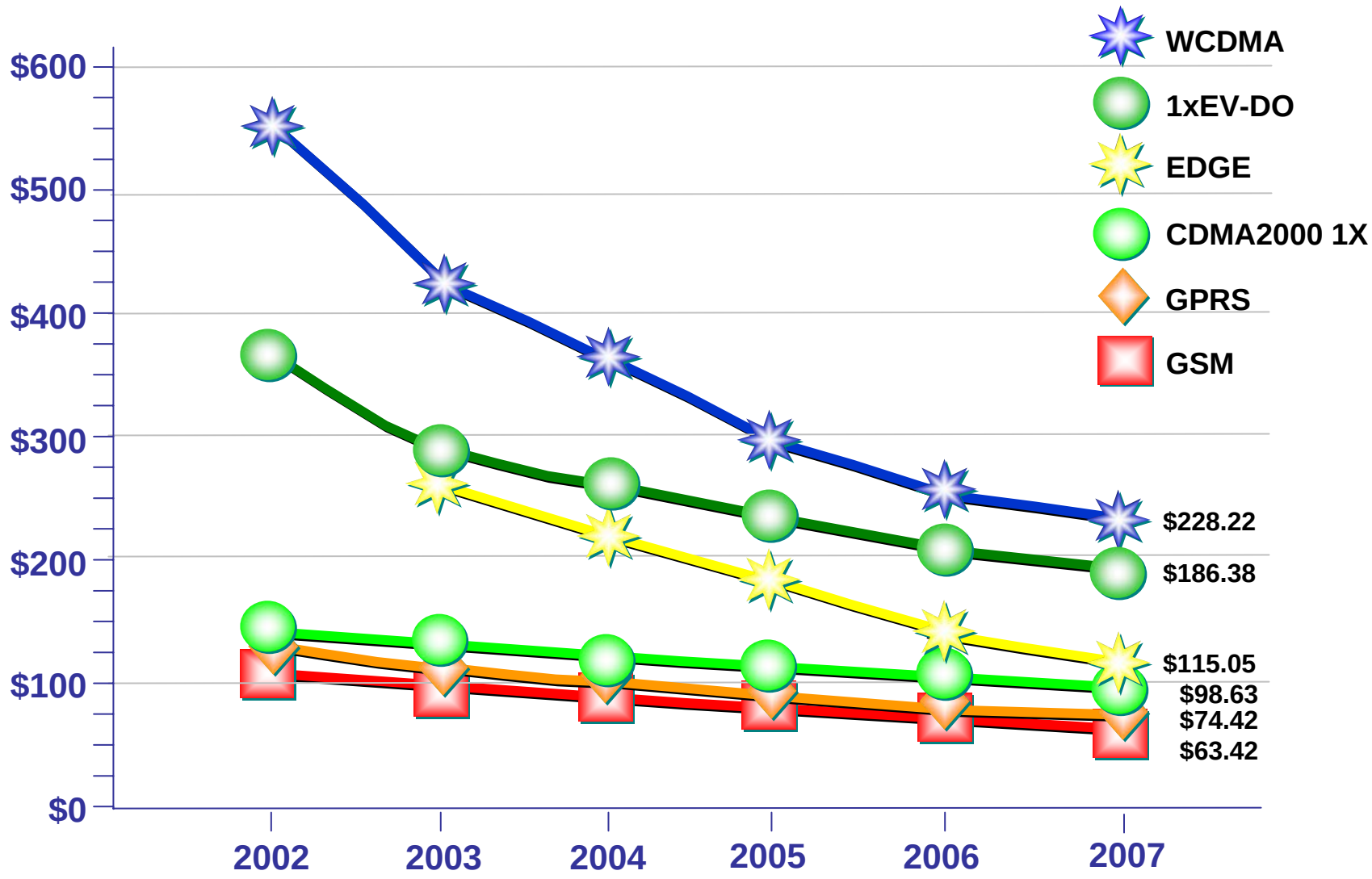


Performance	MSM6250
WCDMA Standby time (hours)	>500
WCDMA talk time (hours)	3.1
GSM standby time (hours)	>375
GSM talk time (hours)	3.65

Notes:

- These components include: resistors, capacitors, power amplifiers, TCXO (Temperature Compensated Oscillator), co-processors, etc.
- The quantity of components will impact the yield and manufacturability of the handset

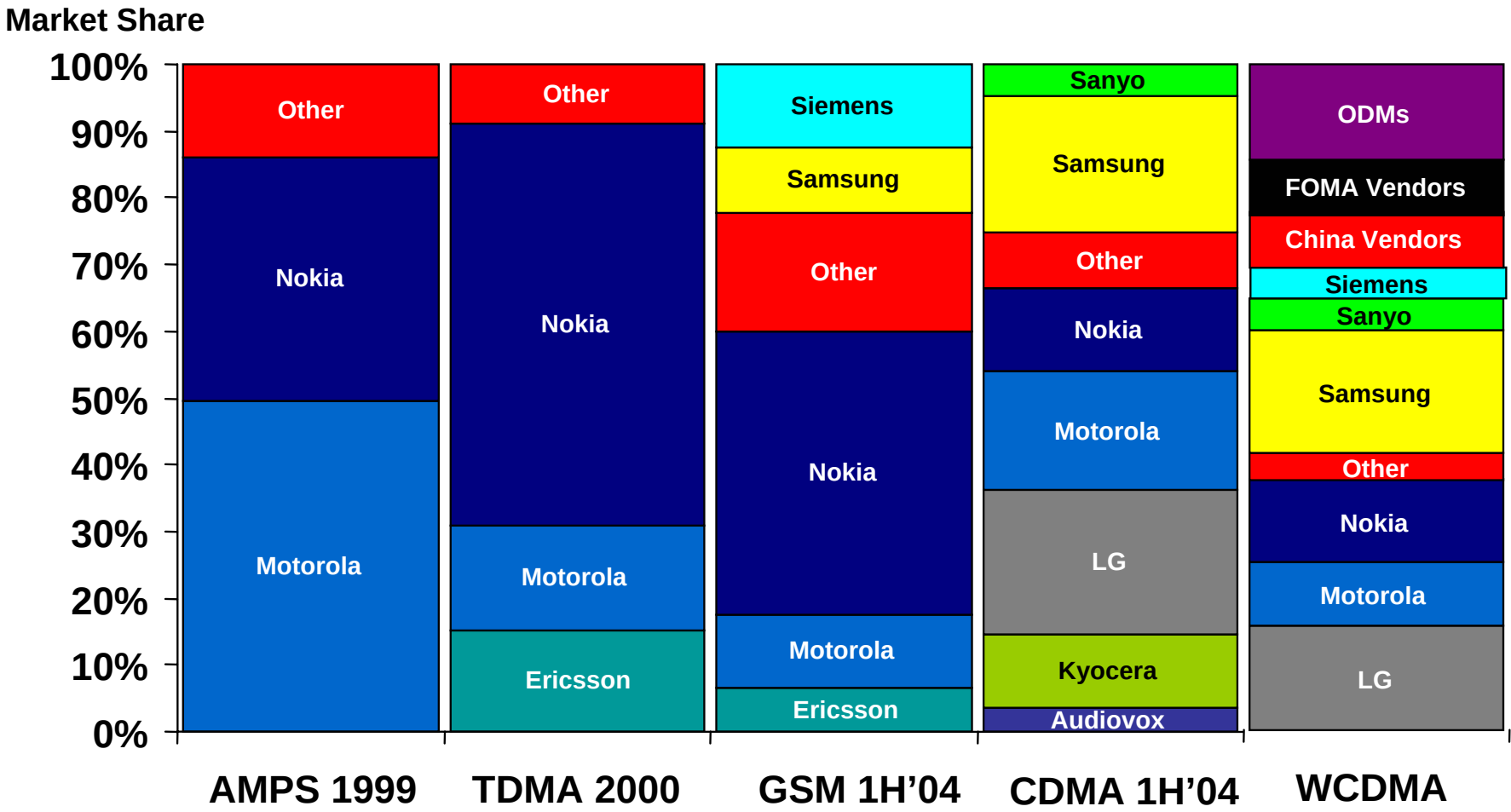
Average Wholesale Handset Pricing



Source: The Shosteck Group (Feb 2004) and Yankee Group (Nov 2003). Average wholesale price of handsets as of year-end.

Market Share is Changing as Technology Evolves to 3G CDMA

It's no longer a 3 horse race to reach "golden eyeballs"



Source: Analog & TDMA – Gartner Group, 2000; CDMA & GSM – Strategy Analytics, 2004; WCDMA – SignalsAhead 11/08/04

Embedded Software, Extensions & Application APIs

Wireless Launchpad™ Suite

A design suite to enable operators to create new enhanced products & services

- **Qsynth™**
  - 128-sound General MIDI Synthesizer
- **MIDI player**
  - 16 polyphony
- **CMX™ Compact Media Extensions**
  - C-MIDI Audio,Graphics,Text,Animation
  - Very Large synthesizer
  - 32 polyphony wavetable
  - 72 polyphony wavetable
  - SMAF Audio support
- **Qtunes™ Audio decoders**
  - MP3, MPEG4-AAC, aacPlus
- **Mobile Video Solutions**
  - MPEG-4 Qtv™ decoder
  - MPEG-4 Qcamcorder™ encoder
  - MPEG-4 Qvideophone™
  - **H.264 Decode**
  - **RealPlayer**
  - **Windows Media Player**
- Still Image decoders
  - PNG, JPEG, GIF
- Q3Dimension 3D game engine
  - Graphics acceleration for games

- **USB**
- **USB Host (On The Go)**
- **Bluetooth**
- **PureVoice Mail™**
- **IP Protocol stack**
- **WAP browser**
- **MMS client**
- **SecureMSM™**
  - **DRM Agent**
  - **Secure Boot**
  - **SSL Encryption**
- **Brew integration support**
- **JAVA J2ME**
  - **H/W acc'l**
- **802.11b**

- **gpsOne™ featuring SnapTrack Technology**
  - Hybrid Assisted GPS solution (MS-Assisted)
  - MS-Based mode
  - Stand Alone mode
- **Digital compass interface**

- **PureVoice VR™**
  - SD & SI Voice
  - Digit Dialing
  - Universal Front End
- **PureVoice Recorder™**
  - Voice Memo
  - Answering Machine
- **PureVoice Audio AGC™**
- **SIM/UIM Card interface**
- **CMOS/CCD Mega Pixel camera interface**
- **Color LCD Interface**

- **MMC**
- **SD-Card**

The Leading Feature Set for Wireless Product Development:

- Available for all 3G CDMA air interfaces
- Consistent use across all product lines
- Enables broad product segmentation & differentiation
- Adopted by global carriers

Integrated Multimedia Solutions

Based on open standards and accessible via the MSM chip & BREWapi

CMX™ - Compact Media Extensions™

Qtunes™ - Playback of music (audio) recordings

Q3Dimension™ - 3D transformations, lighting, shading, animation…

Qcamera™ - Digital camera imaging

QCLIMB™ – Color image enhancement

Qtv™ - Streaming video & audio multimedia

Qcamcorder™ - Video recordings

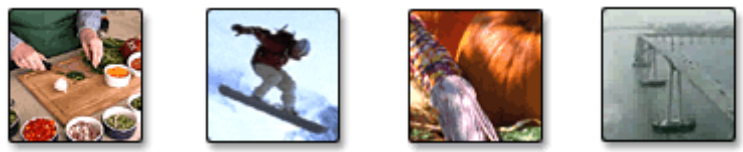
QVideophone™ - Video telephony

QVM™ - Java J2ME™ Virtual Machine

BREW™ - Execution Environment

QPoint™ – Location based services

Screensavers and animated ringers



Still images, video streaming & video telephony

Integrated with Position Location Services

Launchpad™ Multimedia Roadmap

Meeting the demand for Mobile Consumer Electronic Devices

Feature Capabilities \ Chipsets	MSM6500 MSM6300 MSM6250 MSM6100	MSM6800 MSM6550 MSM6275 MSM6150	MSM7xxx
AUDIO	MP3	AAC	AAC Plus
GRAPHICS	50k Triangles	100k Triangles	4 million Triangles
CAMERA	1 M-Pixel	2 - 4 M-Pixel	4 - 6 M-Pixel
VIDEO	15 fps QCIF	15 fps CIF	30 fps VGA

Qualcomm is way ahead in the delivery of mobile consumer electronic solutions

3D Graphics Aren't Just for Gaming

Locating Mobile Phones Accurately Generates Demand for Valuable Services

Video Processing and synchronization

Perspective windows maximize screen real-estate

Translucent Menus don't obscure lower layers

Anti-aliased text to make small text extremely legible

3D GUI implementation can provide a more effective use of limited screen real estate

BREW™ – The Complete Solution

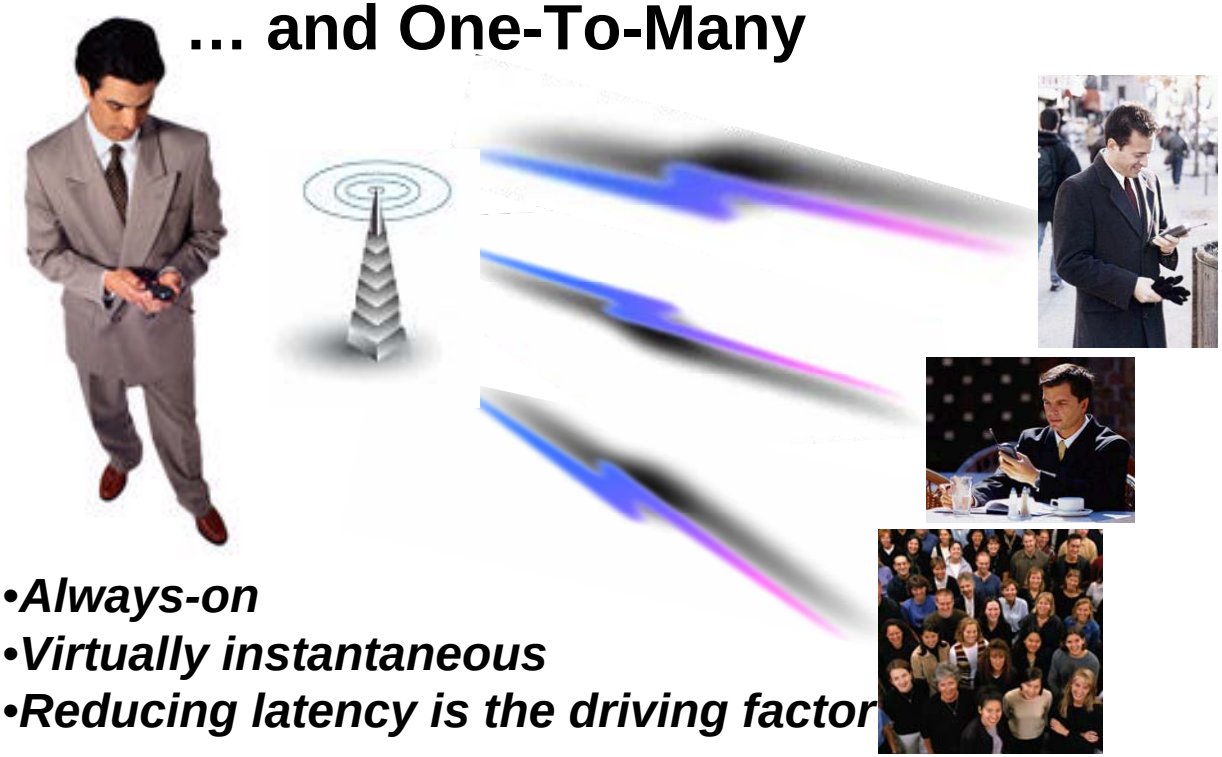
An End-to-End Mobile Platform Solution

Push-to-Talk Service

VoIP-based, push-to-talk, "walkie-talkie" technology solutions

brew

One-To-One … and One-To-Many



- ***Always-on***
- ***Virtually instantaneous***
- ***Reducing latency is the driving factor***

PTT Operators:

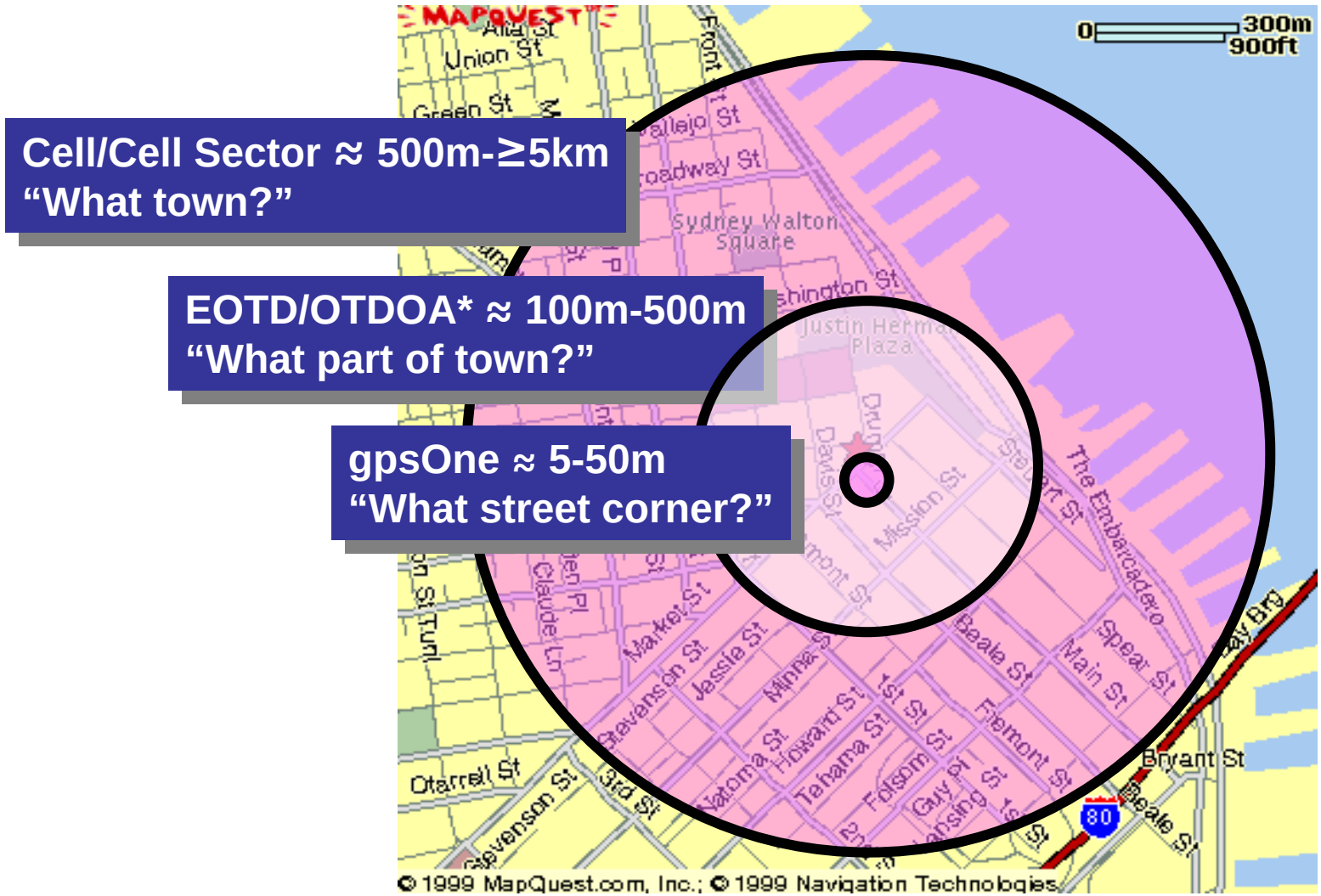
Nextel
Verizon Wireless
Sprint PCS
Alltel
Telus Mobility
Telcel (Venezuela)
Orange

PTT produces up to $20 in ARPU for Nextel

PTT ARPU in Latin America is 81% higher than regular mobile ARPU

Position Location Technology Choices

Locating Mobile Phones Accurately Generates Demand for Valuable Services



* Enhanced Observed Time Difference/Observed Time Difference Of Arrival

MediaFLO Content Distribution

brew

- **Scheduled video clip downloads updated every few hours:**
  - Sports information
    - Half-time and full game highlights of major sporting events
    - Special interviews with coaches and players
    - Choice of viewing most exciting moments (e.g., top tries)
  - News
  - Weather
  - Entertainment
  - etc.
- **Video clips will vary in length – from 10 seconds to 3 minutes**
- **Video clips can be downloaded after midnight to conserve network capacity**
- **MediaFLO supports unicast or multicast services**

MediaFLO™ will allow operators to deliver mass media (multicast) and personal media (unicast) affordably to a large number of devices

Voice Was First Killer App, Now it's Choice

Applications Will Drive Wireless Growth

News

Ring Tones

Entertainment

Sports

Multiplayer Gaming

Position Location

Push to Talk

Photo Sharing

Email

Video Monitoring

The Success of 3G is due to its partnerships…

Note: Not all partners are shown

Many corporations are creating significant shareholder value in the world of 3G

Conclusions

- 3G CDMA systems will surpass the projected performance of WiMAX systems and further enhancements to 3G systems would place the 3G cellular systems in a highly advantageous competitive position.

- 3G mobile networks enjoy a well established value chain of chip makers, infrastructure manufacturers, handset suppliers, mobile operators and innovative application developers combined with highly successful business models.

Thank You

Launchpad Applications
BREWapi
BREW Distribution System
gpsOne
CDMA Chipsets
Homeland Security Initiatives
Fleet Management Solutions
CDMA2000 1X
CDMA2000 1xEV-DO
CDMA2000 1xEV-DV
WCDMA/UMTS
Application Solutions
Mobile Processors
Base Station Processors
Radio Processors
CDMA University
Network Optimization
Software Tools
Development Tools
QCTest Tools
Client Software
Digital Cinema
Advanced Security Solutions

Australia • Austria • Belarus • Brazil • Canada • Chile • China • Colombia • Denmark • Dominican Republic • Ecuador • Guatemala • India • Indonesia • Israel • Italy • Japan • Mexico • Moldova • New Zealand • Nicaragua • Panama • Romania • Russia • South Korea • Sweden • Taiwan • Thailand • United Kingdom • United States • Venezuela • Vietnam

QUALCOMM CDMA Technologies
QUALCOMM Technology Licensing
QUALCOMM Wireless and Internet Group
QUALCOMM Strategic Initiatives