

# Impact of Mobile Communications on e-Commerce

By *Noguchi Shoichi*

## Introduction

Why does mobile communication have a big impact on e-Commerce?

The next-generation Internet will constitute the business foundation of the 21st century. Therefore, ways to use the Internet in society have direct, strong bearings on the e-Commerce world. And it is mobile communications that will have a revolutionary impact on the future Internet. Mobile communications change the time and space sphere of Internet use from a discrete one to a continuous one. This means Net users can freely use the Internet anytime, anywhere, that is, the emergence of a new nomadic society.

Just like the Mongolian empire, which was created on the basis of a nomadic social system, conquered Asia and Europe, a similar phenomenon is taking place in the business world today. As a result, the technological development of a mobile Internet is expected to play a leading role in the development of Information Technology (IT) in the 21st century, with a newly built business world projected to become a gigantic one that will incorporate logistics, finance, entertainment, welfare and many other areas. The mobile Internet will undoubtedly lead not only the Japanese economy but the global economy as a whole in the next century.

This report systematically explains the circumstances leading up to the conclusion mentioned above and discusses the impact of mobile communications on e-Commerce.

## Development of the Internet and social meaning of the Internet

The development process of the Internet is divided into three main phases. The first phase is the era of the Advanced Research Projects Agency

(ARPA) network that was developed in the 1970s. The main users were researchers at universities and business corporations' institutes. ARPANET created a new research environment in the academic world. Amid the rapid expansion of the environment surrounding use of the network, two significant technological developments were made in the early 1990s. One of them is the development of Web technology that builds up information resources on the network under a multimedia-based environment and freely links such resources through the network. The other is the development of browsing technology that enables users to make use of a great number of information resources, which are scattered on the network, as easily as possible. The introduction of the two technologies has caused a drastic change in ways of using the Internet.

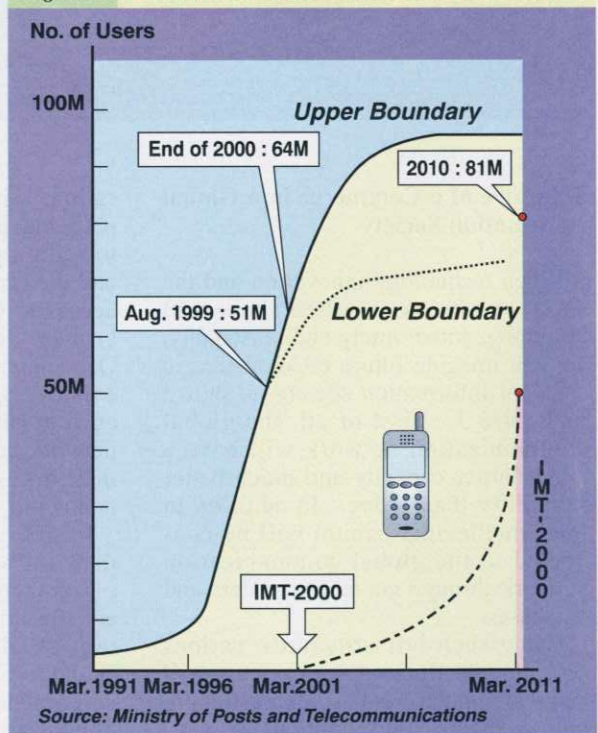
In the meantime, the development of Large Scale Integrated circuits (LSI) has led to a substantial fall in the costs of Personal Computers (PCs) that hook up to the Internet. This, combined with the deregulation of business activities on the Net, has brought about a new Internet world. The Internet penetrated into general households, and acquired status as a citizens' network and established citizenship. This era marks the second phase of development.

Mobile phones, meanwhile, spread into society gradually in the early 1980s. Since the beginning of the 1990s, how-

ever, the use of such phones has grown rapidly, due largely to the fact that mobile phones are well-suited to businesses and the lifestyle of younger generations. Figure 1 shows this situation. Under such circumstances, NTT DoCoMo Inc. launched i-mode wireless Internet services in February 1999.

At the beginning of August 2000, the number of subscribers to i-mode services reached more than 10 million. In Japan, Internet-on-the-move services are also being offered by the Japan Telecom group's J-Phone and DDI's EZ Web. Cut-throat competition among the three business groups helps to rapidly boost the number of subscribers to such services. Figure 2 shows the increasing trend of i-mode users. In this way, a new nomadic society has been created.

Figure 1 Estimated Number of Mobile Phone Users



## Mobile Internet and e-Business

The main technological characteristics of the mobile Internet can be summed up in the following two points.

First, the mobile Internet is easy to operate. Second, it makes it possible to exchange information in real time. These two functions are having a revolutionary impact on e-Business.

Finance is one of the business areas that can take full advantage of the two main technological characteristics of the mobile Internet.

### Business deals

(a) transfers at banks (b) stock transactions (c) business transactions through e-Commerce

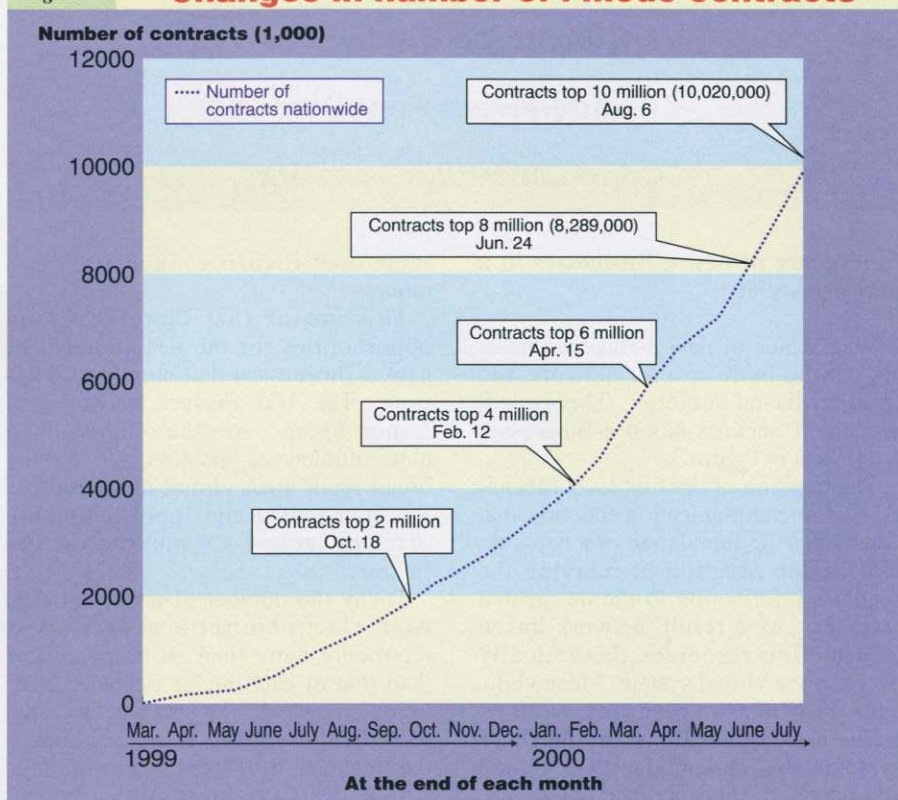
At present, small-amount deals of 5,000 yen or less reportedly account for about 90% of the total electronic account settlements at banks and medium-amount deals of 400,000 yen or less account for around 99%. This indicates that more than 90% of electronic settlements will most likely be made on the mobile Internet in the future and that nearly 100% of deals that need to be settled urgently such as stock trading and other market-linked deals are expected to be done on the mobile Internet.

The mobile Internet is also expected to have an influence on society in various aspects. In particular, businesses related to the younger generations' culture are projected to create a big market. Specifically, a host of computer games, entertainment contents and other new businesses will be created.

The hookup of i-mode to the PlayStation 2 game console is one example of such a trend.

Moreover, a wide array of functions incorporated in mobile phone handsets are expected to create a big content business. In the future, such handsets are expected to have lifeline functions, with the Global Positioning Systems (GPS) and Intelligent Transport Systems (ITS) becoming indispensable services. This indicates that new businesses, based on these services, will be created in the e-Commerce world. The creation of such businesses in turn will

Figure 2 Changes in number of i-mode contracts



provide the transportation and welfare sectors with great business opportunities.

### The Net business environment in the 21st century

The number of Internet users has increased dramatically in Japan. Of these, the number of subscribers to mobile Internet services has already eclipsed 10 million, and some industry pundits project the number of such subscribers will reach 20 million in 2001. According to a report issued by Nokia, the number of mobile Internet users worldwide will exceed that of personal computers by 2003. The prospects show that Internet-based e-Commerce cannot pay off without the environment of the mobile Internet.

Against this background, the world's "Big Three" mobile phone equipment makers: Nokia, Motorola and Ericsson, together with the financial firms of

Deutsche Bank, Citigroup, UBS and VISA, set up a forum in May 2000. This consultative forum is aimed at establishing worldwide standards for a new e-Commerce world, that is, a mobile Internet-based m-Commerce world.

Currently, there are several projections for the future growth of e-Commerce.

A British Telecom report predicts the worldwide scale of the e-Commerce market should total \$200 billion in 2004. Other reports project Japan's market scale at \$68 billion in 2003 and the U.S. market scale at \$165.3 billion that year. It seems certain that the environment of the mobile Internet will play a leading role in global economic growth in the years ahead. Japan for its part needs to promote an IT strategy designed to respond to the emergence of an m-Commerce world and take an important position in that world.

**Figure 3 Theoretical Models of Network-Based e-Businesses**

**e-Commerce Application**

**Middleware Function**

**Communication Function**

### Emergence of new e-Businesses in a network society

What kinds of new e-Business models can be built up in a network and Internet-based society? Theoretical models of network-based e-Businesses are shown in Figure 3.

The function of the first level of society is the communication function that constitutes the foundation of a network, that is, the function of relaying the sender's information to the designated receiver. As a result, network-linked information resources theoretically become one virtual system. Meanwhile, each information resource, such as e-Business applications and database systems, are independently designed and operated. In order to mutually use information resources, a platform needs to be created, and the functions to manage and operate the platform must be built up on the network. It is the second level of society, or so-called middleware, that offers such services. Use of this function leads to organic fusion of all information resources on the network. Network vendors can build up new network-based e-Businesses if they add strong customized support functions to the middleware. This is the model of new e-Businesses. The financial network businesses of America Online (AOL) and Yahoo! are specific examples of such a model in the financial field.

To sum up, the network has two functions — communications in the first level and middleware in the second level. For business corporations, it is naturally most desirable to utilize the strong middleware functions offered by network vendors so as to carry out their own business efficiently. This is because building up middleware on

their own requires much time and money.

This means that there are good opportunities for the development of new e-Businesses that supply middleware. The AOL Finance Network and Yahoo Finance are the outgrowth of new middleware business. As for the broad retail area, virtual malls such as Rakuten Ichiba and Ippin Ichiba are offering new e-Commerce on the Internet.

Today the number of network-based AOL electronic settlement users is reportedly more than 10 times greater than that of each major financial institution's network. This means the value of AOL's network is extremely high in the financial area. Financial institutions will be able to secure a greater number of customers and offer new services if they make use of AOL's network.

Therefore, network vendors have great chances to create new gigantic e-Businesses if they are able to offer powerful middleware. More specifically, they provide existing financial institutions with a broad business forum on the platform of middleware they offer. Each user financial institution pays a royalty to the network vendor in exchange for business they are doing in the forum. If the forum comes to support the functions that are required by a greater number of businesses, network vendors will play the main part in e-Commerce. And, the mobile communication-based Internet will be the basic network function for supporting the vendors.

### Current state and future of mobile Internet

The mobile Internet started with the introduction of mobile telephones.

Early in the 1980s, network vendors started offering mobile phone services. At that time, they had yet to offer Internet hookup services. This marks the first phase. In February 1999, NTT DoCoMo began to supply Internet access services by introducing i-mode. This marks the start of the second phase.

Communication capabilities of i-mode and the DDI group in the second phase were not sufficient enough to make good use of the Internet, however. As a consequence, technological development became indispensable for future use of multimedia information. This is the third-phase development of IMT-2000 (International Mobile Telecommunication-2000). The basic specifications demanded for IMT-2000 were that users will be able to communicate from the indoor semi-static situation to the high-speed running situation such as within automobiles. Also required are communications at 2 megabits per second (Mbps) indoors, 384 kilobits per second (Kbps) at walking speed, and 144 Kbps at fast-moving speed. Among the applications for IMT-2000 are teleconferencing and music distribution, and a combination of such sophisticated services as games, GPS and ITS.

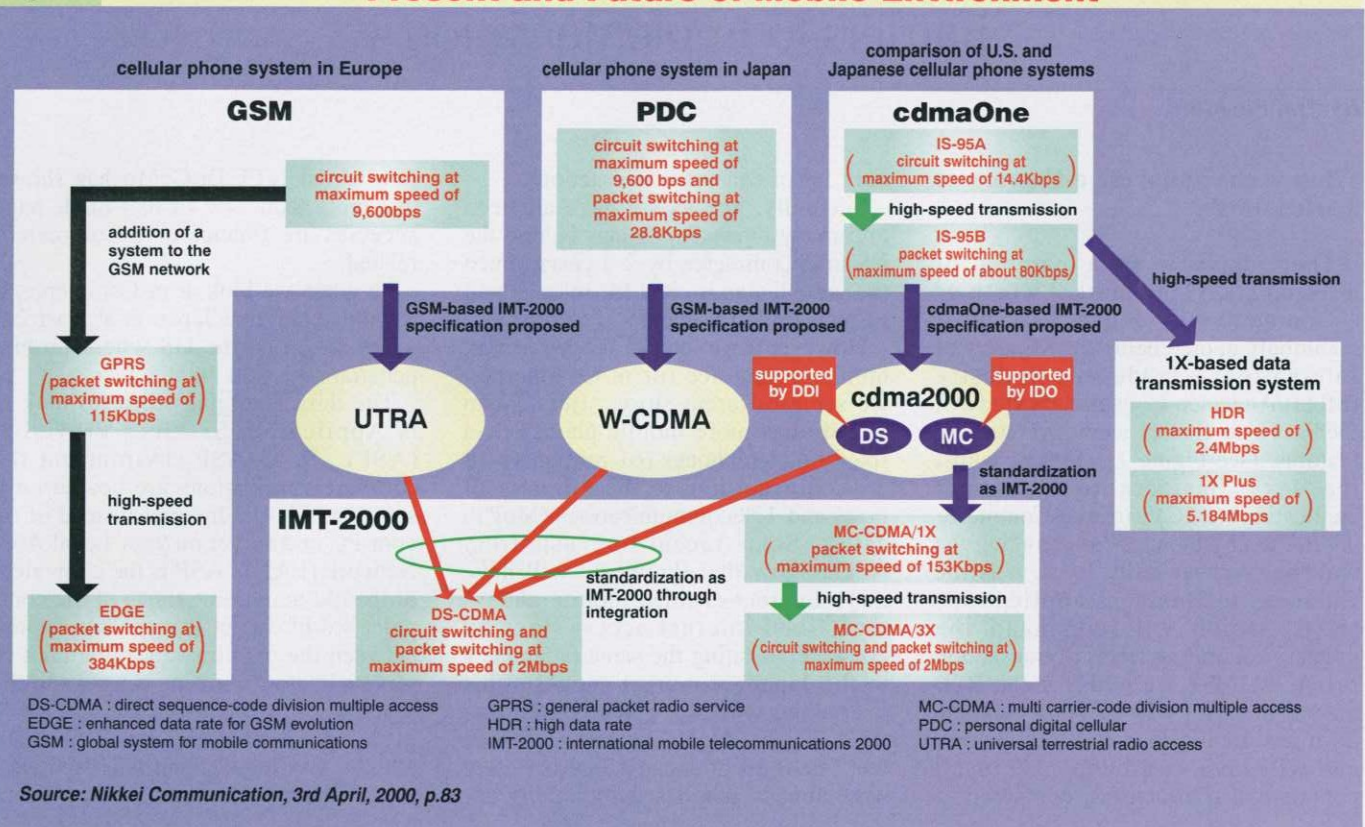
Of these services, the business market involving GPS and ITS is vast, and such services can be offered by using the mobile Internet.

NTT DoCoMo is to start offering IMT-2000 services in May 2001, based on the Wideband Code Division Multiple Access (W-CDMA) standard. Meanwhile, the DDI group, the promoter of code-division multiple access 2000, or cdma-2000 (IMT-2000 MC1X[Multi Carrier-code division multiple access-1X]), is making preparations to launch new services in 2002.

Elsewhere, European nations are scheduled to begin IMT-2000 in 2002-2003 while the United States is to launch new services in 2005. Considering the big impact of the mobile Internet on each nation's industry and the economy, this timeframe may be drastically changed. Since the United States is techno-

Figure 4

## Present and Future of Mobile Environment



logically superior to other nations in this field, its attitude toward the mobile Internet deserves careful study. Figure 4 shows the present and future mobile environment.

### Future of mobile Internet and e-Commerce

One of the noticeable characteristics of the mobile Internet is that its handsets are wearable computers with an advanced interface whose perception is different from the conventional one. This characteristic will help bridge the so-called "digital divide," the gap in IT availability between haves and have-nots, and make it a lifeline in the society of the 21st century. Also notable is that mobile Internet-related technological development will play the leading role in the development of IT in the next century. As a result, the mobile Internet will bring about a revolutionary change in Internet-

based businesses and help build up the gigantic e-Business world while combining business-to-business (B to B) and business-to-consumer (B to C) relations. A report by the Telecommunications Technology Council, an advisory body to the Minister of Posts and Telecommunications, projects the scale of e-Business at 9 trillion to 10 trillion yen in 2010. Given the model of new mobile Internet-based businesses, the market size is expected to expand beyond the projection.

The total amount of spending on technological research and development is also big. Investment worth 1 trillion yen or more per business group or at least 3 trillion yen as a whole is required (currently three groups – NTT DoCoMo, Japan Telecom and DDI). In the current fiscal year, NTT DoCoMo has earmarked 300 billion yen for research and development, and 700 billion yen for equipment investment.

At the same time, the amount of investment in the development of related hardware and software will be vast. Building up the new environment for the mobile Internet will constitute the most important pillar that will lead Japanese and global economic growth.

Finally, we face a host of knotty questions although this report did not refer to specific ways to resolve problems involved in technological development. The questions include standardization, security and intellectual property rights. Especially important is the fusion between the e-Commerce world now being built up on the basis of the eXtensible Markup Language (XML) and the mobile Internet. **UJI**

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