

Special Article on Advanced i-mode Mobile Phones

Service Overview

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i-mode has been rapidly growing since the launch of the service in February 22, 1999, with the concept of “cellular phone-to-talk into cellular phone-to-use”. Ranging from mobile banking to ticket reservation, news, weather information, games and fortune telling, there are more than 1,000 official sites and over 30,000 voluntary sites designed for i-mode users to enjoy the convenience of these mobile phones. In addition, advanced functions such as downloading melodies have been added to mobile phones. Today, the i-mode service is no longer supported only by the 50Xi series, but also by the 20X series. Within 1 year and 11 months of the launch of the service (as of the end of January 2001), the number of i-mode subscribers exceeded 18 million, and it is still increasing at a rate of 40,000-50,000 per day. The following article reviews this remarkable service, i-mode.

1. Introduction

i-mode created a new category called “Mobile Internet,” which enables mobile phone users to access the Internet, the infrastructure of multimedia. From the viewpoint of content providers, i-mode makes content transactions easier and safer, as DoCoMo collects information fees on their behalf, by including the fees in the mobile phone bill to users. From the users’ point of view, i-mode is an easy way to access contents without being aware of the Internet or URLs.

Due to the wide acceptance of these convenient features by both parties, i-mode subscribers have increased steadily in number. Following the introduction of advanced functions, which enabled users to set the waiting screen on the mobile phone and download ringing melodies, subscribers have swelled to more than 18 million – a figure that outstrips all Internet Service Providers (ISP) in Japan.

This article reviews how the functions of mobile phones have advanced over the past 2 years or so, since the launch of the i-mode service.

2. i-mode Mobile Phones

i-mode mobile phone 501i series [1], [2], was released as the first lineup to support i-mode service. The 501i series mobile phones were equipped with 9600 bit/s communication capability and a monochrome browser (browsing software), in addition to the functions equivalent to the 207 series mobile phones. The browser was capable of displaying text written in Hyper Text Markup Language (HTML), the world standard for the Internet.

The subsequent 502i series was equipped with a color browser, plus i-anime and i-melody features. i-anime enabled users to download animations (moving pictures) in their mobile phones and display them on the screen, whereas i-melody enabled them to download melodies from sites (programs) and set them as ringing tones, etc. Both features became popular among i-mode users. Some models in the 502i series were geared with i-navi link features (described in detail later), which enabled connection with i-mode compatible car navigation systems.

Furthermore, the existing 20X series and Doccimo (a combination of a cellular phone and a Personal Handyphone System) were renewed as 209i series and 821i series, respectively, to be added to the list of mobile phones capable of sub-

scribing to the i-mode service.

In January 2001, the Java-capable 503i series was released. The Java-enabled phones, 503i series mobile phones, should provide a higher level of security, and are expected to enable the distribution of dynamic content (described in detail later).

3. i-mode Server

i-mode servers act as the gateway between the DoCoMo network and the Internet. Specifically, their functions include information distribution, e-mail exchange and storage, management of i-mode subscribers, management of Information Providers (IP) and the billing of information fees. The servers are designed with much care to ensure the following three points: a good response; high reliability, based on functionally distributed systems; and extensibility by function, which makes prompt response to market changes possible.

4. Content

i-mode was launched with only 67 content items provided by IPs. As of the end of January 2001, the number of content items exceeded 1,000. The content portfolio is as shown in **Figure 1**. So-called voluntary sites are claimed to have exceeded 30,000 in number, although the precise figure remains unknown.

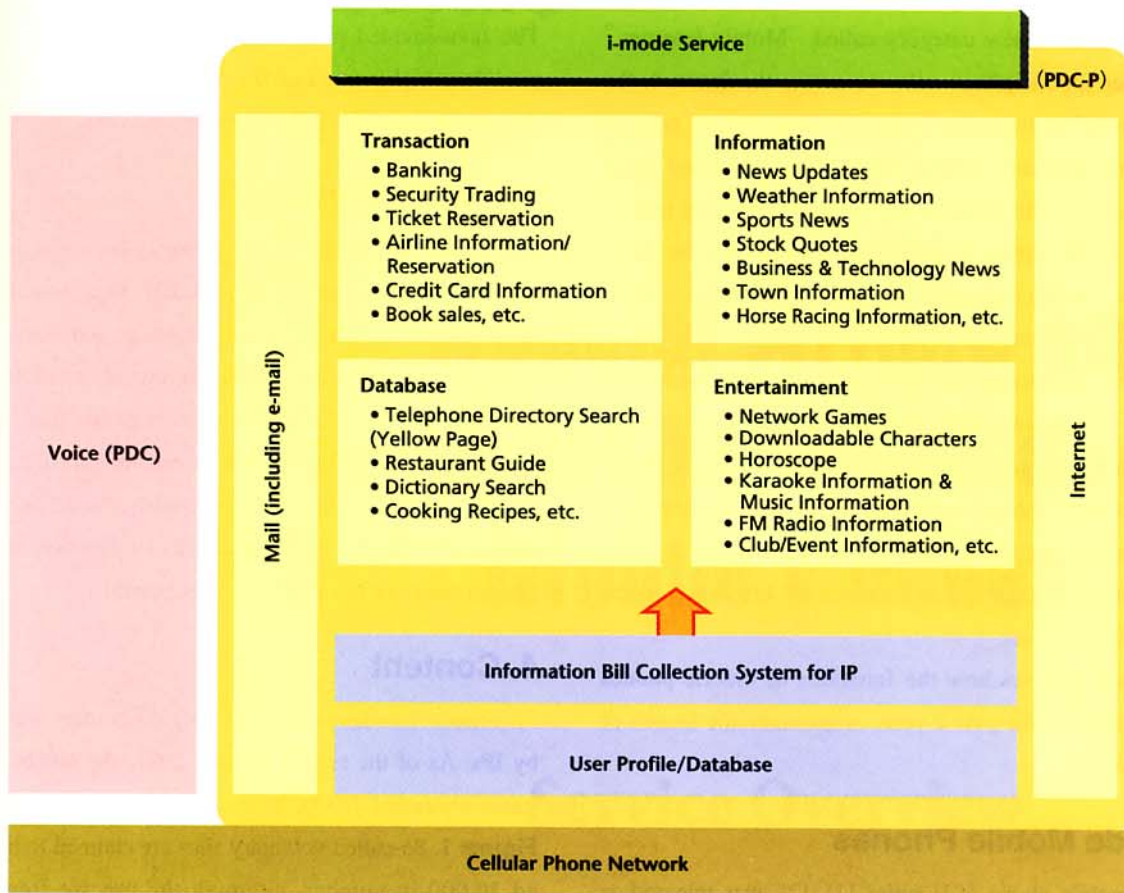
The significant increase in the number of IPs can be attributed to DoCoMo’s decision to adopt a subset of HTML, the standard language on the Internet, not to mention its success in creating a “win-win relationship” for content providers, who are rewarded according to their performance.

5. E-mail Function

i-mode supports e-mail exchange over the Internet, provided that the length does not exceed 250 full-size Japanese characters (= 500 alphabetical characters). E-mail arriving at the i-mode server is sent to the user’s i-mode mobile phone via networks by PUSH technology, so that the user can receive the e-mail virtually in real-time. Users exchange e-mail frequently nowadays: on average, each user exchanges about 8 e-mails per day, contrary to predictions before the launching of i-mode, which assumed only 3 e-mail per day.

6. Java and SSL

For the diversification of the i-mode service, functions need to be enhanced in compliance with contents. Current mobile



PDC: Personal Digital Cellular
 PDC-P: PDC Mobile Packet Data Communication System
 IP: Information Provider

Figure 1 Contents Portfolio

phones in the market are not open to such enhancements, however, as there is no room left to enhance the preinstalled software once the mobile phone leaves the factory. The powers of expressing i-mode content are also severely limited, due to the small screen size and the users' burden of footing the packet communication bill.

The emerging solution to these problems is Java,^{★1} which achieves functional enhancement by downloading new software according to the content, and thereby enables mobile phones to run a wider range of applications.

For the first generation of Java-enabled i-mode mobile phones, Java is expected to be heavily used particularly in entertainment contents. The existing HTML-based static content will rapidly be replaced by dynamic content that responds to users' operations at real time. The Java-capable mobile phones are also likely to be highly beneficial for business users. As data can be processed and stored on the client side, business users

must be able to access the data in a seamless manner, at any time, any place. In regard to security issues, which are of critical importance to contents that involve the transaction of money, the introduction of Java and Secure Sockets Layer (SSL)^{★2} will significantly improve the security level, and thereby accelerate the growth of such contents.

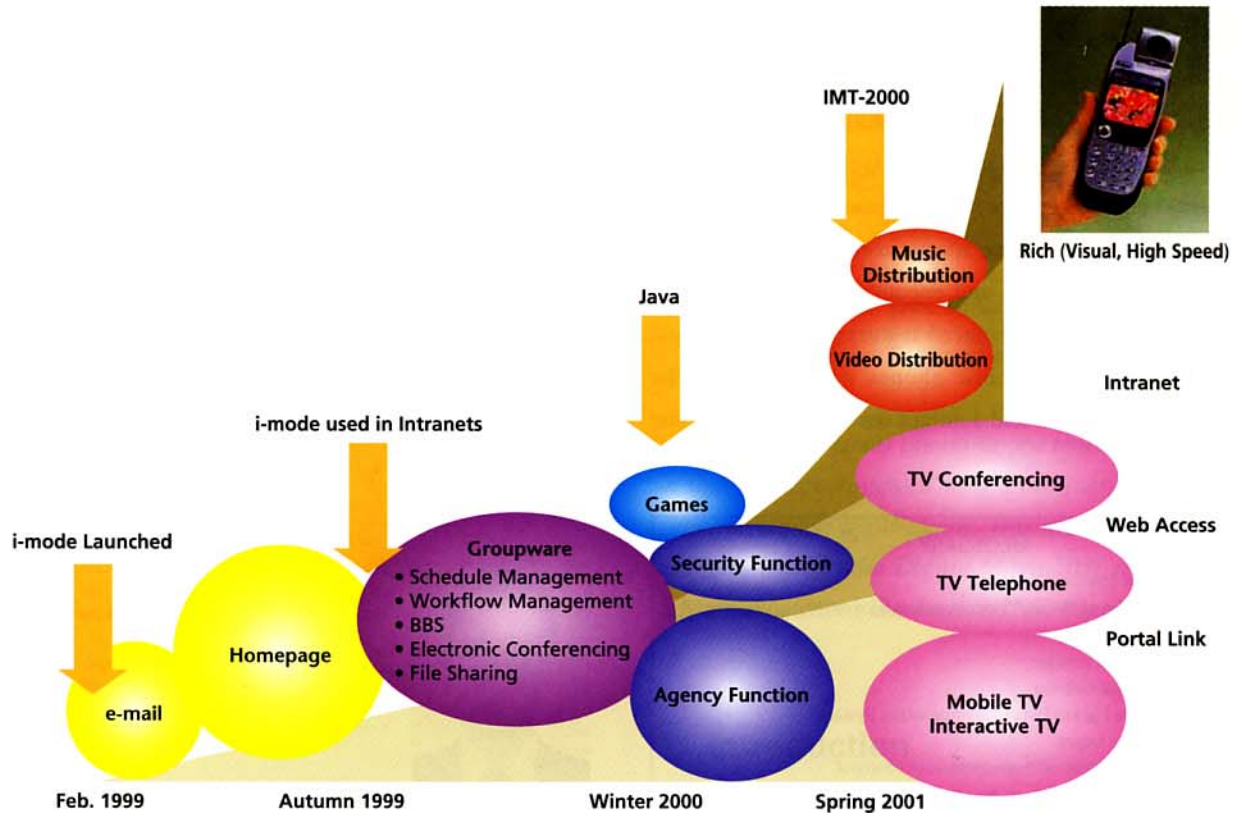
7. Connecting to External Devices

In conjunction with these enhancements, DoCoMo pursues i-mode's ability to connect with various types of external devices. The first service utilizing this external connection is i-navi link mentioned earlier.

i-navi link is a service that enables to interface i-mode mobile phones with i-mode Car Navigation Systems, so that the

★1 Java: An object-oriented programming language suited for use on networks, developed and advocated by Sun Microsystems in the U.S.

★2 SSL: Secure Sockets Layer, a protocol that creates a secure connection between a client and a server, developed and advocated by Netscape Communications in the U.S.



IMT-2000: International Mobile Telecommunications-2000

Figure 2 i-mode Development Strategy

systems can be used to access content, e-mail and other services available on i-mode mobile phones. It also opens doors for new applications that combine i-mode content with various types of functions of Car Navigation Systems. Other than Car Navigation Systems, i-mode is to be interfaced with game console Play Station; DoCoMo is currently making preparations to launch a new service in the spring of 2001, in alliance with Sony Computer Entertainment Inc.

The combination of i-mode mobile phones and external devices as such will undoubtedly encourage the production of attractive contents.

8. Future of i-mode

Needless to say, i-mode's future depends heavily on its ability to adapt to the International Mobile Telecommunications-2000 (IMT-2000) standard, under which services will be launched shortly. By releasing i-mode mobile phones with high-speed connection capabilities, the time taken to download existing contents will be shortened. Moreover, IPs can provide richer contents because of the increase in the memory of mobile

phones.

For i-mode to make further progress, the contents will have to be attractive to users, and the rates will have to be reasonable considering the nature of the service, as a matter of course.

At the same time, it will be important for DoCoMo to launch i-mode in the world of e-commerce and the global market, and improve the service in the respective areas.

The prompt achievement of these objectives will enable DoCoMo to create a completely new world that was previously thought impossible. (Figure 2)

9. International Contributions

Recently, DoCoMo has been investing in many telecommunication carriers overseas, including the Hutchison Telephone Company Limited in Hong Kong, KPN Mobile in Holland, and AT&T Wireless in the U.S. DoCoMo is providing the know-how of i-mode to its foreign partners as a step to launch next-generation mobile phone services overseas. Our aim is to develop a "Mobile Internet" in other countries, in order to create an environment for global, seamless services.

10. Conclusion

i-mode mobile phones have transformed from “cellular phone-to-talk” into “cellular phone-to-use”. They constitute a media that provides direct access to individuals, instead of a company or household unit; a media that is always with individuals. The sites and subscribers have increased so much in number, because this media feature attracts companies interested in individual-oriented services and encourages them to deliver contents. We believe that advanced features such as Java and next-generation i-mode mobile phones will accelerate the expansion of multimedia and Internet markets, both at home and abroad.

GLOSSARY

HTML: Hyper Text Markup Language
IMT-2000: International Mobile Telecommunications-2000
IP: Information Provider
ISP: Internet Service Provider
PDC: Personal Digital Cellular
PDC-P: PDC Mobile Packet Data Communication System
SSL: Secure Sockets Layer
TCP/IP: Transmission Control Protocol/Internet Protocol

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- [1] Enoki: Special Article on i-mode Services, Overview of i-mode Services, New Technology Report, Vol.1, No.1, pp.4-9, Oct.1999.
- [2] Hanaoka et al: Special Article on i-mode Services, Network Technologies, New Technology Report, Vol.1, No.1, pp.14-19, Oct.1999.