
NTT DoCoMo in the 3G Wilderness

In October 2001, NTT DoCoMo launched its third generation (3G) wireless mobile communication network that would accommodate large bandwidth applications like video conferencing and fast Internet connections. Well ahead of potential 3G rivals in Europe and the United States, the company committed to being one of the early leaders in Asia. The question became whether shouldering the costs of early deployment, experimentation, and content development in the short term would position DoCoMo for leadership internationally over the long term. Due to uncertainties surrounding the growth of demand and technical standards, DoCoMo's early 3G play raised questions regarding the trade-off between cultivating a first-mover advantage and investing too far ahead of the curve. Furthermore, DoCoMo faced a formidable challenge in altering its business model to address consumer preferences in the United States and Europe.

Yet Another Standards Battle

Throughout the history of wireless telephony, technical standards contributed to international segmentation of mobile wireless services. Broad deployment of cellular telephony in Europe has been attributed to the international acceptance of the GSM (originally representing "Groupe Speciale Mobile" then "Global System for Mobile Communications"¹) standard. In contrast, the absence of a mandated standard by the United States government has led to that country's "alphabet soup" of competing standards. Countries in Asia fell in between the two extremes with typically a few standards co-existing.

The 1G and 2G choices of the past influenced the early choices of 3G technical specifications. The ability to extend second generation systems to so-called "2.5G" that accommodated Internet connections and instant messaging and then finally to 3G services, which included high-end video transmission, distinguished the legacy systems. Telecommunications companies in Korea extended their CDMA-based systems to provide

¹ Newton, Harry. *Newton's Telecom Dictionary*. New York: CMP Books, 2001, p.315.

This mini-case was prepared by Visiting Assistant Professor Melissa M. Appleyard, Evelyn Hsia (T'02—MBA Fellow, Center for Digital Strategies), and Kanichiro Kato (T'02). It was written as a basis for class discussion and not to illustrate effective or ineffective management practices. The authors gratefully acknowledge the support of the Glassmeyer/McNamee Center for Digital Strategies, which funded the development of this case. CDS Case #02012. Version: February, 2002.

Internet connections, and by January 2002, had a customer base of 1.2 million users on their 1xRTT system² (CDMA2000-based with “data transmission speeds up to 144” kilobytes per second³). Because the 1xRTT technology could achieve the minimum performance dictated by 3G specifications, Korea claimed its system was the first 3G system. DoCoMo, however, touted its FOMA alternative (Freedom of Mobile Multimedia Access, a Wideband-CDMA (W-CDMA)-based system) as the first bona fide 3G network.

Although the two approaches—CDMA2000 and W-CDMA— were recommended as a standard technology by IMT-2000 (International Mobile Telecommunications-2000⁴), and may appear similar on the surface because “CDMA” is embedded in both labels, the technologies were not perfectly compatible. Because there were significant advantages and disadvantages to both technologies, by early 2002, one could only speculate as to which would emerge as the leading standard in the world market (Exhibit 1). Although W-CDMA used a wider range of bandwidth and generated larger transmission data rates, it required a much larger investment for infrastructure because much of the existing infrastructure was neither scaleable nor upgradeable.

Whereas the Korean telecommunications companies could upgrade their existing 2G CDMA networks to accommodate CDMA2000, leading providers in Japan and Europe faced greater investments in order to deploy W-CDMA. Many of the European telecom companies had invested heavily in 3G spectrum licenses—the British licenses alone went for \$34 billion⁵—and with the downturn in high-tech sectors by 2001, the horizon for 3G deployment retreated even further.⁶

Without the burden of having to bid for spectrum licenses, DoCoMo channeled the funds earmarked for 3G into research and development and network build-out. From 2001-2004, DoCoMo was expected to invest approximately \$8.5 billion in infrastructure development following on the heels of “hundreds of millions” already invested in R&D.⁷ At launch in October 2001, DoCoMo charged its 3G customers \$500-\$600 for the 3G handsets and monthly fees that approached \$130.⁸

Launch of 3G service—FOMA

In October 2001, NTT DoCoMo launched its 3G wireless service FOMA as the first 3G service in the world. DoCoMo’s FOMA network permitted the transmission of voice, data,

² *The Economist*. “3G by any other name.” January 12, 2002, p.1.

http://www.economist.com/business/PrinterFriendly.cfm?Story_ID=930233,

³ Newton, p.11.

⁴ <http://www.imt-2000.org/>

⁵ Binmore, Ken and Paul Klemperer. “The Biggest Auction Ever: the Sale of the British 3G Telecom Licences.” September 2001. <http://www.pauklemperer.org>.

⁶ For all of Europe, the cost of wireless spectrum licenses approached \$100 billion (Guth, Robert A. “DoCoMo Launches 3G Service; Industry Hopes for Recovery,” *The Wall Street Journal*, October 2001).

<http://online.wsj.com/archive/retrieve.cgi?id=SB1001870976444414640.djm>.

⁷ *The Economist*, p.2.

⁸ *Ibid*.

and video. Exhibit 2 highlights the primary features of the FOMA handsets in 2001. In terms of speed, FOMA surpassed the alternative technologies as shown below.

Although the Japanese market was anxiously awaiting the new 3G service, the service had to solve a few issues in order to grow its subscriber base. Pricing and coverage area were the biggest issues surrounding the launch. In addition, content and applications for FOMA had not been extensively developed, but much of the existing i-mode content worked much better in FOMA than previous 2G environments. Through early 2002, videophone and i-motion⁹ were two of the major applications promoted with the FOMA system. Additional content and customer-oriented applications were anticipated in order for DoCoMo to increase its subscribers.

Figure 1:



Source: 3GNewsroom.com. “FOMA Factbox – World’s First True 3G,” October 7, 2001. http://www.3gnewsroom.com/3g_news/docomo_factsbox/index.shtml

Alternatives to 3G

When considering entry into markets outside of Japan, DoCoMo had to consider alternatives to its 3G system particularly in light of consumer demand. Relative to other developed countries, the United States led in computer penetration but lagged in cellular penetration. By 2001, the total wireless subscriber base rose to 128.9 million in the United States, a rise of 18%.¹⁰ However, the rate of subscriber growth had slowed from the 27% annual growth rate of the previous year.¹¹ Therefore, DoCoMo had to take seriously other types of multifunction handheld devices that had roots in the computer industry rather than in the telephone industry. By 2002, these devices included Research in Motion’s Blackberry line, Palm’s i705, and Handspring’s Treo. Generally these devices incorporated web and email

⁹ The video-clip distribution service “i-motion” will enable users to obtain video content at speeds of up to 384kbps (64kbps uplinks) from sites accessed via DoCoMo’s official i-mode portal with i-motion-compatible FOMA handsets. <http://www.nttdocomo.com>

¹⁰ Macklin, Ben. “Demanding times,” *eMarketer*, January 21, 2002. <http://www.thetelecommanalyst.com/article.asp?docid=6125&nd=0122>.

¹¹ *Ibid.*

access, an organizer function, messaging, and some basic traditional computing functions like word processing or spreadsheet manipulation. While the Treo incorporated telephony, the other two products did not as of early 2002. Exhibit 3 contains pricing information across these three alternatives relative to the initial pricing of FOMA services.

Among the ways DoCoMo might distinguish itself from competing technologies would be by promoting extensive application development. By January 2002, DoCoMo's "ten leading application partners" were: America Online, Inc., Sun Microsystems, Microsoft Corporation, SAP AG, Sony Computer Entertainment, Inc. SEGA Corporation, Walt Disney Internet Group (Japan), Symbian, Ltd., 3Com Corporation, and Hewlett-Packard Company.¹² This assortment of leading software, hardware, and content providers implied a comprehensive strategy both in terms of providing a multifaceted user experience but also in terms of geographic reach.

Furthermore, DoCoMo invested in foreign telecom partners such as KPN Mobile in the Netherlands, AT&T Wireless Services in the United States, Hutchison in Hong Kong, KG Telecom in Taiwan, and Tele Sudeste in Brazil. Through these investments, DoCoMo improved its access not only to Asia but to European markets and markets in the Americas. For example, at the end of 2001, KPN began testing the i-mode technology it licensed from DoCoMo in its mobile Internet services. In the United States, DoCoMo held 16% of AT&T Wireless's stock and made the i-mode technology available to AT&T Wireless. Even though DoCoMo spread its investments internationally, Asia endured as the company's primary focus.

The Worldwide Roll Out of 3G

While Japan and Korea were competing for bragging rights over pioneering launches of 3G services, the rest of the world was waiting on the sidelines. A number of leading telecom companies in Europe and the United States had announced 3G roll out plans projected for 2002 and early 2003, but faced with technical and financial issues, had to potentially delay these plans.

Having largely allocated most of their investments to 3G licenses, European companies were now scrambling for financial resources to develop and deploy their next generation networks. Vodafone, the Germany mobile phone giant planned to roll out its 3G services in the autumn of 2002,¹³ while Switzerland's dominant telecom operator Swisscom did not expect to provide 3G service until 2004.¹⁴ Burdened by heavy debt from 3G license fees and equipment, European network providers contemplated the possibility of sharing infrastructure and even joining forces with their competitors.

¹² NTT DoCoMo company web site (www.nttdocomo.com partnerships).

¹³ Reuters. "Vodafone sees autumn start for German 3G services" January 17, 2002. http://www.reuters.com/news_article.jhtml?type=search&StoryID=524572

¹⁴ Reuters. "Swisscom sees no full 3G services until 2004," January 16, 2002. http://www.reuters.com/news_article.jhtml?type=search&StoryID=520036

In North America, considerable progress had been made to launch next generation high-speed wireless network. In January 2002, Verizon became the first nationwide carrier to provide Qualcomm Inc.'s CDMA2000 1x technology. It promised high-speed Internet connectivity for as little as \$30 initially to about 20% of its networks. The New Jersey company planned to provide nationwide service including streaming video, office functions, and other content and services. Not far behind Verizon, the number one wireless operator, were Sprint and AT&T, with Sprint promising to launch the same technology in the summer of 2002, and AT&T to deploy W-CDMA in 2003¹⁵.

Although significantly late to the 3G scene and lacking the services and content offered by existing players, these later entrants were moving quickly to expand their capabilities through partnerships and additional applications.

In the mad dash to the starting line, it was easy to ignore the words of Jim Straight, Verizon's vice president of wireless data and Internet, that this may well be "a race that will be going on for quite a while,"¹⁶ and no one knew the degree to which crossing the finish line first depended on being the first to burst out of the gate.

Being the early mover in the next-generation network experiment was not without its challenges for DoCoMo. While anticipating 1.5 million subscribers by the end of 2002, the subscriber base for FOMA stood at under 40,000 at the start of 2002, leaving the company to doubt its ability to reach 150,000 subscribers by March 2002 as initially anticipated.¹⁷

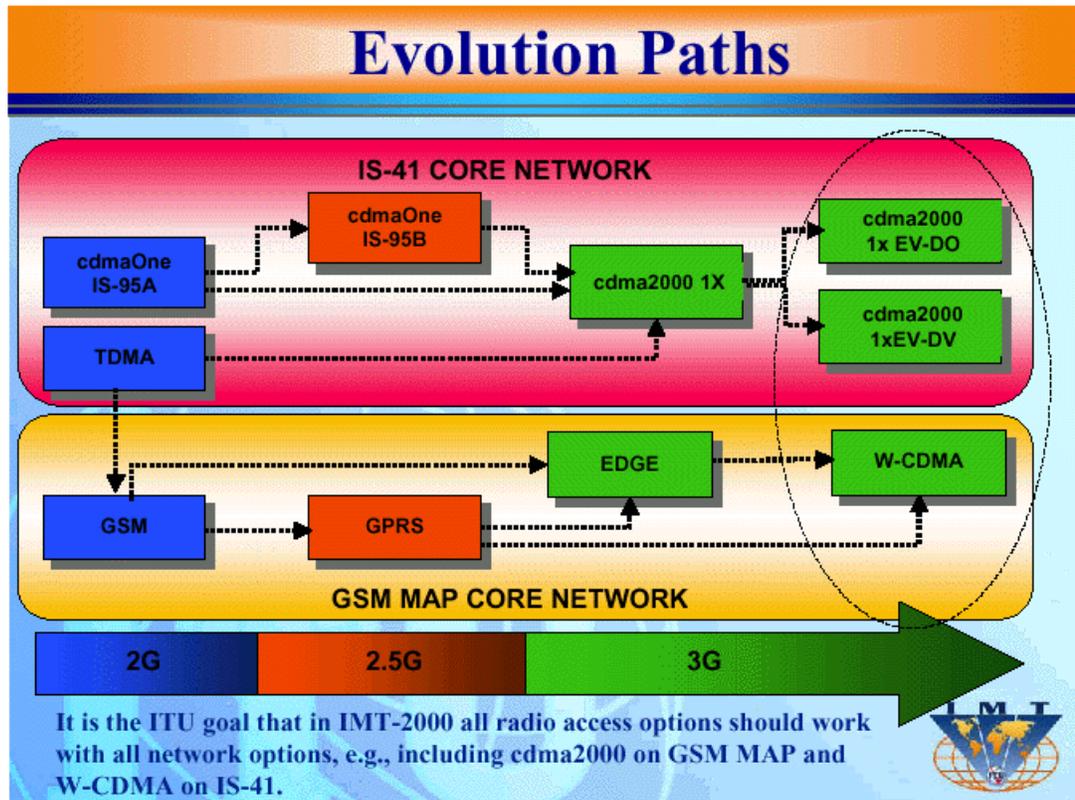
¹⁵ Reuters. "UPDATE 1-FACTBOX-U.S. wireless companies' path to 3G," January 28, 2002. http://www.reuters.com/news_article.jhtml?type=search&StoryID=550834

¹⁶ Reuters. "Verizon Wireless Launches Next-Generation Network," January 28, 2002. http://www.reuters.com/news_article.jhtml?type=search&StoryID=550546

¹⁷ Reuters. "March goal is 'a bit tricky,'" January 10, 2002. <http://news.com.com/2100-1033-807324.html?legacy=cnet>.

On January 25, 2002, however, President and Chief Executive Keiji Tachikawa dismissed the need to revise the 150,000 target. http://www.reuters.com/news_article.jhtml?type=search&StoryID=543862.

Exhibit 1: Evolution Path (IMT-2000)



Source: "IMT-2000 Project," Geneva 2001-2002.

<http://www.imt-2000.org/>

Exhibit 2: Features of DoCoMo's Initial FOMA Handsets.

Features	Handsets
➤ Sound quality equal to landline phones	N2001 P2101V
➤ 64Kbps digital communications for real-time video	P2101V
➤ Maximum 384Kbps downlink, maximum 64Kbps uplink, high-speed packet communications	N2001 P2401
➤ Circuit switched connections for high-speed communications with 64Kbps-uplink and downlink speed.	
➤ Sending/receiving short text messages between FOMA handsets. (SMS)	N2001
➤ Multiaccess function for simultaneous voice and packet communications	N2001
➤ High-speed i-mode connections with maximum 384Kbps downlink connection ➤ Sending/receiving up to 10,000 letters (5,000 full-space Japanese characters) i-mode mail with attached still pictures (GIF, JPEG), music (MIDI), etc. ➤ Select incoming e-mail (text, attached file) by checking title	N2001 P2101V
➤ Downloading up to 30kbyte data at one time	P2101V
➤ Built-in camera for video and still photos	P2101V

Source: 3GNewsroom.com. "FOMA Factbox – World's First True 3G," October 7, 2001.
http://www.3gnewsroom.com/3g_news/docomo_factsbox/index.shtml

Exhibit 3: Pricing of FOMA and Alternative Technologies.

Product: Date of Price Quote	Device	Monthly Fee
➤ DoCoMo FOMA: October 2001 ¹⁸	➤ \$500-\$600	➤ Up to \$130
➤ RIM Blackberry 857 or 957: January 2002 ¹⁹	➤ \$499	➤ \$24.99 Roaming Service (+\$39.99 activation fee)
➤ Palm i705: January 2002	➤ \$449 ²⁰	➤ \$19.99-\$39.99 ²¹
➤ Handspring Treo 180 (GSM): January 2002 ²²	➤ \$399	➤ Wireless service plan

¹⁸ Source: Kunii, Irene M. "3G: Not a Bang, but a Whimper," *Businessweek.com*, October 8, 2001.

¹⁹ Blackberry web site (www.blackberry.net).

²⁰ Palm company web site (www.palm.com).

²¹ Tam, Pui-Wing. "Palm Device Sorts E-Mail in Real Time," *The Wall Street Journal*, January 28, 2002, p.B4.

²² Handspring web site (www.handspring.com).