NTT DoCoMo:

Defining the Mobile Frontier

June 18th, 2000
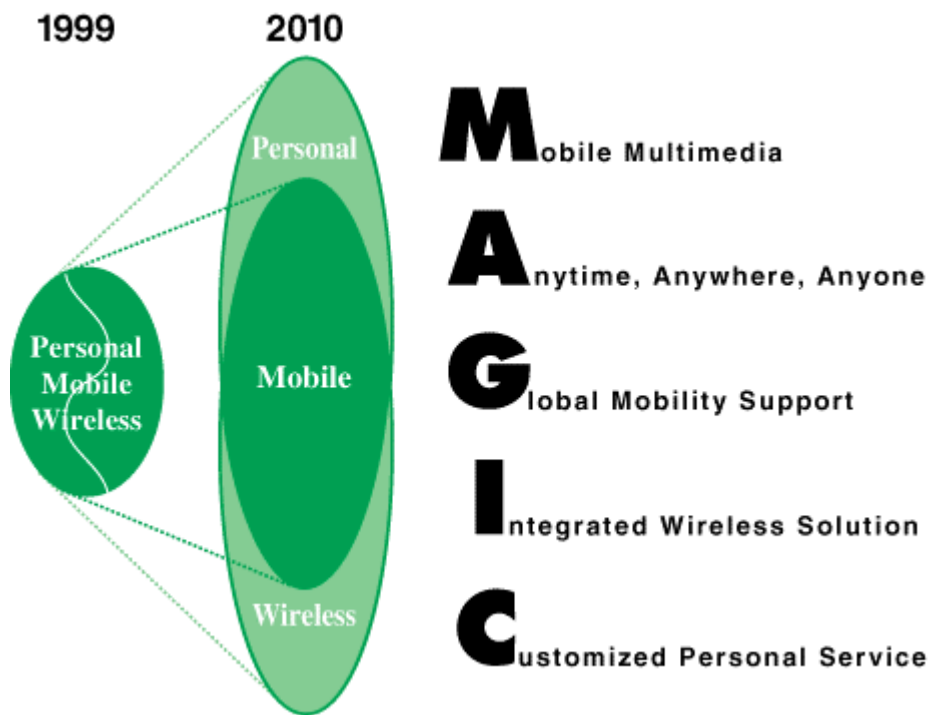
INTRODUCTION

By early 2000, the global mobile market was in a state of flux. New communications services that incorporated voice and data were being launched with the promise of more enhancements. Vendors in the US and abroad were beginning to offer services with 2G (second generation) and 3G (third generation) technologies. Falling prices and improved marketing had turned the wireless into a mass-market service. Initial trends indicated that the European market was better prepared to use wireless services. Network incompatibilities were limiting the US to market opportunities offered by data-enabled devices like those in Europe and Asia. With most of Europe using the Global System for Mobile Communication, known as GSM, mobile phone vendors were in a prime position to deliver a whole new line of services and mobile gadgets. The European domination in this sector was significant, and was directly related to the penetration of cellular phones in several markets. In Finland, for example, 62% of the population had mobile phones. Sonera, the country's carrier, foresaw that their wireless subscriptions would soon outnumber their fixed-line connections. In Sweden, Telia Mobile expected that over the next 2 years, data would make up 30% of the traffic generated by their corporate customers in their Department of the Future mobile services portfolio.[1] Simultaneously, many Internet companies were beginning to rethink their market strategies in Europe. Ebay, the online auctioneer, had launched a trial offering of its services to German mobile phone users. Ebay was considering offering auctions for Italian mobile phone users, sans web site.

In the midst of these developments in Europe and the US, a new global player was emerging from Japan. Defying all predictions, NTT DoCoMo's i-Mode service had gained a rapid following. Flush with domestic success, NTT DoCoMo was planning on entering new markets overseas. Major players across the world were taking a closer look at NTT DoCoMo's global ambitions.

This case study documents the rise of NTT DoCoMo, and outlines their vision and strategy in a rapidly consolidating global mobile communications market.

BACKGROUND

HISTORY

NTT DoCoMo, Inc. began as NTT Mobile Communications Network, Inc. in 1991. Formed as a subsidiary of the Nippon Telegraph and Telephone (NTT), Japan's former monopoly landline local and long distance company, NTT Mobile Communications took over the operations for NTT's wireless divisions. The company provided paging, car, in-flight, and later, mobile phone services. (**Exhibit I**).

The DoCoMo nickname, an acronym for "**Do Co**mmunications over the **Mo**bile Network", was quickly adopted. Growing from 1 million analog mobile users in 1992 to over 27 million users (combined mobile services) by 2000, DoCoMo continually set the market trends in mobile communications. In 1993, digital mobile service was introduced using PDC (personal digital cellular). By 1994, the cellular market explosion took off with customers able to buy instead of rent mobile phones. PHS (personal handyphone services) soon arrived and DoCoMo

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[1] Terho Uimeonen and James Niccolai, Mobile role models; Inexpensive Linux-based solution brings load balancing to all companie, InfoWorld, December 20,1999.

found itself competing with parent company, NTT (also offering PHS). By 1996, DoCoMo had 8 million subscribers and in the same year introduced satellite-based mobile phones to service customers in remote areas beyond cell site territories, such as on ships and in the mountains.

1997 proved to be a critical year for DoCoMo. With success in its back pocket, DoCoMo and its parent company NTT believed all was well. However, Japan's Fair Trade Commission ordered NTT to cut its 95% ownership of DoCoMo in the wake of financial crises in the area.   The following year marked NTT DoCoMo's IPO as the largest in the world at more that $18 billion, effectively reducing NTT ownership to 67%

In 1999, DoCoMo took over the poorly performing PHS service from NTT. Revamping the service to target specific audiences, DoCoMo successfully resurrected the PHS market. In April of 1999, DoCoMo launched i-Mode, the packetized, continuously connected wireless data service that has become the flagship product for the company. By early 2000, DoCoMo had 27.1 million of the 49 million mobile subscribers in Japan. NTT DoCoMo's market capitilization hovers around $335 billion.[2]   DoCoMo's success could be attributed to a combination of factors, but savvy marketing and strong leadership were two of the driving factors.

MANAGEMENT

NTT DoCoMo was a pedigreed offspring of one of Japan's most powerful post-war corporations from which stemmed considerable market power, a seasoned management team and a deep talent pool. From its inception in 1991, NTT DoCoMo had enjoyed a strong leadership position. Since cell phones were initially heavy, large and expensive, many executives felt the DoCoMo initiative would not take off. DoCoMo's CEO Kouji Oshboshi was charged with creating a successful team to deliver an innovative cellular service in Japan. Under the leadership of Oshboshi, DoCoMo responded to the emerging cell phone market by creating the smallest handsets in the world and sharing the specifications with manufacturers like Fujitsu. While the company was growing its mobile subscriptions, Oshboshi set his sites on finding a way to tackle data communications. He charged Keiichi Enoki, an electrical engineer, to find a way. Enoki soon put together a talented team who set their sights on the wireless Internet. The engineering team built a "packet-switched" network that would reduce costs to the end user. Among the key innovators in the group were:

-    seasoned manager Matsunaga, an outside talent

-    Internet entrepreneur, Takeshi Natsuno, and

-    "DoCoMo-chan", the lovable mascot, who would soon become a marketing phenomenon.

Together, this team was credited with having the foresight to look beyond regular digital cellular service offerings. They constructed the idea to build a packet switched network alongside its existing cellular network. The packet network was unlike the conventional circuit switched model whereby a "nailed up" connection must be established. This allowed for multiple access by users at the same time, all the time, as long as the phone is turned on. Their cost efficient and multiple access model was the impetus behind today's I-mode service.

Following this initial success charted by Oshboshi, Dr. Keiji Tachikawa assumed the role of President and CEO in 1998, while Oshboshi retained the Chairman's position. Armed with a PhD. in engineering from Tokyo University and a MBA from MIT, Dr. Tachikawa was very much involved in the operations and strategic planning for DoCoMo. Dr. Tachikawa insisted on affordable pricing and simple, intuitive functionality to ensure widespread adoption of i-Mode. His strategy was obviously successful since i-Mode subscriptions surged to nearly 5 million by April 2000, far exceeding the forecasts. Keiji Tachikawa, DoCoMo's President and Chief Executive was named as one of the Top 25 Managers of the Year by *Business Week International Edition* in January 2000.

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[2] http://www.economist.com/editorial/freeforall/20000311/wb6820.html

Dr. Tachikawa had definite ideas about the future of wireless communications, and believed that content, services, and key strategic alliances would differentiate DoCoMo from the competition. Dr. Tachikawa was determined to have DoCoMo's 3G standard accepted throughout the world with as little resistance as possible. He planned to steer the company through future global expansion to accomplish this task, with Asia as a natural starting point. However, he faced significant challenges going forward. Recently, NTT DoCoMo had to cut back on aggressive growth due to service problems (**Exhibit II**). There were hurdles in forming and managing complex international relationships with equally ambitious players in the area. Technical standards were constantly changing, as were the demands of customers. On a flight from Tokyo to New York, where he was scheduled to speak to a group of investment bankers on Wall Street, Dr. Tachikawa pondered how he should deliver the company's message.

BUSINESS DESCRIPTION

DEFINING THE MOBILE MARKET

In April 2000, the entire domestic Japanese market had 56 million mobile telephone users. Dr. Keiji Tachikawa stated that each year, since 1994, the number of NTT DoCoMo subscribers had increased by 10 million. Every month 20 to 30,000 new users were added, making a projected 10 million new users during 2000. NTT DoCoMo i-Mode users in mid-March 2000 numbered 5.6 million. At the present time, NTT DoCoMo did not have a presence in international markets. The company was positioning itself strategically for entry into markets in Asia, Europe and the U.S. after 3G is launched in Japan in the Spring of 2000. It was aggressively forming strategic alliances, partnerships and working agreements with key players in the mobile computing industry. Dr. Keiji Tachikawa realized that simplicity would be key to the success of i-Mode. At every point of market buildout in Japan, DoCoMo focused on the context of usage of their services, and the needs of their customers.

OPERATIONS

NTT DoCoMo Inc. had a number of subsidiaries to support the basic operational functions of the company. Nippon Senpakutsushin, Inc. operates DoCoMo's maritime services. Other subsidiaries included the eight regional companies, DoCoMo Engineering Inc., DoCoMo Services Inc., and DoCoMo Mobile Inc.

In July of 1998, DoCoMo expanded overseas operations by establishing a European subsidiary named DoCoMo Europe S.A. Soon after DoCoMo Europe, NTT DoCoMo Telecomunicacoes do Brasil Limitada was created. Both subsidiaries were formed with the intent to promote the 3G standardization, and W-CDMA, which were supported by NTT DoCoMo. DoCoMo also paid close attention to advancements in technology and keeps focused aggressively on research. They realized the potential of their "wireless computer", and the fact that the number of home computer users would soon be dwarfed by the number of wireless users. The company further realized that once speech-recognition technology matured to the point where keyboards were not necessary, many users (worldwide) could possibly forgo a desktop computer altogether.

To protect their lead in the market, the company had a state-of-the-art research facility in the Yokosuka Research Park, in southwest Tokyo. The facility had about 700 engineers that tested transmission equipment, cellular phones, palmtops, and car navigation systems based on CDMA. DoCoMo had enhanced the CDMA platform with its own homegrown mathematics skills. A significant amount of DoCoMo's mobile innovations originated in this high-tech R&D facility (See details of the R&D organization at http://www.nttdocomo.co.jp/corporate/rd/profile_e/index_e.html; or take a virtual tour of the R&D facility at http://www.nttdocomo.co.jp/corporate/rd/muse_e/index_e.html)

NTT DoCoMo had the rights to the chipset, mounting and miniaturization technologies. Any company wanting to make the same lightweight and sleek handsets for another market needed to obtain permission from NTT DoCoMo. NTT appears to have understood the context of consumption of its market very well, and built the infrastructure and content to support its activities to address the needs and wants of this market. Since it controlled a large chunk of the infrastructure and content it was not clear if other third-party providers could tap into the dis-aggregation of content and infrastructure.

I-MODE: NTT DOCOMO'S FLAGSHIP PRODUCT

In 1999, DoCoMo also launched their wireless Internet and data service, i-Mode. Within six months, over 1 million subscribers joined the service, making it a wildfire success.[3] The company has stated that its goal is to attract over 10 million users by 2002. Reports indicate DoCoMo has between 3.5 - 4 million i-Mode users through March 1, 2000.[4]

DoCoMo's success with its i-Mode service can be attributed to a number of reasons. Japan's mobile population, over 49 million mobile phone users, was the highest in the world. The i-Mode service offered e-mail, proprietary information and access to over 440 official web-sites, and 9,200 plus private pages. Since the home PC and Internet market had not taken off in Japan, i-Mode offered an attractive alternative. Customers could access banking, email, travel, and information service while on the go. These services were ideal for the small viewing screen on mobile phones.

DoCoMo positioned i-Mode as a "unique mobile experience"[5]. By doing so, i-Mode customers were not disappointed by the basic no-frills presentation on the mobile unit. This was perceived as being an effective strategy for the U.S. and European markets, which had among the highest home Internet usage in the world. Besides the wireless technological lag in the U.S. behind Japan, U.S. providers could see more success in the fledgling wireless data and Internet market. Positioning the wireless product as a separate experience would decrease the level of dissatisfaction U.S. consumers would inevitably feel after trying to compare mobile internet and home base internet.

DoCoMo's primary audience for i-Mode were users in their 20s. This generation was used to using small portable devices, such as games, PDAs, Walkmans, etc. Generation Xers accounted for 50% of all i-Mode users. The marketing team at DoCoMo had pursued this market with high-tech and stylish phones. Some of the more popular phones were extremely compact with bright shell colors and unusually wide color displays. The phones had multiple functionality's. Users could also get directions from their i-Mode phone. Started in February 2000, a new GPS based service helped users navigate in the physical world (See Figure 1). It could be used while on foot, and was provided as a service in combination with i-Mode. In its advertising, DoCoMo sought to convey this notion of the mobile user experience,

> "Doco-Navi provides real-time route guidance to users. It also features concierge-like services that guided the user to points of interest and conveniences, such as restaurants, banks, stores, hospitals etc. More than 210,000 useful sites are available to users who access a location information service center via the terminal."[6]

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[3] Nakamoto, Michiyo "Telcos focus on growing demand for data services:JAPAN", The Financial Times (London), October 10, 1999.

[4] Zohar, Mark "NTT DoCoMo Sets The Mobile Internet Standard", Forrester Research, February 15, 2000; Terazono, Emiko "FT INFORMATION TECHNOLOGY REVIEW: A big rush to sign up for net-linked mobile phones: JAPAN", The Financial Times (London), March 1, 2000.

[5] Zohar, Mark "NTT DoCoMo Sets The Mobile Internet Standard", Forrester Research, February 15, 2000

[6] http://www.nttdocomo.com/corp.htm

Target Customer

As pointed out earlier, DoCoMo's primary audience for i-Mode were users in their 20s. Members of this group were also among the fastest adopters of new features and innovations to the service. DoCoMo had rolled out its services by observing very closely the usage situations and context of use. In fact, one of the most loyal users of i-Mode were teenage girls, who used it to keep in touch with friends and browse interactive content. Both individual and business users could derive multiple functionality out of the service. Some typical customer profiles and usage situations are outlined below:

- A woman customer, who used the i-Mode service for personal usage, said that it was great for keeping track of her email. She didn't send or receive much email using the phone itself, but instead subscribed to a service offered by her Internet provider that used i-Mode's email function to notify her each time a message arrives in her ISP mailbox. Additionally, she used the local area guides offered by the service, a great way to find restaurants and shops when she was in the unfamiliar city of Tokyo. The service also allowed her to check the latest train information before making a trip.

- A businessman used the i-Mode service for email delivery when he was out of the office, and for perusing a stream of business news information from the leading business daily newspaper. He also subscribed to the service's Bandai character delivery channel[7], which sent out a new animated cartoon character every day.

Fees And Billing

Dr. Tachikawa, the president of NTT DoCoMo, had insisted on affordable pricing to guarantee widespread adoption of i-Mode. Users were charged $.04 to send and receive a 250 character message, and $.02 cents to receive a message of the same size. Additionally, Dr. Tachikawa insisted on keeping the functions as simple as possible, often through personal example. For instance, he made sure he could access DoCoMo's share price in just two clicks.

Flat access fees were charged to i-Mode users. The nominal fee, $3, entitled the user to unlimited and continuous Internet connectivity, an i-Mode email address, and nationwide coverage. Additional fees were charged for each packet (about 27 cents) of information. The average data usage was $12 per month. DoCoMo made it easy for the content providers to charge their own fees for access or downloads. Bandai, a popular animation and toy company, charged $1 per month to deliver a new cartoon character everyday to the user's phone. DoCoMo charged Bandai (and all other providers) a 9% commission for billing and collections. This i-mode cartoon site that included Miss Kitty (a pink, mouthless cat with a huge bow on her ear) generated nearly $11 million in annual revenues from its 950,000 members, who paid about $1 a month[8].

The financial results for the company had been encouraging. Subscriber growth in the mobile phone segment of the business had taken off, led by the success of i-Mode . Growth in the other segments had been questionable, thus raising questions about a future restructuring (**Exhibit III**). However, the company remained optimistic about future growth prospects (**Exhibit IV**).

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[7] http://www.abcnews.go.com/sections/tech/DailyNews/imode000313.html
[8] http://www.asianage.com/asianage/14032000/detbus03.htm

Market Positioning

NTT DoCoMo had positioned itself extremely well in the Japanese mobile communications market, making a name for itself as the premier uninterrupted information provider. Their goal was to become a future worldwide market leader, which they were presently preparing themselves for by honing their products in Japan and other Asian countries. As for the U.S. market, Americans were used to speedy Internet access and getting information quickly. Having wireless access would be popular at first but if it was too slow people would grow tired of it. Therefore positioning the product in minds of Americans would be different than in Japan. The company increased branding efforts using such channels as print and television. The Nikkei Weekly awarded NTT DoCoMo first prize in the magazines' Advertising Contest for 1998-99. The ads were described as having an attractive design and "catchy copy" that appealed to a high-quality readership. In addition, the company's branding strategy paid off handsomely, and DoCoMo's president, Kouji Ohboshi was understandably proud of the company's success:

> "Firstly, we have consistently focused on marketing in the five and a half years that we have been operating. This implies considerable market research on customer satisfaction and thorough analysis of the results to pin down the steps that we need to take to satisfy customer demands. To meet those demands we have carried out extensive technical development work. As a result we are able to roll out a fairly inexpensive and good quality network. By moving from analogue to digital, our network capacity expanded threefold - with more technical innovation our capacity is six times the old system. Technical innovation has resulted in lower costs and economies of scale. We also have a very flexible management approach. We change tactics according to market conditions. For example, we have historically reduced subscriber rates very rapidly - as many as three or four times in a fiscal year - particularly when demand starts to lose momentum. A bold investment policy is the last component of our success. A lot of money has to be invested to establish a nation-wide network. Consequently our success stems from our efforts in marketing and technical innovation, as well as management flexibility and a courageous investment policy.[9]

Personalization

i-Mode offered personalization services to subscribers. For a fee, users could download a song which would play every time the phone rang. They could also download an animated character delivery service, which, for $ 1.00 per month, will deliver a new animated Bandai character to the phone every day.

In the near future, NTT DoCoMo planned to bring even more potent personalization services such as biometric authentication of the owner via fingerprint and voice print. This would facilitate greater security for e-commerce transactions, which had been showing tremendous growth and is predicted to be one of the biggest growth areas in mobile computing. Video telephony would further enhance personalization by enabling parties to see each other while talking. NTT DoCoMo reported that entertainment services were the most popular of all its offerings. One of its services, Karaoke Channel, allowed subscribers to check the lyrics of the latest songs before they appeared in the Karaoke songbooks. Several other commercially successful features that incorporated personalization included fortune telling, games, and music.

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[9] http://www.globaltelecomsbusiness.com/gtb/articles/may98/docomo.html

FUTURE TRENDS

NTT DoCoMo had created a business model that could be easily adopted around the world. NTT DoCoMo had built a strategy that would enable the highest level of penetration in the market. By creating a simple business model that didn't extract exorbitant fees, they encouraged growing use of the mobile phone. The continued use conditioned the marketplace to believe that the mobile phone was an extension of the user and an integral part of daily life. With such a clear focus, DoCoMo could design campaigns that matched the market segments in need of expansion. The success of DoCoMo's flagship product, i-Mode, is the result of a comprehensive but simple business model. According to a senior executive, Takeshi Natsuno,

> "People say the Internet has to be free, but we're charging for it. This is a model for the mobile Internet that others now want to emulate."[10]

NTT DoCoMo's business model needed to be crafted further to address the differences in several international markets. Europeans were obviously using their mobile phones for more than just talking. In the UK, 20 million users exchanged approximately 140 million short-message service (SMS) text messages during October 1999. [11] SMS was extremely popular in Europe since most of the country's mobile phone networks are based on GSM technology.

The US didn't yet have a standard in place, and had fragmented technology and spotty coverage, all of which had held back universal development efforts. The growth of mobile voice traffic had been so rapid in the US that network operators such as AT&T and Sprint were having capacity issues. High bandwidth data technologies would require a part of the spectrum that has not yet been allocated for use. If the Federal Communications Commission (FCC) didn't announce that would start licensing spectrum for 3G, little progress could be forseen in the US. (See http://www.fcc.gov/wtb/auctions/ for forthcoming FCC spectrum auction listings). Japan thus had a first mover advantage in the area of mobile communications, especially related to the know-how involved in rolling out high bandwidth services. Companies like NTT have been able to take advantage of deregulation, which began in 1994. The number of Japanese mobile phone users was 4 million in 1995; and over 43 million in early 2000. 3 out of 4 people in Japan owned a mobile phone.

COMPETITION

Qualcomm and Ericsson's CDMA technology was rapidly taking shape and newcomers like DDI and IDO were trying to gain their position. DDI and IDO had launched EZ Service, a data service with multiple functions but without the banking and ticket-buying capabilities of DoCoMo's i-Mode. EZ Service had attracted 32,000 subscribers within one month of their launch. These competitors were extremely focused and differentiated themselves clearly from DoCoMo (**Exhibit V**).

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[10] Kunii, Irene and Baker, Stephen *'Amazing DoCoMo,'* Business Week, January 17, 2000

[11] Terho Uimeonen and James Niccolai, 'Mobile Role Models; Inexpensive Linux-Based Solution Brings Load Balancing To All Companies', *InfoWorld*, December 20,1999.

Competition had intensified and mobile operators had begun to look beyond the boundaries of their domestic markets for new opportunities for profitable growth. With lower pricing, mobile operators were competing directly with established, deep pocket fixed operators for the first time. Innovative operators were combining fixed and mobile service in new ways in order to improve service and also attract new customers.

In Japan, the growth in the market had been tremendous but due to the limitations in mobile applications and the eventual saturation of the market, it would become difficult to maintain this rate of growth. There could also eventually be a shortage of content. Most of the content providers were small and specialized. For example, a company called OpenDoor had teamed up with 30 travel agencies to supply information on affordable plane tickets on i-Mode. Only the daily newspaper Mainichi Shimbun had decided to provide content on the new wireless services.

In contrast to Japan, U.S. and European major media companies had been actively experimenting with various forms of electronic delivery. U.S companies such as Amazon and Delta Airlines had begun to enter the wireless data arena. Amazon announced that customers can purchase their products using Sprint PCS wireless phones. Many other companies were close to rolling out their wireless access as well. Delta was currently testing its wireless services using Spring PCS wireless and on PDAs. Customers would have the ability to check flight arrivals, departures, gate information and worldwide flight schedules. Basic information would be free, but additional details would only be available to Delta Airlines frequent flier members. There were also several innovative startups in the US (like New York based Vindigo, Inc.) who were targeting the personal digital assistant platform (Palm Pilots and Pocket PCs) to deliver a range of interactive content, while others were focused on voice enabled Internet access (like Tellme Networks, Inc., based in California) .

ON THE MENU…

NTT DoCoMo and i-Mode were a smash hit in Japan, and although only available locally, the company's initiatives had gotten a tremendous amount of admiration from the international business community, major telecommunications industry players and consumer technology buffs. Once DoCoMo broke out of its proprietary PHS prison, and implemented W-CDMA , the expectation was that they would be one of the bigger players on the world's mobile computing stage.

MARCH 2001: 3G TIDAL-WAVE TO HIT JAPAN

Over the next year, preparations would be made to roll out W-CDMA for the first time ever, and NTT DoCoMo would be leading the effort beginning at home in Japan. In Spring 2001, the 3G DoCoMo mobile phones would arrive in the hands of Japanese users. The phones would use the new W-CDMA protocol, which, in addition to having an improved voice signal will sport fast music and data access, stereo audio listening, radio and TV reception, video telephony, secure transaction, internet ability, and, of course, the mandatory offering of various entertainment services. To satisfy the demands of Kitty Chan fans, Docomo planned to incorporate Sun Microsystems Inc's Java programming into i-mode handsets. This would enable animated figures to move about the little screens more smoothly and allow automatic updating daily of news, stock prices and other information once it has been downloaded. A Bandai spokesperson promised,

> "We'll be able to do many things, like having Kitty Chan moving back and forth across the display, fetching the latest news for you every day"[12].

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[12] http://www.abcnews.go.com/sections/tech/DailyNews/imode000313.html

These dizzying uses were also becoming more feasible because of the recent allocation of a 5MHz block of the spectrum in Japan, Europe and elsewhere, with the exception of the U.S., and the new 3G protocol developed to exploit it. The W-CDMA/DoCoMo bandwidth specification would facilitate the following speeds: 8kbps for voice; 64 KBPS for PDA's with video; 348 KBPS for vehicles linked to Intelligent Transportation Systems, 2 Mbps for home networking and security.[13] 2G mobile phone speeds were between 9.6 - 14.4 Kbps.

Bluetooth[14], a group developing short-range wireless radio technology for embedding into consumer appliances, would further expand the capabilities of 3G DoCoMos. One example was a wireless earphone/microphone, and a video camera/monitor, both communicating with a DoCoMo phone that was tucked into the users' purse or located up to 100 feet away. The DoCoMo with Bluetooth could also be a super fast modem for a computer, sans cables. The stationary bandwidth of the 3G protocol was a blistering 2 Mbps, which is more than 36 times the speed of a 56K modem (See Figure 2 for a device description).

Judging by the large demand for i-Mode, and the Japanese consumers' enthusiasm for i-Mode entertainment services, the 3G rollout could be quite successful, unless DoCoMo made some serious strategic or implementation errors.

ALLIANCES AND PARTNERSHIPS

Many strategic alliances and partnering relationships were forming between manufacturers of phone sets, base stations, switching components, software developers, and service operators. All of them were fully cognizant of the game in which they are playing- a giant virtual land grab for a secure spot in the multi-regional mobile computing market space. The main event of this land grab would be the carving up the consumer demand for enhanced services. NTT DoCoMo had its own share of partnerships and alliances with several major players[15] (brief listing below)

Sun Microsystems - Java secure transaction software

Microsoft – MobiMagic: A 50-50 joint venture

3COM – Palm Pilot mobile computing hardware

Ericsson – Base stations, phone set development, Europe GSM and GPRS protocol experience and standards implementation experience.

Casio - Cassiopeia mobile computing hardware

ITU – IMT2000, the W-CDMA protocol which NTT DoCoMo helped to establish

Various phone set manufacturers, for development and testing

Member of the Bluetooth Consortium and WAP Forum

NEXT STOP: THE WORLD

After the Japanese rollout beginning in Spring 2001, other parts of Asia and Europe were scheduled to begin. Currently, Europe was in a transition phase, moving from GSM to GPRS, which would allow a speed increase using the same general infrastructure that is now in place. The last major market to begin a 3G rollout would be

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[13] Application/speed numbers from: Cataldo, Anthony (1999), 'Docomo Choices Set Tone for 3G Phone Race,' *Electronic Engineering Times*, April 12.

[14] http://www.bluetooth.com

[15] A full listing of alliances and partnerships can be found at http://www.nttdocomo.com/act.htm

the U.S. This was because the U.S. did not have the necessary spectrum block allocation, but early indications were that it would be available by auction as early as the summer of 2000.[16]

4G: The "Fourth Wave" and "Vision 2010"

NTT DoCoMo's research laboratories had already begun work on the fourth generation protocol for mobile computing. They were working to create a standard to support the richest and most universal media package ever created, as illustrated in the promotional video shown by Dr. Tachikawa, which at times resembled an episode of Star Trek, and titled "Vision 2010"[17]. The signpost for this vision was "M.A.G.I.C." Each letter stood for one of five key concepts (see graphic on Cover Page). While the mobile communications market in Japan had grown remarkably, it has started to show signs of slowing down. At the same time, Japan was facing the major challenge of emerging from the long-lasting effects of a slow economy. With this in mind, DoCoMo would challenge the mobile frontier, in an endeavor to reach the second stage of growth. By the year 2010, the mobile communications market was projected to grow to three times its current size." DoCoMo clearly wished to capture the predicted triple growth in 2010, hoping to drive it forward by focusing on clear goals. That it what is called "Challenging the mobile frontier". Perhaps the most intriguing of the concepts was "Anytime, Anywhere, Anyone". This goal described the ability to move throughout the planet and stay in touch using one phone, to have connectivity through all the stages of one's life, and always on, reliable service.

To illustrate this, a promotional video shown at The Japan Society lecture by Dr. Tachikawa, showed an elderly man speaking to his grandson through his walking cane, which had a video phone built into the handle. In another segment, the child was speaking into a large monitor which also tutored him in virtual reality about dinosaurs. Meanwhile, an office worker remembered to order airplane tickets called his virtual secretary, who placed the order for him. These were dreams right now, but NTT DoCoMo had every intention of converting them into reality.

Questions For Discussion

As Dr. Tachikawa's plane touched down at JFK, he glanced at his checklist of issues to be discussed. We offer them as a starting point for further analysis.

- What were the underlying reasons for the acceptance of DoCoMo's i-Mode service in Japan? What were the building blocks of DoCoMo's success?

- How would DoCoMo continue to build and enhance its innovative capabilities? How would it address technology standards and infrastructure issues going forward?

- How would DoCoMo enter the US market? How would it address the qualitatively different marketing challenges?

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[16] Statement attributed to Dr. Keiji Tachikawa, Lecture at the Japan Society, New York, April 14, 2000

[17] http://www.nttdocomo.com/pr/990325.htm

REFERENCES

Marisa Torrieri, Companies Target New Breed, Generation "Y-erless", Wireless Data News, March 15,2000.

Financial Times (London), *Telcos focus on growing demand for data services*: October 8,1999 Survey Edition I

Velisarios Kattoulas and Kay Itoi with Hideko Takayama in Tokyo, *Reversal of Fortune*, Newsweek International, 05-31-1999. PP63.

Author unknown, *Why Japanese are Mad for I-Mode*, Businessweek Online, January 17, 2000.

Irene M. Kunii, *Staking a claim in Japan's Net Gold Rush (int'l edition)*, Businessweek Online, January 17, 2000.

Irene M. Kunii, with Stephen Baker, *The company's wireless Net phone service is all the rage in Japan—and just might conquer the world*, BusinessWeek Online, January 17, 2000.

Author unknown, *DoCoMo's Dr. Keiji Tachikawa on i-Mode and Beyond (int'l edition)*, BusinessWeek Online, January 17, 2000.

Author unknown, *"it Could obviate the Need for Cable" (int'l edition)*, BusinessWeek Online, January 17, 2000.

What's It All about: An I-Mode Primer (int'l edition), BusinessWeek Online, January 17, 2000.

Company Profile, NTT DoCoMo, www.hoovers.com, 2/23/00

Business Territories, www.nttdocomo.com/corporat/honsya.htm

Ian Messer, *NTT DoCoMo Expects New Cellphone Svc In Japan Spring 2000*, The Wall Street Journal Interactive, March 29, 2000

Photos courtesy of Ericsson Press Information, http://www.ericsson.com/pressroom/phli_pcoco.shtml

GLOSSARY

1. **AMPS** - Advanced Mobile Phone Service - The analog cellular mobile phone system in North and South America and more than 35 other countries. It uses FDMA transmission in the 800Mhz band. The first AMPS system in the U.S. was deployed in Chicago in 1983. See NMT and TACS.[18]
2. **Bluetooth** - Specification allowing 1MB/Second transmission up to 100 feet away. Bluetooth is a SIG founded by Intel, IBM, Toshiba, Nokia, Ericsson, Lucent, Microsoft, 3Com. See SIG.
3. **CDMA** - Code Division Multiple Access - A method for transmitting simultaneous signals over a shared portion of the spectrum. The foremost application of CDMA is the digital cellular phone technology from QUALCOMM that operates in the 800MHz band and 1.9GHz PCS band. CDMA phones are noted for their excellent call quality and long battery life.
   CDMA is less costly to implement, requiring fewer cell sites than the GSM and TDMA digital cellphone systems and providing three to five times the calling capacity. It provides more than 10 times the capacity of the analog cellphone system (AMPS). CDMA has become widely used in North America and is also expected to become the third-generation (3G) technology for GSM.
   Unlike GSM and TDMA, which divides the spectrum into different time slots, CDMA uses a spread spectrum technique to assign a code to each conversation. After the speech codec converts voice to digital, CDMA spreads the voice stream over the full 1.25MHz bandwidth of the CDMA channel, coding each stream separately so it can be decoded at the receiving end. All voice conversations use the full bandwidth at the same time. One bit from each conversation is multiplied into 128 coded bits by the spreading techniques, giving the receiving side an enormous amount of data it can average just to determine the value of one bit.
   CDMA transmission has been used by the military for secure phone calls. Unlike FDMA and TDMA methods, CDMA's wide spreading signal makes it difficult to detect and jam. For more information, contact the CDMA Development Group (CDG) at www.cdg.org. Code Division Multiple Access.[19] A spread spectrum technology, which assigns a code for all speech bits, sends a scrambled transmission of the encoded speech over the air and reassembles the speech to it's original format. Features of CDMA are: "soft hands-off" to reduce dropped calls, longer battery life and talk time than analog, coded phone calls which get "plucked" from the background noise by one phone only (developed by Qualcomm), more efficient use of the spectrum, and the ability to handle data services.
4. **CDMA2000** - A 3G technology that increases data transmission rates in CDMA systems. cdma2000 has been renamed the 1x Multi-Carrier mode (1x MC), which provides a 307 Kbps data rate in the ITU's 3G specification. The ITU 3G specification also includes a 3x Multi-Carrier mode (3x MC) at 2 Mbps as well as W-CDMA, the 3G path intended for GSM carriers in Europe and Japan to upgrade to 3G CDMA.[20] Lucent, Sprint & Bell Atlantic, now trialing this spec in Japan and the U.S. respectively.
5. **CDMAOne** - Main contender today to DoCoMo's I-Mode service in Japan.
6. **CDPD** - (Cellular Digital Packet Data) A digital wireless transmission system that is deployed as an enhancement to the existing analog cellular network. Based on IBM's CelluPlan II, it provides a packet overlay onto the AMPS network and moves data at 19.2 Kbps over ever-changing unused intervals in the voice channels. If all the channels are used, the data is stored and forwarded when a channel becomes available. CDPD is used for applications such as public safety, point of sale, mobile positioning and other business services.
   CDPD was developed as a wireless extension to an IP network and uses the four-octet (0.0.0.0) address for connections. CDPD networks cover most of the major urban areas in the U.S. and has been deployed by AT&T, Ameritech, GTE, Bell Atlantic Mobile and other carriers. By the late 1990s, incompatibility issues had been worked out, and roaming agreements and interoperability between carriers is generally nationwide. CDPD modems [Such as Richochet] are available on PC Cards for laptop and handheld computers.[21] ATT&T plans to

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[18] http://www.techweb.com/encyclopedia/
[19] Ibid.
[20] Ibid.
[21] Ibid.

integrate its existing TDMA voice service infrastructure with this spec for handling wireless data as well. Bell Atlantic wireless also uses CDPD for wireless data today, but moving forward, plans to focus on upgrading it's wireless voice network to handle wireless data.

7. **EDGE** - Enhanced Data rates for Global Evolution - An enhancement to the GSM and TDMA wireless communications systems that increases data throughput to 384 Kbps. See UWC-136, GSM and TDMA.

8. **EPOC** – [Symbian Ltd. Mobile device operating system. (See Symbian)] A 32-bit operating system for handheld devices from Symbian Ltd., London, (http://www.symbian.com). Used in Psion and other handheld computers, it supports Java applications, e-mail, fax, infrared exchange, data synchronization with PCs and includes a suite of PIM and productivity applications. Symbian was originally a software division in Psion and was spun off to support EPOC as an independent entity.[22]

9. **ETACS** - Extended Total Access Communications System: The analogue mobile phone network developed in the UK and available in Europe and Asia.

10. **GPRS** - General Packet Radio Service - The global GPRS market is now beginning to take off. The introduction of GPRS is one of the key steps in the evolution of today's GSM networks to 3G, and GSM operators around the world are upgrading their networks, with a view to launching commercial GPRS services in 2000.Data traffic is increasing enormously, and is expected to grow 40-50 per cent this year. This growth in demand for Internet access and services has paralleled the explosion in demand for mobile communications. Users want access to the Internet while they are away from their offices and homes, and GPRS can deliver this mobile Internet functionality.
With the capability to charge per data bit sent and received, customers will be able to pay only for usage. GPRS will offer a tenfold increase in data throughput rates, from 9.6kbit/s to 115kbit/s. Using a packet data service, subscribers are always connected and always on line so services will be easy and quick to access.
GPRS will allow innovative services to be created, enabling new and previously inaccessible market segments to be addressed, increasing customer loyalty and reducing churn. Machine-to-machine and person-to-machine communications will become possible.
The next stepping stone towards 3G will be the implementation of EDGE, offering data services and applications at speeds up to 384kbit/s essentially using existing infrastructure. Ericsson has been involved in the standardization of GPRS and EDGE from the beginning, and has a leading position in the burgeoning GPRS market with its complete solution, which can be easily and quickly integrated into existing GSM networks.[23]

11. **GSM MoU** - An association which promotes the GSM protocol specification in direct competition to CDMA. (see GSM, CDMA).

12. **GSM** - Global System of Mobile Communications: (Originally defined in France as Groupe Speciale Mobile), the most widely used digital mobile phone system in the world. The GSM systems family also includes GSM 1800 and GSM 1900. There are different phases of roll-out for the GSM system and GSM phones are either phase 1 or phase 2 compliant.[24]

13. **HDML** – Developed by Unwired Planet. Handheld Device Markup Language.

14. **i-Mode**- A packet-based information service for mobile phones from NTT DoCoMo (Japan).
i-Mode provides Web browsing, e-mail, calendar, chat, games and customized news. It was the first smart phone system for Web browsing and grew quickly after its introduction in 1999. i-Mode is a proprietary system that uses a subset of HTML, in contrast to the global WAP standard which uses a variation of HTML, known as WML. See WAP.[25] [NTT DoCoMo's PHS service].

15. **ITU** -International Tellecommunications Union. An organization of the United Nations to help advance the economies of the third world by advancing technological standards.

16. Java, Jini, JavaCard-Sun Microsystems portable language. DoCoMo has deal with Sun to use Java for secure mobile e-commerce.

17. **MME** - Microsoft Mobile Explorer

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[22] Ibid.

[23] Ericsson http://www.ericsson.se/wireless/products/mobsys/gsm/subpages/umts_and_3g/gprs.shtml

[24] NEC Technologies Web Site http://www.gsm.neceurope.com/

[25] http://www.techweb.com/encyclopedia/

18. **NMT** - Nordic Mobile Telephone - An analog cellular phone system deployed in more than 40 countries in Europe. Launched in the Scandinavian countries in 1979, NMT was the first analog cellphone system. Both 450MHz and 900MHz versions are available.[26]

19. **PCN** - Personal Communications Network - also known as the DCS 1800 standard or GSM 1800. It is used in Europe and Asia Pacific.[27]

20. **PCS over cable** - A way for local cable (CATV) operators to start their own "way station" or "cell site" local cellular service. Using their existing cable infrastructure, hooking up an antennae, and uplinking a landline connection to a PCS carrier, they can charge roaming users or local residents for PCS service.

21. **PCS** - Personal Communications Services. Low power, higher frequency (than analog cellular). 1.5 to 1.8 GHz.

22. **PDA** - Personal Digital Assistant - a small mobile computing device such as any Win CE device (e.g. Casseopia), EPOC32 device (e.g. Psion S5) or proprietary operating system device (e.g. Palm IV).[28]

23. **PDC** - Personal Digital Cellular. Japanese spec 2nd generation used by NTT DoCoMo

24. **PHS** - Personal HandyPhone System - Lower power version of PCS for Japan. Proprietary.

25. **SIG** – Special Interest Group. See Bluetooth.

26. **SMS** - Short message service - Available on digital networks allowing messages of up to 160 characters to be sent and received via the network operator's message centre to your mobile phone. To use this service, it must be supported by your network and by your phone. You may also have to add this service to your subscription. All NEC phones support SMS.[29]

27. **Symbian, Ltd**.- A UK based consortium composed of Nokia, Matsushita and PSION. It is in direct competition with Microsoft's WinCE for DoCoMo's 3G phones. See EPOC.

28. **SyncML** -

29. **TACS** - Total Access Communication System - An analog cellular phone system deployed mostly in Europe. It was modelled after the AMPS system in the U.S. In the U.K., ETACS (Extended TACS) tramsmits in the 871-904/916-949MHz band. International TACS (ITACS) and International ETACS (IETACS) are versions that operate outside the U.K. Narrowband TACS (NTACS) operates in the 860-870/915-925MHz band, and by using a narrower channel spacing, delivers more channels in the same amount of spectrum.[30] See AMPS.

30. **TDMA** - Time Division Multiple Access - Used to separate multiple conversation transmissions over a finite frequency allocation of through-the-air bandwidth. As with FDMA, (Frequency Division Multiple Access), TDMA is used to allocate a discrete amount of frequency bandwidth to each user in order to permit many simultaneous conversation. However, each caller is assigned a specific timeslot for each transmission.A digital cellular telephone system assigns 10 timeslots for each frequency channel, and cellular phones send bursts, or packets, of information during each timeslot. The packets of information are reassembled by the receiving equipment into the original voice components.[31] A satellite and cellular phone technology that interleaves multiple digital signals onto a single high-speed channel. For cellular, TDMA triples the capacity of the original analog method (FDMA). It divides each channel into three subchannels providing service to three users instead of one. The GSM cellular system is also based on TDMA, but GSM defines the entire network, not just the air interface

31. **UMTS** - Universal Mobile Telecommunications System – (European name for W-CDMA) is the European member of the IMT2000 family of third generation cellular mobile standards. The goal of UMTS is to enable networks that offer true global roaming and can support a wide range of voice, data and multimedia services. Data rates offered by UMTS are: vehicular - 144kbit/s; pedestrian - 384kbit/s; in building - 2Mbit/s.[32]

32. **UWC-136** - Universal Wireless Communications-136 - Enhancements to the TDMA (IS-136) cellular phone system that increase data rates. EDGE and WIN are key components of UWC-136.

33. **WAP** –Wireless Application Protocol - WAP is a technology designed to provide users of mobile terminals with rapid and efficient access to the Internet. WAP integrates telephony services with microbrowsing and

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[26] Ibid.

[27] Newtons Telecom Dictionary

[28] Ibid.

[29] Ibid.

[30] http://www.techweb.com/encyclopedia/

[31] Newtons Telecom Dictionary

[32] Ibid.

enables easy-to-use interactive internet access from the mobile handset. Typical WAP applications include over-the-air e-commerce transactions, online banking, information provisioning and messaging. [33] In January, 1998, Ericsson, Motorola and Nokia and Unwired Planet (now known as Phone.com) formed Wireless Application Protocol Forum, LTD. To develop a spec for bringing internet services to mobile phones. http://www.wapforum.org.

34. **W-CDMA** - Wideband-Code Division Multiple Access - Also referred to as 3G or IMT-2000. Developed by the ITU (see ITU), WCDMA (Wideband Code Division Multiple Access) is the radio access technology selected by ETSI (European Telecommunications Standards Institute) in January 1998 for wideband radio access to support third-generation multimedia services.

Optimized to allow very high-speed multimedia services such as voice, Internet access and videoconferencing, the technology will provide access speeds at up to 2Mbit/s in the local area and 384kbit/s wide area access with full mobility. These higher data rates require a wide radio frequency band, which is why WCDMA with 5MHz carrier has been selected; compared with 200kHz carrier for narrowband GSM.

Easy integration into existing infrastructure

WCDMA can be added to the existing GSM core network. This will be particularly beneficial when large portions of new spectrum are made available, for example in the new paired 2GHz bands in Europe and Asia. It will also minimize the investment required for WCDMA rollout – it will, for example, be possible for existing GSM sites and equipment to be reused to a large extent.

A single standard for all

An agreement on a globally harmonized third-generation CDMA radio standard that addresses the needs of all current wireless communities was reached by the Operators' Harmonization Group in May 1999. There will be three modes in the harmonized 3G CDMA standard; a direct-sequence mode for WCDMA, a multi-carrier mode for cdma2000 (an evolution of narrowband CDMA), and a time division duplex (TDD) CDMA mode[34]
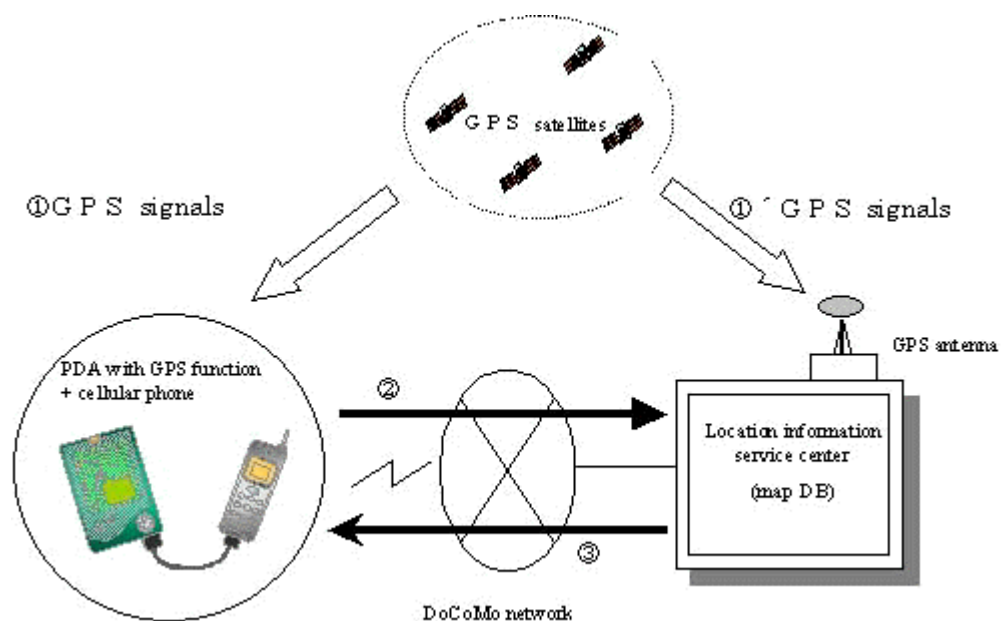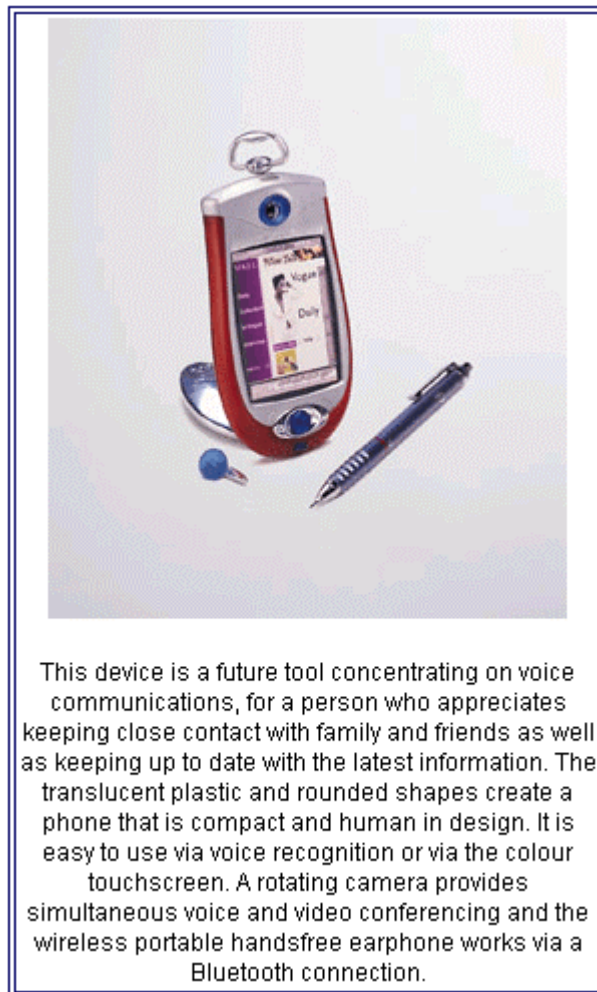
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[33] Ibid.

[34] Ericsson http://www.ericsson.se/wireless/products/mobsys/gsm/subpages/umts_and_3g/gprs.shtml

Figure 1: DoCoNavi

Figure 2: DoCoMo Bluetooth Device Configuration

This device is a future tool concentrating on voice communications, for a person who appreciates keeping close contact with family and friends as well as keeping up to date with the latest information. The translucent plastic and rounded shapes create a phone that is compact and human in design. It is easy to use via voice recognition or via the colour touchscreen. A rotating camera provides simultaneous voice and video conferencing and the wireless portable handsfree earphone works via a Bluetooth connection.

Exhibit I

NTT Group Background

Similar to the divestiture of AT&T, the legal and regulatory framework for telecommunications in Japan had undergone the introduction of several reform laws aimed at promoting competition in the telecom marketplace since the mid 1980's. In response to these changes, Nippon Telegraph and Telephone Corporation, a former state monopoly, had been reorganized into a holding company structure of three wholly owed subsidiaries consisting of two national carriers and one international carrier: NTT East, NTT West and NTT Communications Corporation. The restructured NTT Group still held a majority stake in NTT Data and in the NTT Mobile Communications Network Division, better known as NTT DoCoMo.

The new holding company structure of the NTT group would allow its subsidiary divisions to compete in the open marketplace at home and abroad. All accounting responsibilities had been placed on each of the divisions, and every entity would be responsible to conduct their businesses independently and autonomously in response to market developments.[35]
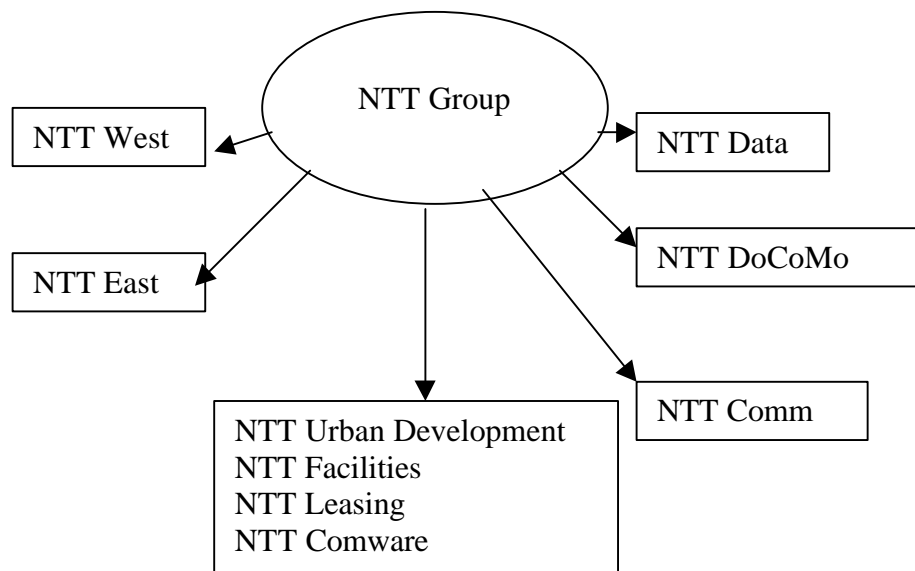
Amidst this changing landscape, however, the NTT Group had been careful not to allow its star performers stray too far. But despite the bosom-hold DoCoMo might feel from its parent company, the relationship worked advantageously in many ways in this furiously paced market. For one, the strong position and market capitalization of the two companies eliminated DoCoMo as a potential takeover target. Since the doors have been open to competition, the #2 international carrier, International Digital Communications (IDC), was purchased in a half billion dollar deal by UK based Cable and Wireless. Foreign investment by AT&T and British Telecom recently took a 30% stake in Japan Telecom.

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[35] NTT 1999 Annual Report (http://www.ntt.co.jp/ir/e/report.html)

Exhibit II

DoCoMo's Service Disruption[36]

**NTT DoCoMo's i-mode service disrupted;
5.46 million users hit**

By Bloomberg, CNET News.com

Tuesday, March 28 2000

TOKYO--NTT Mobile Communications Network Inc said its i-mode service, which provides Internet access through mobile phones, was down for three hours because of a problem in a computer center in Tokyo.

Japan's largest cellular carrier and the second largest cellular operator in the world, has its i-mode service disrupted at 11.40am local time. It was retored at 2.52pm.

The popular wireless Internet service allows mobile users to access various text and interactive services via their cellular handsets. It was launched 13 months ago and has caught the attention of Japanese consumers.

All of the 5.46 million i-mode subscribers nationwide were being affected, although they could still use their phones to make calls.
When the problem first hit, the company, better known as NTT DoCoMo, could not say when the problem would be solved.
NTT DoCoMo's shares rose as much as 6.4 percent to 4.3 million yen (US$40,417). The stock traded recently at 4.2 million yen (US$39,477).

DDI Corp, Japan's third-largest telecommunications carrier, had a similar problem on Feb. 23 this year when 210,000 users of its EZweb mobile Internet service, which competes with i-mode, were unable to access to the service for five hours after one of its server computers crashed.

That problem was due to a glitch in the database software, which damaged some files.

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[36] Courtesy Bloomberg L.P. and News.com http://singapore.cnet.com/news/2000/03/28/20000328t.html

Exhibit III

Subscriber Numbers and Financials (ending March 31, 2000)[37]

Number of Subscribers for Major Services (as of March 31, 2000)

	Consolidated (Changes from March 31, 1999)	**Non-consolidated** (Changes from March 31, 1999)
Cellular	29,360,000 subscribers (up 22.8%)	12,420,000 subscribers (up 17.2%)
i-Mode	5,600,000 subscribers (up 11,674%)	1,870,000 subscribers (up 8,077%)
PHS	1,440,000 subscribers (up 6.9%)	660,000 subscribers (up 17.5%)
Paging	1,440,000 subscribers (down 31.6%)	560,000 subscribers (down 31.0%)

Results for Fiscal 1999

	Consolidated (Changes from March 31, 1999)	**Non-consolidated** (Changes from March 31, 1999)
Operating Revenues	3,716.6 billion Yen (up 19.3%)	1,735 billion Yen (up 16.8%)
Operating Income	545.7 billion Yen (up 7.3%)	256.1 billion Yen (up 9.5%)
Recurring profit	503.1 billion Yen (up 43.6%)	232.7 billion Yen (up 35.8%)
Net Income	252.1 billion Yen (up 23.1%)	128.5 billion Yen

[37] Source: NTT DoCoMo, Inc, Consolidated Financial Statements For The Fiscal Year Ended March 31,2000

Exhibit IV

Forecast Subscriber Numbers and Financials (ending March 31, 2001)[38]

Forecast number of Subscribers for Major Services (ending March 31, 2001)

	Consolidated (Changes from March 31, 1999)	Non-consolidated (Changes from March 31, 1999)
Cellular	33,380,000 subscribers (up 13.7%)	13,720,000 subscribers (up 10.5%)
i-Mode	13,740,000 subscribers (up 145.4%)	4,450,000 subscribers (up 138%)
PHS	1,700,000 subscribers (up 18.1%)	790,000 subscribers (up 19.7%)
Paging	1,230,000 subscribers (down 14.6%)	470,000 subscribers (down 16.1%)

Forecast of Results for Fiscal 2000

	Consolidated (Changes from March 31, 2000)	Non-consolidated (Changes from March 31, 2000)
Operating Revenues	4,147 billion Yen (up 11.5%)	1,902 billion Yen (up 9.6%)
Operating Income	599 billion Yen (up 9.8%)	264 billion Yen (up 3.1%)
Recurring profit	574 billion Yen (up 14.1%)	255 billion Yen (up 9.6%)
Net Income	309 billion Yen (up 22.6%)	147 billion Yen (up 14.3%)

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[38] Source: NTT DoCoMo, Inc, Consolidated Financial Statements For The Fiscal Year Ended March 31,2000

Exhibit V

Competitive Wireless Offerings[39]

Service Name	JapanInc.Net Review
I-mode Company**: NTT DoCoMo**	Has the most sites. Best for cheap email and low-cost surfing. 440 sites, plus 9,200-plus unofficial ones.
EZaccess Company: **IDO**	For speed freaks. 64-Kbps* transmission rates make it faster than most people's home connections. 200 sites.
J-Skyweb Company: **J-Phone**	Tops when it comes to high-quality color graphics. About 100 sites.
EZweb Company**: Tu-Ka**	High sound quality. About 200 sites.
@contents Company**: H**	Cheap voice, and it's the only service with no additional monthly fee for Web access. About 113 sites.

39
 Source: JapanInc.net (2000), 'Unwired - The Services', June,
http://www.japaninc.net/mag/comp/2000/06/jun00_unwired_services.html