INTRODUCTION

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1. QUICK CHANGES IN 'IT'

Technological changes in information technology (IT) have been quickly advancing beyond people's imagination. Demand for broadband access (digital subscriber line or DSL, asymmetric digital subscriber line or ADSL, and CATV) is intense and growing while lower technologies such as Integrated Services Digital Network (ISDN), have quickly become obsolete. The third generation mobile phone is now on sale and people can enjoy photos and moving pictures through these cellular phones. Wireless networks such as Bluetooth, home servers and wireless LAN make our lives more convenient as electronic home appliances can be connected to mobile phones. The convergence of broadcasting and the home computer is taking place and TVs will function as PCs when terrestrial digital broadcasting begins. Such possibilities, which only a decade ago seemed fantasy, are actually within our reach.

Under such circumstances, several fundamental factors should be grasped. First, IT-related infrastructure in both physical and software terms should be established. In the future optical fiber networks — especially fiber to the home or FTTH, which is the most convenient and speediest, but rather expensive — are expected to be deployed. Identification and certification on the Internet is another area of importance, not only for e-government but also for all kinds of e-businesses. Here, a suitable public key infrastructure (PKI) such as a public attesting office should be instituted.

Second, connectivity issues should be addressed, especially, pricing. The Internet route has become more complex reflecting worldwide competition and technical changes in routers and software. There are basically three layers: end-users; Internet service providers (ISPs); and major Internet backbone providers (IBPs). IBPs are usually global-class telecommunications conglomerates. Message senders and final receivers on the Internet are identified but the intermediate routes upon which messages travel are not certain because messages are divided into several packets and sent to final receivers through different vacant routers and

network interconnection points (or 'hops') so exact paths cannot be traced. Connectivity pricing (or wholesale prices) is thus difficult to determine. Therefore we have to clarify what rational prices are for Internet pricing. In addition, collusive activities by oligopolistic backbone companies should be monitored and controlled.

Third, standards in IT have also become complex and fierce competition is going on in such fields as cellular phones, digital TVs, coding and decoding, and business models. Standards are closely related to intellectual property rights. However, open source software such as Linux and TRON has gained popularity even for commercial use. Because technological changes are so quick, new standards swiftly replace existing standards. Therefore it is difficult to draw a clear line between market-induced standards and mandatory standards.

Fourth, the digital divide has been growing not only within advanced countries but also between developed and developing countries. Basically information networks use existing telephone lines such as DSL and ADSL and this basic infrastructure is lacking in developing countries. Thus, the gap between rich and poor countries is expanding, especially, in the broadband era. For example, the diffusion of the Internet and broadband in Latin America is quite slow (Argentina is an exception in terms of possible broadband penetration due to its high CATV diffusion) as compared with East Asian countries. Chile, which has the highest Internet penetration (1,155 per ten-thousand inhabitants in 2000) in Latin America, is less diffused than Malaysia (1,590), the sixth ranked in East Asia.

2. 'IT' RECESSION

The IT Revolution has been overshadowed by the US economic downturn, especially, after the dot com bubble burst at the beginning of 2001. Rapid decreases in IT-related stock prices and venture capital brought about recession in IT industries. This in turn resulted in further stock price declines. Indeed, people who speak ill of IT thought that the IT Revolution was over.

There are several reasons why the IT recession came to the fore: First, excess capital and investment in this sector resulted in oversupply of IT-related equipment and inventories, while demand reached saturation point. PC and mobile phone use quickly spread to almost all necessary consumers and the market went flat. In a sense this sector, too, cannot be

free from business cycles.

Second, stock prices relating to IT were excessively overvalued. After the IT enthusiasm was over, inflated prices had to shrink. The US economy itself had been on a buying spree reflecting the arrival of the 'new economy.' This monetary bubble led the IT sector to instant boom but equally its collapse brought the sector crashing down.

Third, the IT sector lacking the traditional foundation got itself into trouble since new business models sometimes lacked marketing and distribution infrastructure. For example, Amazon.com at first did not have its own distribution systems including distribution centers and warehouses. It had to establish its own infrastructure ('click or brick') and these investments were accompanied by chronic red tape.

Fourth, contents were not so attractive. Although kids can enjoy interactive games and the older generation take pleasure in digital high definition TVs, most ordinary working people cannot spare much time for IT-related entertainment and the poor of course cannot afford expensive IT equipment while at the same time most people remain skeptical of an insecure e-business environment.

Fifth, the terrorist atrocities in the US on September 11 and succeeding air strikes on Afghanistan threw a dark shadow over a world economy and froze consumer demand including IT-related products. This, however, is a temporary factor. When the war is over, demand will return.

However, the importance of the Internet as a communication and business tool has not diminished so the IT Revolution continues. In particular, future utilization of broadband is a guide to the second IT boom.

3. BEYOND THE 'IT' RECESSION

Recent phenomena show signs that a new wave in IT business is coming. Current broadband accesses are: (a) CATV (cable modems), (b) DSL/ADSL, (c) FTTH, and (d) FWA (fixed wireless access). Speed for downloading is up to 20Mbps for CATV, 8Mbps for DSL, and around 100Mbps for optical fiber access (FTTH). Due to the compression technologies of digital information, people can enjoy movies/videos and interactive games through broadband services. Since DSL/ADSL uses traditional telephone lines and prices for its facilitation are not so expensive as other broadband accesses, DSL/ADSL users are increasing.

In Korea, the number of high-speed Internet subscribers reached 7.04

million inhabitants in September 2001. The penetration ratio is almost 14 percent, which is one of the world's highest ratios. Out of which 4 million are ADSL subscribers and 2.4 million are CATV subscribers. In Japan, DSL/ADSL subscribers dramatically increased from 211 subscribers in March 2000 to 112 thousand in March 2001 and reached 1.20 million in November 2001, while CATV grew from 216 thousand in March 2000 to 1.15 million in September 2001. These figures show that broadband is widely accepted and that its deployment globally continues.

FTTH access is very expensive in terms of infrastructure investment. However, the realization of the information highway through FTTH is the most widely expected and the construction of its networks depends on government policy and private sector initiatives supported by users' demand. The diffusion of broadband can act as a kind of ignition switch against the present IT downturn. Furthermore, quality contents should be devised and increased to enhance broadband services.

4. FRAMEWORK OF THE BOOK

In this volume, the following topics regarding IT progress are analyzed: (i) Internet topology; (ii) connectivity pricing; (iii) dot com recession; (iv) IT-related standards; (v) public key infrastructure such as certification and attesting; (vi) IT uses in the mass media; (vii) broadband dissemination; (viii) IT-related labor and investment issues; (ix) the digital divide; and (x) future prospects for IT. It covers IT situations in India, Korea, Thailand, South Africa, Central and Eastern Europe, Latin America as well as developed countries such as Europe, Japan and the US.

Like last year, three teams from Japan, the UK and US were set up to undertake this research project. The Japan team picks up such issues as broadband diffusion in Japan and Korea, standards procedures, public key infrastructure, IT utilization by large Japanese news agencies, and IT-related investment in Thailand. A theoretical analysis on interconnection pricing is also undertaken. The UK team analyzes Internet topology in Europe and South Africa, connectivity pricing and competition, policies and programs reflecting IT progress in Central and Eastern Europe (special emphasis on Estonia), and the Indian software industry from the industrial development point of view. The US team explains the widening digital divide among the urban poor, between urban and local areas, and between advanced and developing countries. The present dissemina-

tion of Internet uses in Latin America (special emphasis on Argentina and Mexico) is also examined.

Last year's book (Mitsuhiro Kagami and Masatsugu Tsuji, eds., *The 'IT' Revolution and Developing Countries: Late-comer Advantage?*, IDE/JETRO, 2001) gave readers a birds-eye view of the IT Revolution. This volume intends to treat specific issues and countries and give deeper insights to ongoing IT progress together with future trends in the IT Revolution.