

Low Cost Mobile Broadband Access

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Wireless Evolution: The Right Technology for the Right Application

Legend: CDMA, CDMA/TDM, OFDM, OFDMA

CDMA2000 1X → EV-DO REL 0 → EV-DO REV A → EV-DO REV B

Mobile WAN Technologies: WCDMA (Rel-99) → HSPA (Rel-6 HSDPA) → HSPA+ (Rel-7 Ph 1) → LTE (Rel-8 Ph 2)

Wide-Area Multicast Technologies: EV-DO GOLD → EV-DO Platinum Multicast → WCDMA MBMS → FLO/DVB-H

Local-Area Technologies: 802.11b → 802.11a/g → 802.11n → 802.11n (Full)

Timeline: 1999 → 2006 → 2007 → 2008 → 2009 → 2010 +

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

Mobile Broadband Today!!

1 Billion People Have Access to over 177 3G Mobile Broadband Networks Over 57 Million Mobile Broadband Subscribers

DO & DOR

- 146 operators committed to DO & DOR
- 67 commercially available networks in 44 countries
- 39+ vendors launched over 465 DO/DOR devices
- 55+ Million subscribers; 50 embedded notebooks
- DO & DOR Mobile Broadband Data Rates:
 - DO Networks delivering DL data rates of 3.1-11 Mbps
 - DOR Networks Peak Data Rates of 3.1-8 Mbps

HSDPA

- 155 operators committed to HSDPA in 77 countries
- 110 commercially available networks in 57 countries
- 62 suppliers launched over 254 HSDPA devices
- 194 handsets, 54 datacards and 63 embedded notebooks
- HSDPA Mobile Broadband Data Rates:
 - Most networks delivering avg of 6.8-11.5Mbps
 - Peak DL data rates of 3.8Mbps, 7.2 Mbps and 14.4 Mbps

Sources: CDMA Development Group (cdg.org), GSM (gsmworld.com), GSA (gsacom.com) and Informa

Leverage From 3G Device Partnerships

400+ EV-DO devices / 30 vendors; 200+ UMTS devices / 26 vendors

Source: www.3Gtoday.com

3G Embedded Laptops with Mobile Broadband Today

74 models from 10 vendors – provide either EV-DO or HSPA mobile broadband

At least one of other companies' logo, product and service may be the property of their respective owner.

CDMA2000: Plenty of Affordable Devices now!

Competition and economies of scales continue to drive down prices

Sub-US\$30, Sub-US\$40, Sub-US\$50

BREW-enabled low-end phones


38 entry-level CDMA handsets from 13 suppliers

Notes: 1. Mobile devices shown are sold in India at an ex-factory wholesale cost below US\$50. 2. Only devices shipped in volumes above 10,000 units are shown. Legend: Color Screen Handsets

QUALCOMM and LG Expand the Availability of WCDMA

GSMA selects LG handset for "3G for All"

"We congratulate QUALCOMM on the outcome of the 3G for All selection process. QUALCOMM has provided enthusiastic support for the GSMA's goals for the program, as well as significant efforts on behalf of their vendor partners, such as LG."
- Rob Conway, CEO of the GSM Association



LG KU250
Winner announced at 3GSM

Steering Group Participants:
Cingular Wireless
Globe Telecom
Hutchison 3G
KTF
MTN
Orange
Smart
Telecom Italia
Telefonica
Telenor
T-Mobile
Vodafone

3G for All program background:

- Program to bring 3G multimedia services and Internet access to the mass-market worldwide
- Builds on GSMA EMH program
- 12 leading mobile operators across 6 continents and representing 620 million subscribers voted on winning handset
- LG KU250 chosen as winner, priced at ~30% less than entry-level WCDMA handsets
 - 15mm thin, video telephony, 1.3 MP camera, MP3, Bluetooth, removable memory, Internet access
 - Uses QUALCOMM UMTS chipset
- Expected to provide LG economies of scale in manufacturing, logistics and marketing

GSMA ASSOCIATION

3G Offers a Wide Range of Services



Social Networks & User Generated Content: MySpace, Facebook, YouTube, MySpace.com, MySpace.com

TV / Video Streaming & Download / Multicast: MediaFLO, Congular Video, June TV, Planet 3, EZ Channel Plus, EZ News Flash, CAST, FSN, Free 3G, HD

High Speed 3D & Multiplayer Games: RAZER MOBILE, Game Street, CAST, PlayStation 3, G-POWER, Microsoft

Music Download: EZ Chaku Uta Full! Downloads Exceed 50 Million, NEW MUSIC, Sprint, Music Store, KTF, L'ESPOIR, Melon, CAST MUSIC, MySpace.com

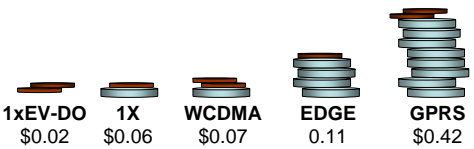
High Speed Data Connectivity: web2walk, Sprint, Mobile Broadband, PacketWIN

Video Calling: Vodafone live!, SK Telecom, VideoCall

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Cost per Megabyte Comparison

CDMA2000 networks support the most affordable delivery of bits



1xEV-DO	1X	WCDMA	EDGE	GPRS
\$0.02	\$0.06	\$0.07	0.11	\$0.42

Spectral efficiency affects cost

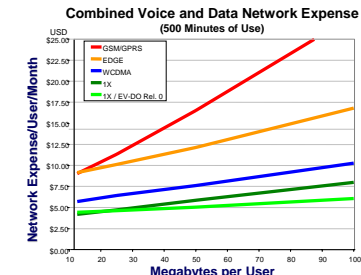
Cost = "Greenfield" Network Operations Expenses + Depreciation on Capital

Affordable and evolutionary mobile broadband technologies are enabling the mass market adoption of mobile multimedia services

Source: The Economics of Wireless Data. <http://www.qualcomm.com/tech/whitepapers/WirelessMobileData.pdf>
Assumptions: On-demand Traffic: 10% of traffic demand occurs at the busy hour. 30 7,000 kbps / sec bit rate busy hour. 0.5 MHz Multicast Traffic: 2,000 subscribers / cell. 30 live streaming minutes / day at 128 kbps data rate. 0.125 MHz

3G Enables Lower Tariffs

CDMA2000 1X and EV-DO enables the lowest cost per bit and Erlang



Combined Voice and Data Network Expense (500 Minutes of Use)

USD Network Expense/User/Month vs Megabytes per User

Legend: CDMA/GPRS, EDGE, WCDMA, 1X, 1X / EV-DO Ref. 0

The Lower the better!


Operators prefer network technologies that are affordable and evolutionary

Source: The Economics of Wireless Data. <http://www.qualcomm.com/tech/whitepapers/WirelessMobileData.pdf>
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3G Building Economies of Scale

Cost of 3G Devices Declining as Scale Increases

WCDMA & CDMA2000 Worldwide Handset Shipments



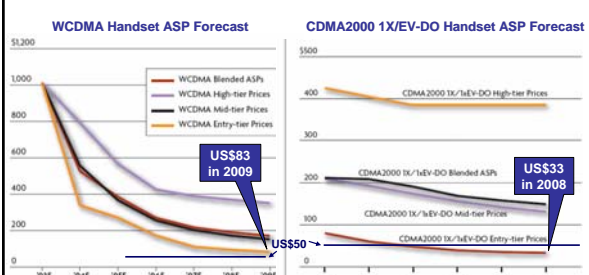
Year	Shipments (Millions)	% of Total
2005	194	22%*
2006	272	
2007	350	
2008	466	
2009	578	
2010	650	58%*

* Percentage of total handset shipments

Source: Average of Gartner Group (July 2006), Signals Research (July 2006) and Yankee Group (September 2006) handset forecasts

3G CDMA Lowers Device Costs

The Average Selling Price (ASP) for 3G handsets is becoming more competitive



WCDMA Handset ASP Forecast: US\$83 in 2009, US\$50

CDMA2000 1X/EV-DO Handset ASP Forecast: US\$33 in 2008

CDMA2000 handsets are reaching price parity with 2G handsets. Yet, they provide the user with more value

Source: Michael W. Theisler Signals Research Group, LLC, 2006

Spectrum Allocations

Providing affordable, ubiquitous, coverage is crucial in mobile communications

The warmer (lower) licensed frequencies are best!
 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

Using the lower frequency bands is preferable for providing "universal access" to telephone, broadband Internet and multimedia content

3G Technologies outperform WiMAX in the mobile environment

Forward Link Sector Throughput Comparison

Effective FL Physical Layer Throughput per Sector in 10MHz

Technology	Mbps/sector
Mobile WiMAX	~4.5
DOrA	8.96
DOrB	10.5
HSDPA	10.4
UMB	13.8

Simulation assumptions:
 • SIMO Full Buffer, Forward Link physical layer performance
 • 3GPP2 frame work
 • DV channel model mix
 • Equalizer gain simulated for DOrA, DOrB and HSDPA
 • Preliminary: 10MHz TDD 2-Mobile WiMAX sector throughput is 3Mbps, scaled to 10MHz effective Forward Link
 • 5MHz FDD carrier for HSPA+, 2 carriers in 2x10MHz, 1.25MHz FDD carrier for DOrA and DOrB, 7 carriers in 2x10MHz

QUALCOMM's Wireless Reach™ Initiative

Empowering Citizens of the World through Effective Partnerships

- QUALCOMM believes access to advanced wireless voice and data services improves people's lives.
- Our Wireless Reach™ initiative supports programs and solutions that bring the benefits of connectivity to developing communities globally.
- By working with our partners, Wireless Reach projects create new ways for people to communicate, learn, access healthcare and reach global markets.

QUALCOMM's Wireless Reach™ Initiative

Empowering Citizens Globally Through Effective Partnerships

Conclusions

- The "CDMA2000 Rural Connectivity Solutions" offer affordable telephony, Internet and multimedia access to large coverage areas that have a low population density
- CDMA2000 has been widely deployed in developed and emerging markets worldwide
- EV-DO and HSPA technologies are delivering low-cost mobile broadband today!
- Mobile WiMAX offers no advantage over DO/HSDPA mobile broadband
- More regulatory focus on lower frequency radio spectrum (CDMA450, UMTS900 etc.,) needed in Africa to accelerate cost efficient rural communications
- QUALCOMM and CDMA Development Group (CDG) building successful industry partnerships to enable low cost mass market solutions to emerging markets.
- QUALCOMM and the CDG is here to support you!

Thank You

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