The challenging of the old Tsunami: the case of NTT DoCoMo
- *Competitive, regulatory, innovation, network and overseas challenges* -

CBS Working paper by
Lars Engel Nielsen & Volker Mahnke

Department of Informatics
Copenhagen Business School,
Howitzvej 60, DK-2000 Frederiksberg, Denmark
Phone: (+45)38 15 24 00, Fax: (+45)38 15 24 01
E-mail: vm.inf@cbs.dk

Abstract

In recent years, the leading Japanese wireless operator NTT DoCoMo has risen from being largely unknown outside Japan to international fame. Ground-breaking service innovations such as the world's first wireless internet service, I-mode, the world's first third generation wireless service FOMA, as well as the company's successful proliferation of its W-CDMA 3G technologies as the UMTS standard in Europe have generally impressed the troubled telecom industry on its brink to the new era wireless data services. Conversely, much scientism has been aired whether the NTT DoCoMo experience applies to European and US contexts due to differences in e.g. demographics, Internet penetration, and wireless industry structures. To date, these considerations have largely been based on anecdotal reports in trade magazines and an increasing number of case studies focused primarily on the I-mode service (e.g. Mulder and Simpson (2001); Harvard (2000)). Notable, exceptions are Ratliff (2001) and Williamson and Meegan (2002) that however both point to the need for elevating insights on NTT DoCoMo. This working paper sets out to contribute to a more elaborate picture of NTT DoCoMo.

The working paper is outlined as follows. Departing from a sketch of DoCoMo's current challenges from the perspective of the CEO Keiji Tachikawa as the financial year 2003 is coming to an end (March 31 2003), a brief introduction to DoCoMo's history and its innovative capabilities initiates the effort to present a more detailed picture of the company. Then, the normal perception of NTT DoCoMo as a de facto monopolist with all dominating market and bargaining power is challenged by means of longitudinal study of the Japanese wireless market's development from 1992 to 2003. During this period, DoCoMo's leadership position as increasingly been challenged by new competitors that emerged from an industry consolidation and regulatory forces. It is found that the nature of competition has shifted from DoCoMo's undisputed dominance to a more dynamic environment signified by intense service innovation based competition. Then, insights are provided as how the NTT DoCoMo competes in its new environment. Three key strategic pillars are analyzed, namely the company's to approaches the (1) orchestrating of innovation with the examples of I-mode, C-mode, and Telematics services, (2) relational challenges with the examples of technology standardization alliances, interfirm relationships with handset providers and internationalization partners, and lastly (3) how new growth avenues are explored.

On his return from London in mid-January 2003, Keiji Tachikawa, CEO of Japan's leading wireless operator NTT DoCoMo, had time to reflect on his company's spectacular journey over the past decade from largely unknown Japanese wireless monopoly to globally celebrated wireless technology and market leader. DoCoMo had first caught the worlds attention with its world-first and highly successful wireless Internet service dubbed I-mode launched in February 1999, then later with the also world-first but to-date less successful FOMA 3G wireless service launched in October 2001, and its global crusade to spread its wireless services, handsets and network technologies in Asia, Europe and US through minority equity investments in overseas wireless operators since 1999.

Looking at a perfectly blue and cloudless sky from his seat, Tachikawa recalled the exciting times of the 1990s and the early 2000s in which his company was among the world's fastest growing companies. Impressive yearly growth rates propelled annual revenues from ¥807 billion in 1995 to ¥5.171 billion in 2002. In the same period, the subscriber base had rocketed from 2,2 million to 43 million meaning that the company commanded nearly 60% of the worlds second largest wireless market. By 2002, the company's success had made it the largest by market capitalization value in Japan, and among wireless operators globally (Business Week, 15.07.2002). In 2001, the Economist ranked the company number 9 among the world's 5.000 largest quoted companies by accumulated shareholder value generated between June 1996 and June 2001. DoCoMo was the best performing telecommunication operator worldwide (Economist, December 2001). A final testimony of his company's achievements was its lead in the service innovation race to substitute falling earnings on voice calls with new revenue sources from wireless data services such as Internet, Email, M-commerce and Multimedia. By end of 2002, DoCoMo generated 20% of revenues from wireless data, while global competitor Vodaphone's share of data ARPU amounted to 16% (Appendix; Vodaphone, 2003).

As the sleek private jet entered a thundercloud, the turbulence brought Tachikawa back to his company's challenges of present times. Recently, DoCoMo had faced increasing problems both due to intensified competition in the Japanese home-market, a widening revenue gab caused by early saturation of its 2G services and a surprisingly slow uptake of its 3G services, and substantial losses on overseas investments. The last financial year ended in March 2002 had broken the company's steady profit growth due to substantial write-offs on equity investments in Asian, European and US wireless operators caused by partners' falling share prices due to the burst of the telecom share bubble. Since, more write-offs had followed leading to accumulated losses of Y1,489bn of the totally Y1,800bn invested overseas. In Japan, the successor to I-mode that with currently 36 million I-mode subscribers had been the key driver of the company's growth since the launch in February 1999, 3G FOMA had witnessed nearly disastrously slow uptake. Meanwhile, for instance, competitor KDDI had surpassed DoCoMo with their attractive and successful camera-phones and thereby threatened DoCoMo's unbroken lead in service innovations.

Soon, the financial year 2003 would come to an end. By March 2003, the company at best would have solid proof to shareholders and industry observers that the tremendous success of I-mode had not merely been one-time luck. Indeed, during

2002, the ambitious international expansion plans had materialized through a series of commercial launches of I-mode on new 2,5G networks in Europe and Asia, however with limited success so far. Also, substantial efforts had been made to match and outpace Japanese competitors in launching new innovative wireless services and handsets. The big question remained, if DoCoMo was on the right strategic track for the current and future challenges in the rapidly changing and increasingly competitive wireless industry. Surely, by mid-March shareholders would ask him that question.

The London-visit he was returning from had included a friendly visit to the premises of newly established European HQ, but also a rare public interview with the Financial Times. At the interview, he had indicated that his Company expected substantial consolidation in the European market resulting in four major regional players. He had also defended his strategy of taking minority investments in overseas operators rather than e.g. entering markets through acquisition like Vodaphone. In Europe, the key partner, Dutch KPN Mobile, against expectations based on recent financial trouble would not emerge one of the four key players. "That is why we are being friendly with Telefonica (of Spain) and we have been friendly with TIM (Telecom Italia Mobile) for many years, Tachikawa said (Financial Times, January 2003a). But would those answers satisfy shareholders, and even more importantly secure the continuous growth of DoCoMo?

Introduction to NTT DoCoMo

As the leading wireless operator in the Japanese home market, NTT DoCoMo captures around 60% of the world's 2nd largest wireless market – a market that was largely developed by the company itself during the 1990s. Telecommunications has traditionally been focused on transmitting voice calls, but following a global trend, revenues from traditional person-to-person voice services have been steadily declining since the mid-1990s. Highly successfully, the company has responded to this key challenge of Global Wireless Industry by developing and commercializing new wireless data services to generate new revenue sources.

NTT DoCoMo's core business remains the provision of wireless voice and data services through attractive operator-specific handsets retailed by NTT DoCoMo to subscribers. To do so, the company co-develops, builds, operates and owns a wireless infrastructure transmitting the voice and data signals. Traditionally, revenues are earned on time-based tariffs charged for voice calls. In the case of wireless data services tariffs are charged on the amount of data packets transmitted when subscribers e.g. surf the wireless internet or receive wireless emails, as well as shared revenues from the service fees collected by content providers for access wireless internet services such as ringing tones, entertainment, news and more. Thus, fundamentally, DoCoMo make revenue by offering attractive wireless services or providing access to attractive wireless Internet content that generate chargeable network traffic. Facing declining voice revenues, the company in line with global peers is eagerly developing new revenue sources in the emerging era of wireless data. Thus, revenues are increasingly earned on e.g. revenue sharing with wireless content providers, advertisements on the wireless Internet, profits and equity gains from overseas market alliances, and service application alliances. Moreover, revenues are earned from royalties and licenses on the company's technology base.

Company history

The prior wireless arm of the formerly state-owned Japanese telecommunication monopoly, Nippon Telegraph and Telephone Corporation (NTT), was spun-off in April 1992. The split-up was driven by the liberalization and privatization of the Japanese telecommunication sector, and throughout the 1990s regulators continued to lower protection from national and later international competitors to the benefit of consumers. While parent NTT has remained in the seat as majority owner with currently 64,1% of outstanding shares, the October 1998 IPO in Tokyo, further listings at NYSE and LSE in March 2002, and a series of corporate bond issues have increased exposure to and fundraising from the international financial markets.

The company's first CEO (1992-1998), Kouji Oshboshi, provided the leadership necessary to develop the wireless market in Japan since 1992. In 1997, he predicted that growth generated on wireless voice services would saturate in the near future. This promptly motivated the establishment of the Gateway Business Department led by another key executive and electrical engineer, Keiichi Enoki, with the task to develop non-voice (i.e. data) wireless services (Kodama, 2001). Enoki soon built a talented engineering team. Among the key innovators in the team were seasoned manager and outside talent Mrs. Matsunaga, and the Internet entrepreneur, Takeshi Natsuno. Key to the development of the I-mode service was that the team worked around a business model inspired by AOL's platform approach in USA rather than a technology, and moreover entirely built the wireless service on existing technologies to minimize time to market (Business Week, 17.01.2000; Mulder and Simpson, 2001; Kodama, 2001). In 1998, Keiji Tachikawa became CEO (and still is), and contributed in the commercialization stage of I-mode by e.g. insisting on affordable pricing and simple and intuitive functionality to ensure widespread adoption of I-mode (Business Week, 17.01.2000). Under Tachikawa, DoCoMo's management has sustained its recognition among industry observers as visionary and innovative, and moreover accelerated the internationalization process of the company that today is among the cores of the competitive strategy (Credit Swiss First Boston, September 2000; Boston Consulting Group, 2002).

DoCoMo's innovative capabilities

Looking back on the past 3 years, Keiji Tachikawa was puzzled with the kind of attention paid to his Company. DoCoMo had gone from being largely unknown outside Japan to be globally celebrated for its innovative I-mode wireless Internet and the daring worldwide first launch of 3G services. At the same time, however, overseas skeptics claimed European and US players could learn little from DoCoMo, as its success had more to do with young Japanese gadget freaks and a protected market position than DoCoMo itself. In consequence, considering the efforts of western firms to learn TQM from Toyota during the 1980s, surprisingly little consideration had been made about the factors underlying the DoCoMo's success. In his opinion, however, DoCoMo's success is very much based on its strong innovative capabilities held both internally and externally.

Strong R&D in wireless technologies, infrastructure and handsets

Wireless operators typically focus solely on network operations and rely on equipment and handset vendors for R&D. In comparison, DoCoMo has a strong R&D tradition for both basic and applied R&D in wireless technologies, which was a key inheritance from NTT. After the Second World War, the parent company was created by the Japanese state as a monopoly to provide telecommunication services to stimulate the national economy and to facilitate other high-tech industries through huge R&D and procurement budgets. The objective was to nurture and support a strong family of firms to domesticate foreign technology and ensure independency. The 'NTT family' included 'the big four' (NEC, Fujitsu, Oki and Hitachi) and a couple of hundred smaller firms. The keiretsu-style environment was highly collaborative rather than competitive, and NTT co-funded and participated in the development of new equipment and products that were subsequently procured from family members (Anchordoguy, 2001; Business Week, January 2000).

Today, a state-of-the-art R&D organization with above 900 researchers keeps up brutal pace of innovation, and is headquartered in the Yokosuka Research Park (YRP), southwest of Tokyo. Here, Japanese and overseas handset and equipment vendors flock to learn from and collaborate with one of the global wireless technology leaders. Also, Western journalists and companies frequently visit the premises to get a taste of future wireless telecommunications. The organization covers all R&D stages ranging from basic research, and applied research often conducted with technology alliance partners, to prototyping and testing through trials of novel technology systems, and finally refinements of existing equipment through operations and maintenance (NTT DoCoMo Annual Report, 2001).

During the 1990s, the Company's proprietary 2G PDC wireless technology dominated the Japanese market, and the high quality of the network ensured unchallenged technological leadership until mid-1998. It was developed solely through the NTT family and intended for later export to EU and US markets. Regional standardization processes, however, resulted in EU adopting GSM and the US having enough competing standards already, which postponed the internationalization of DoCoMo. Still, due to its packet-switched communication mode, the PDC network became key to the development of the I-mode Internet service because it enabled the I-mode creators to build the innovative platform business model with its always-on feature, and simple billing system based on revenue-sharing for wireless data services. Hence, the network enabled the launch of the worldwide first wireless Internet service in 1999 at low investment costs (Funk and Methe, 2001; Credit Swiss First Boston, September 2000; Ratliff, 2002).

The commercial launch of the 3G FOMA wireless service in September 2001 was the culmination of 10 years innovation efforts. Basic research commenced in the early 1990s, collaborative applied R&D for building and testing experimental network systems was pursued in late 1990s and the network rollout was initiated in 1999 (NTT DoCoMo press releases, Nakajima and Yamao, 2001). The WCDMA technology provides a 10-fold performance increase compared to 2G technologies (i.e. 384 kbps downlink and 64 kbps uplink transfer speeds). Based on lessons learned from PDC, DoCoMo has very actively proliferated the technology as the 3G world standard through standardization forums, technology alliances with equipment vendors and handset producers, and market alliances with overseas wireless operators. W-CDMA was adopted by the European standardization body ESTI in 1997 as the European 3G

standard (UMTS), and numerous Asian countries have also adopted the standard. Currently, around 110 wireless operators have adopted the standard, which puts it ahead of the main competing standard, US-based CDMA2000 1x (NTT DoCoMo Press release, 06.11.2002).

In Europe and US, most wireless operators are struggling with high debts from 3G licenses and investments in intermediate network updates for wireless data with e.g. GPRS and in 3G infrastructure. Ahead of its time, DoCoMo is preparing for 4G wireless telecommunications based on a R&D programme started in April 1998 (NTT DoCoMo Press release, 05.04.2000; NTT DoCoMo Annual report, 2001). During 2002, OFDMA was chosen as the company's 4G standard, and successful transmission at 100Mbps-downlink and 20Mbps-uplink speeds on a 4G experimental system during fall 2002 indicates the advanced stage of the company's research. Whereas WCDMA was not compatible with PDC meaning high investments in rolling out a new network for 3G, OFDMA is designed to be compatible with WCDMA allowing cheaper gradual updates of existing 3G networks in the future (Nakajima and Yamao, 2001; NTT DoCoMo Press releases).

Following the tradition of NTT, DoCoMo has continued to do joint R&D with wireless infrastructure and handset vendors in 'the NTT family' and in particular NEC and Fujitsu. However, since mid-1990s the family has been extended internationally. Now, key infrastructure vendors are NEC, Ericsson and Lucent, and key handset vendors include all major Asian, European and US vendors.

Superior technology commercialization and marketing skills

NTT DoCoMo is renowned for having an exceptional marketing power based on a customer-oriented mindset, strong brands and superior sales channels (Nomura, 1998; HSCB, October 2001). Customer-orientation might be expected from modern companies. Nonetheless, in recent years, European and American wireless operators have proven "notoriously bad at developing new attractive services" to consumers, and a key reason is often sighted to be overly emphasis on technology rather than customer needs as seen with the failed European WAP wireless Internet service (Economist, July 2002).

Keiji Tachikawa had recently refused to make guestimates on future killer applications to succeed SMS and ringing tones, "because our customers will decide" (Boston Consulting Group, 2002). Instead of outguessing customer preferences, the Company instead relies on large-scale experimentation of multiple killer application candidates. To illustrate, in the case of I-mode, the company developed a technology platform for Internet-like content, which serves as a market place in which sellers (i.e. content providers) by utilizing available platform features provided by NTT DoCoMo such as JAVA compatibility, I-area (location-specific services), I-shot (pictures) and I-motion (video) can develop and offer new innovative service content to I-mode and FOMA subscribers. DoCoMo facilitates the market transactions with effective billing systems, sets quality standards for official content providers, and ensures that the total portfolio of content providers cover a wide range of content categories such as ringing tones, banking, news, restaurants and more. Over time, the actual subscriber demand will lead to either prosperity or failure of launched content services. Thereby, no matter which services prevail, DoCoMo will profit from increased network traffic

from the commercially successful services. Currently, I-mode gives access to 3.000 official I-mode sites and above 54.000 voluntary sites not officially associated with the Company (NTT DoCoMo Annual report, 2002).

The company takes a similar portfolio approach to the joint development of new types of wireless services with alliance partners such as Sun Microsystems, Matsushita, Sony, IBM, HP, Walt Disney, Sony Playstation, Sega, AOL, SAP, IBM Lotus, Oracle, Coca-Cola and Nissan. Now, thus, the 'DoCoMo' family is also crossing national boundaries for service development. Given the uncertainty on how the new wireless technology can be commercially exploited and which new wireless data services customers will pay for, DoCoMo engages in R&D alliances with leading firms from other industries such as music, movies, entertainment, banking, gaming, business solutions, automotive industry, formula one racing and more to leverage partners' customer and market knowledge. I-mode was likewise developed in collaboration with Internet firms, content providers, customers and internal R&D staff. In these technology alliances, brainstorms produce novel applications of wireless technologies and market feasibility studies determine if joint development of new business ideas and enabling technology platforms should be pursued. After commercial launch, the partners share profits and property rights through consortia (NTT DoCoMo press releases).

In Japan, the company has developed strong brand names such as DoCoMo, I-mode and now also FOMA. DoCoMo is a play of the Japanese for "anywhere", and was initially a slogan, which due to high brand recognition was adapted as corporate name in the late 1990s. In Japan, the corporate mascot "DoCoMo-Chan" has long been a marketing phenomenon (Nomura, 1998). The 2G wireless service brand, I-mode stands for interactive, Internet, and independence (Fortune, September 2000). The FOMA wireless service, which is an abbreviation of Freedom Of Mobile multimedia Access, also holds a strong symbolic meaning. Backed by the commercial launches of I-mode in several Asian and European countries, NTT DoCoMo is becoming known around the world, and I-mode may soon become a global brand associated with superior wireless services.

Strong financial resources

Wireless telecommunications is a capital-intensive industry, and wireless operators face substantial up-front capital requirements to both upgrade existing 2G networks to 2,5G compatibility and in particular for building novel 3G network infrastructures. In parallel to the increasing technological complexity, wireless networks tend to become increasingly expensive to operate (Davies, 1996). Also, capital expenses to development of new wireless data services and content are souring (Financial Times, May 2002).

With a consistent dept/equity ratio around 30%, NTT DoCoMo is far less leveraged than most other wireless operators. The financial position is not only strong due to partial state-funding of e.g. R&D, the tremendous revenue and profit growth endured since 1992, and the fact that Japanese wireless operators faced no 3G license payments. Also, the company has raised substantial sums in the equity markets through the 1998 IPO, the 2002 additional listings and several bond issues before the window of opportunity closed to its peers in the light of the burst of the telecom

bubble. Also, for international expansion DoCoMo relies on equity-stakes rather than M&As as opposed to e.g. Vodaphone, Deutsche Telecom and French Telecom (USB Warburg, June 2000; NTT DoCoMo, October 2002). Thus, in 2000 and 2001 as many overseas peers were financially troubled, the company earned a reputation as a cash-rich partner for the investment and commercialization of 3G wireless services. A hard blow to the relatively cautious investment strategy of DoCoMo was caused by falling share prices of its overseas investments leading to write-offs of Y1,5bn out of a total of Y1,8bn overseas investments. Still, at the January 2003, CEO Keiji Tachikawa had reassured observers that DoCoMo stays with its equity-based internationalization strategy. He had added that while his company was on the outlook for investment opportunities, now was time for patience. While he expected an European consolidation in the near future with the outcome of four major regional players, apart from Vodaphone it was unclear who would emerge as key players. (Financial Times, January 2003a).

Wireless market development in Japan

Until 1985, telecom services were the sole domain of state-owned NTT, and international communications were the remit of KDD, a listed company partly owned by NTT and an arm of the Ministry of Posts and Telecommunications. Although the market was technically opened and NTT was partially privatized in 1985, the government did little to enable effective competition beyond minor moves to open up long-distance and international markets (Far Eastern Economic Review, August 1999). Four telecom segments emerged in the light of regulation; local calls within each of the nine regions of Japan, domestic long-distance calls between regions, international calls, and wireless calls (Morgan Stanley, August 1997).

DoCoMo was spun-off from parent NTT in 1992, at which time liberalization of the wireless telecom segment remained limited, and DoCoMo still enjoyed monopoly market position. The wireless market itself was also limited, as NTT had only attracted 1 million subscribers from 1979 to 1992. Key reasons were that offered wireless services and handsets were still being too expensive for most households, analogue voice services were not compelling enough, and mobile handsets were heavy and unattractive to consumers. In the first years, NTT DoCoMo did not bring about much change to this neither and over the next two years only 1 million new subscribers were added.

In 1994, long due liberalization paved the road for domestic competitors, and soon NTT DoCoMo faced competition from new domestic wireless operators such as DDI, IDO, JPO, Tu-Ka, and Digital Tu-Ka. Facing souring competition from the newcomers, NTT DoCoMo launched new tariff schemes lowering prices, and a handset-purchasing programme that allowed customers for the first time to buy handsets instead of leasing them. Over the next years the wireless market boomed as mobile phones and services became affordable for the masses. The 10 million mark was passed in early 1996 after three years consecutive 100%+ growth due to the continuously intense price competition and improved services.

By the end of 1996, NTT DoCoMo had seen its market share erode to 52,5%. The biggest competitor, DDI, commanded 16,4%. The two operators were the only to offer nationwide wireless services, while holding different regional strongholds. The

rest of the booming wireless market was served by four regional operators, although with varying degrees of success and growth potential; JDP (9,2%), Tu-Ka (9,1%), IDO (8,2%), and Digital Tu-Ka (4,6%) (Morgan Stanley, August 1997; TCA, 2003).
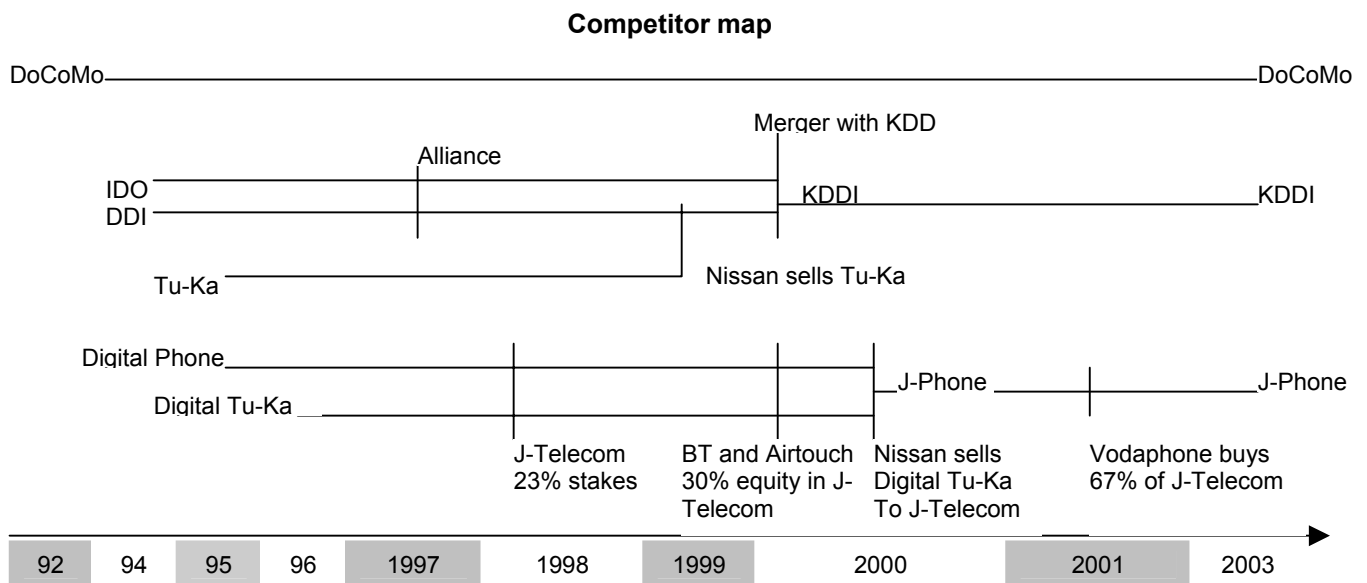
Still, the NTT DoCoMo continued to dominate the wireless market and captured most of the market growth despite intense price competition on tariffs and handsets. In particular, its competitive lead was underpinned by a supreme image on service quality and customer care, high customer loyalty, an attractive range of wireless services and handsets, and an infrastructure providing nationwide high-quality and stable wireless communication. Along with these factors and the fact that handsets are operator specific in Japan (i.e. subscribers buy bundled handsets branded with DoCoMo and not e.g. NEC or Nokia), DoCoMo's superior ties with handset producers and technological leadership in the dominating PDC standard, DoCoMo was able to charge a 5-10% price premium, and to offer lower incentives to retailers than competitors. To illustrate, the differentiation strategy involved the launch of the first 100g handset in 1996, which helped establishing the DoCoMo brand firmly in consumers' minds as innovative and value-added. The main competitor DDI was only second to DoCoMo with almost as good image, products, and network efficiency. The four regional operators offered low-cost wireless services at similar low price levels.

Clearly, the 1994 liberalization achieved much of intended effects on prices and service quality, but NTT DoCoMo continued be to market leader. A key reason competitors always lagged behind the company in the development of new handsets and services was that they were forced to use NTT DoCoMo's own proprietary PDC system (Morgan Stanley, July 1998). The technology was the Japanese 2G parallel to the European GSM standard defining the transmission standard for wireless signals, and thereby all infrastructure and handsets had to comply with the standard. The disadvantages were substantial as (1) NTT DoCoMo with its enormous R&D muscle led the advancements of the PDC system, (2) competing operators could not benefit from NTT DoCoMo´s state-of-the-art infrastructure as regulations required the competitors to operate their own networks, and (3) likewise since handsets and wireless services are operator-specific in Japan (i.e. users with different operators cannot communicate), no spill-overs could be reaped from the R&D and financially superior market leader (Morgan Stanley, July 1998; Morgan Stanley, August 1997; Kodoma, 1998).

By early 1997, the wireless market growth witnessed early signs of saturation. While, the total market had passed the 20 million subscriber mark, the impressive 100%+ subscriber growth rates in 1995-1997 started to decline, as did handset subsidies. Therefore, 1997 was dominated by aggressive sales campaigns, and for NTT DoCoMo´s part new tariff schemes eliminating subscription fees and new value-added services supported the further growth of the subscriber base and market leadership. In fact, the company's market share recovered rapidly from the all-time low of 48,4% in 1995 to 57% in early 1998. Indeed, the gab was widening between the highly profitable NTT DoCoMo and competitors as evident from differences in relative subscriber growth. To illustrate, in 1997, main competitor DDI saw a 38.2% decline, Digital Phone a 44.7% contraction, Tu-ka a 52.7% fall, and Digital Tu-ka an 8.5% slide. Only low-cost IDO had subscriber growth among competitors, however at the cost of being the only operator with declining earnings. Thus, all other carriers managed to get profits despite lowered prices on subscriptions and air-time. This

reflects the undisputed market attractiveness that in absolute terms has continued to grow with 9-11 million new subscribers yearly.

Competitor consolidation: 1997 - 2001

Competitor map

However, an alliance between two competitors would soon signal changes in the DoCoMo´s stable and favorable competitive landscape. Thereby an era of consolidation among DoCoMo´s competitors was augmented that would last until 2001. In April 1997, early entrants DDI and IDO responded to the NTT DoCoMo supremacy by allying to jointly upgrade their PDC networks to CDMA, a competing 2G wireless transmission standard developed by US Qualcomm. Thereby the two regional operators collectively reached 100% population coverage (Morgan Stanley, August 1997). The competitive background was that the two operators were facing rapid erosion of their market shares from 1996 to 1998 (DDI from 22% to 9%, and IDO from 16 to 8%) due to price competition from two new entrants (Digital phone and Tu-Ka) and DoCoMo increases market share again (TCA, 2003; Appendix). For the roll-out of CDMA networks, international sourcing from mainly US Motorola and Qualcomm rather than the traditional DoCoMo PDC vendors from the 'NTT Family' signaled new times (Wireless Review, February 1998).

In April 1999, DDI and IDO each launched cdmaOne wireless services with new compatible handsets from XX. Promptly, NTT DoCoMo's position as the only value-added operator was challenged. The CDMA network performed better than DoCoMo's PDC network e.g. in terms of higher sound quality, connectivity and stability. Thus, while DoCoMo's proprietary PDC network had been an essential driver of the Japanese wireless market development and growth due to low-cost tariffs and handsets, serious competition was emerging. Indeed, the subscriber growth had led to capacity problems on the PDC network, and voice quality had been lowered to half-bit-rate. Thus, DDI and IDO pursued the window of opportunity by marketing quality cdmaOne services and the slightly more expensive cdma-handsets to DoCoMo's premium private and especially corporate subscribers (Morgan Stanley, July 1998). The cdmaOne services would prove successful, and within 6 month 1 million subscribers were attracted and within 2 years 6 million subscribed to the operators cdmaOne wireless services (TCA, 2003; Telecommunications International,

October 1999). From 1998 to 2000, however, both operators suffered from the initial investments in cdmaOne network and ad campaigns, and while their market position was improving, profits were declining (Morgan Stanley, July 1999). Even worse, soon after the two operators gained momentum to threaten DoCoMo's market share, the market leader would launch the infamous I-mode Internet service, competitor J-Phone was both increasing market share and profits, and part of the cdmaOne subscriber growth was achieved at the expense of the operators existing PDC customers (Morgan Stanley, January 2000).

In response, the partners continued to consolidate. In fall 1999, DDI, the former leader among DoCoMo's competitors, acquired the PDC-based Tu-Ka operator from Nissan as the latter exited the wireless market (Morgan Stanley, July 2000). In October 2000, the final step was taken through a merger between DDI, IDO and new third partner KDD; Japans long-time leader in international fix-line traffic. After 1985, KDD successfully operated as monopoly in international calls largely locked out from domestic services, but due to intensified competition, market shares declined and the first net loss ever was recorded in 1999 (Far Eastern Economic Review, August 1999). Now, by combining the fix-line and wireless business of the three companies, a complete telecom carrier able to compete with NTT/DoCoMo in all four telecom segments was established.

"We will challenge NTT's mastery of the market," KDDI President Yusai Okuyama said at the launch (Far Eastern Economic Review, October 2000).

The combined wireless market share of 25% again established the group as no. 2, and the integration of DDI and IDO's services gave potential for a unified nationwide service with a strong brand image. Also, synergies were expected from DDI's big subscriber base complemented by KDD's Internet knowledge, and interaction with shareholder Toyota Motor would enhance prospects for car-electronics and in-car Internet markets. With the merger, common interests had bridged previous differences between the management of Kyocera, a major DDI shareholder, and that of Toyota, IDO's main backer (Morgan Stanley, July 2000; Far Eastern Economic Review, October 2000).

Consolidation behind the J-Phone Group

The DDI and IDO tie-up became the first step in the consolidation process. A facilitating factor was a 1998 legislation liberalized the strict ownership rules for telecom carriers and pawed the road for foreign operators to pursue their interest in the booming Japanese wireless market. The consolidation that eventually led to today's #3, the J-Phone Group, was initiated with the late entries of the regional wireless carriers Digital Phone in 1995 and Digital Tu-Ka in 1996. Despite both firms' poor profitability, in 1998, Japan Telecom, a telecom carrier focused in domestic fix-line long distance calls, branched into wireless telecom by taking a 23% equity stake in each carrier and thereby joined the other two majority owners, Nissan and Airtouch (Morgan Stanley, July 1998). The three owners jointly applied for one 3G license and thereby foresaw future consolidation (Communications International, March 1999). With market presence in both fix-line and wireless telecommunications, the alliance attracted BT and AT&T to invest 220bn in Japan Telecom for a 30% equity stake. The improved financial momentum fuelled investments in fix-line local

networks and data communication, as well as 3G wireless technologies. Thus, Digital Phone and Digital Tu-Ka continued to operate on a PDC network, and after long time of poor profitability both were profitable due to aggressive ad campaigns, a new discount service and especially Digital Phone's popularization of SMS/Email services (Telecommunications International, October 1999; Morgan Stanley, January 2000). In 2000, Nissan decided to exit the wireless telecommunications market, and sold its stake in Digital Tu-Ka to Japan Telecom, which then consolidated the two carriers into J-Phone (Morgan Stanley, July 2000). The last milestone in the J-Phone consolidation process occurred in October 2001, when Vodaphone increased its 45% stake in Japan Telecom to 67% with the ambition to eat market shares from DoCoMo and #2 KDDI, while boosting profitability. At this point, J-Phone had just experienced rapid market growth due to a successful world-first wireless picture email service enabled by camera phones (Wall Street Journal, October 2001).

After the consolidation process, the competitive landscape had NTT as market leader with KDDI being chased by Japan Telecom. Each company operates in fixed-line, wireless and international markets and each has been awarded a license for the next generation of wireless services called 3G, or third generation (Far Eastern Economic Review, October 2000).

Wireless service and handset innovations: From voice to data

Table: Wireless market subscribers (000) by operator, March each year.

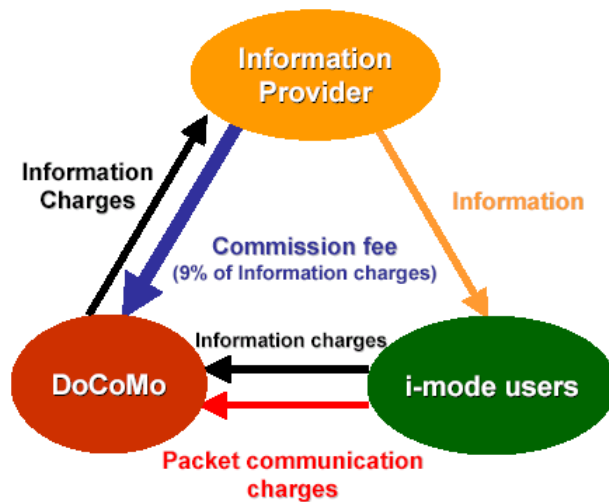|	1991/3	1992/3	1993/3	1994/3	1995/3	1996/3	1997/3	1998/3	1999/3	2000/3	2001/3	2002/3	dec-02	jan-03
Total market	868	1378	1712	2131	4331	10204	20876	31526	41530	51141	60943	69121	73514	73900
DoCoMo	549	846	1027	1323	2206	4936	10960	17984	23898	29356	36026	40783	42874	43033
KDDI (consolidated)				806	1844	4095	5553	9420	11453	13619	14940	16105	17317	17411
au (KDDI)											10986	12214	13468	13583
Tu-ka (KDDI)					259	1005	1899	2323	2890	3494	3954	3891	3849	3828
J-Phone (consolidated)					281	1173	2873	4123	6179	8166	9978	12232	13323	13456
IDO Corp				335	635	1130	1722	2768	3265	3895	KDDI			
DDI Cellular				471	950	1960	1932	4329	5298	6230	KDDI			
Digital Phone					281	1080	1913	2373	3906	J-Phone				
Digital Tu-ka						93	960	1750	2273	J-Phone				

Source: TCA, 2003
Italics: subscribers summarized for KDDI firms (Tu-Ka, IDO and DDI) and for J-Phone firms (Digital Phone and Digital Tu-Ka) for comparison.

Voice market saturation

In the late 1990s, the accelerating consolidation was only one key development augmenting the Japanese Wireless market. The 100%+ growth rates of the mid-90s were supplanted by falling mobile subscriber growth, and the mobile penetration rate had reached 33% of the population with a total of 43 million subscribers. While traditional voice services still accounted for 99% of network traffic (i.e. data services were miniscule), voice ARPUs (average revenue per user) were steadily falling due to lower call rate and discount services driven by price competition (Morgan Stanley

July 1999; Morgan Stanley January 2000). The price competition and market saturation forced the operators to focus on subscriber retention and reducing churn, which they on the short-term did by improving voice quality and providing value-added text services. Surely, operators' profits continued to rise, as subscriber growth still added 10 million yearly, but the mid-term need for new growth and revenue sources was obvious. By early 1999, wireless data services were still simple and confined mainly to SMS and data transfers that had not captured many subscribers (Nomura, 1998). In data transfer services, DoCoMo was market leader with 28 Kbps transfers, Digital Phone (later part of J-Phone) had successfully popularized SMS, and

DDI (later part of KDDI) had gained some growth momentum with its technologically superior cdmaOne service offering better quality than DoCoMo's PDC-based services (Morgan Stanley, January 2000).

1999: DoCoMo's strategy change and the I-mode Wireless Internet service

Against the worrisome developments, DoCoMo formulated a new competitive strategy, Vision 2010, which comprises five core elements articulated in the acronym MAGIC; (1) Mobile multimedia (i.e. increase modes of communication beyond simple voice communication), (2) Anytime, anywhere, anyone (i.e. widespread accessibility of mobile services), (3) Global mobility support (i.e. global seamless mobile communication), (4) Integrated wireless solutions (i.e. meet user needs beyond person-to-person communication to machine-to-machine, and person-to-machine communication), and (5) Customized personal service (i.e. tailoring services to particular needs of each business or individual user). MAGIC wireless telecommunication essentially expresses the image of the wireless telecommunications market and services that NTT DoCoMo is striving to develop in collaboration with partners "to realize the full potential of mobile multimedia communication" (NTT DoCoMo press release, 25.03.1999; NTT DoCoMo Press Kit, 2001). DoCoMo's market scope was expanded from the Japanese home market to overseas wireless markets in primarily Asia, Europe and US. In response to the saturating market and intensified competition the wireless service scope was expanded to focus on generating network traffic with data-based services supported by more advanced mobile handsets.
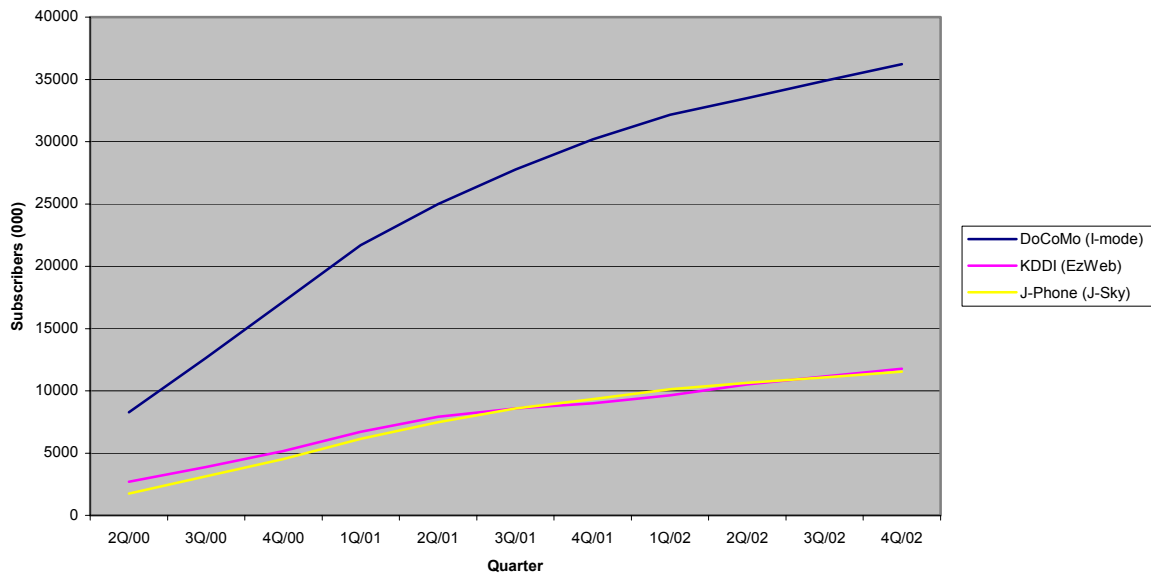
In February 1999, DoCoMo's launch of its now famous and world-first I-mode Internet service marked the shift from a volume-based to a value-based growth strategy. In April 1999, KDDI followed with EzWeb, and in December 1999 J-Phone followed with J-Sky. I-mode impressed with an breath-taking speed of penetration signing more than 10,000 new subscribers daily, and has since heavily outperformed the competing services (Far Eastern Economic Review, August 1999; Telecommunications International, October 1999). Intrinsic qualities of I-mode drove its success; Firstly, the packet-switched I-mode technology platform encouraged frequent as subscribers were "always-on" while paying for data-transfers rather than

air-time. Secondly, DoCoMo had chosen compactHTML as programming language for the I-mode technology platform, which due to compatibility with HTML from WWW allowed content providers to easily convert existing HTML sites or programme new sites. In comparison, the technology platforms of EzWeb and J-Sky were circuit-switched (i.e. subscribers paid for airtime which discouraged e.g. surfing the wireless Internet services) and used WAP - a programming language most content providers were unfamiliar with. Thereby, given the slow transmission speeds (9,6 kbps) I-mode was relatively inexpensive as transmission charges is calculated on volume of data sent, and not air-time like competitors (Far Eastern Economic Review, August 1999).

Since the technology platform build on existing technologies (i.e. cHTML and the PDC network was packet switched), DoCoMo could rapidly rollout I-mode nationwide at low investment costs (Ratliff, 2002). I-mode has, however, been celebrated much more for its innovative business model, customer orientation and facilitation of a content provision industry than for its technology. Defining itself as a platform leader focused on wireless technology and not content provision of the new mobile Internet, with inspiration from AOL's www-service DoCoMo conceived a business model based on revenue-sharing offered to official I-mode content providers. The service fees were split with 91% for the content provider and 9% for DoCoMo, who in return handled the complicated billing task (i.e. subscribers would not pay directly to the content provider, but be charged on the monthly bill). Like AOL, official content providers were subjected to strict quality requirements for content offered, and in return featured on the default I-mode menus on I-mode compatible handsets. Generous revenue sharing, easy access to content sites, quality requirements were instrumental to the development of a previously non-existing and highly competitive content industry that continued to innovate with new attractive services user were willing to pay for and thereby creating traffic on DoCoMo's network. The usability was also high, as the I-mode Internet was simply access by pushing the "I" button on the handset. Already from day one, basic content services were available within news, weather, mobile banking, securities, ticket reservations, train times, cooking recipes, maps, travel, mobile shopping, gourmet and lifestyle, job banks, music, karaoke, book purchases, games, fortune-telling, sports results, TV and radio, dictionaries, and the ever increasing number of content providers have only added to the plurality of offered services (Far Eastern Economic Review, August 1999; Mulder and Simpson, 2001). For instance within 6 months, I-mode had already secured participation by all eight national banks, more than 10 regional banks, and a large number of securities, credit card and airline companies (Telecommunications International, October 1999). The i-mode launch was complemented with 4 new I-mode compatible handsets that set new standards. The explosive up-take of I-mode created substantial network-effects in that increasing numbers of attractive content sites, increased the number of subscribers, which in return attracted new content providers.

The superior I-mode service and the wireless Internet became the first killer data application in Japan, and thereby started a belated Internet revolution in Japan that due to low PC penetration had not occurred previously (Far Eastern Economic Review, August 1999; Morgan Stanley, July 1999).
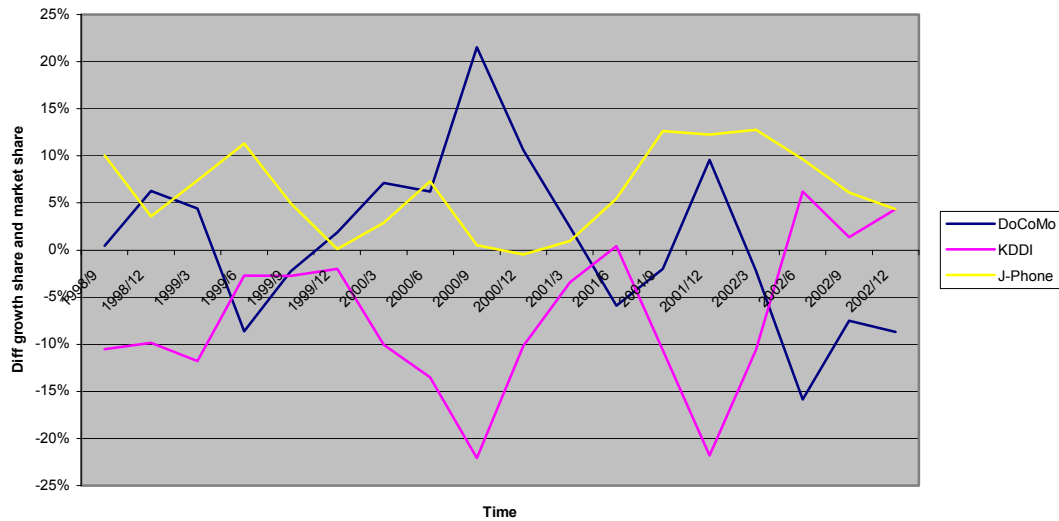
Wireless Internet Subscribers

2000-2003: Data service innovation and competition

Intro: Changing competitive nature

The rapidly expanding wireless Internet punctuated a fundamental shift in the Japanese wireless market towards a more dynamic competitive environment. By early 2000, the industry's focus was changed towards non-voice services, and signs of increasing demand were compelling in the light of the saturated voice market (Morgan Stanley, January 2000). The industry consolidation saw the emergence of two strong competitors backed by international investors, and while the old monopolist and market dominator had clear won the first round in the race for new wireless data services with I-mode, the two competitors would soon prove capable of innovating new attractive data services.

Although competition was increasingly dynamic, since 1998 only minor changes had occurred in each of the three competitors overall market share. From September 1998 to January 2003, DoCoMo's share went from 56,8% to 58% with a high of 59,1%, KDDI's share steadily declined from 29% to 23,6% with a low of 23,3%, and J-Phone's market share steadily climbed from 14,2% to the all-time high of 18,2% (TCA, 2003). Below the gradual shifts of market shares, however, lies an increasingly intense and innovation-based competitive situation. The battle for market shares is evident from the competitors' changing shares of market growth, in which current subscriber uptake is not weighed down by the grand number of total subscribers. The below chart shows the difference between the operators' share of last quarters subscriber growth and their overall market share, which indicates whether market shares were won or lost (i.e. in September 2000, DoCoMo had 59% market share, but 80% of market growth in 3Q 2000). When a company lies at 0, the current market share is sustained, when above 0, market shares are won, and below 0 market shares are lost.

Growth share vs. market share

Diff growth share and market share

25%
20%
15%
10%
5%
0%
-5%
-10%
-15%
-20%
-25%

1998/9 1998/12 1999/3 1999/6 1999/9 1999/12 2000/3 2000/6 2000/9 2000/12 2001/3 2001/6 2001/9 2001/12 2002/3 2002/6 2002/9 2002/12

Time

— DoCoMo
— KDDI
— J-Phone

The battle for market shares now evolved around more competitive parameters than during DoCoMo's dominance as premium provider during the 1990s. IDO and DDI's rollout of the cdmaOne network led to competition on network quality in terms of data transfer speeds, capacity and voice quality. Along with network competition, corporate branding became important to differentiate premium services from standard services. With consolidation, all three competitors were striving for 100% nationwide coverage that also for new 3G services has become a crucial competitive parameter. Moving away from traditional voice services, accelerated product differentiation of operators' bundles of operator-specific handsets and operator-specific services became imperative. Also, coordination of service launches and availability of new service-enabling handsets became crucial as data service often requires supporting software (i.e. Java) and hardware (i.e. cameras, color screens). Thereby, service uptake now increasingly drove handset replacements. In addition to supporting new service applications, handsets generally have been improved in terms of weight, battery life, processing power, menu usability, and indeed high-functionality handsets have become popular.

Regarding new data service innovation, the quest for new killer applications had been kick-started by I-mode that had co-opted KDDI's growing success with its higher-quality cdmaOne network during 1999. From 2000 to 2003, each competitor have had success with different killer applications; like in the case of I-mode first movers have won first rounds. With these killer applications, the competitors have won and lost growth shares in intense competition, while overall largely sustaining their total market shares. (Based on the Japanese experience killer applications are characterized by rapid subscriber uptake, increasing ARPUs often stabilizing at 50%+ of non-users, and over time a high percentage of a firms total subscribers use the killer app).

Networks and Branding: Premium and Budget services

Prior to the industry consolidation, DoCoMo enjoyed the status as sole premium brand operator in the market. With the cleverly branded I-mode service, traditional voice service run on the 2G PDC network were differentiated from the new innovative

data services, thus establishing I-mode (I-mode phones enable regular PDC voice communication) as a premium brand. With the high-quality cdmaOne network launched by now partners DDI and IDO, KDDI had establishes a premium wireless service that by November 2001 had attracted impressive 10 million subscribers. A key contributor to the surge was the introduction of the company's Au (pronounced ay-yob) premium brand for its cdma-services after the KDDI merger in October 2000 broke the branding grip of DoCoMo that had protected DoCoMo despite at times superior pricing and technology of KDDI (FEER, Oct00). Like, DoCoMo a low-cost brand was sustained as the brand Tu-Ka has been used for PDC-based services. Unlike KDDI, J-Phone continued to operate on DoCoMo's proprietary PDC technology, and focused on service innovation rather than network rollouts. Following competitors, J-Phone launched the low-cost brand "Simple Phone" with basic handsets oriented towards voice and SMS. Compared to the premium service offering wireless Internet and picture messaging, however, "Simple Phone" has achieved limited uptake (250.000 by February 2002) (Company press releases; TCA, 2003).

The launch of 3G wireless networks has added a new dimension to branding. In October 2001, DoCoMo launched the world's first 3G wireless services on its proprietary high-speed WCDMA network under the brand name FOMA. To date, uptake of FOMA has been sluggish with currently 150.000 subscribers more than 2 years after launch, which has been attributed to lacking multimedia content justifying migration from I-mode on PDC handsets, too high tariffs, limited availability of FOMA handsets, low connectivity, poor geographical coverage, technical glitches with the new WCDMA network and interoperability problems with handsets. Also, FOMA has failed to boost ARPUs of users compared to I-mode (Appendix). In April 2002, having learned from FOMA, KDDI launched its 3G network with close to full nationwide coverage and high network stability. KDDI's investments costs were significantly lower as the migration from cdmaOne to their 3G technology cdma2000 1x was achieved with simple software updates of the infrastructure and new cards in cell phones (DoCoMo had to build a whole new network). KDDI chose not to brand their 3G services separately, but sell them under the 'Au' premium brand offering the same services only faster and cheaper than FOMA. Thereby, consumers focused on functionality rather than technology, and the rapid uptake of totally 5 million as of January 2003 supports the strategy. Early experienced showed that 44% of 3G customers were new, while the rest transferred from cdmaOne. In comparison with WCDMA's 384 downlink and 64 uplink speeds, cdma2000 1x enables up- and downloads at 144 kbps, which has proven sufficient with current services. By October 2003, however, KDDI has scheduled another incremental upgrade of the cdma network to cdma2000 1x EVO enabling 2,4Mbps transfers. In contrast to FOMA, a survey of 20.000 3G Au users found that ARPUs are definitely rising with currently 8%+. (KDDI, 2003; Reuters, 20.12.2002; Company press releases; TCA, 2003; Wireless Asia, August 2002; Business Week, June 2002). Latecomer J-Phone launched their 3G services in December 2002 based on a WCDMA network.

JAVA: DoCoMo builds on the I-mode success with platform innovations

In January 2001, DoCoMo enhanced the I-mode platform with I-appli co-developed with JAVA-inventor SUN to support JAVA on I-appli enabled I-mode handsets that soon followed. The platform upgrade enables download and storage of stand-alone applications such as shooting-type video games, animations, standby clock, and

karaoke, thereby eliminating the need to continually connect to a website. I-appli also enables agent-type applications with automatic updates of constantly changing information such as stock quotes, weather forecast, online interactive games at set times (NTT DoCoMo press release, 18.01.2001). JAVA enables content providers to offer far more complex applications, because they can write their own 'applets' (i.e. programs) to run on handsets. Also, JAVA offers an enhanced graphical environment and the ability to securely download new applications to handsets (Wireless Review, March 2001). In June 2001, both KDDI and J-Phone enhanced their web-services with JAVA-services enabled by software developed by Aplix, and subsequently launched compatible handsets. KDDI branded its service EzPlus, while J-Phone included JAVA into the J-Sky web service without separate branding. Although the competing services offered higher download capacity than I-appli's 10kb at one time (30 kilobytes for J-phone and 50 kilobytes for au), thanks to the success of I-mode, the vast number of content providers and early introduction of JAVA, DoCoMo's services has heavily outperformed the others (Morgan Stanley, June 2001). Whereas, e.g. J-Phone JAVA enabled handsets reached 1 million in October 2001 and 2 million in February 2002 (Company press releases), I-appli handsets saw rapid uptake with 4 million by June 2001, 10 million by December 2001, 15 million by September 2002, and 15,5 million by December 2002 (NTT DoCoMo, January 2003). In the quest to generate more data traffic and boast ARPUs, I-appli has proven highly efficient as early I-appli adapters after launch generated 6 times as much traffic as regular users. As I-appli subscribers rocketed to 43% of all I-mode users by December 2002, I-appli traffic usage stabilized at 50% more than normal I-mode users (NTT DoCoMo, January 2003). Since, July 2002, however, the uptake of I-appli has saturated at 43% of all I-mode users.

Picture messaging: J-Phone is still leading the pack

Breaking DoCoMo's supremacy in new service innovations, J-Phone launched the world's first handsets with build-in cameras in November 2000, and the Sha-mail photo emailing service enabling camera-handset users to send and receive pictures was launched in November 2001. The killer application witnessed rapid uptake with 1 million users in June 2001, 3 million in December 2001, 6 million in August 2002, and now 8 million in January 2003. Thereby, 60% of J-Phone's subscribers now have a camera phone up from 46% in July 2002. In October 2002, the Sha-mail@Album service was launched providing subscribers with a 20mb online storage for pictures to compensate for handsets limited storage capacity. The Sha-mail service propelled users ARPUs with 44% in comparison with J-Phone non-users (Communications International, June 2002). Competitors KDDI followed in April 2002 with camera-phones as a key application of the 3G cdma2000 1x launch under the 'au' brand name. By December 2002, KDDI had 2,5 million camera users that contributed to the 3G outpacing of DoCoMo's FOMA service. DoCoMo was the last to follow J-Phone (picture messaging was offered under the FOMA brand already in October 2001, but due to sluggish FOMA take-up not widely used). In June 2002, DoCoMo launched the I-shot picture messaging service and by November 2002, 4 million I-shot cameras had been sold corresponding to 10% of all DoCoMo subscribers (Wireless Asia, August 2002; NTT DoCoMo, January 2003).

The success of picture messaging relates to its apparent consumer appeal, the user-originated content avoids problems of creating compelling content, and for operators

the content is for free. Part of J-Phones such is due to a compelling handset line up of more than 17 models from e.g. NEC, Sanyo and Nokia. In comparison, early I-shot camera phones did not live up to J-Phones usability, but recent launches have improved DoCoMo's position. Photo-services have come to reignite the saturating Japanese market, and thus are crucial for the three competitors in the race for customer acquisition (Wireless Asia, August 2002). Moreover, until recently the photo services have enabled both KDDI and J-Phone to partly catch up with DoCoMo. However, since June 2002, J-Phone has added only 2,8 million Sha-mail subscribers, whereas DoCoMo has added more than 5 million in the same timespan (Reuters, 15.1.2003).

Videophoning, wireless movie and music: still too early to know

For some time now, a new buzzword in wireless telecom has been MMS to succeed the enormously successful SMS services. In addition to simple still photos (see above), more advanced content such as videophoning, as well as downloading and/or streaming of video clips of movietrailers, entire movies and music files is entering wireless arena. In the quest to recoup the large investments in new network infrastructure, wireless operators are hoping for large-scale MMS up-take as multimedia content requires high bandwidth technologies.

In November 2001, DoCoMo launched the 'I-motion' service on its FOMA network enabling approx. 30 seconds video clips and 100 second audio clips to be downloaded to compatible handsets at 384Kbps downlink and 64Kbps uplink (Press release). Videophoning (i.e. caller and receiver see each other) was also supported. Competitor KDDI followed promptly in December 2001 with the EzMovie application running on its premium 'Au' platform. In this category, KDDI has had the most success with its EzMovie co-launched with the GPS-enabled EzNavigation. At 64 Kbps, users can reach both paid and free contents in MP3 and MPEG4 such as movies, music, news, weather reports, and contents relating to cartoon characters, sports, fashion, celebrities, comedy and entertainment. Together with EzNavigation, EzMovie had attracted 4 million subscribers by December 2002 pointing to the quality of the cdmaOne and cdma2000 networks. Lacking a high-capacity network, in March 2002 J-Phone launched its movie-shamail service enabling transmission of recorded video messages up to 5 seconds transferred at 28,8 Kbps. By November 2002, however, only 1 million subscribers had movie-shamail enabled handsets. To date, despite high expectations, the advanced MMS services have not proven themselves worthy of the 'killer app' label. This also goes for DoCoMo. I-motion was the first new service to take advantage of the WCDMAs fast transfer speeds, but no mass market has been created due to inadequate audio and video content, and problems with FOMA including poor stability, pricy handsets, short battery life and lacking nationwide coverage. Also, at launch only 4000 videophones were available that were sold out in the first three days. Thus, still there is more of a buzz surrounding camera phones that have become the latest fad among young Japanese rather than the more advanced MMS services offered e.g. by FOMA (Financial Times, November 2002; Company press releases; Telecommunications International, February 2002; Far Eastern Economic Review, July 2001).

GPS/Location services: KDDI taking the lead

Many industry observers expect great things from wireless services that take advantage of knowing the position of the user, so-called location-based services. DoCoMo launched the simple I-area service in June 2001. By choosing the current location in a menu list, the user can access local information on e.g. restaurants, weather, maps and town information on e.g. galleries and hotels (Company press releases). Already in May 2000, J-Phone had launched its similar J-Navi service and the enhanced Station area-info service in October 2000. Both services require no special handsets, and are part of the companies' wireless Internet services (i.e. no data on user uptake available).

In December 2001, KDDI launched the more advanced and GPS-enabled service branded EzNavigation that requires GPS-enabled handsets. The user's location is automatically determined via the global satellite communications system (GPS). In addition to map functions, gourmet town guides, communications services, traffic information and weather reports, emails can be pushed to users from nearby shops, and families and friends are able to check on the location of family members, and emergency signals can be sent out should the need arise (Company press releases). EzNavigation has since been one of the main applications running under KDDI's premium brand Au. The service uptake rose from 1 million in May 2002, to 3 Million in August 2002, and 4 million in December 2002. Also, in October 2002 a GPS services was launched on the 3G cdma2000 1x network enabling companies to track personnel and allow staff members to communicate their status as known from Internet messaging services (i.e. at lunch, in meeting, in car etc.). DoCoMo's GPS service DoCo-desu services enabling users to find the position of goods and persons had by November 2002 only attracted 1100 subscribers (Company press releases, NTT DoCoMo, November 2002).

Following the regulatory on DoCoMo to enable other operators to access its wireless Internet, from March 2002 J-Phone will expand its Station services with 'Loco guide' that offers access to the currently 482 I-area sites (Company press releases).

Strategic challenges

In the following, a detailed study of three of NTT DoCoMo's distinctive strategic challenges is presented. In particular, insights are provided as how the company approaches the (1) orchestrating of innovation with the examples of I-mode, C-mode, and Telematics services, (2) relational challenges with the examples of technology standardization alliances, interfirm relationships with handset providers and internationalization partners, and lastly (3) how new growth avenues are explored.

Orchestrating innovation

After the Second World War, parent NTT was established to pursue the government-set objective to nurture and support a strong family of firms that would provide the essential technological underpinnings of the electronics industry in Japan. The NTT Family consisted primarily of 'the big four' NEC, Fujitsu, Oki and Hitachi, but counted a couple of hundred firms. NTT dominated and provided innovative leadership for the family within telecommunications and electronics with its huge internal R&D, and huge budget for collaborative R&D and procurement (Anchordoguy, 2001). DoCoMo inherited many of the external family relations, and builds its innovative strategy on platform leadership by developing and proliferating

core proprietary wireless technologies and standards, as well as co-develop compatible infrastructure, handsets and service applications now both with domestic and overseas partners (Cusumano and Gawer, 2002). Wireless innovation is increasingly complex due to increasing wireless technological complexity and the convergence with previously unrelated industries such as IT, media, entertainment, automotive and more. The intrinsic innovation challenges for new wireless data services and enabling equipment is a hard test for the platform leadership model. To illustrate, three recent innovations exemplify DoCoMo's platform leadership strategy to orchestrate innovation in the new era of wireless data telecommunications.

Innovating I-mode

 With more than 36 million subscribers, more than 55.000 content sites, and on-going global diffusion, by now I-mode is by far the most successful wireless Internet service in the world, and still the main Internet access point in Japan. The basic Internet service was launched in February 1999 with access to a few Internet content sites in entertainment, banking and more. Since, the platform has evolved with new features such as I-melody, I-appli, I-area, I-motion and I-shot, and thereby been DoCoMo's key 2G data brand and technology platform (the 3G successor is called FOMA).

In 1997, in response to predictions on saturation of wireless voice services, the company's first CEO (1992-1998), Kouji Oshboshi, commissioned the corporate business director, Keiichi Enoki, to build a project organization to develop new non-voice wireless services, empowered him to recruit internally as well as externally (the latter was quite unheard of for DoCoMo and parent NTT), and gave him the financial and managerial mandate to launch developed services. Initially staffed with 10 diverse and highly talented personnel, the project grew to 70 persons by August 1997, by which time the unit evolved into the Gateway Business Department. Key managers were electrical engineer and head, Keiichi Enoki, seasoned manager and outside talent Mrs. Matsunaga, and the Internet entrepreneur, Takeshi Natsuno. In entrepreneurial spirit, seven working groups worked on flexible and autonomous terms with seven identified facets of wireless service development (network server, mobile phone, facility building, facility maintenance, system/sales, content and application). Managerial emphasis was placed on "prompt decision making and expedious activities". Top management support in the larger traditional organization was fostered through the established Mobile Gateway service introduction promotion committee seated with managers from all branches (Kodama, 2001). To develop both the technological and market side of wireless services, four communities were formed (in-house, portal, technical and platform) with participants also from other DoCoMo divisions, external content providers, and consumer groups. After the commercial launch of I-mode in February 1999, the working group participation of external parties was continued and formalized into three communities. Strategic alliances were formed with content providers to improve information available on the I-mode portal (i.e. the portal community), handset producers and handset application partners to develop and enhance I-mode handsets (i.e. the technical community), and lastly to expand the scope of I-mode availability alliances with other platform vendors within e.g. games industry and overseas wireless operators were formed (i.e. the platform community).

Inspired by AOL's Internet platform approach in USA, the department worked around a business model rather than a technology as had been the norm with traditional wireless voice and simple data services. Also, I-mode was entirely built on existing technologies to minimize time to market (Business Week, January 2000; Mulder and Simpson, 2001; Kodama, 2001). The innovative I-mode business model that provides entrepreneurial incentives has been key to the emergence of the rich network of content providers. In a generous profit sharing scheme offered to official I-mode content providers signing a contractual agreement, the Company mediates otherwise complex billing of wireless data services by conveniently charging subscribers for accessed information, services and m-commerce on their monthly subscription bills for a 9% commission fee (i.e. 91% of collected fees are transferred to the respective content providers). Separately, the Company charges subscribers on network traffic based on the number of data packets transferred, which constitutes the most significant revenue source from I-mode. Official content providers are featured on the official I-mode gateway portal enhanced with innovative application platforms and directly accessible through the I-mode menus and search engines. In return, official content providers are contractually obliged to comply with four simple quality rules for the wireless content, and in periodic evaluations content providers are assessed in terms of these four rules and the network traffic generated. The four quality rules require that (1) all content must be as current as possible (i.e. several daily updates), (2) all content must be as comprehensive as possible and link to related information, (3) content must be designed attractively to encourage repeat visits, and (4) content must be highly readable, so that users can easily understand the information and services available to them. Moreover, content must be accessible in the cHTML programming language that easily converts from e.g. existing HTML and XML content. The billing system and the cHTML-based wireless content system provide a simple interface for daily operations and low task interdependence. The business model is offered to official content providers (i.e. with billing service, access through the official I-mode portal and menu system), and NTT DoCoMo solely decides who is accredited with the official status (Telecommuncations International, February 2001; Economist, March 2002; America's network, March 2000; Ratliff, 2002; McKinsey, 2000b; www.nttdocomo.com).

I-mode initially offered a range of basic data-related wireless services in addition to traditional voice communication, and the range has continuously have been expanded with new innovative services. Technologically speaking, the main features of the PDC network are that it is packet-switched enabling 'always-on' access to wireless data services, it supports 9,6 Kbps (recently upgraded to 28,8 Kbps) up and downlink data transfers, and for I-mode a wireless content platform build on c-HTML programming languages allows internet content providers to easily convert existing web pages to I-mode content sites (e.g. Mulder and Simpson, 2001). The basic wireless data services are access to official I-mode information sites and un-official I-mode compatible information sites, an email service, and a message service. The I-mode user can access internet-like sites (now above 3.000 official I-mode sites (at launch 100) and above 55.000 un-official sites (at launch 500)) in areas such as news, weather, mobile banking, securities, traffic, maps, travel, mobile shopping, gourmet and lifestyle, job banks, music, karaoke, games, fortune-telling, sports results, TV and radio, dictionaries (NTT DoCoMo Press Kit, 2001). Fundamental to I-mode's enormous commercial success has been the ever-increasing number of services provided through

the platform, and the ease of use. Subscribers enjoy attractive content, innovative services, easy billing, simplicity of use, and advanced features enabled by Appli; a platform upgrade introduced in January 2001 to support JAVA and subsequently underpinned with Appli mobile handset launches. In 2000, the main content improvement was addition of English I-mode menus and content. In 2001 and 2002, frequent launches of new innovative service applications have significantly expanded the I-mode service many of which are JAVA enabled: international roaming services in Europe, Asia, Africa and recently also in US, I-area for location-specific services, a GPS based position service, a billing information service enabled by Appli, the I-mode session service providing companies more reliable connections, an anti-spam option for I-mode email, C-mode enabling users to buy products from Coca-Cola vending machines with their I-mode phone, to buy admission tickets to amusement facilities, to pay-per-download of information content and local area information such as maps, and most recently the I-shot service enabling transmission of photos taken with built-in digital cameras. (NTT DoCoMo Press releases, 1999-2002). In the aftermath of the initially failed targeting of corporate subscribers, which was successfully followed by subsequent marketing focus on young private users (Kodama, 2001), NTT DoCoMo has managed to improve the attractiveness of the I-mode corporate wireless services to the corporate market, which is lucrative due to the high sign-up rates on single contracts, high and relatively data-intense usage, and lack of personal income constraints collectively leading to higher ARPUs relative to private users. In mid 2001, corporate users comprised 10% of NTT DoCoMo's subscriber base putting the company in a market leader position. Innovative corporate services such as sales support systems with business reporting, product information and customer data, and mobile message boards have been marketed under the two brands 'DoCoMo value' and 'Link to DoCoMo' (USB Warburg, June 2000).

Innovating C-mode

In April 2002, C-mode, an entirely new concept in consumer services was launched in Japan. With cutting-edge computer software a traditional soft drink vending machine had been transformed into an information station and services terminal offering fun, excitement and entertainment. The Cmo intelligent vending machine was the result of a fast-paced joint development effort by Coca-Cola, DoCoMo and Itouchu Corp, one of the leading Japanese trading houses. In September 2000, the three partners agreed to brainstorm for potential content for an 'I-vending' machine linking an overhauled Coca-Cola vending machines with I-mode mobile phones. The project aimed to reap synergies from convergence of Coca-Cola's expertise in vending commerce, DoCoMo's wireless technologies and market knowledge, and Itouchu's marketing expertise in products as diverse as information technologies, finance, textiles, construction, chemicals, real estate, aerospace, machinery, energy and food products. Coca-Colas nationwide network of around 1

million vending machines points to the attractiveness of this new form of distribution channel for DoCoMo services.

As soon as March 2001, the three companies had developed a new business concept. In practice, having signed up as Cmode club member on the i-mode menu site "Coca-Cola Moment", the I-mode subscriber would access the vending machine via the infrared port of the handset, the i-vending machine then verifies the user's identity, after which the user can insert funds into any i-vending machine for subsequent cashless purchases. With a loaded I-mode phone, cashless shopping of soft drinks and a variety of services can be purchased with prepaid funds. Point service points are earned by making purchases on the I-vending machines, and these points can be exchanged for special merchandises including soft drinks or buying I-mode service content.
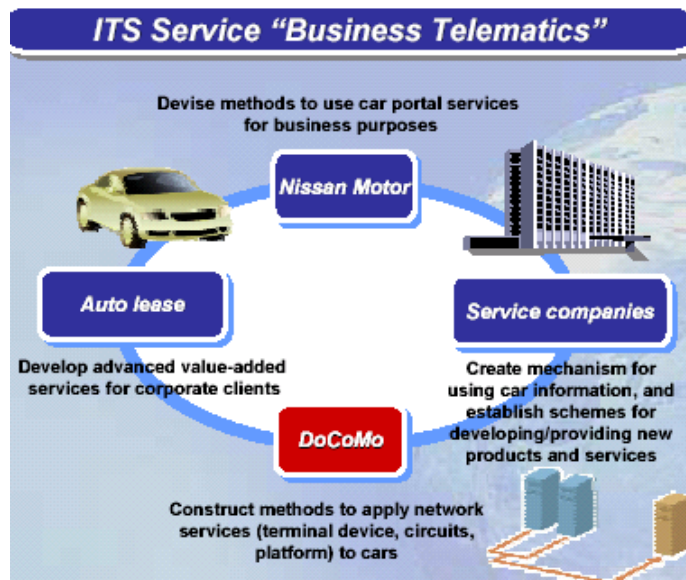
Through commercial viability studies, the business concept was found mature for commercial testing to gauge consumer response and identify additional service options to extent the C-mode service later. From September to December 2001, 25 of the new Cmo prototype I-vending machine were installed at frequently visited spots in Tokyo (America's Network, September 2001). The Cmo vending machines are highly computerized and their functionality can be enhanced according to consumer feedback. Trial users could while buying a coke purchase amusement park tickets, i-mode content, local area guides and other types of information.

Having extended the trial period into 2002, by April the three partners concluded that "Cmode to have high levels of consumer acceptance and to provide significant business opportunities" (NTT DoCoMo Press release, 15.04.2002). The now 41 vending machines had attracted around 20.000 Club Cmode members that compared to regular vending machine users showed higher ratios of women and young people. A consumer survey gave the Cmode service high points of being "innovative," "fun," and "exciting". Based on the trial period, the partners forecasted that Cmode would provide significant business opportunities. Coca-Cola achieved differentiation in the vending machine business and drink sales increased compared to regular vending machines. DoCoMo would increase I-mode usage by linking I-mode phones with the vending machines, and Itochu could expect an expansion of content business.

In the launched version, in addition to traditional vending products, the Cmode offers local information such as maps, and advertising information such as coupons and Coca-Cola campaign and event information by checking the Cmo's built-in LCD display. A hardcopy printout or audio playback as well as amusement park tickets are also available from the machine's speakers and printers (NTT DoCoMo Press releases). The Cmo machine also allows pay-per-download sales of i-mode content such as standby screen savers, wall-papers, ring-tone melodies, and i-αppli games. The roll-out of Cmos was planned at 2000 units across Japan by the end of 2002. Provided the flexible computerized technology platform of the Cmo, the three partners planned to form alliances with a wide range of new content providers to upgrade the range and depth of content provided by Cmode service.

In the aftermath of Cmode development project, other I-mode services deploying infrared connections to other devices have been launched. The "Mobile GEO" service uses I-mode handsets as membership card and payment means in videoshops,

"iLawson" allows the user to collect coupons for later payment at convenience stores, and "Dam" turns the handset into a remote control for karaoke-systems allowing the user to request songs, play a stored playlist, and access lists of new releases (NTT DoCoMo, January 2003).

Innovating Telematics services

The Cmode service is a clear example of the convergence between wireless telecommunication and previously unrelated industries. DoCoMo approaches the challenge to develop new killer applications with partnerships to leverage own and partner technologies and market knowledge. Telematics (i.e. car multimedia services) is another prominent example that many observers expect has only seen its beginning with existing GPS location services. Telematics has long been touted as the next big blockbuster for the auto industry. Adventis, a technology consultancy, projects telematics to become a $20-billion industry in eight years. But so far, rather than filling the industry's coffers, telematics that is a wide array of computer-based services and functions including wireless communications, entertainment, safety/security, and vehicle diagnostics has been a steady money loser (Automotive Design & Production, July 2002).

In February 2002, DoCoMo and Nissan agreed to jointly study the possibilities of a wide range of potential telematics services, and to develop onboard devices and an information platform building on FOMA technologies, and information services for driver/passengers and services utilizing vehicle information to be proliferated as industry standards used by many market participants. Nissan would contribute with its vehicle and human-machine interface (HMI) technologies, along with its expertise in information services for automotive applications accumulated through its current telematics service operations. DoCoMo, on its part, brings its mobile communication infrastructure and technologies as well as its expertise in mobile multimedia services (NTT DoCoMo Press releases).

Swiftly, two service development targets were agreed, namely (1) advanced telematics services to be launched in early 2003, and (2) telematics services integrated with new media and other content industries to be launched in early 2004. For the first target, a brainstorm produced network navigation services with traffic information, weather reports, availability of parking, hotels, restaurants and other facilities linked to the latest road map data. Also, location-linked services were suggested as advanced telematics services to combine local information matching the users' interests and preferences as voice and data.

The second service category was decided to focus on convergence with a range of other industries related to the everyday use of vehicle such as non-life insurance companies, security service companies, and service stations. Thereby, vehicle security could be improved and new possibilities for customer relationship management (CRM) would be created. Also, service integration with banking through e-money and broadcasting were considered. One example is on-demand audio-visual services that are combined with music downloads and the downloading of real-time information.

By December 2002, out of the wide range of potential telematics service candidates, the partners formed a cross-industry group to develop business models targeting the car leasing companies. The group comprise from the car leasing, insurance, maintenance, components and other automobile-related industries. The group was commissioned to decide on types of relevant information, and begin transmission tests in January 2003. The development was expected to materialize into specific telematics services around April for commercial launch during 2003. The group should also facilitate dialog among the different industry groups to devise win-win business models for telematics services to deal with issues such as revenue sharing, R&D cost sharing, and IPR issues (NTT DoCoMo Press release; NTT DoCoMo, January 2003).

Facing new relational challenges

In rapidly changing and high-technology industries such as the wireless telecommunications, firms are increasingly resorting to strategic alliances for R&D, production and marketing activities. The need for rapid, flexible and innovative R&D, along with the global dispersion of technological competencies are key drivers of such alliances. Shaped by the traditional Japanese keiretsu industry model, interfirm collaboration has long been key to DoCoMo's competitive strategy. In practice, the company engages in alliances in these core activities; (1) co-development of wireless handsets and network infrastructure, (2) co-development of new wireless service applications with e.g. IT, media, entertainment, corporate solutions and automotive companies, (3) technology standardization forums to proliferate DoCoMo's proprietary technologies as global standards, (4) content provider alliances with nearly 3000 official and above 55000 unofficial providers of Internet content to the I-mode service, and (5) market entry alliances with leading Asian, European and US operators to spread DoCoMo's technologies and services globally. While the alliance strategy has greatly contributed to the success of DoCoMo, numerous critical challenges face a networked company.

Looking back, Keiji Tachikawa, recognized the strong heritage for interfirm collaboration from parent NTT that was setup in postwar Japan to spur the development of a competitive electronics industry; an objective that was evoked through keiretsu-style collaboration on joint technology and product development within the NTT Family, and high dependency of family members on NTT's enormous R&D and procurement budgets (Anchordoguy, 2001). Surely, the alliance strategy had been core to company successes such as I-mode, WCDMA development, handset portfolio and a strong brand. Following the deregulation of the Japanese market and the internationalization of DoCoMo, though, new challenges were piling up for the old alliance strategy, as partners were increasingly international and DoCoMo assumed a less dominant role vis-à-vis partners.

Technology standardization alliancing

One alliance challenge confers to the ever-intensifying global standardization race over core wireless technologies, in which DoCoMo fundamentally changed approach during the 1990s. In Japan, wireless operators' services have traditionally been incompatible and are operated on incompatible proprietary systems (Economist, October 2001). Provided its historic technological leadership, DoCoMo developed its own proprietary 2G standard (PDC). While the technology became superior as compromising standardization processes, negotiations and coordination did not hamper innovation, overseas network and handset vendors, as well as operators rejected PDC due to the implied dependency on DoCoMo. Instead, GSM pioneered by Nokia and Ericsson emerged as global 2G standard due its successful selection in Europe's open standard setting committee (ETSI) with representatives from wireless operators, governments and equipment manufactures. Realizing it was in no position to dictate global standards, after 1996 DoCoMo actively formed alliances with overseas operators and equipment vendors to co-develop, proliferate and ensure overseas adaptation of its own 3G standard WCDMA (Funk and Methe, 2001; NTT DoCoMo Press release, 03.04.1997). Thereby, experience from acting as technology leader in Japan was leveraged (Ratliff, 2002). Crucially, DoCoMo formed a coalition with mainly Nokia and Ericsson, gave the partners the concession to integrate their core technology GSM into WCDMA, and won ETSI's approval as the single European 3G standard (UMTS) in late 1997 in competition with a less aggressive US coalition proliferating their TDMA-based IS95 standard (Funk and Methe, 2001; Nomura, 1998). Due to the apparent success of DoCoMo's strategy, WCDMA is now backed by most European mobile operators and equipment vendors, and adding to the standard's critical mass, globally 115 operators subscribe to WCDMA (NTT DoCoMo Press release, 06.11.2002; Reuters, 20.12.2002). Recently, however, technical problems related to the rollout of WCDMA networks, high investments costs, as well as KDDI's 3G lead in Japan based on its cdm2000 network, FOMA's slow uptake and general uncertainty over which applications will attract consumers and justify the investments, have led several (often indebted) operators to put WCDMA investments on stand-by. Concurrently, cdma2000 1x and the future EVO update enabling 2,4 Mbps transmission is expanding its base with currently 15 operators and 20 million users globally (Telephony, June 2002, Business Week, June 2002; Reuters, 20.12.2002). Moreover, whereas the WCDMA standard requires rollout of new expensive networks, CDMA2000 1x requires only requires software upgrades to base stations of existing 2G cdma networks and new cards for handsets. This heavily impacts investment costs, the speed of rolling out, the breath of initial geographical coverage and, thus, enables more rapid commercial service launches. Clearly, Keiji Tachikawa was concerned about the toughening 3G standard race, but additionally the growing success of cdma2000 based 3G could jeopardize DoCoMo's global plans for 4G telecommunications. In April 1998, the firm's 4G R&D programme was launched, and by October 2002 DoCoMo's proprietary OFDMA technology was chosen the company's 4G standard. The technology enables 100Mbps-downlink and 20Mbps-uplink transmissions (NTT DoCoMo Press release, 18.03.2002; NTT DoCoMo Press release, 09.10.2002). The R&D has focused on high compatibility with WCDMA providing low migration costs for the expected large future base of WCDMA 3G networks. Thus, DoCoMo seeks lock-in of operators to its technologies with high future pay-offs to the currently expensive WCDMA network

rollouts (Nakajima and Yamao, 2001). In addition to the current success of cdma2000, US players including Qualcomm may have learned from 2G and 3G, and may better proliferate their 4G technologies. Clearly, standardization races will challenge DoCoMo again.

Co-specialization and dependency on handset providers

DoCoMo not only retails handsets vendors' products, but also takes active part in co-developing new attractive phones. In contrast, in EU and US handset producers develop their own phones that in terms of availability and supported features subsequently set the boundaries for wireless operators' competitive offerings of wireless services (Far Eastern Economic Review, January 2001; Reuters, 03.07.2001). The operator-specificity of wireless services and handsets in Japan has fuelled a strong tradition for exclusive agreements between operators and vendors with long-lasting stable relationships as an obvious outcome (Nomura, 1998). Through joint R&D, DoCoMo and their handset vendors reap benefits from their co-specialized complementary technological and market capabilities. Based on experiences, Keiji Tachikawa had stated that handset vendors lack the "intimate understanding of user needs" and thus, DoCoMo must influence handset design to drive acceptance, usage and revenues and for this own R&D is critical (Boston Consulting Group, 2002). From his perspective European and US handset vendors such as Nokia, Ericsson and Motorola had too much power to dictate handset design. DoCoMo's division of labor with vendors involves joint R&D until finalized prototypes and sufficient technical specifications are at hand. Then vendors produce the new models, and DoCoMo distributes and retails them through its vast nationwide sales network of DoCoMo stores.

Until recently, DoCoMo primarily sourced from traditional NTT Family vendor, in particular NEC and Panasonic that still by 2001 supplied above 90% of I-mode handsets. The dependency was mutual as I-mode handsets represented 90% of NEC's total handset sales (Far Eastern Economic Review, January 2001). The alliance model proved highly successful as e.g. DoCoMo offered superior handsets throughout the 1990s and a key success factor for I-mode has been the ease of use built into the handsets. This illustrates the strong systemic dependencies between wireless services and handsets when exclusively bundled as a wireless package. The operator-specific handsets are grouped into model series with similar specifications, and within each series several handset manufactures supply their own version. The manufacturer is only recognizable from a letter in the model classification on the otherwise DoCoMo branded and operator-specific handsets.

In recent years, the handset alliances had exploded in numbers from the cosy NTT family with particularly NEC and Fujitsu from 'the big four'. In 2000, there were only four I-mode handset providers, namely NEC, Fujitsu, Mitsubishi and Panasonic (Communications International, April 2000). By now, I-mode handset suppliers are Denso (D), Ericsson (E), Kokusai (K), NEC (N), Nokia (NM), Panasonic (P), Sony

(SO), and Sharp (SH). For DoCoMo's 3G service FOMA, 11 handset manufactures were commissioned, but by the launch in October 2001 only NEC and Panasonic were able to supply FOMA handsets. In 2002, Fujitsu (F) and Denso have also introduced FOMA-handsets, but world leaders such as Nokia and Ericsson still fall short of delivery (NTT DoCoMo Press releases, Telephony, May 2001). CEO Keiji Tachikawa thought of how the increasing number of suppliers required careful coordination and prioritization of R&D activities. Also, relationships with the numerous overseas vendors were quite different from the NTT Family not only for cultural reason, but they also less dependent on DoCoMo's large R&D budgets, technological expertise and market leadership, since Japan was only one of their key markets. Change was also coming from within, as key suppliers such as NEC now explored overseas markets. Keiji Tachikawa was puzzled if the cozy relationships from Japan could be exported overseas as well, or whether old partners would go it alone or find new partners. On one side, NEC and Panasonic were key suppliers of I-mode phones in the new European markets such as Germany, Netherlands and France. On the other side, for instance Panasonic had publicly announced that they would pursue all attractive internationalization avenues including marketing products under their own brands to move away from exclusivity agreements with DoCoMo (Far Eastern Economic Review, January 2001; InfoWorld, July 2000). Keiji Tachikawa saw the risk of leaking even proprietary knowledge benefiting overseas vendors and operators outside DoCoMo's control. Thus, challenges of protecting intellectual property rights were emerging.
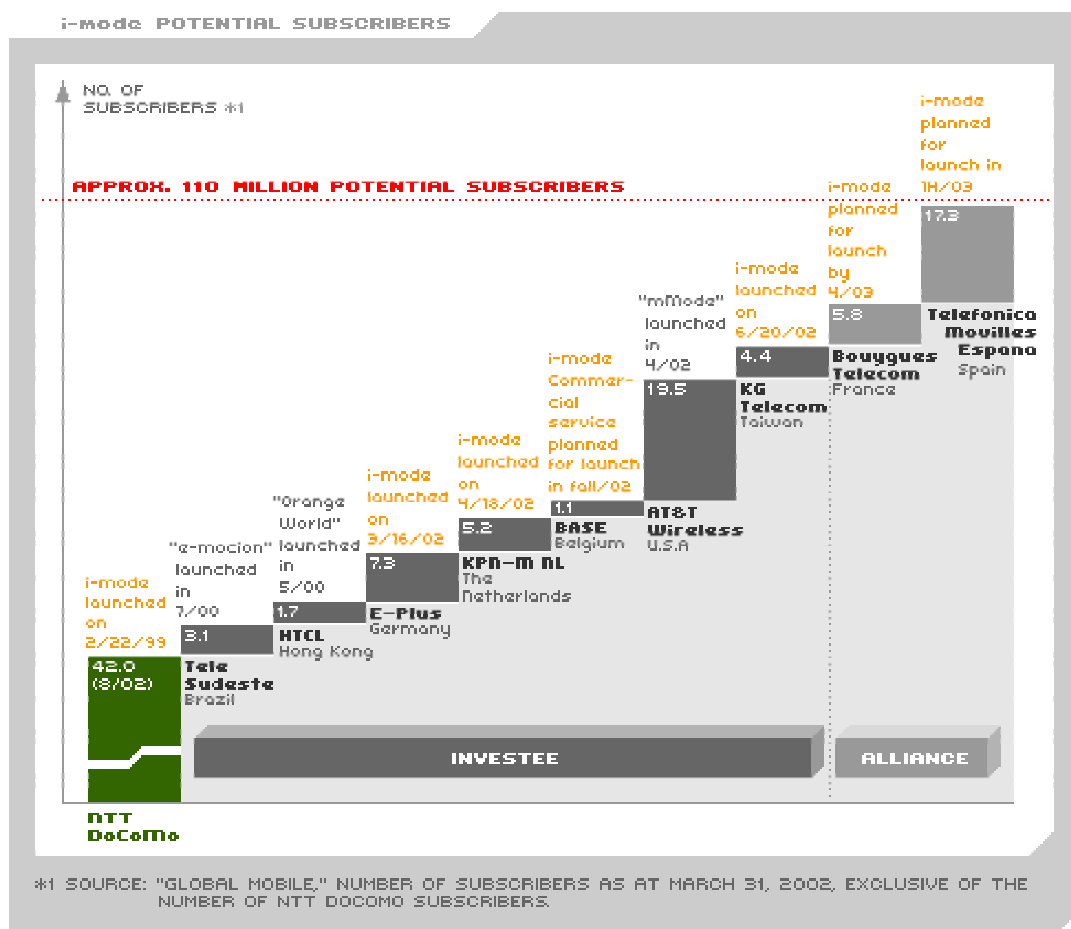
The intensified competition from domestic competitors J-Phone and KDDI that too have exclusivity agreements with handset vendors had challenged the supremacy of the 'DoCoMo' family's handsets. For instance, with its competitive photoemail service enabled by attractive handset with built-in cameras, J-Phone rather than DoCoMo had reaped first mover advantages in this killer app. J-Phone launched camera-handsets in November 2000, and the Sha-Mail service followed in June 2001. DoCoMo had entered the photoemail segment in June 2002 with less appealing handsets. Similarly, KDDI and its handset vendors have pioneered GPS-enabled handsets and services. Now, Keiji Tachikawa was hoping that the major overhaul of I-mode and FOMA handsets in 2002 and DoCoMo's latest initiative to fund half of vendors' R&D in FOMA handsets would help the company and its partners regain its leadership (Financial Times, January 2003b).

International alliance endeavors

Spurred by the internationalization intent laid down in the Vision 2010 strategy, DoCoMo entered the global battle for wireless supremacy through a massive investment spree of accumulated Y1,8bn in 2000 and 2001. Equity stakes of 15-20% were acquired in key partners such as Dutch KPN Mobile, Taiwanese KG Telecom, and US AT&T Wireless that should serve as bridgeheads into the European, US and Asian markets (NTT DoCoMo Press releases). DoCoMo allied primarily with former state monopolies "with similar cultures including respect for R&D and conservative management styles" (Ratliff, 2002:67). At this time, DoCoMo was a highly attractive partner with its technological lead in 3G technologies chosen as EU's UMTS standard (WCDMA), strong R&D organization, essential patents, the proven wireless Internet model and technology platform and highly successful I-mode service, strong R&D and core technologies, dominance in the EU UMTS standard WCDMA, as well as

substantial financial resources to co-finance the expensive acquisitions of 3G licenses and rollouts of novel WCDMA networks (Business Week, August 2000; Fortune, September 2000). In return, the equity-stakes gave cost-efficient access to overseas partners' local market knowledge, existing wireless network infrastructure such as a GPRS networks, their ties with handset and equipment vendors necessary for the network rollout, local brands and the existing subscriber base. Partnerships were vital considering the limited international experience of DoCoMo at the turn of the millennium.

Initially, the market alliances focused solely on bidding of 3G licenses and subsequent role out of WCDMA networks as part of DoCoMo's proliferation of its core 3G technology as de facto world standard, and thereby profit from its technological and market lead in advanced wireless services. During 2001, DoCoMo successfully shifted the short-term focus of the alliances to rapid rollout of 2G I-mode services on

GPRS networks upgraded from GSM. This to fill a widening revenue gab caused by saturated I-mode uptake, intensified competition and slower than expected acceptance of the new 3G FOMA service. Having developed an I-mode overlay for GPRS, I-mode services were launched in numerous Asian, European and US markets during 2002 (see chart).

The export of DoCoMo's success has proven far from easy. In addition to technical problems with incompatible systems and heavy investment requirements, I-mode services have had limited commercial success. By December 2002, I-mode had about 220.000 subscribers in Germany and Netherlands, and almost 100.000 in France (Wall Street Journal, February 2003). The problems reassured sceptic European and

US operators and equipment manufactures that DoCoMo's success was a Japanese phenomenon due to (1) low competition from PCs and fix-lines due to high costs of dial-up Internet access, small PC penetration, and high costs of fix line telephoning, (2) cultural and demographic factors such as the large population proportion of teenagers and young adults being gadget-freaks and customer taste differences making many information services (i.e. entertainment, fortune telling, ringing tone download and kitty cartoons) only popular in Japan due to culture, and (3) NTT DoCoMo's dominant position in an isolated market enabling it to dictate wireless offerings and developments. Moreover, the market conditions in EU and US have been argued to be less lucrative for wireless data services, because (1) users would have little interest in I-mode like Internet services because Internet content largely is free (consumers only pay for the internet access when using PC, although this is changing), and (2) Europe is short of a legacy of millions of wireless data subscribers due to the failures of WAP and GPRS to date (Communications International, February 2002; Economist, March 2002; Telecommunications International, February 2001). Keiji Tachikawa recalled how unhappy shareholders at a meeting in June 2002 had lashed out at DoCoMo for the souring overseas investments and the management's commitment to continue despite huge write-offs of overseas sharepositions (Y1,490bn out of Y1,8bn). Vice president Yoshinori Uda had defended the expansive global strategy arguing that
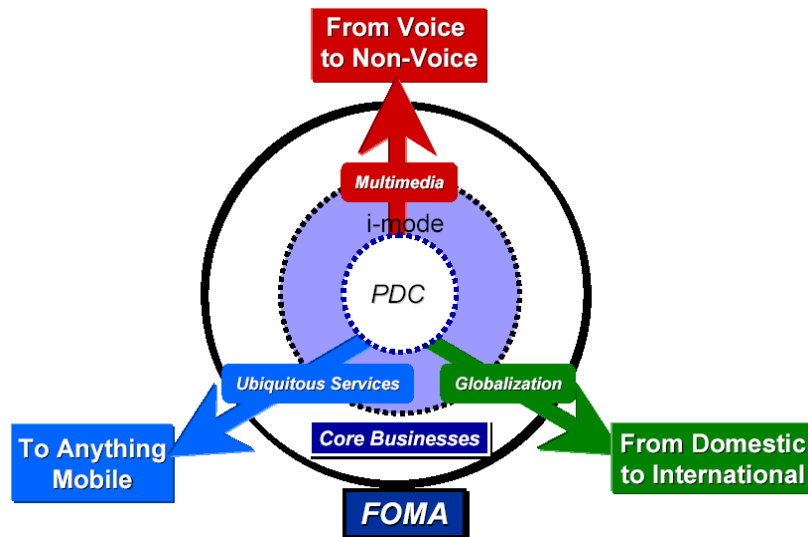
"It's necessary to make overseas investments to cope with the globalization of the mobile phone market [...] and we will continue investments otherwise we won't be able to survive and may miss a growth opportunity" (Reuters, 20.06.2002).

While sticking to the investment strategy and facing exportability problems, Keiji Tachikawa asked himself, if his company had forgotten a key lesson from the successful development of a wireless market in Japan and the creation of the world's largest wireless Internet. They had carefully adapted technologies and services to consumer preferences through user-driven innovation. Could one explanation behind the slow overseas uptake be lacking adaptation of existing services from Japan and/or lacking development of novel wireless services matching unique market characteristics of overseas markets.

Recently, other severe challenges to the internationalization strategy had emerged that shareholders would soon point to. In US, worsening market conditions lead to a plunge of partner AT&T's shares, and annual wireless subscriber growth has dropped from 40% to 20%. AT&T's trouble fed concerns that it would fall short of launching 3G services in 14 of the top 50 markets in the US by June 2004. While DoCoMo had a clause with a right to sell back its 16% stake to AT&T, if the target was not fulfilled, there was a risk that AT&T would spread the service to provincial cities to avoid the right being exercised. Instead, in the light of limited control of partner activities in minority alliances, DoCoMo and AT&T agreed to change the ambition to agreed to start 3G services in 4 major cities - San Francisco, Seattle, Dallas and San Diego - by the end of 2004 instead (Financial Times, January 2003a). In Europe, apart from slow commercialization, DoCoMo's bet on Dutch KPN Mobile with its Belgium, German and East European subsidiaries as its key European partner was also backfiring. In near future, Keiji Tachikawa expected a consolidation of the European market leading to 4 dominant players. Already now it was clear that KPN would not be among those; only global competitor Vodaphone is in that league by now. Therefore, DoCoMo led

its equity stake in KPN deplete from 15% to 2,2%, and consider to expand existing friendly relationships with Italian TIM and/or Spanish Telefonica. However, shareholders had to be convinced for such a move (Financial Times, December 2002; Financial Times, January 2003a).

Managing growth

Looking back, Keiji Tachikawa remembered the thrilling days of 100%+ growth rates in the mid-1990s. DoCoMo's growth strategy then rested upon traditional means such as clever branding, low tariffs, a proprietary network, and high quality handsets and wireless voice services. While I-mode had paved the road for new wireless data service to substitute falling ARPUs from traditional voice services, the wireless Internet was showing signs of saturation and for future growth, new compelling innovations had become essential. DoCoMo's growth strategy laid down in Vision 2010 had formulated three key growth pillars for DoCoMo; (1) Multimedia enabled by new service applications such as multimedia messaging, (2) Globalization through alliances with overseas operators, and (3) Ubiquitous services (see figure) (NTT DoCoMo Annual report 2001; NTT DoCoMo, January 2003).

Much progress was already on its way for future multimedia services. In the quest to find utilization of the higher capacity of 3G technologies, convergence with the media industry had been a fairly obvious path, as videos, music, pictures, games and more content types were already digitized, available on the Internet and mobile devices related to each were already existing. Since, late 1999, Keiji Tachikawa had taken DoCoMo abroad through minority stake alliances, and thereby reached most key overseas markets rapidly and efficiently. Having publicly defended the internationalization strategy at numerous occasions, Keiji Tachikawa was sure DoCoMo was on the right track with respect to this growth pillar. Thus, in the light of the currently slow uptake of FOMA multimedia services (pillar 1) and shareholders' scientism about the internationalization strategy (pillar 2), taking shareholders on a visionary journey to 2010 with a focus ubiquitous services appealed highly to Tachikawa. With these services DoCoMo sought to meet user needs beyond person-to-person communication to machine-to-machine and person-to-machine communication, as well as tailoring services to particular needs of different industries

or individual users (NTT DoCoMo Press Kit, 2001). Thereby, DoCoMo can exceed exceeding 100% penetration (Economist, October 1999).

Vision 2010	
People (handsets)	120 mill
Cars	100 mill
Bicycles	60 mill
Portable PCs	50 mill
Motorbikes, boats, vending machines etc	10 mill
Pets (e.g. cats, dogs)	20 mill
Total	**360 mill**
NTT DoCoMo, September 2001	

Substantial innovation efforts were required in this field, and most service application alliances to date had been formed with leading media players. Still, the vision remained that 70-80% of traffic would be generated by wireless data services, and DoCoMo had previously predicted that by 2010 only a third of units delivering wireless services would be handsets (see table). An early success has been the I-vending machine Cmo co-developed with Coca-Cola and a Japanese trading firm. Now, also other infrared communication enabled services are planned such as Mobile GEO, iLawson, and clubDAM.com. The DoCo-desu-Car location service enabled by GPS allows firms to locate trucks and goods. In collaboration with Nissan, advanced telematics are under development. Also, the m-payment service e-value allows online purchase of subway tickets, drinks and tickets for events and concerts, and the e-billing payment services lets users pay for groceries in convenience stores with handset (NTT DoCoMo January 2003).

A more short-term project has been the launch of M-Stage MMS services for PDAs connected via 2G PDC handsets. Thereby, DoCoMo leverages the vast existing number of PDAs and I-mode phones to deliver advanced FOMA services at a time when FOMA attracts only few subscribers. In February 2002, the PDA portal 'Infogate' was launched and from October 2002, three M-stage services were launched (Visual Net, M-Stage book, and M-Stage V-live) (NTT DoCoMo Press releases).

The Nissan alliance and the telematics services under development had taught a few early lessons. Joint R&D was extremely challenging as participants were from completely unrelated industries. DoCoMo that was used to providing leading-edge user knowledge also found itself in a new role as technology provider with limited understanding of the new customers. Also, DoCoMo's R&D organization including existing handset and network partners had found itself in an entirely new territory. Thus, while ubiquitous services were compelling, such diversification would surely be questioned by the already skeptic shareholders.

As the private jet landed in Tokyo, Keiji Tachikawa was wondering if his company had overlooked attractive ubiquitous applications for wireless technology for the future, or for that sake new promising pillars for the growth strategy. Surely, the presentation of the financial year 2003 ending on 31 March 2003 would require his full attention in the near future.

NTT DoCoMo consolidated financial figures, 1995-2002

Million yen

Financial year*	1995	1996	1997	1998	1999	2000	2001	2002
Operating revenues	806.982	1.237.176	1.962.850	2.626.120	3.118.398	3.718.694	4.669.366	5.171.500
Net Income	16.448	21.379	28.690	120.628	204.815	252.140	401.755	800
Total Assets	959.483	1.228.840	1.799.036	2.293.723	3.331.137	3.613.124	6.016.505	5.912.500
Employees	5.945	6.323	6.901	7.557	9.342	10.098	18.015	19.700

* The financial year is from April 1 to March 31 (i.e. FY02 ended 31.03.2002)
Sources: NTT DoCoMo Annual Reports 1999, 2000, 2001, 2002.

DoCoMo APRU

(FY1995=March95)	1995/3	1996/3	1997/3	1998/3	1999/3	2000/3	1Q/01	2Q/01	3Q/01	2002/3	1Q/02	2Q/02	3Q/02
PDC APRU total	19720	15930	12570	10800	9270	8740	8770	8570	8540	8020	8150	8170	8200
- Voice APRU						8620	7300	7060	6960	6430	6520	6460	6430
- I-mode APRU						120	1470	1510	1580	1590	1630	1710	1770
FOMA APRU total							-	-	10400	8430	7800	7250	7750
Total I-mode APRU							2300	2180	2130	2040	2040	2100	2110

KDDI ARPU

(FY1995=March95)	1995/3	1996/3	1997/3	1998/3	1999/3	2000/3	1Q/01	2Q/01	3Q/01	2002/3	1Q/02	2Q/02	3Q/02
Au Total ARPU							8610	8360	8060	7320	7560	7660	7640
- Au Voice							7760	7470	7180	6390	6530	6530	6440
- Au Data							850	890	880	930	1030	1130	1200
Au CDMA 2000 1x subtotal											10420	9610	9240
- Au 3G Voice											7290	7310	7080
- Au 3G Data											3130	2300	2160

Total wireless market subscribers (000), March each year

	1991/3	1992/3	1993/3	1994/3	1995/3	1996/3	1997/3	1998/3	1999/3	2000/3	2001/3	2002/3	dec-02	jan-03
Total market	868	1378	1712	2131	4331	10204	20876	31526	41530	51141	60943	69121	73514	73900
DoCoMo	549	846	1027	1323	2206	4936	10960	17984	23898	29356	36026	40783	42874	43033
KDDI *(consolidated)*				806	1844	4095	5553	9420	11453	13619	14940	16105	17317	17411
au (KDDI)											10986	12214	13468	13583
Tu-ka (KDDI)					259	1005	1899	2323	2890	3494	3954	3891	3849	3828
J-Phone *(consolidated)*					281	1173	2873	4123	6179	8166	9978	12232	13323	13456
IDO Corp				335	635	1130	1722	2768	3265	3895				
DDI Cellular				471	950	1960	1932	4329	5298	6230				
Digital Phone					281	1080	1913	2373	3906					
Digital Tu-ka						93	960	1750	2273					

Wireless market shares

	1991/3	1992/3	1993/3	1994/3	1995/3	1996/3	1997/3	1998/3	1999/3	2000/3	2001/3	2002/3	dec-02	jan-03
DoCoMo	63,2	61,4	60	62,1	50,9	48,4	52,5	57	57,5	57,4	59,1	59	59,5	59,5
DCM cal	63,2%	61,4%	60,0%	62,1%	50,9%	48,4%	52,5%	57,0%	57,5%	57,4%	59,1%	59,0%	58,3%	58,2%
KDDI *(consolidated)*				38%	43%	40%	27%	30%	28%	27%	25%	23%	23,6%	23,6%
au (KDDI)											18%	18%	18,3%	18,4%
Tu-ka (KDDI)					6%	10%	9%	7%	7%	7%	6%	6%	5,2%	5,2%
J-Phone *(consolidated)*					6%	11%	14%	13%	15%	16%	16%	18%	18,1%	18,2%
IDO Corp				16%	15%	11%	8%	9%	8%	8%				
DDI Cellular				22%	22%	19%	9%	14%	13%	12%				
Digital Phone					6%	11%	9%	8%	9%					
Digital Tu-ka						1%	5%	6%	5%					

OUTLOOK – Service and handset roadmaps.

"au" & Solution Chart

KDDI, February 2003
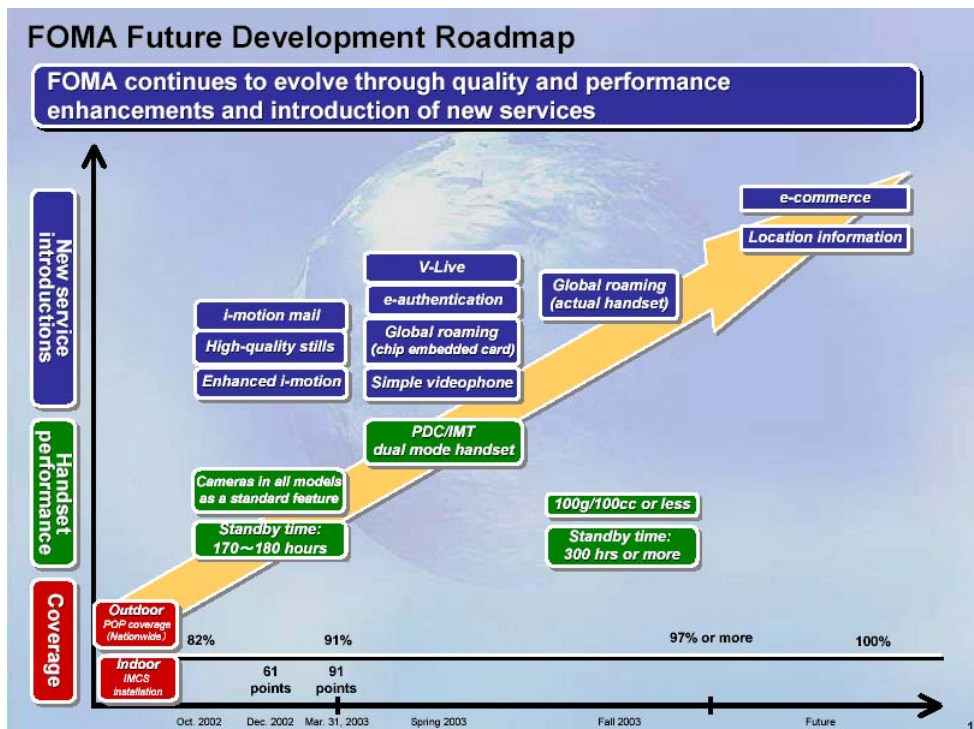
Brew = service application platform standard for cdma2000 1x, corporate solutions, GPS and current services combined.
SI = system integrators.

Source: NTT DoCoMo, January 2003)

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