

CDMA2000: Leading 3G

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**ITU Sub Regional Seminar on IMT-2000
September 10, 2002
Moscow**



CDMA Development Group



CDMA Worldwide



CDMA2000: Leading 3G



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Charter

To lead the rapid evolution and deployment of CDMA-based systems, based on open standards and encompassing all core architectures, to meet the needs of markets around the world in an emerging, information-intensive environment

Information Distribution

- Conferences
- Emails
- Website
- Etc.

Technical Service Development

- System Testing
- Advanced Systems
- Evolution
- Etc.

Deployment Assistance

- Time-to-Market
- Int'l Roaming
- Interoperability
- Etc.

Membership

The CDG is a consortium of over 113 member companies from around the world. Members are involved in many aspects of CDMA system deployment and support.

Operators

*Subscriber
Equipment*

*Value-Added
Services*

*Network
Infrastructure*

*Network
Enhancement/
Optimization*

*Network
Interface &
Access*



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CDMA is the present and future of advanced wireless services

Code Division Multiple Access (CDMA) is a spread spectrum technology used in second and third generation wireless networks



cdmaOne™ identifies 2G and 2.5G cellular, PCS and wireless local loop (WLL) services based on the IS-95A and IS-95B CDMA air interface standards. IS-95A supports data delivery up to 14.4 kbps while IS-95B offers up to 115 kbps.

CDMA2000 is an ITU-approved, IMT-2000 (3G) standard
 CDMA2000 1X can double voice capacity and delivers data rates up to 307 kbps

CDMA2000 1xEV is optimized for high-speed data:

CDMA2000 1xEV-DO (Data Only) uses a designated channel for data at speeds of up to 2.4 Mbps in a single carrier

CDMA2000 1xEV-DV (Data Voice) integrates voice and data on a single channel with speeds of up to 4.8 Mbps

CDMA Benefits

As the most advanced digital technology, CDMA offers significant benefits to operators and their subscribers

Operators

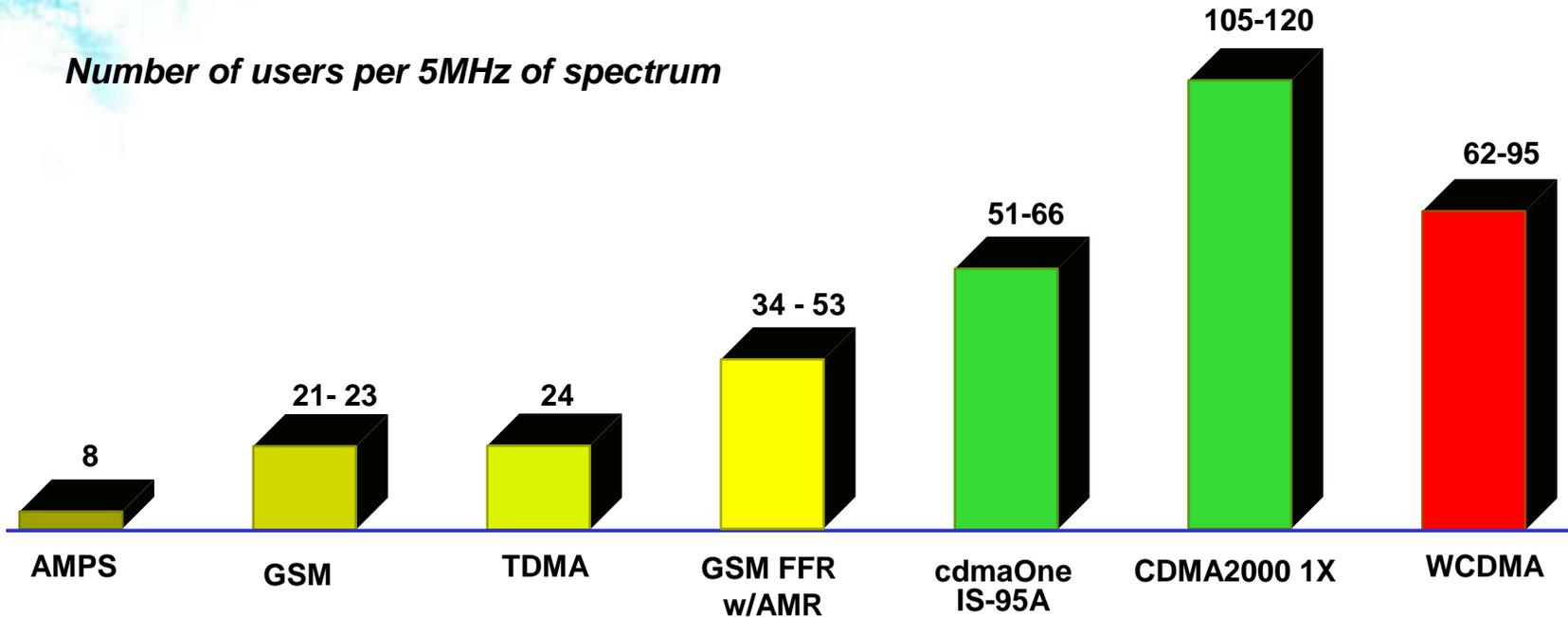
- Greater voice capacity
- Simplified system planning through the use of the same frequency in every sector
- Improved coverage characteristics resulting in fewer cell sites
- Data ready; uses standard IP commands and protocols
- The platform for 3G

Subscribers

- Better voice quality
- Longer talk time
- Improved privacy and security
- Advanced data services

CDMA technologies deliver superior capacity for voice and data

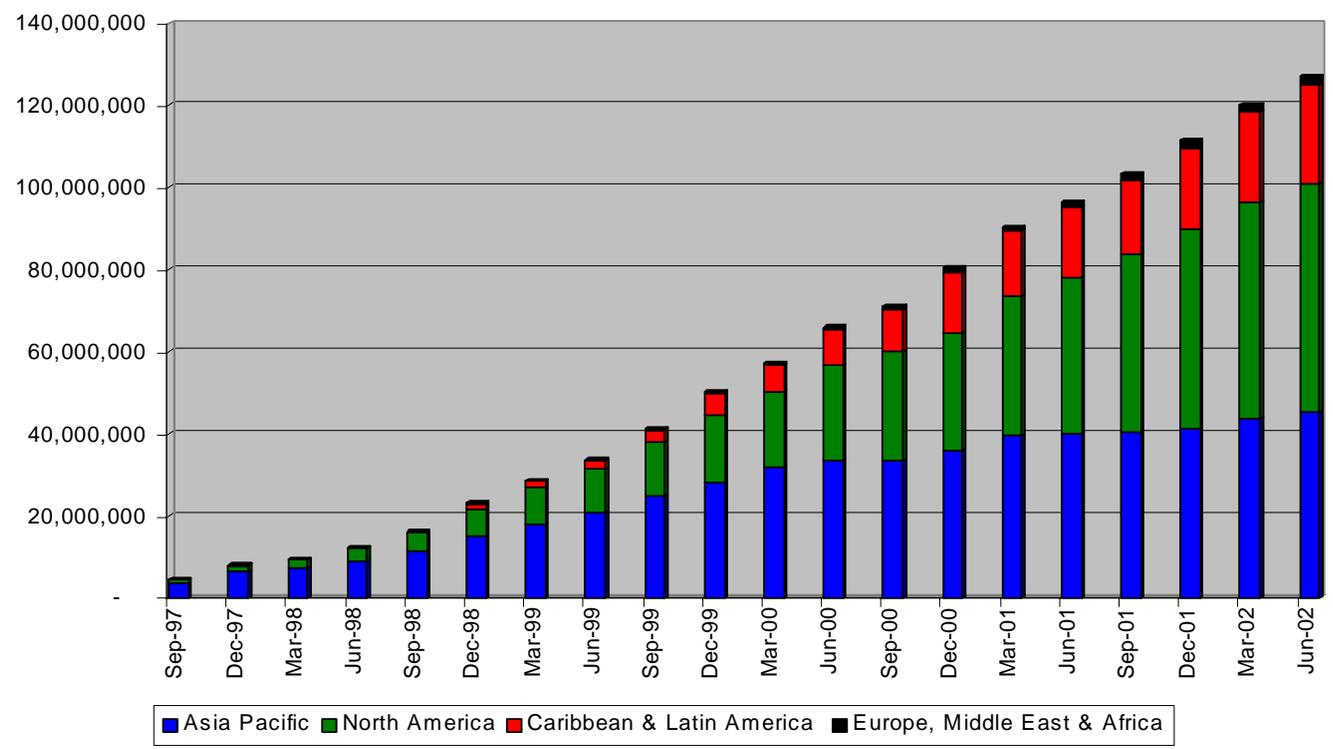
Number of users per 5MHz of spectrum



CDMA is the most spectrally efficient technology

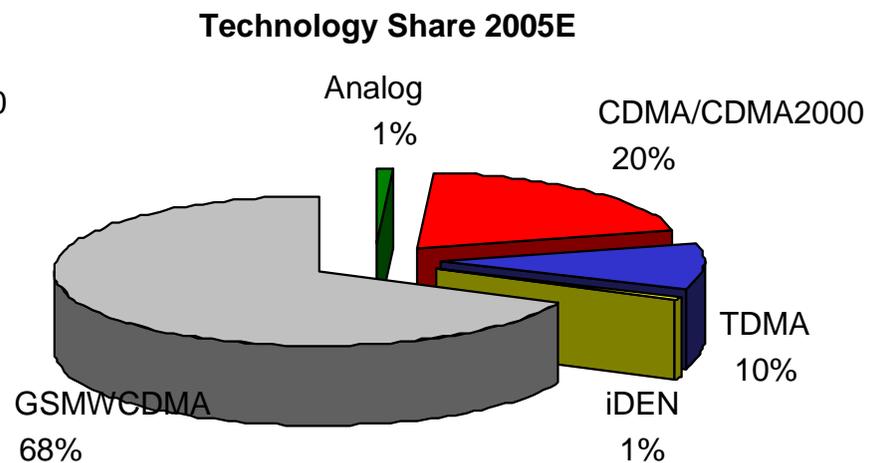
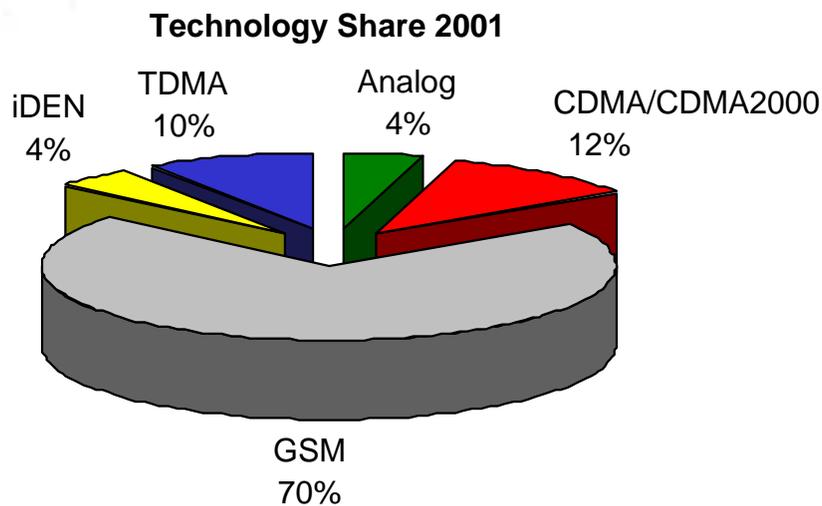
- cdmaOne delivers 14x increase in voice capacity over analog and more than 2x more than GSM and TDMA*
- CDMA2000 doubles voice capacity of cdmaOne systems making it the most spectrally efficient technology available today*

CDMA is the fastest growing technology, serving more than 127 million subscribers worldwide...



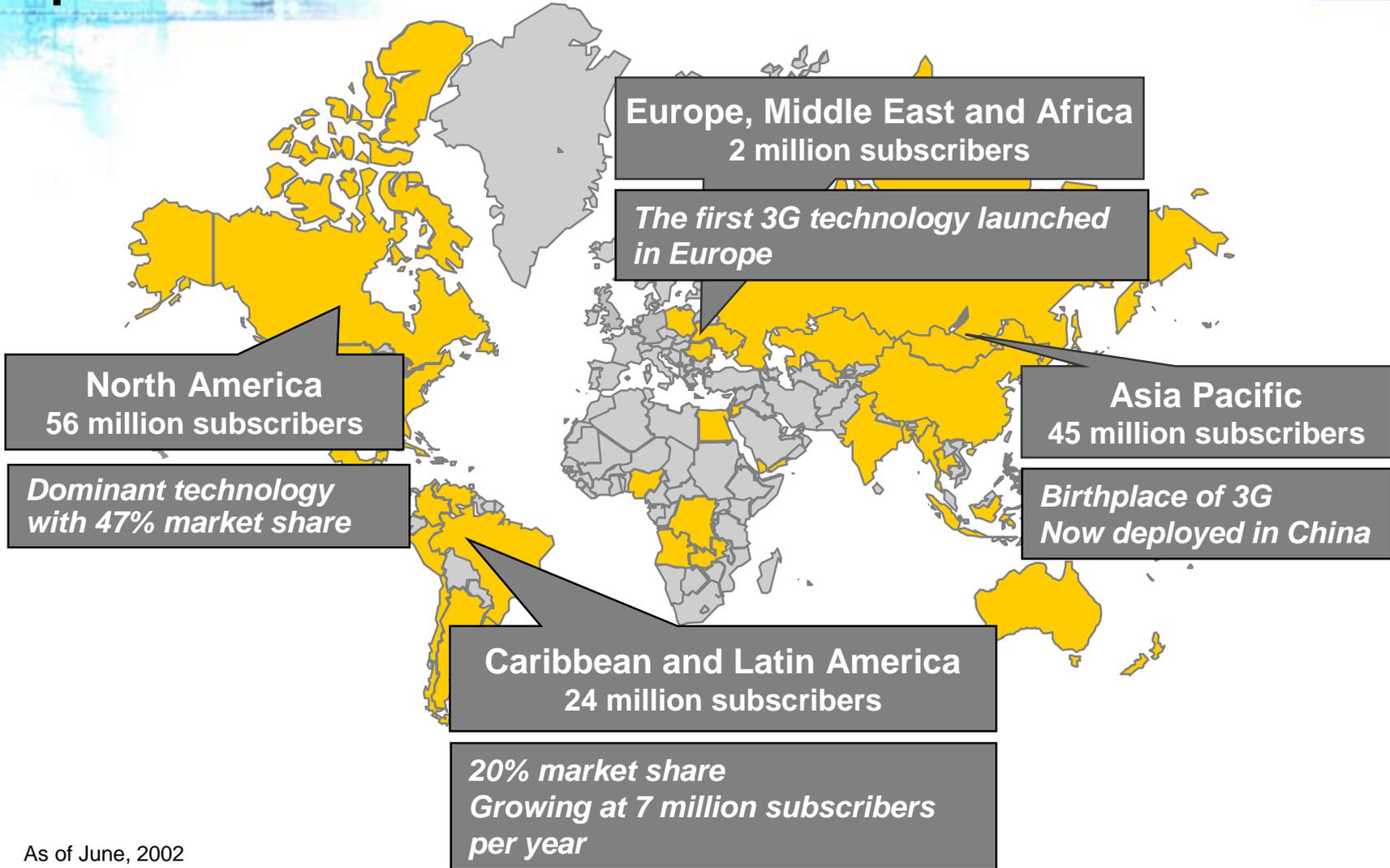
Source: CDMA Development Group

...and it will continue to be the fastest growing technology platform



Source: EMC, Morgan Stanley, 2002

CDMA is one of the leading technologies with presence across all continents

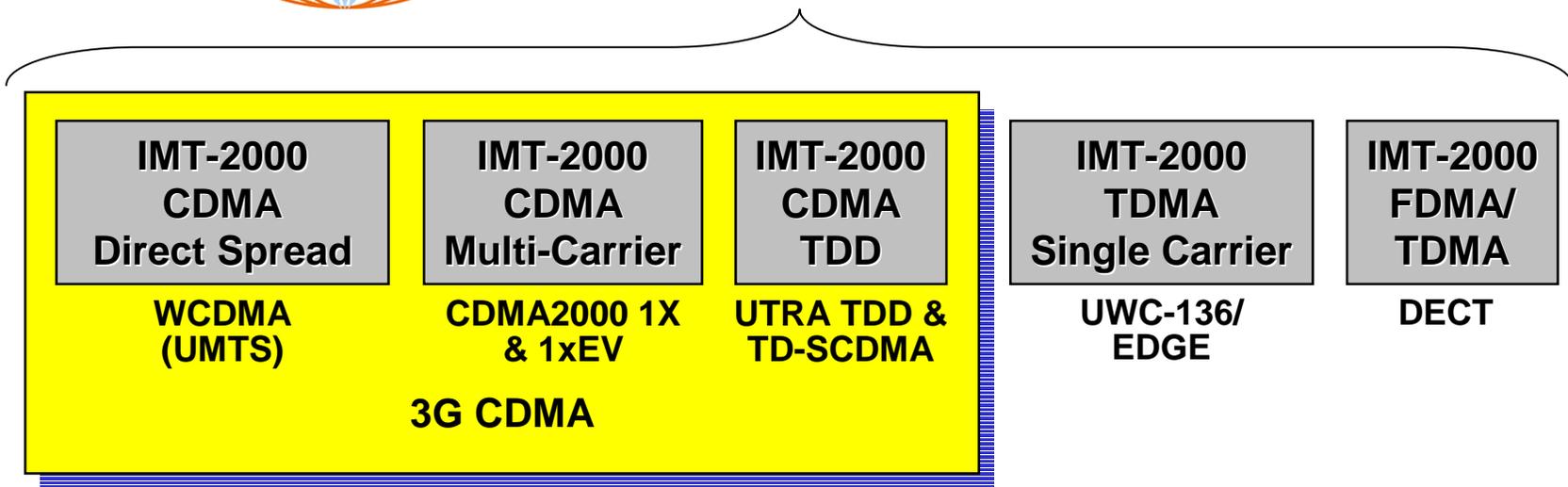


As of June, 2002

The dominant 3G standards are based on CDMA



IMT-2000 Terrestrial Radio Interfaces



Although there are five terrestrial standards, most of the attention and energy in the industry has been directed toward the CDMA standards



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CDMA2000: Leading 3G



Dominates the 3G market



Offers significant lead time and service differentiation

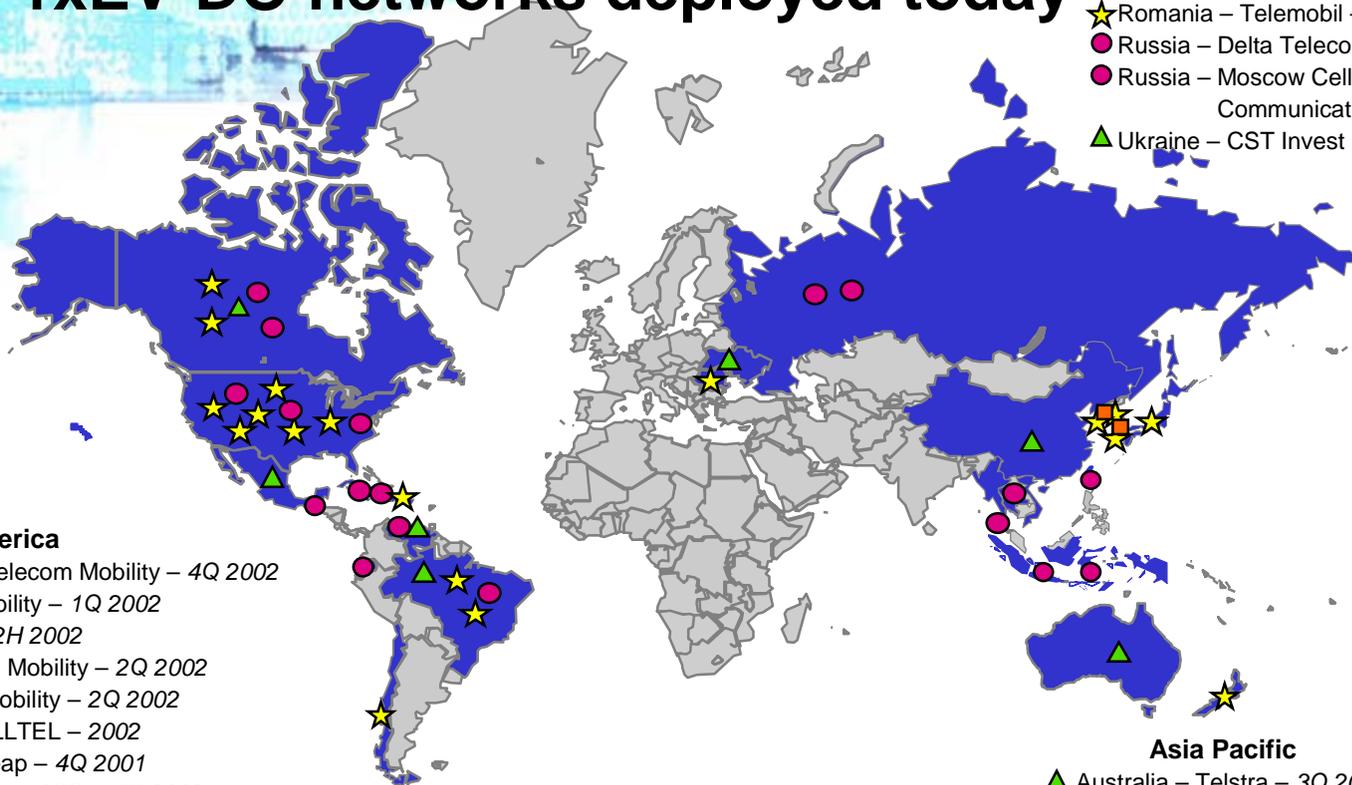


Delivers services to consumers and revenues to operators



Why CDMA2000 is so successful

There are eighteen CDMA2000 1X and two 1xEV-DO networks deployed today



Europe / Russia

- ★ Romania – Telemobil – 4Q 2001
- Russia – Delta Telecom – 4Q 2002
- Russia – Moscow Cellular Communications – 2H 2002
- ▲ Ukraine – CST Invest Limited – 2Q 2002

North America

- Canada – Aliant Telecom Mobility – 4Q 2002
- ★ Canada – Bell Mobility – 1Q 2002
- Canada – MTS – 2H 2002
- ▲ Canada – SaskTel Mobility – 2Q 2002
- ★ Canada – Telus Mobility – 2Q 2002
- United States – ALLTEL – 2002
- ★ United States – Leap – 4Q 2001
- ★ United States – MetroPCS – 1Q 2002
- ★ United States – Monet Mobile Networks – 4Q 2001
- United States – NTELOS – 3Q 2002
- ★ United States – Sprint PCS & Affiliates – 3Q 2002
- United States – U.S. Cellular – 4Q 2002
- ★ United States – Verizon Wireless – 1Q 2002
- ★ United States – Western Wireless – 3Q 2001

Latin America / Caribbean

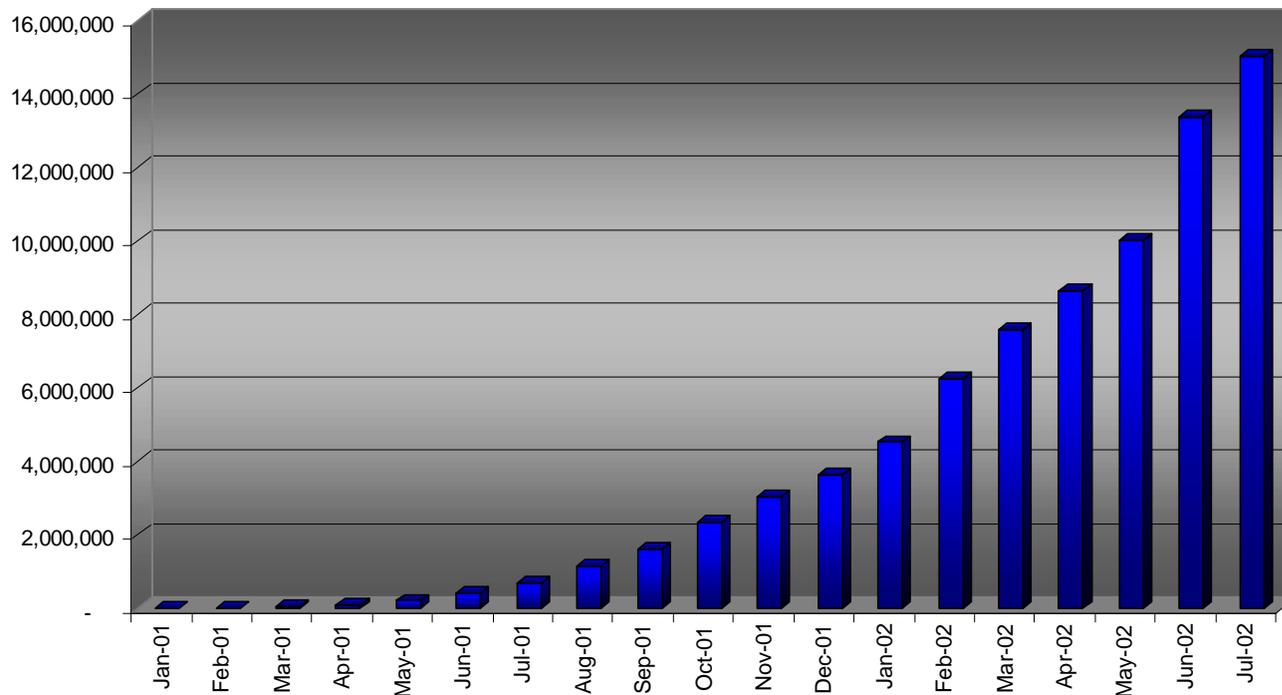
- ▲ Brazil – TCO – 3Q 2002
- ★ Brazil – Telefonica Celular – 2Q 2002
- ★ Brazil – Telesp Celular – 4Q 2001
- Brazil – Vesper – 2H 2002
- ★ Chile – SmartCom PCS – 3Q 2002
- Dominican Republic – Centennial Dominicana – 2H 2002
- Ecuador – BellSouth – TBA
- Guatemala – SERCOM (Telgua) – TBA
- Jamaica – Centennial Digital Jamaica – 3Q 2002
- ▲ Mexico – Pegaso PCS – 2Q 2002
- ★ Puerto Rico – Centennial de Puerto Rico – 2Q 2002
- Venezuela – Movilnet – 3Q 2002
- ▲ Venezuela – Telcel – 1H 2001

Asia Pacific

- ▲ Australia – Telstra – 3Q 2000
- ▲ China – China Unicom – 1Q 2002
- Indonesia – PT Radio Telepon Indonesia – 3Q 2002
- Indonesia – PT Wireless Indonesia – 1Q 2003
- ★ Japan – KDDI – 2Q 2002
- ★ Korea – KT Freetel – 2Q 2001
- Korea – KT Freetel – 2Q 2002
- ★ Korea – LG Telecom – 4Q 2000
- ★ Korea – SK Telecom – 4Q 2000
- Korea – SK Telecom – 1Q 2002
- ★ New Zealand – Telecom Mobile Limited – 3Q 2002
- Taiwan – Asia Pacific Broadband Wireless Communications Inc. – 1Q 2003
- Thailand – Hutchison CAT – 4Q 2002
- Vietnam – Saigon Postel – 2H 2002

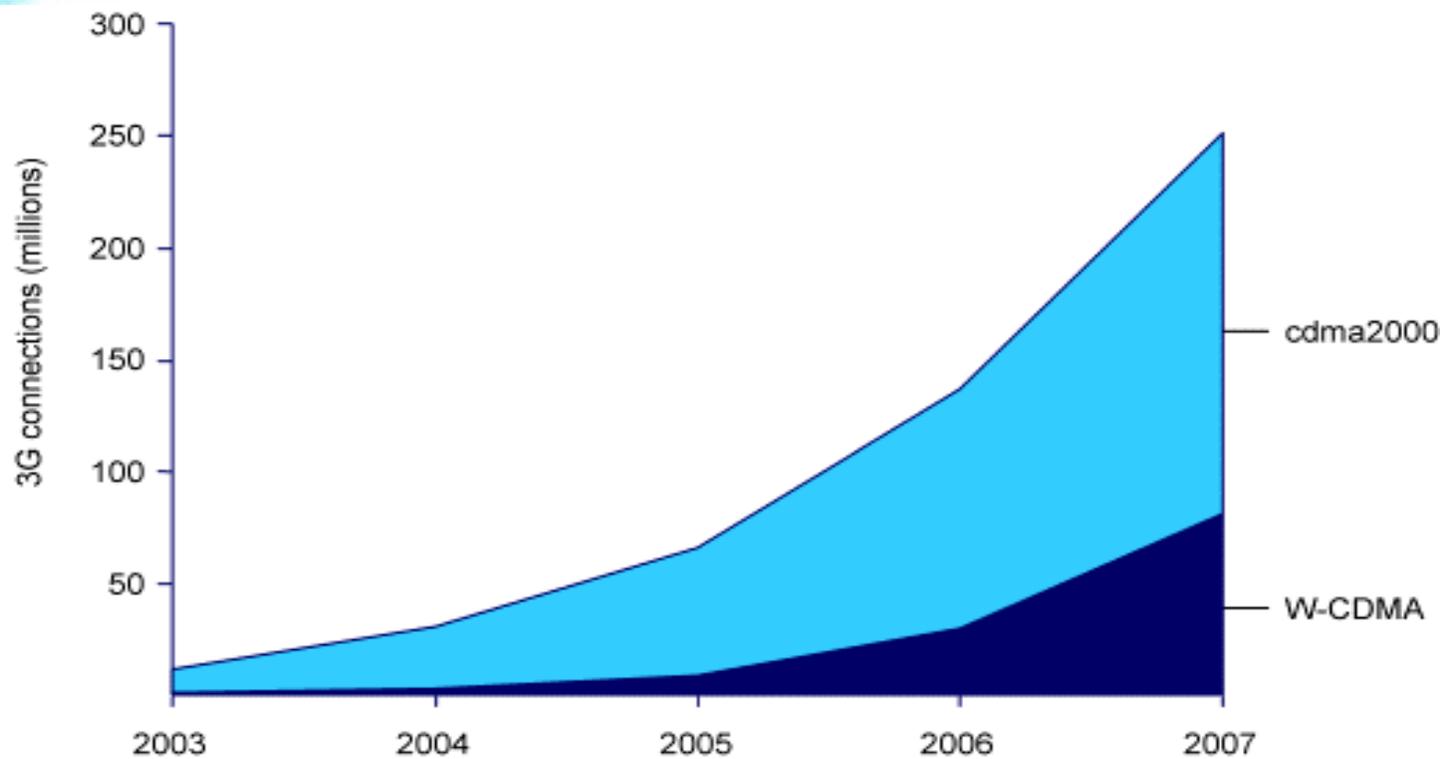
- Countries with CDMA2000
- ★ 1X Commercial
- 1X Deployment
- ▲ 1X Trial
- 1xEV-DO Commercial

CDMA2000 dominates the 3G market...



- *CDMA2000 has more than 99% of the 3G market*
- *Over 15 million CDMA2000 subscribers as of July 2002*
- *More than 1.8 million are being added every month*

... and will continue to lead the 3G market



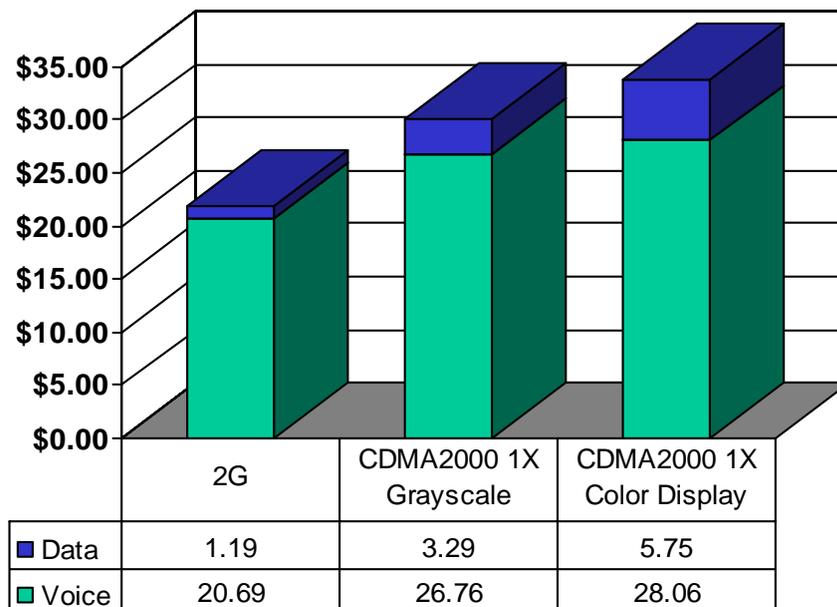
Source: Mobile@Ovum

CDMA2000 delivers greater value to consumers and increased revenue to operators

Applications

- Multimedia messaging
- Game downloads
- Telematics
- Camera and motion video

Revenue per Subscriber (ARPU)



CDMA2000 delivers a nearly five-fold increase in data revenue and more than 50% higher total revenue per subscriber

Why CDMA2000 is so successful



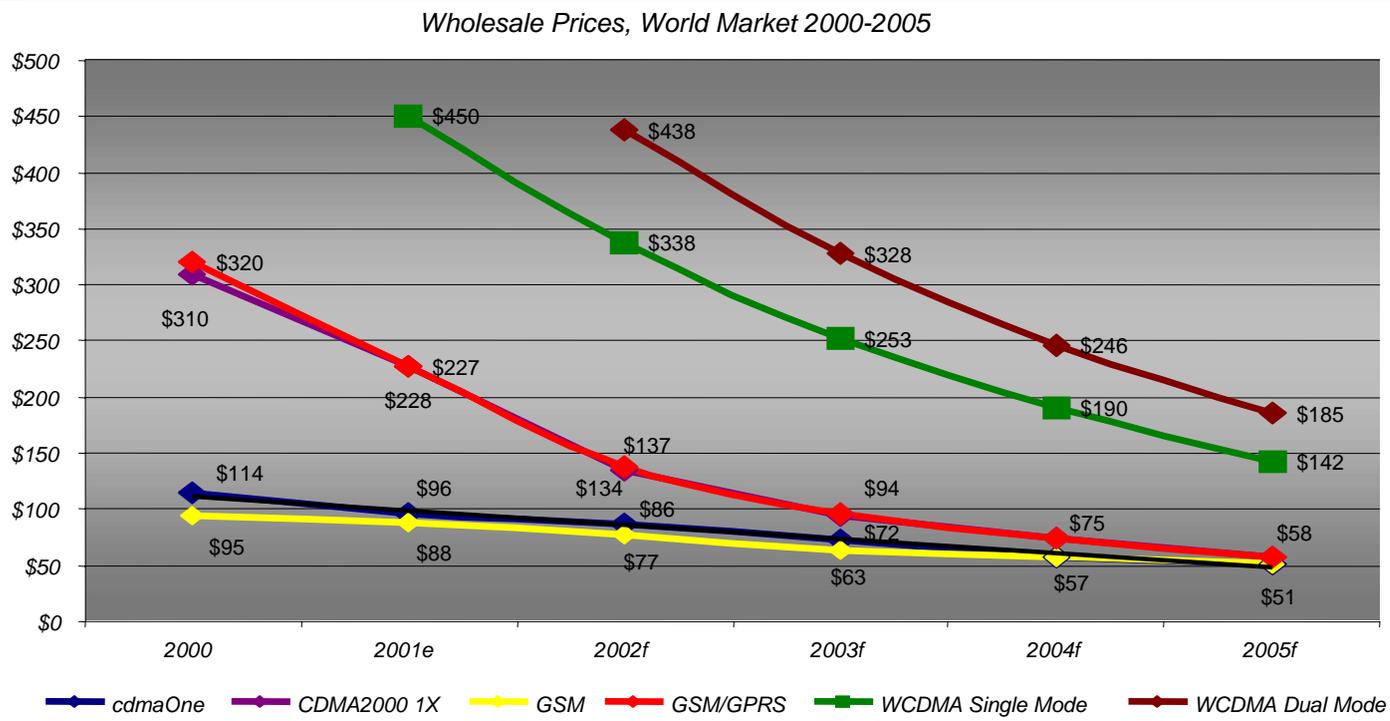
More than 120 CDMA2000 terminal products are available in the market



Why CDMA2000 is so successful (cont.)



...at competitive prices



- *cdmaOne phone prices will continue to decline and will reach \$53 by 2005*
- *CDMA2000 1X phone prices will decline at a faster rate to reach \$58 by 2005*
- *UMTS phones, especially dual mode, will remain at least 3 times more expensive than CDMA2000*

Why CDMA2000 is so successful (cont.)



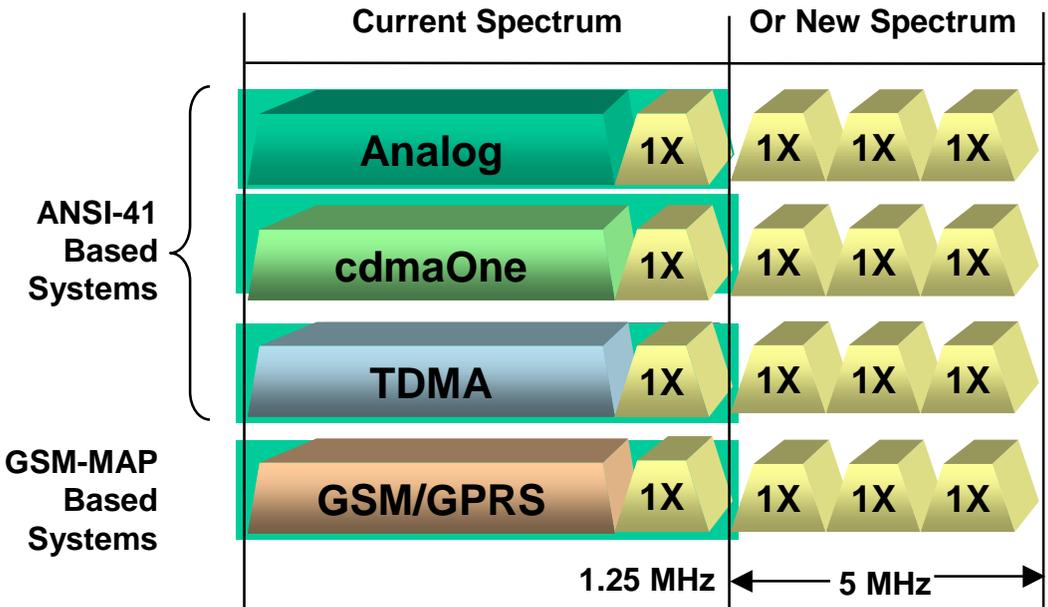
CDMA2000 can be deployed in any existing cellular, PCS and IMT-2000 spectrum



CDMA2000 can be deployed in a small amount of spectrum

CDMA2000 is not constrained to only the IMT-2000 band. It is defined to operate in existing and IMT-2000 spectrum:

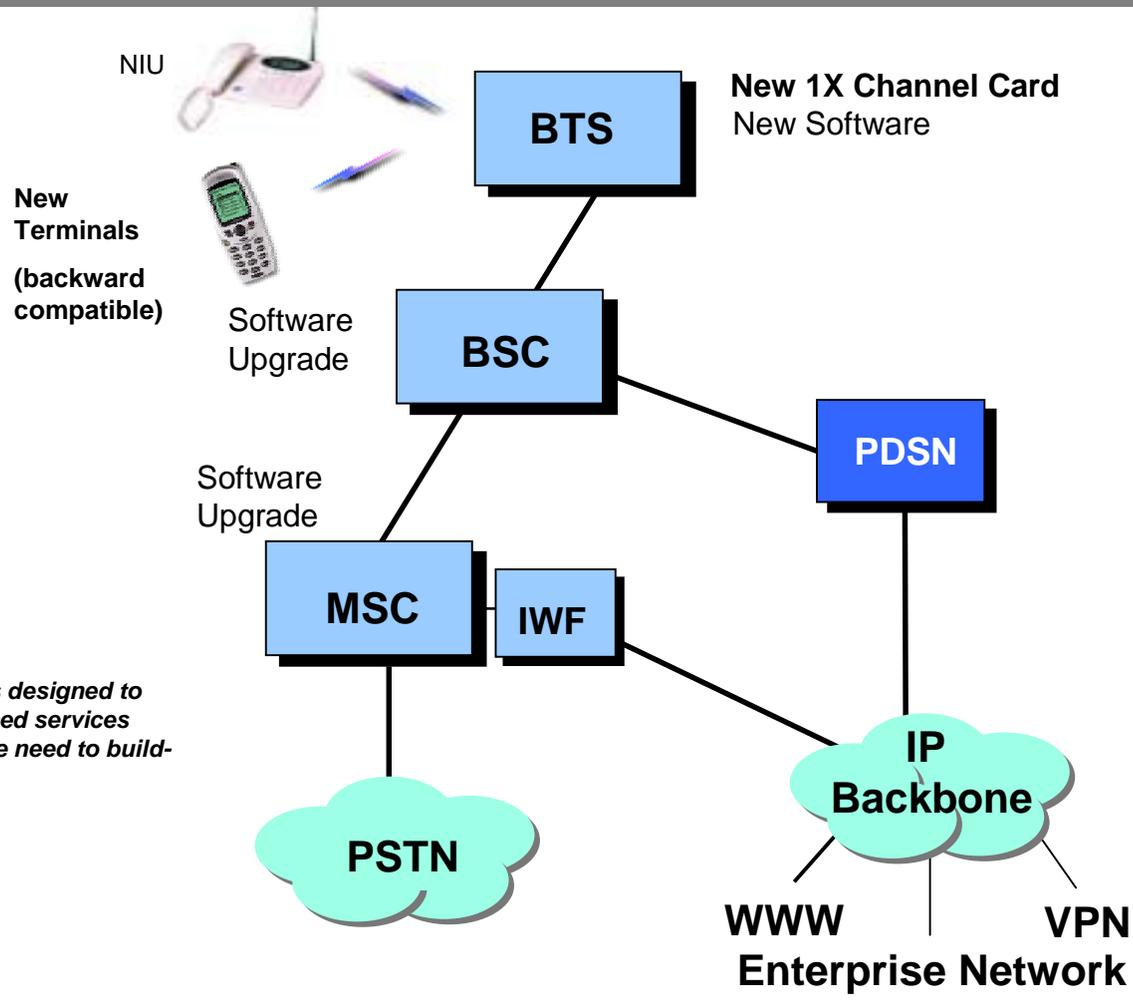
- 450 MHz
- 700 MHz
- 800 MHz
- 900 MHz
- 1700 MHz
- 1800 MHz
- 1900 MHz
- 2100 MHz



Why CDMA2000 is so successful (cont.)



Requires only minor enhancements to the existing cdmaOne network...



The network architecture is designed to deliver Internet and advanced services seamlessly, and without the need to build-out a new packet network

Why CDMA2000 is so successful (cont.)

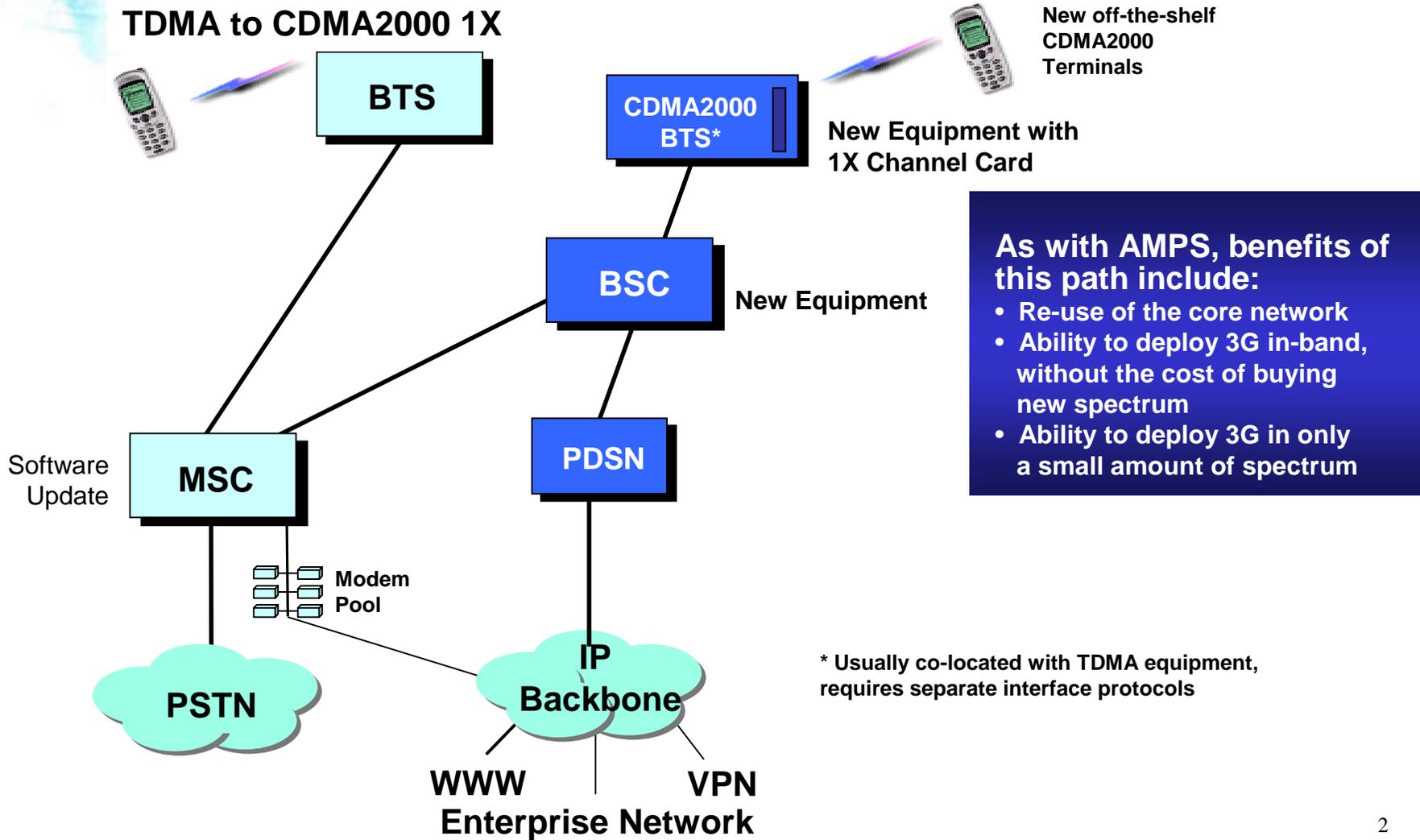


...and relatively small capital investment

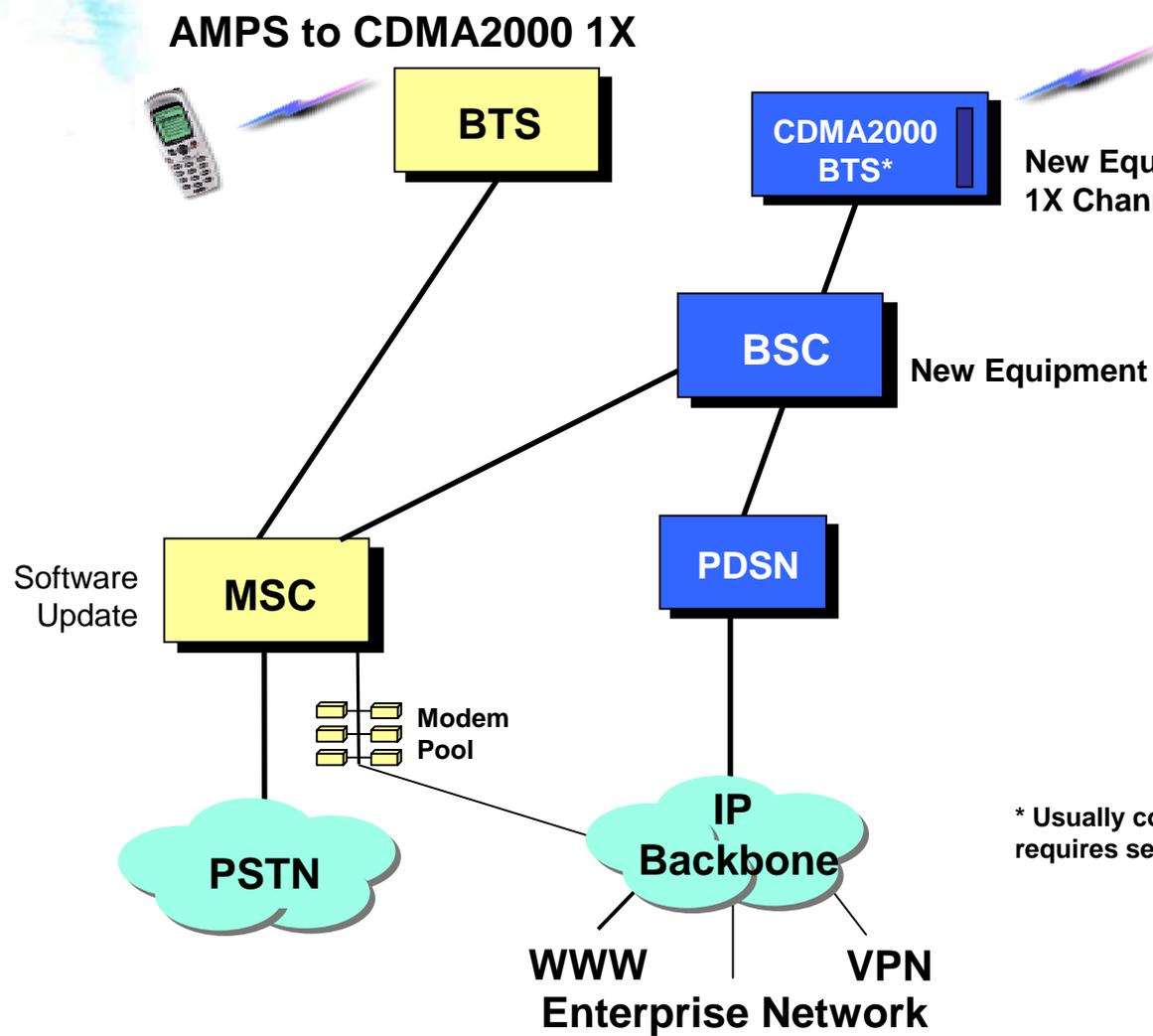
		Total CapEx (US\$ billion)
Korea	SKT (CDMA2000 1X and 1xEV-DO)	2.4
	KTF (CDMA2000 1X and 1xEV-DO)	1.2
	LGT (CDMA2000 1X)	0.4
Japan	KDDI (CDMA2000 1xEV-DO)	2.5
	DoCoMo (W-CDMA)	10.9
U.S.	Sprint PCS (CDMA2000 1X and 1xEV-DO)	2.4
	AT&T Wireless (GSM/GPRS/EDGE/WCDMA)	4.4

*Sprint PCS will spend \$8 per POP to migrate to CDMA2000
AT&T Wireless will spend \$15 per POP for the GSM/GPRS overlay*

TDMA to 3G: Practical solution to CDMA2000



AMPS to 3G: Practical solution to CDMA2000



New off-the-shelf CDMA2000/AMPS Terminals

New Equipment with 1X Channel Card

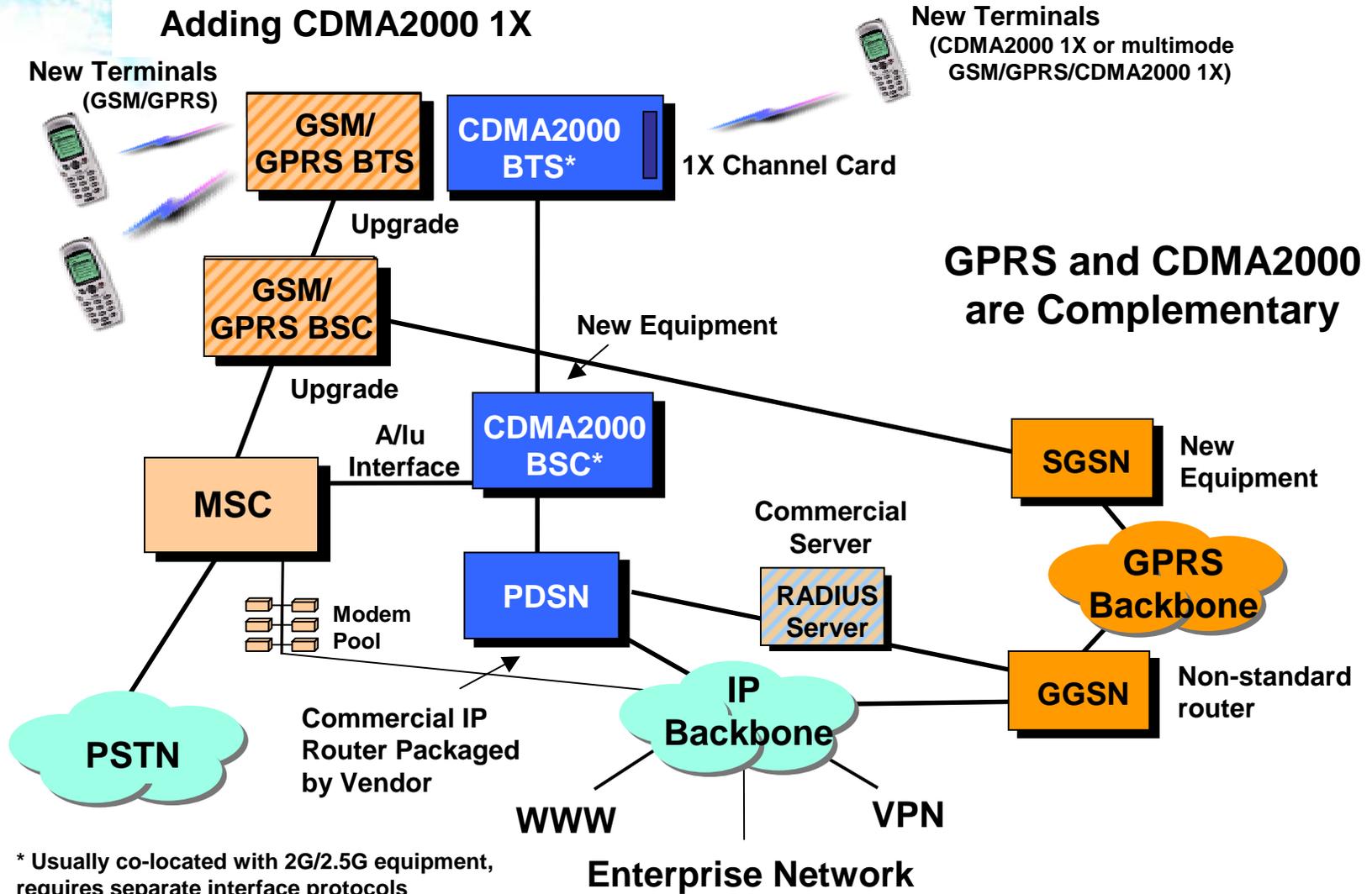
New Equipment

This path is particularly compelling due to:

- Re-use of the core network
- Ability to deploy 3G in-band, without the cost of buying new spectrum
- Ability to deploy 3G in only a small amount of spectrum

* Usually co-located with AMPS equipment, requires separate interface protocols

GSM to 3G: Practical solution to CDMA2000



* Usually co-located with 2G/2.5G equipment, requires separate interface protocols