

# 7

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## Ba-BA-Ba-BAAAAH

This “telephone” has too many shortcomings to be seriously considered as a means of communication. The device is inherently of no value to us.

—*Western Union internal memo, 1876*<sup>1</sup>

### *INSIDE THIS CHAPTER*

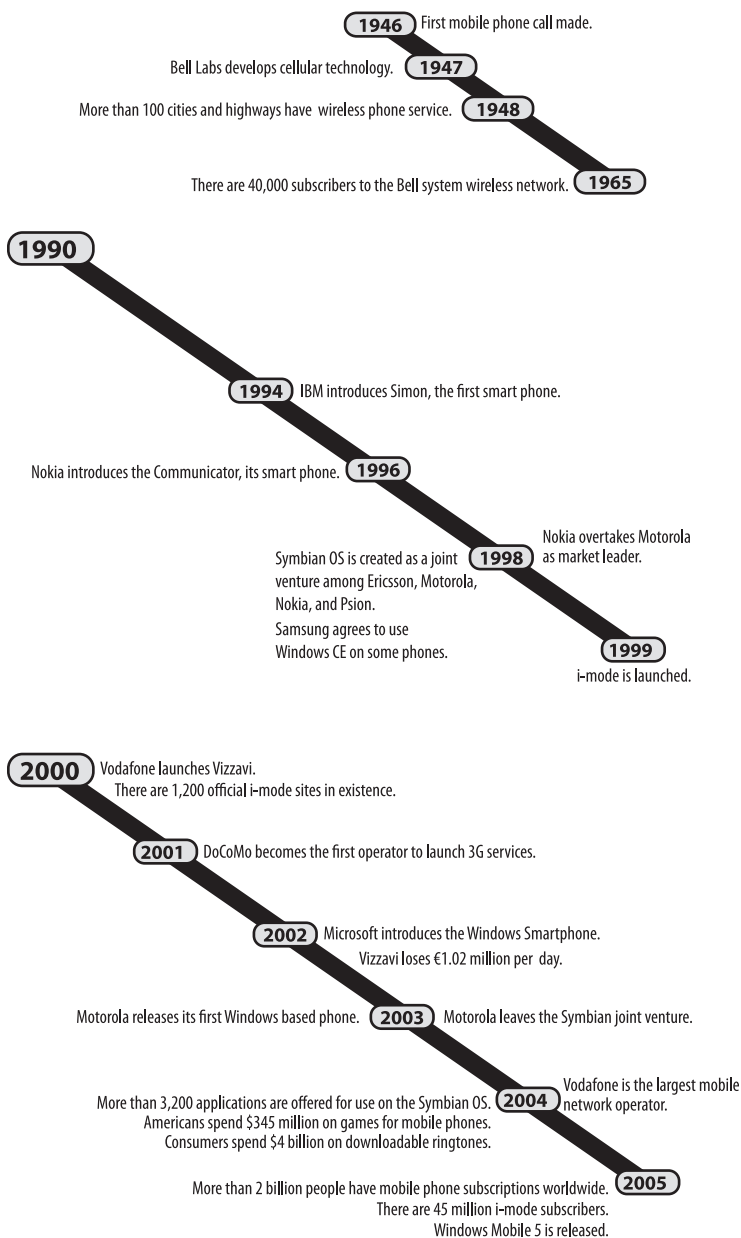
- The complex structure of the mobile phone industry
- Software platforms for smart mobile phones
- Multisided strategies and the development of DoCoMo’s i-mode phone platform

Many years ago, most telephones alerted people that they had a call with a single jarring ring. The same unchangeable ringtone was bundled into every phone. As we all know from the cacophony of mobile phones ringing in public places, people now hear many sounds that tell them they have incoming calls. Mobile manufacturers have different standard tones, and many makers allow people to choose among several possible rings.

Moreover, people are no longer restricted to the ringtones that come with their phone. They can buy ringtones from various Web sites and download them into their phones. If you want to hear Simon and Garfunkel singing “Bridge Over Troubled Water” to announce a call, you can get it for \$2.49 from [www.cingular.com](http://www.cingular.com), among other places. These downloadable ringtones are small software applications. They

1. Morgan, Michael, *Making Innovation Happen: A Simple and Effective Guide to Turning Ideas Into Reality* (Warriewood, Australia: Australian Print Group, 2000).

## Chapter 7: Mobile Phone Timeline



include 15 seconds of digital sound and code that works with the software platform that's on the phone to make the digital sound audible.

With the spread of increasingly sophisticated mobile telephones, ringtones have become a big business. Consumers around the world spent an estimated \$4 billion in 2004 on downloadable ringtones.<sup>2</sup> Most mobile operators sell these on their Web sites, and many Web portals specialize in providing them. The segment has attracted hundreds of software developers in the last few years.

That something as frivolous as ringtones has become such a money-maker for mobile operators, music owners and publishers, and software developers is early evidence of the power of the software platforms that power these small computing devices.

Most of the mobile phones used by subscribers in the world aren't smart enough for ringtones or other software or Web-based applications. They don't have the microprocessor and operating system required for an intelligent phone. (Many data sources restrict "smart phones" to those that are closer to the PDAs of the last chapter—ones onto which it is easy to download sophisticated applications. These data sources would not include many of the sophisticated phones we discuss here.) That is changing rapidly in many countries. Mobile network operators have seen Web-based services as a driver of revenues and profits. They have developed capacious networks for delivering data and have started encouraging their subscribers to take ever-smarter phones that can rely on these services.

Japan is far ahead of the pack. Most phones there are smart, with 79 percent connected to the Internet in 2004. A June 2005 article in the *Business Telegraph* describes what anyone who has lived recently in Japan knows:

There are some things that a teenage girl in Tokyo cannot leave the house without. Her gladiator sandals, her Mac strobe cream moisturiser, and her i-mode mobile phone. With i-mode she can be constantly connected to a virtual playground of web-based treats: ringtones, chat, email, games, horoscopes and whacky cartoon characters.<sup>3</sup>

2. Reinhardt Krause, "Cellular Carriers Search for Piece of Music Biz," *Investor's Business Daily*, May 13, 2005.

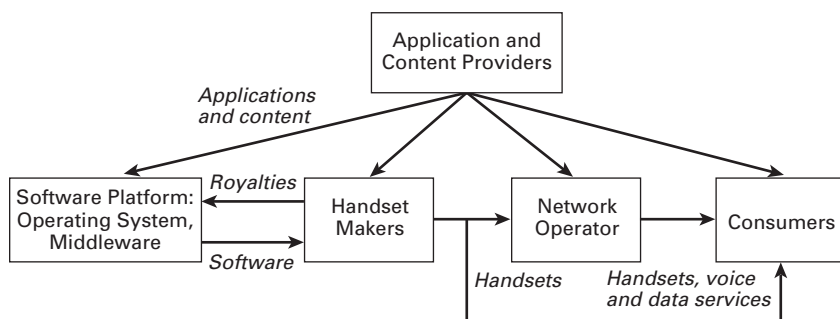
3. *Business Telegraph*, June 24, 2005.

If the Japanese experience is any indication of the future elsewhere, these small computing devices promise to revolutionize many industries. People with certain i-mode phones in Japan can wave them at a device at the store counter to automatically pay for things. The transaction generally goes through the i-mode mobile phone network (and its associated billing system) rather than through a payment system network like that operated by MasterCard.

This chapter is about how mobile phone software platforms are driving innovation and transforming industries. It is a story once again of the power of these invisible engines and the role of multisided strategies in getting diverse customer groups on board. Pricing, bundling, and evangelizing remain the key tactics.

### The Mobile Phone Business

The company that operates the wireless network has a critical influence on mobile telephone platforms. These “mobile operators” ultimately control what mobile telephones their subscribers use, what software platform runs those phones, and what applications can be downloaded onto them. We begin with these networks and then consider the other key players in the ecosystem: the phone manufacturers, software platform providers, application developers, and content providers. A simplified sketch of the relationships among the players is shown in Figure 7.1. (Americans refer to cell phones. We use the term mobile phones or



**Figure 7.1**  
Platform ecosystem for mobile phones.

mobiles, which seems to be the more common term outside the United States.)

### *Mobile Operators*

The first mobile phone call—made with a handset in a car—took place on June 17, 1946. More than 100 cities and highways had wireless phone service by 1948. There were 5,000 subscribers using clunky handsets. The wireless network, then controlled by the nationwide Bell telephone system, grew slowly. There were only 40,000 subscribers in 1965. The 2,000 New York City subscribers had to wait 30 minutes to place a call on one of the limited number of channels available. At this point, the wireless network was based on a single transmitter serving each wide geographic area.

Cellular telephone technology originated at Bell Laboratories. In 1947, the well-named D. H. Ring came up with the idea of having low-power transmitters spread across a grid and handing off calls from one cell to another of this grid as a person moved around it. Further development of computers was necessary to make this idea workable. A Motorola employee walking the streets of New York finally made the first cellular telephone call on April 3, 1973. AT&T started field-testing cellular telephone service in the late 1970s. The first commercial cellular network in the United States was started in Illinois in 1983. Japan, however, had started one four years earlier. Cellular technology soon displaced single-transmitter systems.<sup>4</sup>

Before the mid-1980s, telephone systems in most countries were monopolies, either public utilities or state-run enterprises. The United States started introducing competition in telephone service in the 1970s. As a result of the settlement of a government antitrust case, on January 1, 1984, AT&T divided itself into a separate long-distance company, operating in competition with other long-distance providers, and seven regional operating companies. Although few other countries went this far, the idea of promoting more competition in telephone service had widespread appeal. When the promise of cellular technology became apparent, many countries decided to create competition in this area by making licenses for the necessary radio spectrum available to several

4. <http://www.ideafinder.com/history/inventions/mobilephone.htm>.

competing companies. As of 2005 there were four major mobile operators in the United States, five in the United Kingdom, three in France, four in Germany, and three in Japan.

Mobile networks are multisided platforms. They link people who make calls and people who receive calls (we discuss more sides below). The subscribers to a mobile telephone network make calls to, and receive calls from, other subscribers on the same mobile network, subscribers of other mobile networks, and individuals with traditional fixed-line telephones. Mobile operators around the world have followed a similar pricing strategy. They generally subsidize the purchase of mobile telephone handsets by prospective subscribers. They then recover the costs of these handsets through various subscription plans for making calls and other fees that callers pay, as well as from the many new mobile telephone services discussed below. For example, Vodafone offers several mobile telephones for free in the United Kingdom as part of an initial subscription package that also includes reduced calling charges. A three-month subscription that costs £12.50 per month includes a Motorola V3 telephone that is sold separately on [amazon.uk](http://amazon.uk) for £199.99.<sup>5</sup>

Mobile telephone companies compete for subscribers. After investing in subsidized phones and sales efforts to sign them up, they try to make these subscribers as “sticky” as possible to their networks. In many countries, for instance, people who switch carriers lose their telephone numbers. They also usually have to switch telephones, and that often means losing all of the telephone numbers and other information they have programmed into their handsets.<sup>6</sup>

The mobile operators also try to get their subscribers to use the network as much as possible. Until recently that meant encouraging

5. Vodafone: [http://shop.vodafone.co.uk/index.cfm?fuseaction=home.viewPressOffers&WT\\_ref=HOM-15-07-2005-H005](http://shop.vodafone.co.uk/index.cfm?fuseaction=home.viewPressOffers&WT_ref=HOM-15-07-2005-H005) (downloaded October 10, 2005); Amazon.co.uk, Motorola V3: [http://www.amazon.co.uk/exec/obidos/ASIN/B000980PVM/qid=1128958244/sr=8-2/ref=sr\\_8\\_xs\\_ap\\_i2\\_xgl/026-6708820-8480445](http://www.amazon.co.uk/exec/obidos/ASIN/B000980PVM/qid=1128958244/sr=8-2/ref=sr_8_xs_ap_i2_xgl/026-6708820-8480445) (downloaded October 10, 2005).

6. Local number portability has been available in the United States and the United Kingdom for years, and Japan began to offer local number portability in 2006. <http://www.fcc.gov/cgb/consumerfacts/wirelessportability.html>; [http://www.ofcom.org.uk/consult/condocs/uk\\_num\\_port/uk\\_num\\_port\\_cons/#content](http://www.ofcom.org.uk/consult/condocs/uk_num_port/uk_num_port_cons/#content); “KDDI to Turn Its Handsets into Wallets,” *Financial Times*, July 12, 2005.

people to make and take phone calls. With Internet connectivity, these companies are trying to get their customers to use the networks for other services, such as messaging, buying things online, and downloading content. One of the most successful of these is DoCoMo, whose i-mode service we discuss in this chapter.

The mobile operators serve as gatekeepers to their subscribers, a role that doesn't exist in other computer-based industries. One cannot call a subscriber without going through the operator's switch. Although it is possible for manufacturers to sell handsets directly to subscribers, it is more convenient for the subscriber to get both the phone and the network subscription from the operator. Most mobile phones are sold through system operators.<sup>7</sup>

Mobile network operators have consolidated over time in most nations, and several global operators have appeared. The largest by revenue as of 2004 were Vodafone, followed by NTT DoCoMo and T-Mobile, as shown in Table 7.1.

The United States has lagged behind Europe and Japan in the use of mobile telephones. For many years just about everyone under the age of thirty has had a mobile telephone in Europe and Japan. Young people outside the United States have used these computing devices since the mid-1990s for tapping out short messages (SMS) to each other, often using a dialect that economizes on keystrokes, such as the common "ttyl" (talk to you later) or "cu" (see you). The United States is catching up. But SMS is less popular in the United States because of the relatively low cost of voice telephone calls and high Internet penetration.<sup>8</sup>

Mobile telephones are particularly attractive for emerging economies that haven't invested in their fixed-line systems. More than 330 million residents of China have a mobile phone. Estimates are that more than 545 million—about 41 percent of the Chinese population—will have one by 2009.<sup>9</sup> Eventually most of these phones will be smart enough for the

7. "The NPD Group," *Business Wire*, November 21, 2005.

8. Charles S. Golvin, "Sizing the US Mobile Messaging Market" (Cambridge, Mass.: Forrester Research, July 30, 2004).

9. "China: Telecoms and Technology Forecast," Economist Intelligence Unit—Executive Briefing, April 19, 2005.

**Table 7.1**  
Largest Mobile Operators by Revenue, 2004

Carrier	Revenues (billions)	Subscribers (millions)	Countries
1 Vodafone	\$58.7	\$154.8	Australia, New Zealand, Germany, Greece, Hungary, Ireland, Italy, Portugal, Spain, Sweden, U.K.
2 NTT DoCoMo	\$45.1	\$117.0	Japan
3 T-Mobile	\$29.9	\$120.0	U.S., Australia, Germany, U.K., Slovakia
4 Verizon Wireless	\$24.4	\$45.5	U.S.
5 Orange (France Telecom)	\$23.5	\$50.0	Australia, Hong Kong, Thailand, France, Netherlands, Poland, U.K.
6 China Mobile	\$23.2	\$220.5	China
7 Cingular	\$19.4	\$50.0	U.S.
8 Movistar	\$14.4	\$74.0	Argentina, Spain
9 China Unicom	\$9.6	\$112.0	China
10 Mobile TeleSystems	\$3.9	\$42.3	Russian Federation

Note: Vodafone also owns 49% of Verizon Wireless (not included in the Vodafone total).

Source: Operator Web sites, and the press.

kinds of services we describe in this chapter. Worldwide, some analysts predict that the smart phone share of mobile shipments will more than quadruple over the next few years to about 18 percent in 2009, so that more than 180 million will be shipped annually.<sup>10</sup> Many of these people probably won't have a PC and will be connected to the Internet mainly through their mobile phones.

### *Mobile Phone Manufacturers*

As we noted earlier, Motorola made the first mobile telephone for use with a cellular network. For a while it owned the business, but aggressive competitors soon appeared.

10. Kevin Burden, Randy Giusto, David Linsalata, Ramon T. Llamas, and Allen M. Liebovitch, "Worldwide Mobile Phone 2005–2009 Forecast Update and 1H05 Vendor Analysis" (IDC report no. 34408), November 2005.



One of them, Nokia, overtook Motorola as market leader in 1998.<sup>11</sup> It had moved more quickly than Motorola to respond to the emergence of digital networks in the early 1990s. It also recognized that people who carried mobile phones around all the time cared about how they looked. Nokia excelled at creating fashionable phones that initially appealed to the burgeoning European market, and eventually to Americans as well. Motorola fought back by continuing to improve its popular StarTac phone, which it originally introduced in 1996.<sup>12</sup>

An important dimension of competition among manufacturers has become how smart the phone is<sup>13</sup>: the sophistication of the hardware and software platform and therefore its functionality. Motorola introduced the first mobile that could receive wireless email, for instance, while Alcatel had the first phone that could both send and receive wireless email, and Samsung offered the first mobile that could play streaming video.<sup>14</sup> Competition has also included adding features that weren't

11. <http://nds2.ir.nokia.com/aboutnokia/downloads/archive/pdf/eng/nok98eng.pdf>.

12. <http://www.motorola.com/content/0,,123-288,00.html>.

13. The wireless transmission standards are the other noteworthy technological dimension: they are embodied in the phone chips and determine how data (voice and other) are transmitted on the network. For second-generation (2G) networks there are three main standards: GSM, accounting for 75% of worldwide users, especially in Europe; CDMA, with 17% of users, prevalent in South Korea, China, and North America; and TDMA, an old U.S. standard, which is fading away. Patents for the GSM standards are owned by a consortium of major handset manufacturers, including Nokia, Motorola, and Ericsson. By contrast, virtually all patents for CDMA are owned by U.S. firm Qualcomm, which in 2003 was virtually the sole provider of chips for CDMA phones and the overall world's number 2 cell phone chip provider, after Texas Instruments. For advanced, third-generation (3G) networks capable of supporting higher bandwidth and faster data transmission, the two main standards are WCDMA (Wideband CDMA, known in Europe as UMTS), the upgrade for GSM used by carriers such as NTT DoCoMo, Vodafone, T-Mobile, and Cingular; and CDMA2000, the upgrade for CDMA used by Verizon Wireless, SK Telecom, and Sprint, among others. Qualcomm owns all patents on CDMA2000 but only 20% of those for WCDMA, at least 60% of which is owned by Nokia, Ericsson, NTT DoCoMo, and Siemens together.

14. "Samsung Electronics Launch Streaming Video Cell Phone," *Israel Business Today*, October 1, 2000; "Motorola Debuts Internet Service At Wireless '96,"

originally associated with mobile phones. The now famous example is bundling a digital camera with a phone. Some phones now do almost everything one could do with a PDA—they include calendars, contact managers, and other features of an electronic organizer.

Because network operators serve as gatekeepers, competition among mobile telephone makers has a dimension that we haven't seen in other industries based on software platforms. Manufacturers sell their phones mainly through the operators, giving those operators considerable influence over the features that get included on the phones. After all, these phones are ultimately designed to benefit subscribers and thereby to help each operator sell calling and other services to its subscribers. Thus, when DoCoMo decided that it wanted its phones to include a smart card so that its subscribers could pay for things, it asked Fujitsu, NEC, Panasonic, Sharp, and other manufacturers that supply its phones to include this feature.<sup>15</sup>

Ultimately, of course, the consumer determines the popularity of different mobile phones. There is a choice among operators in many countries. The operators therefore have strong incentives to make sure that consumers are getting the phones they value most highly. In addition, most operators give prospective subscribers the ability to choose among different phones. For example, Verizon offers various mobile phone models from Kyocera, Audiovox, Samsung, Motorola, and LG at its wireless stores. The pricing of mobile telephones to the consumer is, however, less transparent than hardware-software platform pricing in other industries. Mobile operators enter into deals with manufacturers to supply phones. These are then bundled by the operators into packages that are designed to appeal to different customer groups.

### *Operating Systems, Middleware, and Software Platforms*

For mobile telephones to become smarter, they needed increasingly sophisticated operating systems to exploit advances in microprocessors and other elements of the mobile hardware platform.

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*Mobile Phone News*, March 25, 1996; Saunthra Thambyrajah, "New Alcatel Phones with Net Capabilities," *The New Straits Times*, June 18, 1998.

15. Ben Charney, "Carrier Turns Cell Phones into Wallets: NTT DoCoMo Launches a Service That Lets People Make Credit Card Transactions and Bank Withdrawals via a Handset," *Cnet*, August 9, 2004.

IBM made the first smart phone. Dubbed Simon, it was distributed for use with Bell South's mobile network in 1994.<sup>16</sup> It was an early PDA—it included an address book, appointment calendar, notepad, sketchpad, calculator and to-do programs, plus utilities for setting system preferences and managing data files. In addition to making telephone calls, subscribers could also send and receive emails and faxes. The operating system was primitive—a version of DOS. The Simon died a quick death, just as other early PDAs introduced around this time did.

Nokia introduced its Communicator phone two years later. The Communicator could send and receive faxes, emails, and SMS messages, as well as access corporate or public databases and the Internet. It also included a calendar, calculator, address book, and notepad. It was more of a success than the Simon. Nokia sold 100,000 Communicators in the six months after the release.<sup>17</sup> The Communicator used an operating system from Geoworks, the company that made the operating system for Palm's failed Zoomer.

These and other early smart phones had only those applications that had been embedded in the phone by the manufacturer or mobile operator. There was no significant community of third-party application developers.

With the development of the World Wide Web, the increasing sophistication of mobile networks, and greater interest on the part of consumers for email services, the demand for smart telephones increased, and the need to develop sophisticated platform software grew.

Three major operating systems have emerged for smart mobile phones: the Symbian OS, Windows CE-based Microsoft systems, and the Palm OS. Table 7.2 shows their shares over time. Together they have about 75 percent of all operating systems for mobile phones, with the remainder divided between Linux, voice-enabled BlackBerries that have the BlackBerry OS, and other smaller operating systems.

Creating a sophisticated operating system for a mobile telephone is a significant undertaking. As the need for such systems became apparent,

16. Chris O'Malley, "Simonizing the PDA," *Byte*, December 1994.

17. "Nokia 9000 Communicator Named Best New Product of '97," *Business-World*, January 30, 1998; Mark Moore, "Smart Phones Get Smarter," *PC Week*, February 10, 1997.

**Table 7.2**  
Operating Systems Market Shares (%)

	2002	2003	2004
Microsoft powered	11.9	9.7	12.7
Palm OS	17.6	8.0	6.3
Symbian	45.6	66.0	55.9
Other	24.9	16.2	25.2
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Source: IDC reports nos. 29586, 31554, and 33415.

so did the reluctance of individual hardware manufacturers to go it alone. On the other hand, the large makers didn't want to leave this to Microsoft. They feared that mobile telephone manufacturing would become like computer manufacturing—a highly competitive industry in which each firm struggles to differentiate itself from its rivals. The mobile manufacturers also didn't want to leave this to competition. They feared they might repeat the fragmentation of the early days of personal computing, with many incompatible operating systems and applications.

So in 1998, the hardware manufacturers formed a joint venture to create an operating system they could all use. Symbian, as the joint venture was called, initially consisted of the three largest handset makers at the time—Ericsson, Motorola, and Nokia—together with Psion, a British maker of a PDA with its own operating system. This cooperative venture developed the Symbian OS and released it in 1999. (It was based on Psion's EPOC 321 OS for its PDAs.) Nokia was the first to release a phone based on the Symbian OS, the Nokia 9210 Communicator.

Symbian licenses its operating system both to the manufacturers who own the joint venture and to other manufacturers of telephones and other small computing devices. It has become the leading operating system for smart phones. Of the 22 million smart phones sold worldwide in 2004, 12 million used the Symbian OS.<sup>18</sup>

18. David Linsalata, Kevin Burden, Ramon T. Llamas, and Randy Giusto, "Worldwide Smart Handheld Device 2005–2009: Forecast and Analysis: Passing the Torch" (IDC report no. 33451), May 2005, Table 27.

As of April 2005, Symbian's shareholders consisted of Nokia, Ericsson, Panasonic, Samsung, Siemens, and Sony. Nokia had the largest stake, at 48 percent, followed by Ericsson, at about 15 percent.<sup>19</sup> All the shareholders license Symbian. Motorola dropped out of the joint venture in 2003 as a result of Nokia's growing influence. But it continues to license Symbian. So do a number of other mobile makers that don't belong to the venture.

Microsoft has had less success in this business than Symbian. It has had trouble getting the largest manufacturers to take its software platforms for mobile phones—Windows Smartphone, released in October 2002, and Windows Mobile 5, released in May 2005. As a result, its approach as of 2005 has been to form partnerships with low-cost, original design manufacturers (ODMs) to produce mobile phones. It tailors its mobile software platform to the needs of individual network operators.<sup>20</sup>

Microsoft thereby effectively bypassed the brand-name handset makers by dealing directly with the network operators. For example, it got Taiwanese ODMs to build phones that use Windows Mobile, and Orange, a French network operator, to sell these phones to its subscribers. Orange benefited from the greater flexibility it had to customize the phones it sells and from being able to market them under its own brand.<sup>21</sup>

Motorola and Samsung have decided to use Windows-powered operating systems on some lines. Samsung did this quite early, beginning in 1998. Motorola did so as part of its strategy to reduce its participation in and reliance on Nokia-controlled Symbian. It released its first Windows-based phone in September 2003. Both companies are multi-homers: they both use Symbian as well as Windows Mobile; Motorola also uses an operating system it developed based on Linux. Most other mobile manufacturers have standardized on a single operating system.<sup>22</sup>

19. <http://www.symbian.com/about/ownership.html> (accessed April 28, 2005).

20. "The Third Way," *The Economist*, September 18, 2003.

21. For instance, operators seem to think that one-touch access to their portals through a button common to all their handsets (such as the "i" button on i-mode handsets) can work wonders in increasing revenues from customers. Sue Marek, "Customisation? Suits You, Sir!" *Mobile*, April 14, 2005.

22. "News in Brief," *Digital Cellular Report*, April 23, 1998; "Mobile Phones: Battling for the Palm of your Hand," *The Economist*, April 29, 2004; Ben King,

Palm was well positioned to take the lead in smart mobile phones. Its Palm OS was a well-regarded operating system for small computing devices. It had a significant share of mobile operating systems in the first few years of the twenty-first century. But it has declined precipitously since. Symbian was a major obstacle for it, as for everyone, since the large mobile phone makers had a stake in and control over Symbian and feared losing control of the platform to anyone else. The rising fortunes of Windows CE in both the PDA (as we saw in the previous chapter) and the smart phone spaces have also hurt Palm OS. In particular, in late 2005 PalmOne itself (the hardware company resulting from the 2003 split of Palm) added a model to its popular line of Treo smart phones that used the Windows Mobile 5 software platform.<sup>23</sup> But Palm OS may yet find a way to rise from the ashes through its new owner, Access Co.,<sup>24</sup> the main provider of Internet browsers for NTT DoCoMo's i-mode phones.

This doesn't quite complete the story of software platforms. Windows CE and the Palm OS are sophisticated software platforms with rich sets of software services for developers. Symbian is a more bare-bones operating system. Early on, Symbian decided to separate the software platform into a rudimentary operating system and middleware that would run on top of it. Meanwhile, some of the handset manufacturers have chosen to develop their own proprietary middleware. Nokia is perhaps the most advanced in this regard, as we discuss later in the chapter.

### *Applications*

Writing applications for mobile telephones isn't like writing them for Wintel or Apple computers. Different mobile phones have different operating systems and middleware. Developers have to customize their

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"Challenger Is Open Source of Debate: LINUX," *Financial Times*, February 18, 2004.

23. <http://www.microsoft.com/presspass/press/2005/sep05/09-26MobilityPR.msp>.

24. As mentioned at the end of Chapter 6, Access bought PalmSource for \$324 million in September 2005.

applications for each of the packages on which they want their applications to run. Developers sometimes need to customize their applications to run on different phones running the same operating system and middleware (such as a Samsung phone running Series 60 and a Nokia phone also running Series 60). The varying screen sizes and other hardware components may also require nontrivial adjustments.

Given these difficulties, it is perhaps not surprising that the leading consumer application is something as simple as a ringtone. This is not a killer application in the sense we have used that term. People bought Apple IIs just because they wanted to use VisiCalc. People—at least people we know—don’t buy mobile phones just because they want to hear “Toxic” from Britney Spears every time they get a call.

Ringtones may be trite, but they are hardly trivial applications. They are supposed to make the mobile phone play a replica of up to 15 seconds of a song you choose. How close they come to the original depends on the cleverness of the programmers in using the mobile platform to replicate the tones of the song. It also, of course, depends on the mobile phone. The smart phones available in 2005 aren’t known for the quality of their speakers.

As in the Palm economy, most ringtone developers are small shops and startups. Faith, Inc. was one of the largest in 2005. It developed the specific polyphonic ringtone MIDI format first used in Japan and now worldwide. It has a market capitalization of less than \$500 million—quite small for a publicly traded company.<sup>25</sup>

Three other types of businesses besides the developers earn profits from ringtones and are therefore relevant for understanding this niche of the mobile software platform ecosystem. The most popular ringtones are based on popular songs that are protected by copyright. The music publishers that own these copyrights (and the songwriters who get royalties from the publishers) benefit whenever a ringtone is sold. The producer of a \$2 ringtone usually pays \$0.40, or 20 percent, to the music publisher. (Publishers usually charge more for higher-fidelity ring tones—

25. “Faith—Mobile Solution,” [http://www.faith.co.jp/hp\\_engl/e\\_mobile.htm](http://www.faith.co.jp/hp_engl/e_mobile.htm). “Faith, Inc.” <http://quote.tse.or.jp/tse/quote.cgi?F=listing/EDetail1&MKTN=T&QCODE=4295> (downloaded October 10, 2005).

between 35 and 55 percent of the ringtone price.<sup>26</sup>) Many mobile phone operators sell ringtones from their Web sites and take a piece of the action; they also profit when their subscribers download ringtones from other sites. And finally, there are a number of Internet businesses such as RingTonesGalore that aggregate ringtones and sell them to consumers.

Ringtones are by far the most popular application for mobile phones as of early 2006. Games are another popular application. American consumers spent almost \$345 million dollars on games for mobile phones in 2004, and estimates indicate this will rise to \$1.4 billion by 2008.<sup>27</sup> Other applications for personalizing mobile phones, such as wallpapers and screen savers, and personal productivity applications, such as contact organizers, are also popular. Some mobile phones based on the Symbian OS support mobile versions of the Adobe Acrobat document reader, the Opera browser, and the RealPlayer media player.

Many applications are sold directly to consumers through the Internet or the mobile carriers. However, developers also license applications to the operating system makers or handset manufacturers directly, and they in turn bundle the applications with their own offering.

The development of applications for mobile phone software platforms has taken longer to take off than for personal computers, video game consoles, or PDAs. This side of the mobile platform is still in its infancy in 2006. The explanation for this difference is quite simple. Unlike these other industries, the mobile phone software platforms lack the ability to control the ecosystem and drive innovation in it. Much of the power that other software platforms have is dissipated in the mobile phone industry as a result of the fragmentation of control in this global industry among many network operators and device makers.

26. Lewis Ward, "U. S. Wireless Ring Tone 2004–2008 Forecast and Analysis" (IDC report no. 34713), August 2004.

27. David Linsalata, Schelley Olhava, and Lewis Ward, "U.S. Wireless Gaming 2004–2008 Forecast and Analysis: Gaming... Together" (IDC report no. 32644), December 2004.



## The Role of the Software Platform

Symbian has the largest share of mobile telephone operating systems, but it leaves the provision of many platform features to others. Take the Nokia 6620. It has the Symbian OS 7.0. That operating system takes care of all low-level tasks of the phone, such as sending and receiving voice and other data, updating the date and time, and connecting to the wireless network. The Nokia phone also has Nokia's Series 60 platform, a middleware platform that runs on top of the Symbian OS. This middleware platform provides a graphical user interface, an organizer, a media player, and application support. Nokia licenses its middleware software to other mobile makers, including LG Electronics, Lenovo, Panasonic, Samsung, Sendo, and Siemens. These makers customize it for their phones. Other mobile makers, such as Sony Ericsson, Fujitsu, and Mitsubishi, use different middleware with the Symbian OS. All of the middleware makers provide third-party applications developers with software development kits for writing to their middleware. Symbian does the same for its operating system.

All of the software platforms for mobile phones, whether middleware or not, engage in the basic tactics that all software platforms pursue. They keep adding services exposed through APIs that help developers, they provide tools that facilitate writing applications, they do all this with minimum charges, and they evangelize. Symbian and Nokia provide examples of tactics pursued in some form by all of the mobile software platforms.

### *Symbian*

Although the middleware provides additional features not present in the Symbian OS, Symbian has been very successful in encouraging the development of applications that work directly with the OS. The number of Symbian applications offered by third-party vendors rose from 1,700 in 2003 to more than 4,700 in 2006. Macromedia's Flash Player for the Symbian OS enables people to navigate through interactive content provided in sleek graphic formats, the Adobe Acrobat reader allows

people to read Adobe documents, people can stream audio and video with RealNetworks' RealPlayer, and they can browse the Web with the Opera web browser.<sup>28</sup> Some of the more important applications such as RealPlayer resulted from joint development efforts.

Symbian has an active program for encouraging application developers. Its Web site enables independent developers to download software development kits, programming languages (Java, C++, OPL,<sup>29</sup> and Visual Basic) customized for various middleware packages, and other development tools and documentation. It also holds industry-wide events and organizes contests for the best applications.<sup>30</sup>

Although many development aids can be downloaded from Symbian's Web site at no cost, some tools for development and customization of the operating system are available only to those who enroll in Symbian's Platinum Partnering Program. Affiliation with the partnership program costs \$5,000 per year for Platinum members and \$1,000 per year for Affiliate members.<sup>31</sup> In exchange for these participation fees, Platinum members receive the Symbian OS development and customization kits,<sup>32</sup> technical, commercial, and marketing support from Symbian, and participation and showcase opportunities at industry events. Membership in the Platinum Program allows a company to purchase a development kit license for Symbian OS v7 for \$15,000 (with optional updates at \$3,000 per year), Symbian OS v8 for \$18,000 (updates at \$3,600), or for v9 and above for \$25,000. But according to Symbian, these programs

28. "Total Cumulative Shipments Reach 70.5 m," Symbian press release, May 16, 2006; "RealNetworks Launches New Mobile Media Solutions for Content Providers," *Asia Pulse*, February 19, 2004; "Adobe Expands Reach of Adobe Reader and PDF on Consumer Electronics Devices," *Business Wire*, June 10, 2004; "Symbian Enhances Wireless Internet Offering with Opera," Symbian press release, May 29, 2001.

29. Open Programming Language.

30. "At the Heart of Smartphone Evolution," *Symbian News*, March 11, 2002; "Symbian Exposium03—Invitation to Press," Symbian press release, April 10, 2003; "Nokia Names Top Symbian Applications Globally," Symbian press release, April 15, 2002.

31. Emails to Laura Gee of LECG from Pamela Annund of Symbian, May 5, 2005.

32. They are available free to Symbian's licensees.

**Table 7.3**  
Symbian Revenue Structure

	2004	2003	2002
Symbian OS Units	14.38 m	6.67 m	2.00 m
Average royalty/unit*	US\$5.72	US\$6.24	US\$5.75
Royalty revenue* (£m)	45.2	25.5	7.7
Consulting services revenue (£m)	17.5	17.1	20.2
Revenues from partnering and other revenues <sup>†</sup> (£m)	3.8	2.8	1.6
<b>Total (£m)</b>	<b>66.5</b>	<b>45.4</b>	<b>29.5</b>

\* Royalties comprise Symbian OS and UIQ.

<sup>†</sup> “Partnering and other revenues” include revenues from training, partner activities, and trade shows.

are “priced only to enable cost recovery.”<sup>33</sup> (These programs accounted for only 5.7 percent of Symbian’s total revenues in 2004.)

Symbian earns its keep from licensing its OS to mobile phone makers. From Symbian OS version 7.0 onward, the royalty has been set at \$7.25 per unit for the first 2 million phones and \$5 per unit thereafter. It also charges its licensees for the consulting services it provides during the installation and customization of the Symbian OS. The share of royalty revenues has dramatically increased over time, as shown in Table 7.3: it went from 26 percent of total revenues in 2002 to 68 percent in 2004.

### *Nokia*

Nokia established an independent division called Nokia Mobile Software to write and evangelize its middleware. It set up a “Chinese wall” between this division and the rest of the firm in an attempt to assure competing manufacturers that licensed its middleware that Nokia would not seek a software advantage at its competitors’ expense.

Nokia’s Series 60 middleware has software services exposed through APIs for supporting a variety of applications such as games, navigation,

33. “Symbian OS Phone Shipments Reach 14.4 m in 2004,” Symbian press release, February 14, 2005.

dictionaries, voice recognition, and multimedia. The current version comes bundled with a variety of features. These include a Web browser, streaming audio and video based on RealPlayer, a camcorder application, organizational software, a mobile wallet, and video telephony.<sup>34</sup>

## I-Mode

A new breed of platform, portals for mobile Internet services, has emerged with the advent of smart phones and advanced-generation mobile networks with greater bandwidth. I-mode is the focus here.<sup>35</sup> It was created by DoCoMo, the Japanese mobile network operator that is owned by NTT, Japan's largest telephone company. It was the first 3G network and remains the most successful to date.

The Japanese mobile market differs from others in several ways that have proved important for the emergence of i-mode in Japan and the lack of emergence of similar services in the American and European markets. DoCoMo has a much higher share of the Japanese mobile market (56 percent in March 2005<sup>36</sup>) than most mobile operators have in their national markets. DoCoMo therefore has considerable bargaining power over handset manufacturers that hope to sell in Japan. There's another difference. Japanese households are far less likely to have a PC at home than American households and households in many European Union countries.<sup>37</sup> The mobile telephone became the major way for

34. "Series 60 Platform 3rd Edition Overview," Nokia Corporation, February 2005; available at <http://www.series60.com>.

35. Most of the analysis is informed by our conversations with Takeshi Natsuno, i-mode's architect and chief strategist.

36. "DoCoMo Will Sell Nokia Phones for 3G Network From October," *Bloomberg*, May 27, 2005.

37. "USA: Telecoms and Technology Forecast," Economist Intelligence Unit—Executive Briefing, June 9, 2005; "Japan: Telecoms and Technology Forecast," Economist Intelligence Unit—Executive Briefing, June 9, 2005; "Singapore: Telecoms and Technology Forecast," Economist Intelligence Unit—Executive Briefing, June 6, 2005; "France: Telecoms and Technology Forecast," Economist Intelligence Unit—Executive Briefing, February 10, 2005; "Germany: Telecoms and Technology Forecast," Economist Intelligence Unit—Executive Briefing, February 1, 2005.

Japanese consumers to surf the World Wide Web. Finally, a love of gadgets and games appears to be deeper for Japanese consumers than for American and European consumers. The conditions were ripe for i-mode.

### *The I-Mode Technology*

The other software platforms we have examined up to this point all reside on the computing device. By contrast, the i-mode software platform consists of many pieces that reside in several places. Some are on the handset and others are on a variety of server computers that handle requests from the handsets and pass information to and from the Internet. The core of the i-mode platform is a set of rules for transmitting data between the mobile handsets, DoCoMo's wireless network, and DoCoMo's server computer farm. Much of the platform lives on the server computers. These pieces count packets sent and received by each i-mode user, manage user email and subscriber accounts for various content sites, handle billing information, and connect i-mode mobile phones to the content providers' application servers. A portion of the platform therefore sits on top of the operating systems used by the several handset makers (including Linux and Symbian).

### *Getting Two Sides on Board*

I-mode is a two-sided platform that serves subscribers to DoCoMo's mobile phone network, on one side, and Internet content providers on the other. Before i-mode was launched in February 1999, the company signed up sixty-seven content providers, handpicked by Mr. Natsuno, its chief strategist. He sought a diverse portfolio from the beginning. Mobile banking, perceived as vital to the success of i-mode, had twenty-one sites. The remaining forty-six sites covered gaming, fortune telling, news, sports, airline information, train and other travel information, real estate listings, and weather forecasts.<sup>38</sup> This variety set the stage for a marketing campaign that emphasized the myriad of amazing things subscribers could do with their mobile phones other than making phone calls.

38. Takeshi Natsuno, *i-mode Strategy* (New York: John Wiley & Sons, 2002), p. 49.

I-mode gained one million subscribers in six months, 5.6 million in one year and 32.2 million in three years. Subscribers totaled 45 million in August 2005. That is a remarkable market penetration for a premium service in a nation with a population of 127 million. The content provider side today includes some 5,000 “official” i-mode sites and another 88,000 unofficial ones.<sup>39</sup> Official sites can be accessed directly from the i-mode menu on subscribers’ handsets. To access unofficial sites, users must type in the Web address manually.

Three strategic decisions were key to i-mode’s success.

*Adopt standards.* I-mode chose standard formats and protocols with which Internet content providers were already familiar. This dramatically lowered the cost to content providers of providing content for the new service. To begin with, i-mode supported the compact HyperText Markup Language (c-HTML) for the creation of Web pages by content providers. This choice was widely viewed as contrarian at the time. Other major players, including mobile phone manufacturers such as Nokia and network operators such as Vodafone, were championing the rival Wireless Application Protocol (WAP) as the standard for creating Web pages for handheld wireless devices. The DoCoMo team opted for c-HTML because the language permitted content providers to adapt their existing Web sites for i-mode access at very low cost.

DoCoMo supported other standard Internet formats. These included the HyperText Transfer Protocol (HTTP) for transmitting data between the phones and servers and the standard protocol (SSL) for transmitting the secure data needed for financial transactions over the Internet. It also decided to support the Music Instruments Digital Interface (MIDI), a sound format widely used in karaoke-on-demand services. MIDI became the standard format for downloading i-mode ringtones.<sup>40</sup>

*Rely on others for content.* DoCoMo decided from the start to go two-sided. It relied on the market for the provision of diverse content to end users rather than supplying everything itself. This ran counter to con-

39. [www.nttdocomo.co.jp/english/corporate/investor\\_relations/referenc/annual/pdf\\_02\\_e/2002.pdf](http://www.nttdocomo.co.jp/english/corporate/investor_relations/referenc/annual/pdf_02_e/2002.pdf); <http://www.nttdocomo.com/companyinfo/subscriber.html>; <http://www.nttdocomo.com/companyinfo/subscriber.html>.

40. The MIDI standard was adopted by the electronic music industry for controlling all devices (including synthesizers and sound cards) that emit music.

ventional industry wisdom at the time, not to mention the advice DoCoMo received from McKinsey—that wireless platforms needed to *own* the content they supported and to block entry by competing third-party content providers if they were to maximize network revenues. DoCoMo rejected the closed garden for the open one.

In Mr. Natsuno's view, it was essential to assist third-party content providers in joining i-mode—for example, by lowering their fixed costs. The combined innovative power and resources of outside providers, he reasoned, far exceeded that of any single platform vendor. A large variety of creative offerings attracts more users to the service, and a large potential market stimulates yet more creative effort on the part of independent providers.

*Develop a billing system.* I-mode's unique billing system was its third strategic pillar. DoCoMo set up the network to charge users according to the amount of data, measured in packets, they downloaded rather than the amount of time they spent online.<sup>41</sup> In addition, they made this billing system available to content providers so that these providers could charge small monthly fees for their services; i-mode charges 9 percent of the gross billings as its fee for providing this to the content providers.<sup>42</sup> Users therefore got the convenience of a single monthly bill, while content providers got reliable billing service for a fraction of the cost of doing it themselves.

It is interesting to contrast i-mode's strategy with that employed by Vodafone during its failed attempt to introduce wireless 3G services in Europe. In 2000, this British network operator partnered with the French media conglomerate Vivendi to launch the Vizzavi service for mobile phones.<sup>43</sup> Like all European operators at the time, Vizzavi relied on WAP as the protocol for displaying content. Therefore, content providers with

41. "Traditionally, Telco's billing models have been designed to handle voice traffic . . . and, as in the traditional voice world, charges were usually based on prices per minute. With content services and new GPRS technologies, where data connection will be 'always on,' this model is no longer valid." Alain Lefebvre, "Not all kilobytes are equal," *Telecommunications International*, March 1, 2002.

42. This offer is restricted to official content providers.

43. Ian Lynch, "Vodafone Clinches Vizzavi Purchase," *vnunet.com*, August 30, 2002.

traditional Web sites had to rewrite their pages from scratch in order to make them accessible through Vizzavi-enabled mobile phones. Furthermore, Vizzavi was not an “always on” mobile Internet service like i-mode, so users had to establish a dial-up connection to an access number in order to browse wireless content, tying up the phone the way fixed-line telephone modems displace voice communications. Time spent online was billed exactly like a voice call at the same per-minute rate, an inefficient and very expensive arrangement for both the operator and the user. Vizzavi attracted very little interest from third-party content providers, but both Vodafone and Vivendi were confident that the content they were able to supply themselves through Vivendi’s ownership of Universal (Music and Studios) would be sufficient to attract a critical mass of subscribers, whereupon third-party developers would find the service more interesting.

Despite Vodafone’s and Vivendi’s investment of €1.6 billion<sup>44</sup> in Vizzavi, the portal’s revenue and subscriber growth were both disappointing. After one year of operation Vizzavi had 2 million subscribers, compared to i-mode’s 5.6 million subscribers, and after about two years Vizzavi had 4.2 million subscribers, compared to the Japanese service’s 21.7 million. By May 2002, the portal was spending €1.02 million per day without any profit in sight, and its stock market valuation, which had been €20 to €50 billion at the height of the Internet bubble, had dropped to almost nothing by the time Vodafone bought out Vivendi’s 50 percent stake in Vizzavi in August 2002.<sup>45</sup>

### *Evangelization*

Given the explosive success of i-mode with subscribers, DoCoMo found itself overwhelmed with propositions from many diverse content and

44. Dan Roberts, “Survey—Creative Business Vizzavi,” *Financial Times*, June 12, 2001.

45. “Vivendi Universal Announces 24% Revenue Growth to 7.3 Billion Euros and 90% Ebitda Growth to 1.5 Billion Euros in Third Quarter for Media & Communications Businesses,” Vivendi Universal press release, October 30, 2001; Dan Roberts, “Survey—Creative Business Vizzavi,” *Financial Times*, June 12, 2001; “Vivendi considers sale of stake in new media portal Vizzavi,” *The Canadian Press*, August 20, 2002, Ian Lynch, “Vodafone Clinches Vizzavi Purchase,” *vnunet.com*, August 30, 2002.



application providers. In October 2000, a little more than a year and a half after the service's introduction, there were already 1,200 official sites from 665 companies and approximately 28,000 nonofficial ones.<sup>46</sup> These sites already covered the four major content categories initially identified by DoCoMo: information (news updates, weather, sports results), e-commerce (mobile banking, securities trading, ticket purchases), databases (telephone directories, restaurant guides, maps, dictionaries), and entertainment (games, fortune telling, clubs, ringtone and character download). Content providers were attracted by the subscribers, the ease of porting content to the i-mode platform as a result of its standard formats, and the fact that they got to keep 91 percent of their revenues.

Having made wise strategic decisions in designing i-mode, DoCoMo didn't need to stoke the fires continually under the content providers who were the application developers for this platform. Since its launch, DoCoMo has never had to seek new content. Its major challenge has instead been how to select among the many applicants that want to become "official" i-mode sites. I-mode is an open platform, and therefore content providers don't need permission to make themselves available. However, i-mode helps ensure the quality of its content through a certification program that labels some sites "official." The company organizes regular meetings bringing together the content editors from each of its regional subsidiaries to discuss their views on what content should or should not be included as official, in marathon sessions that sometimes last for two days. In May 2004 the 4,100 official providers accounted for 40 percent of i-mode network traffic, while the 70,000 unofficial content providers accounted for the remainder.<sup>47</sup>

DoCoMo does not organize conferences for its application developer and content provider community. Nor does its Web site have space and resources specifically dedicated to its developer-content providers like the other software platforms we have encountered.<sup>48</sup> It doesn't need to provide any special tools since its platform is intentionally composed of

46. Natsuno, *i-mode Strategy*, pp. 9–10.

47. Natsuno, *i-mode Strategy*, pp. 64–65; <http://ojr.org/japan/wireless/1084495929.php>.

48. Compare <http://www.nttdocomo.co.jp/english/index.shtml>; [www.symbian.com](http://www.symbian.com); [www.palmsource.com](http://www.palmsource.com); [www.microsoft.com](http://www.microsoft.com); and [www.apple.com](http://www.apple.com).

already successful and widely used technologies, such as c-HTML and Java, that already have strong developer communities. Its technology partners provide and advertise their own tools.

### *Pricing*

To access i-mode, users must purchase i-mode-enabled handsets from DoCoMo, which acquires them from a variety of manufacturers, including Fujitsu, NEC, Panasonic, and Sharp. From the beginning DoCoMo has employed a loss-leader strategy, selling handsets for roughly \$80 to \$170 less than it pays the manufacturers.

DoCoMo began by charging end users roughly \$2.50 per month and 2.5 cents per 128-byte packet. The maximum-length email (500 alphanumeric characters, or 250 kanji characters)<sup>49</sup> costs a user less than 80 cents to send. These prices were in force as of late 2005 for users of older 2G handsets. However, those who used 3G phones paid \$1.25 per month and less than 2 cents per packet. DoCoMo also offers volume discounts.

DoCoMo has always allowed content providers to keep the lion's share of their revenues in order to encourage them to provide diverse and innovative content. The only charge to content providers is the 9 percent fee levied on official sites that choose to piggyback on i-mode's billing system. In 2004, for example, DoCoMo derived \$10 billion in revenues from traffic charges to users and only \$90 million from fees charged to content providers.

### *The I-Mode Platform*

Consider a day in the life of Yoshiko, an avid i-mode user in the summer of 2005. During her one-hour commute to the trendy Ebisu area in central Tokyo, where a branch of her company is located, she uses her pink NEC N700i phone to send ten emails to her friends, her boyfriend, and her mother in Kobe. She also buys advance movie tickets for that evening's *Lost in Translation* showing at a nearby Toho Cinema (Japan's biggest chain of movie theaters). When she gets to the theatre she will get her tickets by simply waving her mobile phone—equipped with a FeliCa chip for contactless payment—in front of a reader placed at the entrance.

49. Youngme Moon, "NTT DoCoMo: Marketing i-mode," *Harvard Business Online*, July 17, 2002, p. 4.

At lunchtime she goes to an Italian café for lunch. She has to pay cash for the only time that day because they don't take FeliCa yet. While eating with a colleague, she books a flight to Seoul on All Nippon Airways (ANA) for the next weekend to visit a high school friend. She gets an e-ticket and notices that she can even do e-pre-check-in, so that at Narita airport she will get her boarding pass by simply waving her phone in front of a reader close to ANA's counter. As the meal ends, she takes a picture with her camera phone of herself and her colleague and emails it to her mother.

That evening, on the way to the movie theater by subway, she leafs through a fashion magazine and uses her phone to scan the QR code next to an ad for Shiseido makeup. This opens an on-screen window giving more details about when the makeup line will become available, as well as prices and recommended accessories. Distracted, she can't find the movie theater. With her almighty *keitai* (mobile phone), she goes to Japan Teletext Co.'s Web site, pulls up an interactive map of the movie theater and, after 2 minutes of deft navigation, finds her way there. She meets her boyfriend, who is passing the time furiously playing an online i-mode game provided by locally famous publisher Enix.

After the movie, she starts talking with her boyfriend about how they both like Green Day's "Holiday" and they decide to have it as a ringtone. Her phone is more advanced than his, so she uses i-mode and the Chaku-Uta music service to search and download the song in two minutes. She also gets her favorite animated cat character from Chakumotion, which will move in sync with the song when her phone rings. Then she beams the song to her boyfriend's phone through infrared. Meanwhile, her boyfriend was checking baseball results on i-mode because they missed an important Yomiuri Giants' game to see the movie, which they didn't much like.

This is reality in Japan, especially for the young. It is made possible by the invisible engine of the software platform. It is already revolutionizing industries in Japan beyond mobile phones. DoCoMo is becoming a leading payment system and disrupting the existing industry. The success of i-mode in Japan is the result of a technology that was just right for the economic and social circumstances of that country. While some of the story told above may remain uniquely Japanese, some of it will no doubt become reality in many parts of the world.

## Which Is the Platform for Mobile Phones?

After encountering so many “platforms” in the mobile phone industry, one wonders, who exactly controls (and in what sense) the mobile phone platform? Indeed, one interesting feature of this industry that has become particularly salient with the rise of smart phones is the struggle between handset manufacturers, mobile operators, software platform providers, and standard setters (such as Qualcomm) to dominate the entire ecosystem. There is of course competition within each of these layers—Nokia versus Motorola, Vodafone versus Verizon, Microsoft versus Symbian—but, more interesting, there is also intense competition between layers. Mobile phone operators would like handset manufacturers to yield to their demands and design the phones in accordance with the operators’ specifications. Handset makers, on the other hand, wish to maintain the strength of their brand name and are not very keen on customizing their devices for each individual operator, both because it is costly and because it would give operators too much control. Finally, given the importance computer-like features have gained in consumers’ minds, software platform vendors see a good reason for both mobile operators and handset makers to bend to *their* will. Things are in fact even more complicated, as some actors in this ecosystem participate in several layers. Take Nokia, the primary sponsor and leader of the Symbian consortium. Through its strong brand name it hopes to maintain the high ground it has traditionally had over U.S. and European mobile phone operators. At the same time, its Symbian efforts have been in no small part motivated by the desire to pre-empt Microsoft (or any other software platform producer, for that matter) from taking control of the mobile phone industry. To counter this, as we have seen above, Microsoft has temporarily allied itself with the other layer, mobile operators, by using Asian device manufacturers and branding Windows-powered phones with the operators’ logos.

That Nokia and Microsoft, two companies with very different products and business models, can be considered to be competing against each other illustrates the complex platform relationships in the mobile phone industry. After all, no one would argue that Dell is competing with Microsoft for control of the PC industry.

That dominance of the software platform is a critical asset in the competition for dominance of the industry seems to be clear to everyone. The handset makers were quick to realize this, which led to the creation of Symbian. More recently the major mobile operators have taken a strikingly similar step by establishing a London-based organization, the Open Mobile Terminal Platform (OMTP), to promote standards that will give mobile phone owners a more universal user experience while still allowing mobile operators to customize their offerings. The OMTP alliance is a clear indication that mobile operators want more control of the handsets

(continued)

used on their networks. Through this alliance, operators will be able to define standards regarding handsets and operating systems that major mobile phone vendors such as Nokia, Samsung, and Motorola will be expected to follow.<sup>50</sup> And Qualcomm, the company behind CDMA 3G mobile telephone standards, is also staking a serious claim with its Brew software platform, which has risen to prominence recently through the success of another Japanese operator, KDDI, and its au mobile Internet service, a serious rival to NTT DoCoMo's i-mode.

It is not yet clear what exactly "control" or "dominance" of the mobile phone industry means. "Ownership" of the customer seems to be an important element and one helping to tilt the balance of power in favor of mobile operators. But those same customers are rather sensitive to handset brands and design—witness the success of the latest Razr phone by Motorola—so that one popular model can make its producer a dominant player. Last but not least, consumers today care more and more about the variety and quality of features and content available on their phones, which depend crucially on the underlying software platforms. This gives software platform providers considerable say and influence over the evolution of the industry, which explains why participants from all layers are keen on being involved in a software platform.

Thus, if one defines dominance or control as the ability to drive innovation and ultimately extract the lion's share of profits, the dominant position in the mobile phone industry is still up for grabs. In particular, it is telling that mobile phone industries in different countries have different power structures. Japan's NTT DoCoMo, for instance, is the envy of mobile operators worldwide for its ability to dictate technical specifications to handset makers (including Panasonic, Sony, Sharp, Fujitsu, and NEC) and even downplay their brand names. The situation is very different in Europe and in the United States, where mobile operators have little leverage with giant handset makers such as Nokia and Motorola, and therefore little ability to drive innovation throughout the industry.

It is not at all clear, as we write these lines, that the traditional operating system platform as we know it from PCs and PDAs is necessarily the relevant software platform in the smart phone space. As David Nagel, once head of Palm, pointed out to us, it might turn out to be a different type of platform, say a network standard or a mobile Internet platform such as i-mode, which commoditizes all the layers underneath.

50. "Mobile operators unite to influence handset evolution," *EE Times UK*, June 23, 2004.

### *INSIGHTS*

- Because mobile telephone operators have generally controlled what phones subscribers use, what software platforms run those phones, and what applications can be downloaded onto them, the mobile phone business has been an unusually complex environment for software platforms. This control is being challenged by both handset makers and software platform providers.
- The Symbian OS, Microsoft's Windows-powered OSs, and Palm OS are the leading operating systems and software platforms for mobile phones. Symbian, with by far the largest market share, is a joint venture formed by leading mobile operators in an effort to standardize on non-Microsoft operating systems.
- Some mobile operators/manufacturers control middleware platforms that sit on top of the mobile phone operating system; handset maker Nokia and mobile operator DoCoMo are the leading examples.
- Although industry fragmentation and efforts by mobile operators to control the customer experience have slowed the growth of application developers, there are now multibillion dollar markets for ringtones and games.
- Japan's DoCoMo, a mobile operator, has built a highly successful software-platform-based ecosystem that provides third-party content and applications to phone users. DoCoMo uses its significant share of mobile phone sales to persuade handset manufacturers to, for example, equip phones with contactless FeliCa chips that make it possible to pay with one's phone.
- Several key DoCoMo decisions defied conventional wisdom. It chose standard formats and protocols with which Internet providers and developers were familiar, relied on the market to develop content rather than producing it themselves, and made money by charging users for data downloaded rather than air time consumed.

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# Invisible Engines

## How Software Platforms Drive Innovation and Transform Industries

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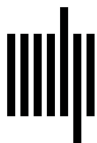
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