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INFORMATION TECHNOLOGY:

THE KEY TO LONG ISLAND'S FUTURE ECONOMIC COMPETITIVENESS

Information technology permeates our personal and business lives. Studies have shown that investments in information technology boost worker productivity faster than any other type of investment. The economic significance of information technology lies in its ability to transform other sectors of the economy so as to make them function more efficiently. In the future, productivity gains will be concentrated in those industries that understand the potential of information technology and use it intelligently. This article discusses how emerging IT developments will influence Long Island's business community and affect its economic competitiveness.



BY DR. PEARL M. KAMER,
LIA Chief Economist

An Overview of the IT Industry

The nation's information technology industry currently employs 3.76 million persons. Although relatively small in terms of employment size, it is an "enabling" industry that helps other sectors of the economy to function better. According to the Information Technology and Innovation Foundation, money spent on computing technology delivers productivity gains that are three to five times those of other investments. Some studies suggest that information technology has been responsible for as much as one-third of U.S. economic growth over the

past decade. Business investment in IT equipment and software has more than doubled in real terms over the past five years. Corporate IT spending, although not as robust as it was during the late 1990s, nevertheless remains significant. Last year, corporations increased their IT spending by an estimated 6 to 8 percent and similar gains are expected this year. According to a recent Citigroup survey, the top IT spending priorities for U.S. corporations include improved computer security, server consolidation and deployment of new software. (See Table 1)

Information Technology on Long Island

According to the New York State Labor Department, Long Island contained 30,100 jobs in information-related industries as of September 2007. This broad industry category includes software publishers, providers of cable and other subscription programming, Internet publishing and broadcasting firms, wired telecommunications carriers, cellular and other wireless communications providers, Internet service providers and providers of data processing, hosting and related services. Average annual wages in this group of industries exceeded \$78,000 in 2006. (See Table 2) Several IT occupations, notably network systems and data communications analysts, computer software engineers, database administrators and network and computer systems administrators, are projected to be among Long Island's fastest-growing occupations in the foreseeable future. (See Table 3)

Table 1

Top Priorities in Corporate IT Spending

Purpose of Investment	Percent of Survey Respondents
Improving IT Security	40
Server Consolidation	29
Software Deployment	29
Regulatory/Compliance Projects	29
Software Testing	26
Custom Software Development	17
Transition to Internet Protocol Infrastructure	16
PC Upgrade	13

Source: Citigroup Investment Research based on a survey of 100 CIOs in March 2007

The Revolution in Mobile Communications

The proliferation of wireless mobile devices has allowed information technology to permeate all aspects of our lives. Cellphones have evolved from simple communications devices into complex multimedia tools that take pictures, play music and allow us to surf the Web. Advances in battery, display and storage technology will make it possible to put more and more functions on smaller handsets. In the future, cellphones will receive live TV programming with greatly improved picture quality. They will be used as data storage devices, credit cards, even identity cards.

Cellphones in Japan and South Korea have already assumed many of these functions. In South Korea, 70 percent of all online purchases are charged directly to cell phone bills instead of credit cards. Online purchasers receive a code as a text message on their cellphones. They utilize this code to pay for their purchases. When using public transportation, South Koreans swipe their cellphones at turnstiles instead of using tokens or smart cards. More than three million South Koreans regularly use their cell-

phones to log on to social networking sites. Social mapping software allows them to determine where their friends are at any given time.

In Japan, advanced bar codes are being used on billboards, street signs, published materials and food packaging. Fast food customers can point their camera-equipped cellphones at the wrappings on their hamburgers to obtain nutrition information. Magazine readers can point their cellphones at insurance advertisements to obtain insurance quotes on their cellphone screens. Japanese hospitals put the codes on prescriptions, allowing pharmacies to instantly scan them with their camera phones. Supermarkets use the codes on perishable foods to inform customers about the expiration dates of different items.

In this country, some cellphone models permit one-on-one video conferencing. Users can stream live video to another cellphone during a call. Those on the receiving end are able to reverse the video feed. Some U.S. banks allow their customers to perform basic banking functions over their cellphones or other handheld wireless devices with Web access. Users can pay bills, monitor account balances and transfer money between accounts

at the same bank by using their cell phone keypad and screen. An estimated 22 million bank customers are expected to use such services by 2012. Mobile devices are allowing medical personnel to access and update patient medical records and send prescriptions directly to pharmacies. Eventually, medical personnel will be able to obtain extensive treatment advice through cellphones and other mobile devices. Advanced cellphones are being used to close sales, manage inventories and send service representatives on calls. This has greatly enhanced the productivity of sales and customer service workers. Some studies have shown that each 10 percent increase in mobile penetration causes the nation's GDP to increase by 0.6 percent.

The Ongoing Revolution in Computing Power

Microprocessors are the calculating engines for computers. Recent technical breakthroughs will lead to faster, more energy efficient computer chips. Intel plans to replace much of the silicon dioxide used for insulation in its microscopic transistors with an alloy of the element hafnium. This will lessen their tendency to leak electricity as they are reduced in size. The leakage of electricity makes chips run hotter and causes them to consume more power. Smaller circuits will make it possible to pack more transistors on a single chip. The new chips will have twice the transistor density and twice the computing power of today's chips. They will provide a 20 percent improvement in switching speed and a 30 percent reduction in power requirements.

Hewlett Packard has designed a computer chip that will be up to eight times denser than those currently being produced. These improvements were achieved by overlaying a nanoscale

Table 2

Employment and Earnings in Long Island's Information-Related Industries, Fourth Quarter 2006

Industry	Employment	Average Annual Wages
Software Publishers	516	\$89,901
Cable & Other Subscription Programming	5,418	87,886
Internet Publishing & Broadcasting	279	65,372
Wired Telecommunications Carriers	5,230	72,079
Cellular & Other Wireless Telecommunications	379	63,445
Telecommunications Resellers	561	74,328
Cable & Other Program Distribution	309	66,786
Internet Service Providers	335	53,903
Data Processing, Hosting and Related Services	3,384	76,630

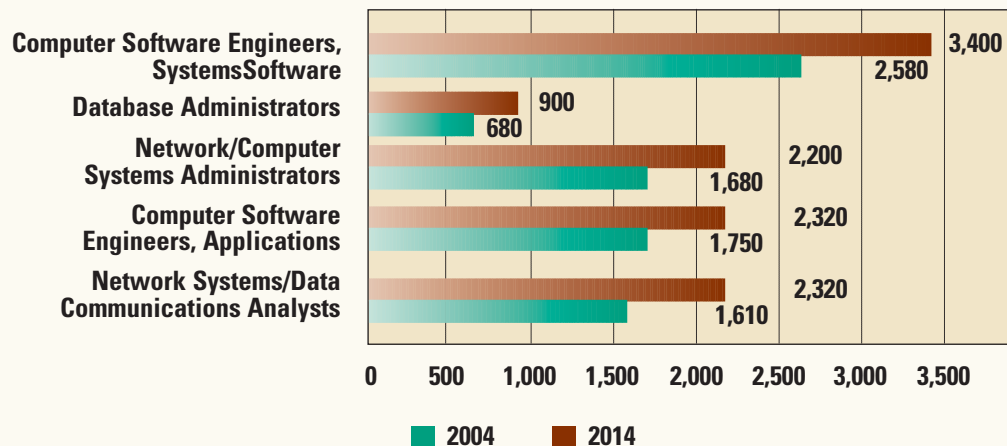
Source: New York State Labor Department

crossbar switch structure atop a conventional chip, an idea first developed by researchers at the State University of New York at Stony Brook. The new chips will have a memory that is 30 times greater than current chips. I.B.M. Corporation has also entered the race to produce faster, more energy efficient computer chips. Its scientists plan to increase the speed of semiconductors and reduce their energy consumption by using a technology known as air-gap insulation. The technique can increase chip speed by as much as 35 percent with a 15

percent reduction in energy consumption. This would make it possible to triple the data stored on a typical microprocessor and double its computing performance. The new chips will first be incorporated in high-end personal computers but everyone will eventually benefit from lighter, longer-lasting laptops and smart phones that perform multiple functions with less battery drain. The net effect will be to extend Moore's Law, which states that the number of transistors on a chip doubles every two years, thereby creating cheaper, more powerful computers.

Laptop computers are themselves changing. Some of today's laptops no longer have hard drives. They are instead equipped with a new hard-disk alternative called a solid-state drive (SSD). Whereas a conventional hard drive stores data on a magnetic disk that spins at up to 7,200 revolutions per minute, an SSD is a handful of chips with no moving parts. The benefits of moving to flash storage include greater reliability, lower power consumption and faster performance, particularly at startup. Although flash memory currently

Projected Growth of Selected IT Occupations on Long Island 2004-2014



costs more per megabyte than magnetic storage, the cost of flash storage will decline as chip prices decline.

The shift to SSD will enable the design of even smaller laptop computers. Some small laptops, known as ultraportable notebook computers, are already on the market. The ultraportables are not as small as ultramobile personal computers, which are palm sized. However, they are smaller than standard notebook computers. Whereas standard notebook computers generally have screens measuring 15 to 17 inches diagonally, ultraportables have screens of 12 inches or less. Many ultraportable notebooks weigh four pounds or less as compared with a regular notebook computer, which generally weighs more than 6 pounds.

Achieving Universal Internet Access in a Wireless World

Today, about a quarter of the U.S. population still lacks access to the Internet, which puts them at a disadvantage both economically and socially. It is hoped that municipal Wi-Fi networks can fill this gap and lead to uni-

versal Internet access. Wi-Fi, or wireless fidelity, is a standard for transmitting Internet communications wirelessly to Wi-Fi enabled computers and handheld devices. Most new laptop computers and many desktop computers have a built-in wireless capability. A wireless router connected to the Internet transmits the signal to computers within range via radio waves. A regional Wi-Fi system requires about 25 to 40 transmitting devices per square mile to blanket an area with a signal. In an urban setting, it costs between \$75,000 and \$125,000 per mile to set up such a network.

Municipal Wi-Fi networks have the potential to perform many functions. They can be used to control traffic lights, send electric meter readings to utilities and allow police officers to monitor wireless cameras from their cars. Currently more than 400 communities are planning to deploy such networks. Because Wi-Fi uses unlicensed bands of radio spectrum, it must use low-power transmitters, which limits its ability to penetrate walls. Therefore, additional equipment is needed to boost the signal and

obtain coverage indoors. Moreover, there is as yet no single business model for a successful network. Advertisements and residential subscriptions have generally failed to cover the cost of installing municipal Wi-Fi systems. The industry is now turning to anchor tenants, such as utilities and local governments, to pay for the bulk of planned services. Long Island recently selected E-Path, a Florida based company, to install a Wi-Fi network throughout much of Nassau-Suffolk. E-Path plans to pay for the network through advertisements, paid residential subscriptions and services to businesses, educational institutions and government agencies.

Another promising technology is fixed WiMAX. WiMAX, short for Worldwide Interoperability for Microwave Access, is a technology for rapidly transmitting large amounts of digital bits via radio signals. Because it uses licensed radio waves, it avoids digital traffic jams. The new WiMAX standard will be ready early next year and WiMAX-capable laptop computers should be available shortly. WiMAX will provide Web browsing speeds many times faster than Wi-Fi over a broader geographic area. Whereas Wi-Fi networks have a range of only a few hundred yards, WiMAX coverage will extend up to 30 miles at Internet speeds up to 50 times as fast as Wi-Fi.

WiMAX will eventually be built into TVs, notebook PCs and smart phones. The first WiMAX transmitters are already appearing on light poles and towers in Chicago and Washington, D.C., two test markets. Major rollouts of WiMAX services are planned in Pakistan, Australia and China by 2009. WiMAX networks will eventually deliver video entertainment and voice telephone services that compete with traditional telecom and cable-TV services. The new technology will also extend the range of wireless email and Web surfing services in mobile computers.

Conclusions

We are in the midst of a revolution in mobile communications. In the future, mobile devices will be able to switch seamlessly between Wi-Fi hot spots, cellular networks and new high-speed data networks. High-end Wi-Fi smart phones have been available for several years and some cell phone providers automatically transfer cellphone calls to available Wi-Fi networks as a means of easing network congestion. Wi-Fi capable phones detect when a user is in

range of a Wi-Fi connection in much the same way that a laptop computer does. Using Wi-Fi on a cellphone gives the user faster connections and better access in areas with weak cellular reception. It is anticipated that a quarter of all handsets shipped worldwide will have Wi-Fi capability by 2011.

The information technology industry is well established on Long Island. Moreover, Long Island is also at the forefront of innovations in wireless communications. The Center of Excellence in Wireless and Information Technology (CEWIT), located on the campus of the State University of New York at Stony Brook, is currently performing groundbreaking research in mobile computing, wireless networks, cyber security, wireless sensor networks, wireless protocols and related areas. Three important markets – health care, transportation and mobile commerce – have already benefited from the commercialization of CEWIT inventions. The presence of research facilities such as CEWIT ensures that Long Island will continue to remain at the forefront of IT research and development.

Table 3

Projected Long Island Job Growth, Selected IT Occupations, 2004-2014

Industry	Jobs, 2004	Projected Jobs, 2014	% Increase
Network Systems/Data Communications Analysts	1,610	2,320	44.1
Computer Software Engineers, Applications	1,750	2,320	32.6
Database Administrators	680	900	32.4
Network & Computer Systems Administrators	1,680	2,220	32.1
Computer Software Engineers, Systems Software	2,580	3,400	31.8

Source: New York State Labor Department