



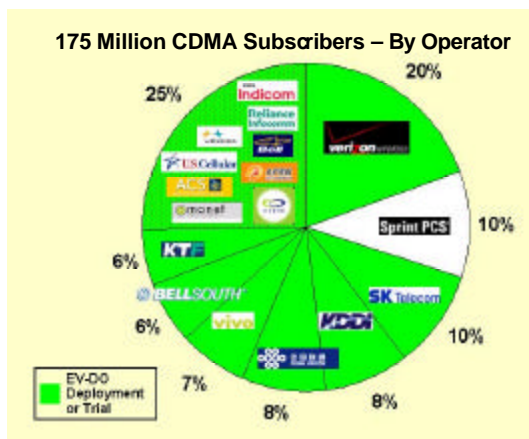
The Growth and Evolution of CDMA2000 1xEV-DO

CDMA2000 1xEV-DO

The fastest mobile wireless networks in the world, from Seoul to San Diego and Sao Paulo, are powered by CDMA2000 1xEV-DO (Evolution – Data Optimized) – the only commercial 3G technology that can deliver data rates exceeding 2 Mbps¹. 1xEV-DO's success is evidenced by:

- **Strong Subscriber Growth:** 1xEV-DO had 4.2 million subscribers at the end of 2003, growing at over 50% a quarter.
- **Increased ARPU:** 1xEV-DO subscribers pay up to four times more than they did for slower data services.
- **Wide Handset Availability:** Over forty commercial, multi-mode (1xEV-DO and 1xRTT) Phones and PC cards are now available.
- **Low Cost Network Deployment:** Operators can cost-effectively upgrade their networks to 1xEV-DO, without purchasing new spectrum or cell sites.

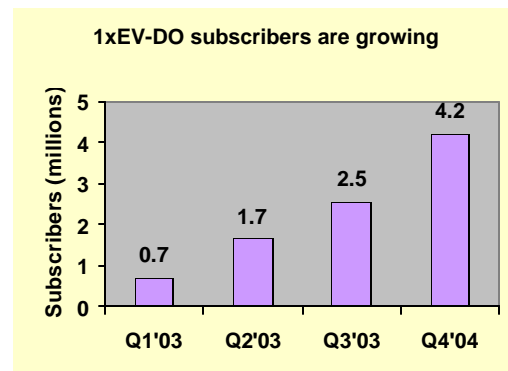
Persuaded by the winning combination of high revenue services and low network costs, major operators that serve over 45% of CDMA subscribers have already launched commercial 1xEV-DO service and several operators are planning deployments in 2004.



In addition to winning in the marketplace today, 1xEV-DO operators are also well positioned to build the mobile wireless network of tomorrow – an All-IP packet network that carries a wide array of communication services, from Internet access to multimedia and commercial-grade Voice-over-IP. This network is enabled by an enhanced version of 1xEV-DO, called 1xEV-DO Revision A (Rev A). With Rev A, 1xEV-DO operators can firmly join the global migration of telecommunication networks from circuit-switched to packet-switched and benefit from the superior economics of packet-switched networks.

Delivering Revenue Growth

Consumers are enthusiastically signing up for 1xEV-DO services wherever they are available. Over four million consumers have subscribed to 1xEV-DO services offered by SK Telecom² and KT Freetel³ in South Korea, and 1xEV-DO services offered by KDDI (Japan), Verizon Wireless (USA) and Vesper (Brazil) are seeing strong subscriber uptake.



More importantly, the higher speed of 1xEV-DO is delivering higher incremental Average Revenue Per User (ARPU) than lower-speed data services.

¹ 1xEV-DO's Peak speed is 2.4 Mbps. Average per user data rates are between 300-600 Kbps

² SK Telecom Monthly Factsheet, Jan 5 2004

³ KTF Monthly Factsheet, Nov 2003

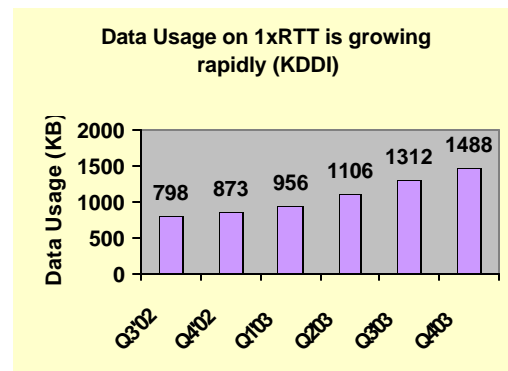
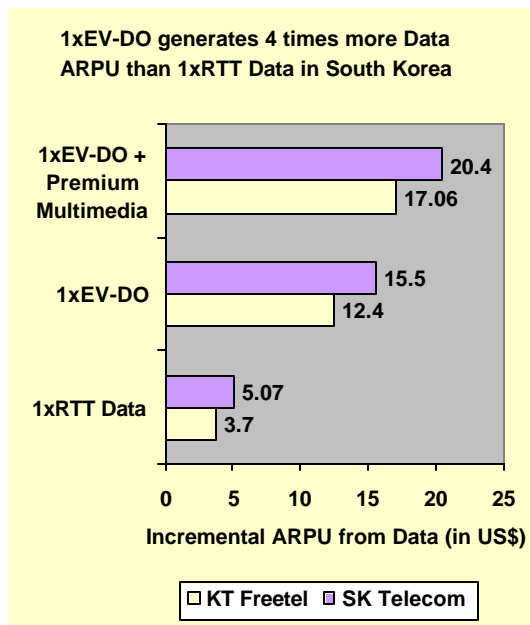
- Subscribers of SK Telecom’s 1xEV-DO premium multimedia (MM) service, pay an additional US\$20 per month, four times higher than the US\$5 paid by subscribers of its 1xRTT data service⁴.
- Subscribers of KT Freetel’s 1xEV-DO Video-on-Demand service, pay an additional US\$17 per month, four times higher than the US\$3.7 paid by subscribers of its 1xRTT data service⁵.
- KDDI launched its 1xEV-DO service (called WIN®) with a US\$38 per month unlimited usage plan⁶ for handsets, a price that is double the ARPU generated by its 1xRTT data service⁷.
- Vesper, in Brazil, launched Giro®, a 1xEV-DO service that provides high-speed Internet access to homes and small businesses at US\$25⁸ per month, three times the price of dial-up Internet access services in Brazil.

The experience of 1xEV-DO operators demonstrates that consumers prefer broadband and are willing to pay a premium for it – behavior that is consistent with wire-line telecommunications where consumers pay twice as much for DSL and Cable broadband than they do for dial-up access.

Low Deployment and Operational Cost

As data applications become compelling and data speeds increase, data usage per subscriber increases dramatically. However in competitive markets, average revenue per user (ARPU) does not grow at the same rate. To win, operators need a network with the lowest cost per MB.

According to KDDI, while incremental ARPU from data hovered around US\$20 between the third quarter of 2002 and the third quarter of 2003, data downloaded by its 1xRTT users increased by over 65%⁹.



Data usage explodes once attractive high-speed data services are introduced. According to KT Freetel, 1xEV-DO subscribers download 15 times more data than 1xRTT subscribers¹⁰. To meet this growing demand for data, an operator

⁴ SK Telecom KSE Conference Investor Presentation, Sep 2003

⁵ KTF Investor Presentation, Sep 2003

⁶ KDDI Website

⁷ KDDI Q1 FY2004 Financial Results, July 31 2003

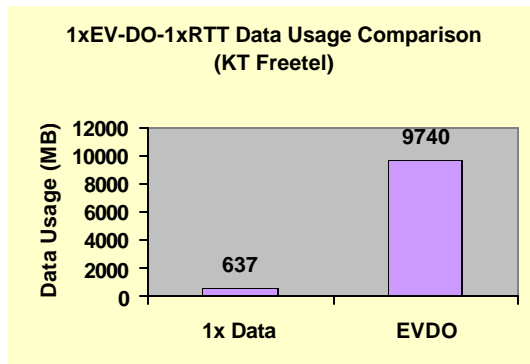
⁸ Vesper Giro Website (www.giro.com.br)

⁹ KDDI Q1 FY2004 Financial Results, July 31 2003

¹⁰ KT Freetel 2Q FY2003 Earning Report

needs a 3G network that costs less to deploy, operate and market.

handsets¹¹ (access terminals) are available at prices comparable to 1xRTT devices.



With 1xEV-DO, CDMA operators have the most cost-effective 3G technology in the industry.

- ✓ As a spectrally efficient technology optimized for data, a single 3-sector 1xEV-DO base station can serve up to 2800 subscribers, each of which can download 150 MB a month.
- ✓ Capital expenditure (Cap-Ex) is low because 1xEV-DO can be deployed as a channel card upgrade to existing CDMA base stations. No new spectrum, cell sites or radio equipment is required.
- ✓ Initial cap-ex can be reduced by deploying 1xEV-DO selectively since all 1xEV-DO handsets support 1xRTT. As a handset roams outside an area covered by 1xEV-DO, it can seamlessly handoff to 1xRTT, without losing connectivity.
- ✓ Installation and commissioning expense is low because 1xEV-DO can be deployed without impacting the 1xRTT voice network.
- ✓ Operational expenses are low because 1xEV-DO can use a cost-effective IP backhaul network rather than dedicated TDM links.
- ✓ Cost per Gross Add (CPGA) is low because a wide variety of 1xEV-DO

Evolving to Support VoIP

Not only does 1xEV-DO help operators win today, but it also provides a clear evolution to a next-generation All-IP packet network that can support the most demanding IP applications including:

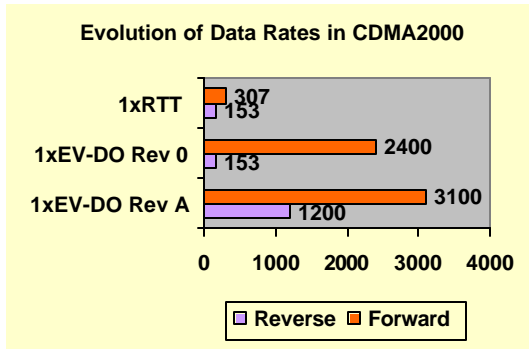
- ✓ Push-to-Talk and Push-to-Multimedia
- ✓ Video Telephony
- ✓ Voice Over IP (VoIP)

These applications are enabled by an enhanced version of the 1xEV-DO standard called 1xEV-DO Revision A (Rev A). Rev A is fully backward compatible with 1xEV-DO and all Rev A handsets will support 1xRTT. Enhancements in Rev A include:

- End-to-End Application level QoS
- Short packet support to increase the efficiency of low-bandwidth, low-latency applications
- Reduction in minimum reverse link latency
- Variable paging cycle for real-time and instant multimedia applications

Rev A also maintains 1xEV-DO's leadership as the fastest CDMA data technology by increasing the peak forward link (download) data rate to 3.1 Mbps and the peak reverse link (upload) data rate to 1.2 Mbps.

¹¹ <http://www.3gtoday.com>



Instead of mixing circuit voice and packet data on the same channel, as some competing technologies propose to do, the 1xEV-DO Rev A approach allows an operator to build one, simple, versatile, end-to-end All-IP packet network that efficiently carries both data and voice. This approach reduces both the capital expenditure and operating expense for an operator. For example, instead of installing a circuit-switched MSC, an operator can use low-cost VoIP softswitches and media gateways. Instead of building its backhaul network with channelized T1 or E1 lines, an operator can use IP backhaul. Most importantly, an operator can now benefit from the economies of scale provided by the global migration of telecommunications from legacy circuit-switched networks to IP-based packet networks.

Wire-line broadband providers are already on the VoIP path and are giving traditional circuit-voice carriers strong competition. Yahoo! Broadband, Japan's leading DSL provider, signed up six million VoIP subscribers in less than 12 months of launching service¹². In the United States, cable operators such as Comcast, Cox and AOL Time Warner¹³ have started rolling out VoIP and traditional telephone companies such as AT&T¹⁴ are responding with their own VoIP offerings.

¹² Investor's Business Daily, Dec 31 2003

¹³ New York Times, Dec 9 2003

¹⁴ New York Times, Dec 11 2003

With 1xEV-DO Rev A, CDMA operators can migrate to a next-generation All-IP packet network cost-effectively and at a pace determined by the marketplace. Since all 1xEV-DO Rev A handsets will support 1xRTT, operators can continue to fully use their 1xRTT network for circuit voice traffic and use the 1xEV-DO network to provide a wide range of enhanced multimedia services. As 1xEV-DO Rev A becomes widely deployed in the network, operators can choose to either keep their voice traffic on 1xRTT or migrate it to the All-IP packet network.

1xEV-DO gives CDMA operators the winning edge. It is available today, when market shares for mobile data services are still being defined, and with Rev A, it has an evolution path that makes it the network of choice for next-generation mobile personal communications.

Airvana and 1xEV-DO

Airvana is a leading provider of All-IP 1xEV-DO Radio Access Network infrastructure. Its products include a 1xEV-DO Radio Node, the industry's highest-capacity Radio Network Controller, and 1xEV-DO base station channel modules for its OEM customers - Nortel Networks and Ericsson.

Airvana and its OEM customers are deploying networks in the United States, Latin America and Asia. Operators are using Airvana technology to provide broadband to the home, high-speed data solutions to business travelers and streaming multimedia to handsets.

For more information on how Airvana's All-IP 1xEV-DO solutions can help grow your business, please contact David Hassman or Amit Jain at +1 (978) 250 4455 or visit our website at www.airvananet.com

Airvana