



CDMA2000 delivers 3G

CDMA Development Group

Ljubljana, Slovenia
December 1, 2003



✓	CDMA Development Group
✓	CDMA Worldwide
✓	CDMA2000: Delivering on 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

Information Distribution	Technical Service Development	Deployment Assistance
<ul style="list-style-type: none"> Conferences Emails Website Etc. 	<ul style="list-style-type: none"> System Testing Advanced Systems Evolution Etc. 	<ul style="list-style-type: none"> Time-to-Market Int'l Roaming Interoperability Etc.

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Membership

The CDG is a consortium of 100 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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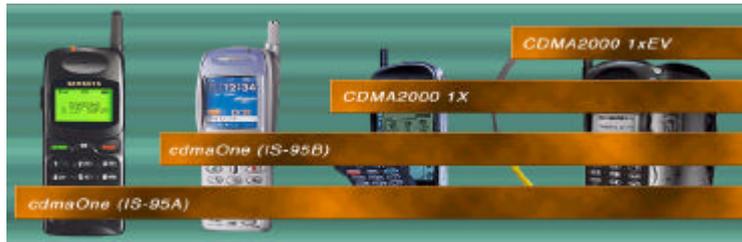
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✓	CDMA Worldwide
✓	CDMA2000: Delivering on 3G

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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 uses a designated channel for data at speeds of up to 2.4 Mbps in a single carrier
- CDMA2000 1xEV-DV integrates voice and data on a single channel with speeds of up to 4.8 Mbps

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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

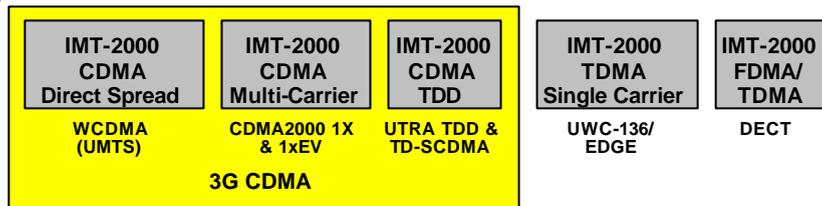
- Improved voice quality
- Longer talk time
- Enhanced privacy and security
- Advanced data services

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The dominant 3G standards are based on CDMA

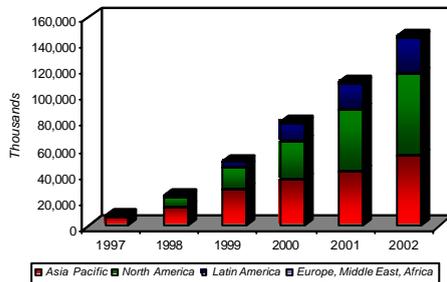


IMT-2000 Terrestrial Radio Interfaces



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CDMA is the fastest growing technology worldwide



Source: CDMA Development Group

- Serves more than 174 million users across all continents
- Subscriber base growing at 29% per year*
- Rapidly expanding in key markets
 - Latin America and Caribbean – 31 million users
 - India – fastest growing technology, reached 5.5 million subscribers and growing at nearly 700,000 per month
 - China – 15 million users in 21 months
- Dominant technology in North America
 - CDMA: 71 million subscribers, 48% market share**

*Source: EMC Database for 2002

**Source: EMC Database for June 2003

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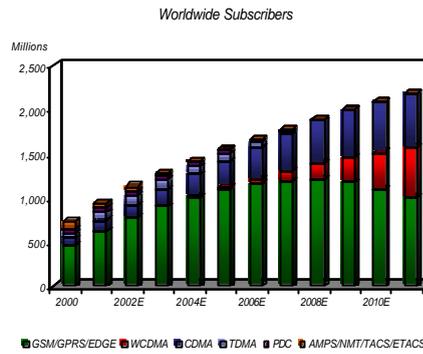
CDMA will double its market share



158 networks in 59 countries across all continents by the end of 2003

Servicing 490 million subscribers by 2008*

Global market share will nearly double to reach 26% in 2008 and 28% by 2011*



*Source: Deutsche Bank, May 2003

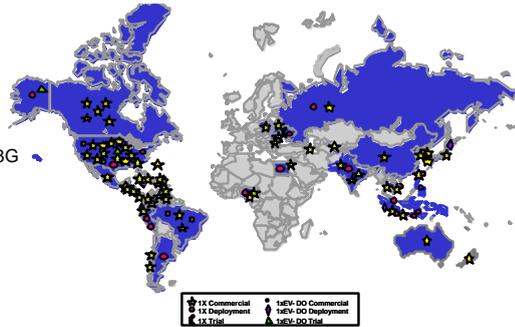
- ✓
CDMA Development Group
- ✓
CDMA Worldwide
- ✓
CDMA2000: Delivering on 3G

CDMA2000 is the leading platform for advanced wireless services today



CDMA2000 leads in deployment of 3G today

- 71 commercial networks across six continents
- 17 networks scheduled to be deployed this year
- 64.5 million subscribers
 - 37% of CDMA users have access to 3G
 - Growing at 4 million new users per month
 - KDDI added 10 million subscribers in 18 months



Source: CDMA Development Group

CDMA2000 leads in number of data subscribers

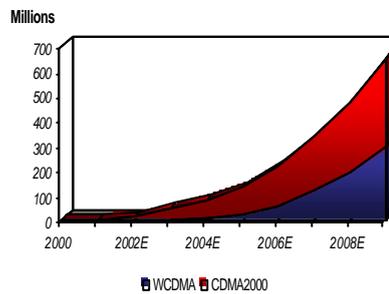
- 54% of data subscribers worldwide use CDMA2000*
- 14% of CDMA subscribers use CDMA2000 data services

*Source: EMC Data Base, June 2003

CDMA2000 will continue to expand



3G Subscriber Base



CDMA2000 and WCDMA will dominate the 3G market

- CDMA2000 subscriber base will reach 360 million by 2009
- Nearly 70% of CDMA subscribers will use CDMA2000
- CDMA2000 will have 18% of worldwide market share

Source: Deutsche Bank, April 2003

CDMA2000 key success factors



Enables rapid time-to-market

- Commercial since October 2000 and widely deployed worldwide
- Can be deployed rapidly
- Does not require new spectrum



Offers the most economical and flexible management of spectrum

- Requires only 1.25 MHz of spectrum and can be deployed in any frequency designated for wireless services
- Increases network capacity for voice and data traffic



Offers cost-effective migration from existing systems

- Viable solution for any existing technology
- Minimizes capex and opex by leveraging investments in core networks and operating systems



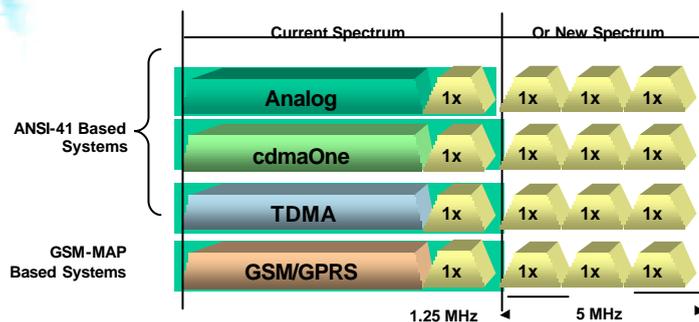
Delivers high data rates and supports advanced applications



Offers the broadest range of devices at affordable prices

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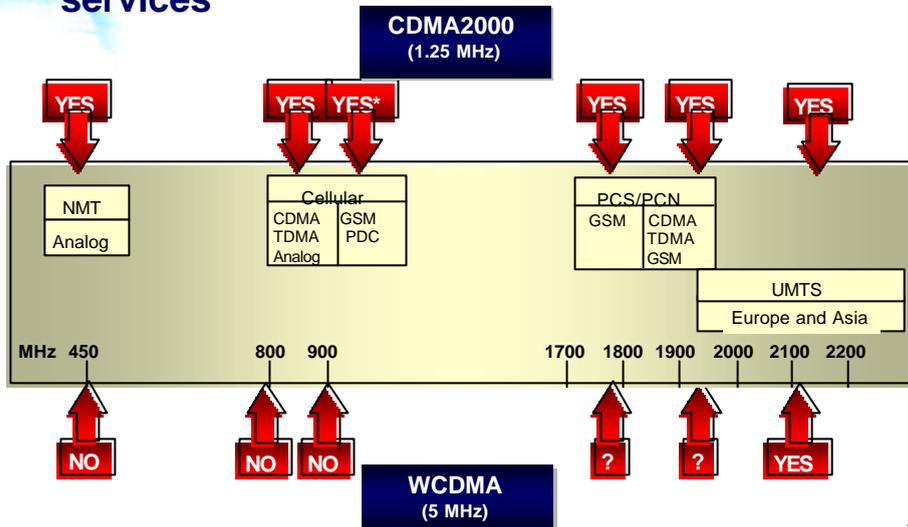
CDMA2000 affords flexible management of spectrum



Because CDMA2000 requires only 1.25 MHz of spectrum, it allows an operator to introduce 3G data services gradually while preserving most of the spectrum to service voice customers

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CDMA2000 can be deployed in any existing and new spectrum allocated for wireless services



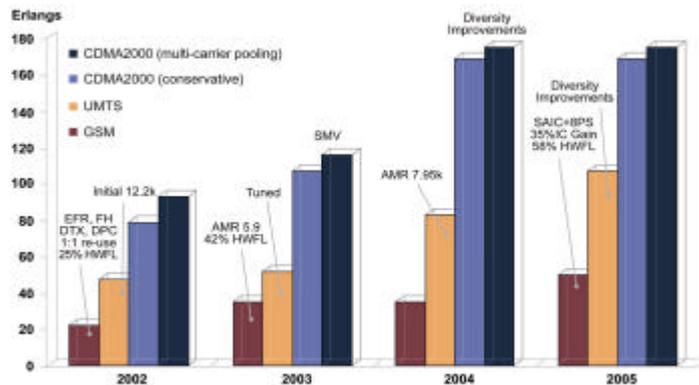
*Limited by Regulations

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CDMA2000 offers increased capacity to support growth. . .



Voice Capacity Evolution
(Compared in 5 MHz bandwidth)



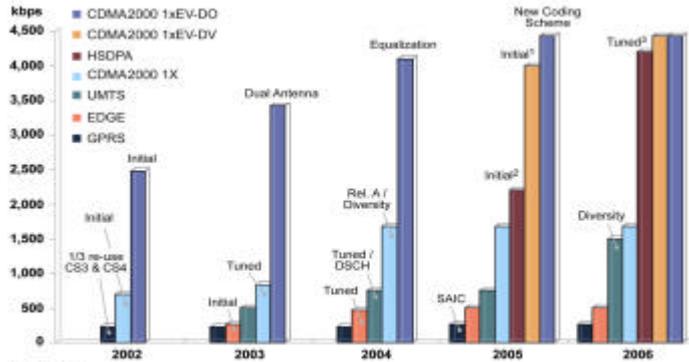
Footnotes:
Assumes 100% loading of voice traffic.
Assumes 2% blocking.
Gains assume 100% of users using latest technology.
Actual gains would depend on handset penetration.

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... and high throughput to support advanced applications

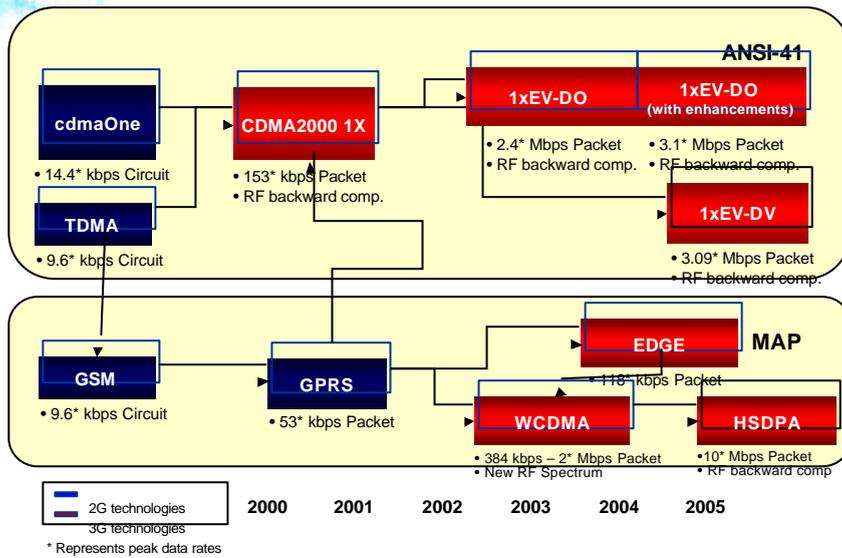


Average Aggregate Throughput
(Compared in 5 MHz bandwidth)

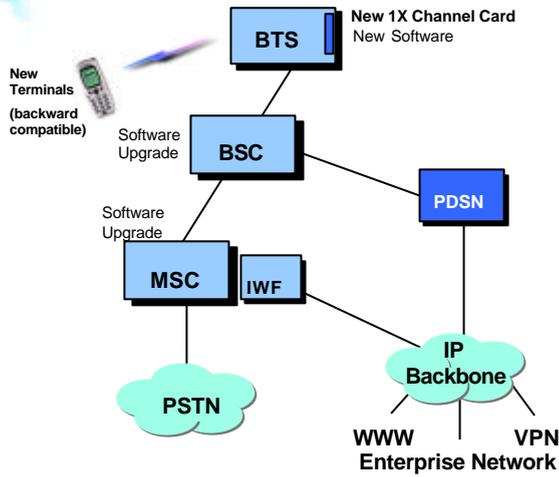


Footnotes:
¹ Assumes initial version of 1xEV-DV will support Mobile Diversity and Equalization.
² Assumes 2005 HSDPA devices will be class 12 (support 5 out of 15 codes and only QPSK modulation).
³ Support for Mobile Diversity, Equalization and higher data rates.

CDMA2000 offers a direct path to 3G for any existing technology



CDMA2000 is a natural evolution path for cdmaOne operators...



- CDMA2000 ADVANTAGE**
- Preserves existing AMPS and ANSI-41 network
 - Handsets backwards compatible with cdmaOne system

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...and requires relatively small capital investment



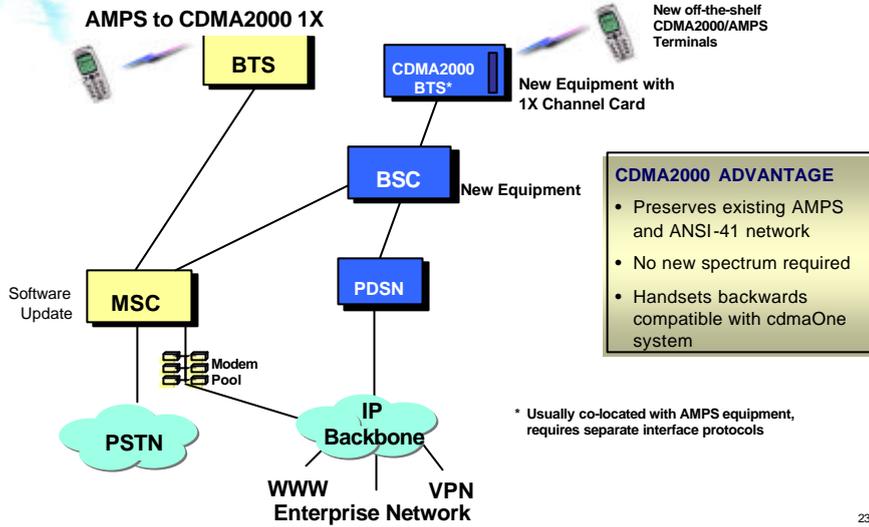
		Total CapEx (US\$ billion)
Japan	KDDI (CDMA2000 1X and 1xEV-DO)	2.5
	DoCoMo (WCDMA)	10.9
U.S.	Sprint PCS (CDMA2000 1X)	0.8
	AT&T Wireless (GSM/GPRS/EDGE)	5.0

Moody estimates that cdmaOne carriers could upgrade to CDMA2000 1X for \$3 to \$5 per POP

Source: Morgan Stanley, June 2002; Yankee Group, July 2003; Moody; operator reports

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TDMA/AMPS to CDMA2000: One step evolution to 3G



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There are more than 430 CDMA2000 terminals from 46 manufacturers

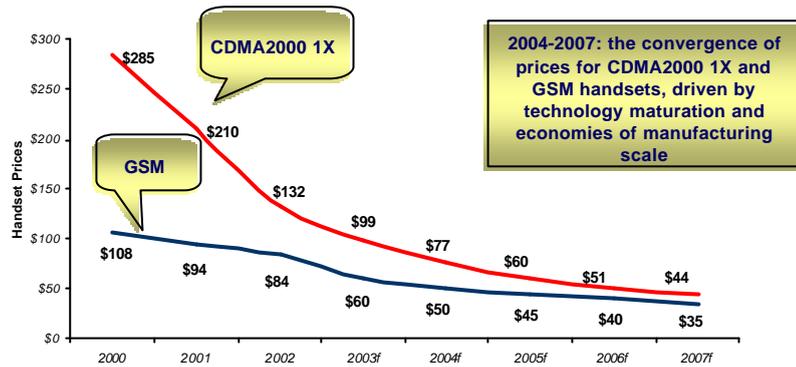


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Economies of scale are driving prices down



WHOLESALE PRICES OF CDMA 1X AND GSM HANDSETS



Source: The Shostek Group. Average low-price handsets produced by "first tier" vendors for their largest customers. Prices as of year-end.

CDMA2000 delivers a broad range of applications to the end user. . .



News



Position Location



Entertainment



Push To Talk



MMS



Email



Multiplayer Gaming



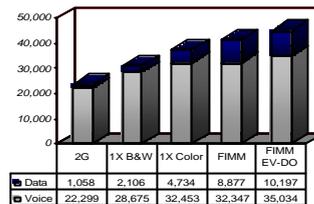
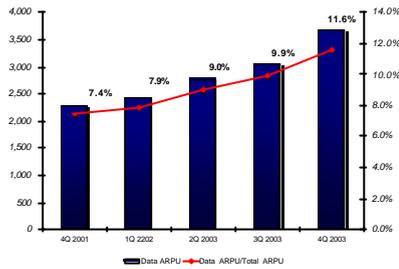
Video Monitoring

...and incremental revenue to operators

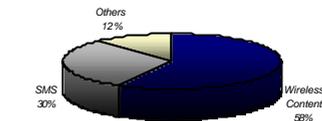


For CDMA2000 operators, data ARPU increases by 62% to contribute 11.6% of total ARPU

CDMA2000 subscribers generate 5 times more data ARPU and 57% more in total ARPU than 2G subscribers



CDMA2000 allows operators to offer richer content (beyond SMS) that drives data usage



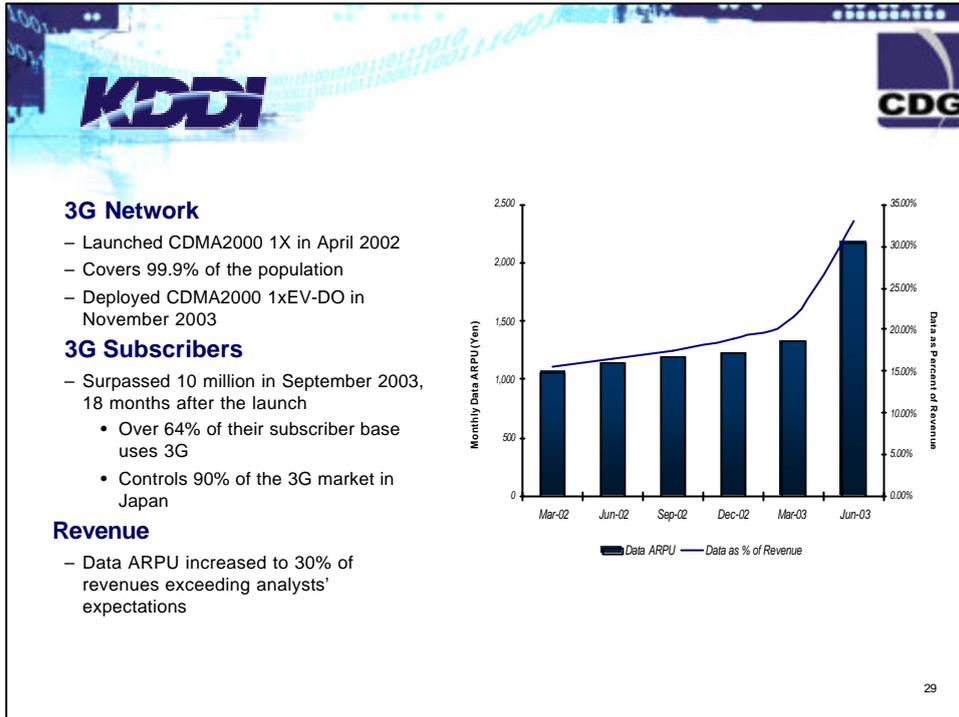
Source: KTF, December 2002

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CDMA2000 Case Studies



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KDDI **CDG**

CDMA2000 1X EZweb services include location based services, MMS, video distribution and high-speed web access



eznavigation

- Location-based services (LBS)
- Powered by **gpsOne**



ezplus

- **Java™** application services
- Support of **Mobile agent** function using **HTTP**
- Automatic application update from servers



ezmovie

- Video Clip Distribution
- Use of Industry Standards, i.e., **MPEG-4** and **MP3** in **MP4** file
- Take 15 second movies and send in e-mail

EZweb@mail - IMAP4-based e-mail platform for "Multimedia Messaging"

EZweb - WAP2.0-based Internet Access and Browsing Platform

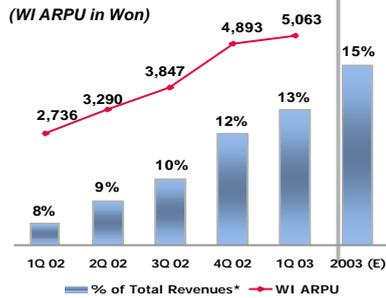
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SK Telecom



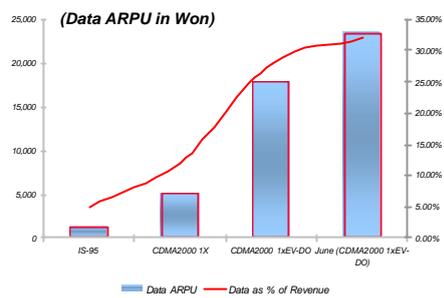
- CDMA2000 subscribers: 13.5 million or 75% of base
- Data services surged 91% in 2Q 2003 compared to the same period last year
- CDMA2000 1xEV-DO subscribers constitute 6% of the subscriber base, but they already account for 12% of the operator's total revenue

Data Usage



* % of Total Revenues excluding interconnection revenues

Data ARPU by handset



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Wireless Internet Trends

SK Telecom



"June" 1xEV-DO High Quality Video using MPEG4



Mobile Movie



Hot Key



Music Video



Video Mail



Traffic Information



Real Time News

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Subscribers: 19.3 million
 Data: 5.1 million
 Vision PCS (3G Data): 2.7 million

CDMA2000 Services:

- Picture Mail, Messaging
 - Picture Messaging: 23 million in 3Q 2003
- Games
- Ringtones
- Web Access

Data ARPU:

- Average Subscriber: \$2
- Vision PCS: \$10

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Subscribers: 36 million (14% annual growth) in 3Q 2003

- Data: 10 million (nearly 30% of base)

CDMA2000 services: Picture Messaging, BREW-based entertainment, ring-tones, Broadband Access based on CDMA2000 1xEV-DO

- Text Messaging: 400 million per month, 1 billion per quarter
- BREW Applications: 4 million per month
- Picture Messaging: 2 million per month

CDMA2000 1X data usage up 77%

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