Title: The Diffusion of Internet Technology in China and China's Information Technology Strategies

Course: EMGT 610
Term: Winter
Year: 1998
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Report No: P98014

Abstract: China has achieved great progress in developing Internet during the recent four years, while it still has a long way to go. This paper looked back on the history, overviewed and analyzed the current status and forecasted the future of Internet in China. This paper gave its view on the way ahead of China in terms of diffusing Internet.

The Diffusion of Internet Technology in China and China's Information Technology Strategies

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EMP-P9814

EMGT 510

Winter 1998

Individual Research Report

The Diffusion of Internet Technology In China And China's Information Technology Strategies

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March 20, 1998

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1. *Introduction*

China has achieved a great progress on developing Internet during the recent four years, while it still has a long way to go. This paper looked back to the history, overviewed and analyzed the current status and forecasted the future of Internet in China. This paper gave its view on the way ahead of China in terms of diffusing Internet.

2. *Internet In China — Yesterday And Today*

- ***Retrospect***

Internet had gained its great impetus since 1990s, especially in America and Europe, followed by Asia Pacific region. China is behind in the tide but catch up it rapidly. The development of Internet in China can be divided into the following three phases.[1]

The first phase was 1987 ~ 1994. This phase is characterized as email application phase during which China exchanged email with Europe and North America through dialing. In 1990, China opened CHINAPAC, a low speed data network, which is far below the requirements of computer communications and data exchange. Thus, the Institute of High Energy Physics (IHEP), affiliated with the Academy of Sciences of China, decided to rent international satellite channels to establish a dedicated 64 KBPS line linked with SLAC national laboratory of America. 18 months later in March 2, 1993, a computer communication line between IHEP and Stanford Accelerator Center of USA is opened, linked to other regions under DECnet protocol. Soon, IHEP obtained privilege of purchasing routers from CISCO and moved into Internet by running TCP/IP protocol. Since, China's Internet went into its second phase.

The second phase was 1994 ~ 1995. This phase is characterized as the development of the Education and Research Network. China realized the full functions of Internet through TCP/IP connections. In early 1995, IHEP switched from satellite to ocean-floor cable, going through Japan into Internet. Meanwhile using high speed optical fiber cable and routers, the NCFC network (the National Computing and Networking Facility of China), formed by the Academy of Sciences of China, Beijing University and Tsinghua University, realizes backbone connections

with international Internet through a 64 KBPS line. Also, China's highest domain name (CN) server is set up. Just at that point, China went into Internet actually.

Later on, China Education and Research Network(CERNET) is established and linked to America through a 128 KBPS line. Also, the Beijing University of Chemical Engineering built up a 64 KBPS line routing through Japan into Internet. For an instant, tens of institutes and universities connected with each other by Internet, which leads a big tide of networking of the academy. In May 1995, the Ministry of Post and Telecommunications opened a public Internet network, namely CHINANET, as a public business network providing public Internet services. Since, China's Internet went into the third phase, the business application phase.

The third phase started from 1995. This phase is characterized as business applications. From then, China has merged into the global Internet world extensively. As being into the business applications phase, Internet has swept across the China mainland as a hurricane with its overwhelming power and great vitality. CHINANET built up two key nodes connected to Internet in Beijing and Shanghai, respectively, and established its backbone networking across the country. As of today, CHINANET has offered Internet services in most of the important cities. In September 1996, ChinaGBN, affiliated with the Ministry of Electronics Industry, is opened. The local ISPs emerged vigorously, too. Based on statistics, only in Beijing, more than 30 ISPs either begin or plan to open their Internet services by the end of 1996, such as Oriental Netscape, Information Highway, Century Networking, etc. Their investment scales even exceed those of the government owned competitors. [3]

- ***Internet in China Today***

Figure 2.1 shows the information about the Internet connections between China and international, and their specific bandwidths. It can seen from the figure that China have already had 13 lines of international connections, administered by four ministries respectively, namely the Academy of Sciences of China, National Education Committee, the Ministry of Post and Telecommunications, and the Ministry of Electronic Industry. Compared to the situation in early 1996, the connection speed and the number of lines increase significantly. The course of China's informationization is administered by the Administration Group of Informationization, affiliated with the State Council. The operations are implemented by the office of Administration Group

of Informationization, local informationization ports(special offices affiliated with local government) and informationization committees. Also, the upcoming Internet Association of China will help to promote the development of Internet in China.[3]

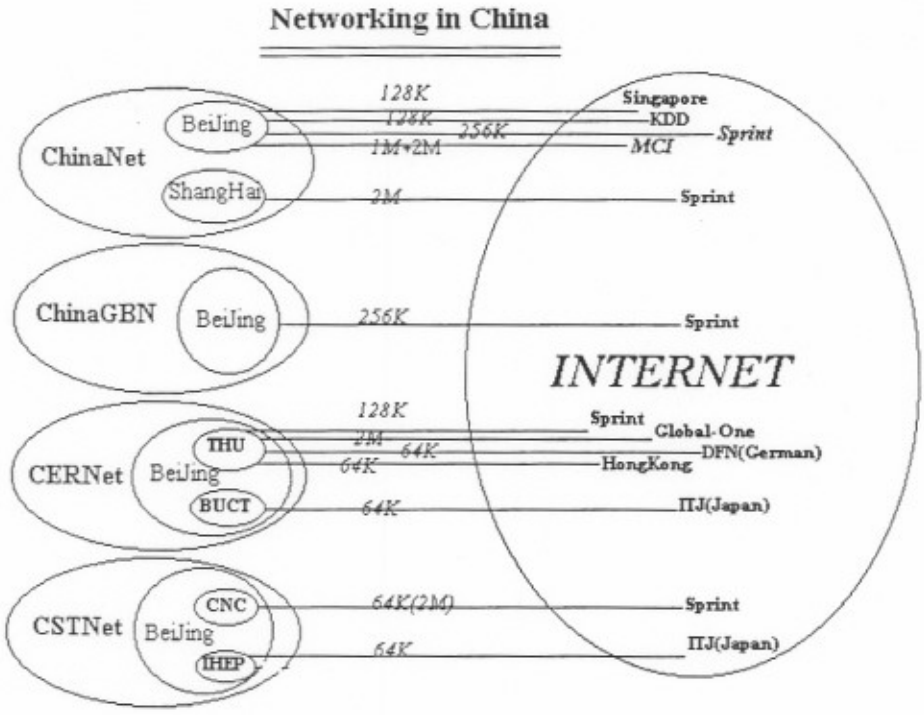

Figure 2.1 Networking in China

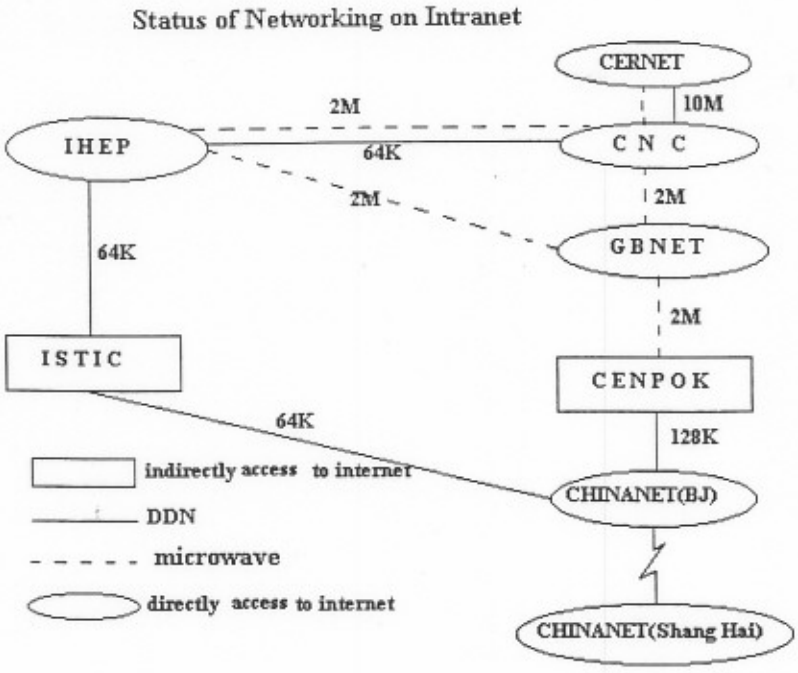

Figure 2.2 The Status of Intranet In China

Chinese people are suffering many problems with current Internet services while they are shocked by the power of Internet. To date, China's business users obtain their Internet connections via the data communications networking provided by Post and Telecommunications, most at a speed of 64 KBPS, which give rather poor quality when transferring multimedia data. So far, the lines of 2 MBPS are few and very expensive. To personal users, dialing-in solutions are either not cost effective. The information isolations between the main network structures, and bandwidth issue become the bottlenecks. However, as of today, the main Internet networking structures in China connected with each other and their bandwidth were also improved by a large pace. The status of complete internal structure and bandwidth are shown in the Figure 2.2.[1][3][7][10]

3. *China's Information Technology Strategies*

- **Informationization Is Becoming A Strong Will Of The State**

Early in 1984, Mr. Deng Xiaoping, the highest leader of China, emphasized that "explore the information resources to serve the construction of the Four Modernization". Recently, it could be noted that every highest level leader of China has emphasized the very importance of the informationization to China. "No one of the Four Modernization can go without informationization" and "China should have an essential progress on informationization within the term of its 9th five-year plan" etc. are consensus of these leaders. It's no wonder that information industry imposed a very niche in the schemes of China's 9th five-year plan and expectedly in the successions. China's 9th five-year plan started in 1996.[2][4]

In December 1993, the State Council called on a special joint conference participated by more than 20 ministries, namely "Information Joint Conference". The Vice State Secretary, Mr. Zou Jiahua, chaired this conference and led to organize national informationization work and launch a series of key schemes. They launched the famous "Golden Series" schemes — "Golden Bridge", "Golden Card", "Golden Custom" and "Golden Tax". The purposes of these schemes are to informationize the comprehensive technology aspects of each area and each key aspect of national industry and economics. In 1996, the joint conference is evolved to be the Administration Group of Informationization in State Council, headed by Mr. Zou, participated by 18 ministries and committees. Its specific task is to create the strategies, guidelines and policies for national informationization, organize and customize the standards for informationization, and coordinate the intra-ministry informationization schemes and important technology projects. Meanwhile, a series of regulations is created in terms of managing Internet in China.

In April 1997, the State Council called on the 1st National Informationization Work Conference in Shengzheng. The conference clarified the guiding policy for the construction of China's informationization. The emphases of the conference are expressed as the following consciousness: the government will lead the course of informationization; pushing the exploration of Chinese (font) is becoming the most important task; supporting national information industry is critical to national informationization; unified planning by the state and co-development are used to

optimize the funding and establish the corresponding regulation system.

The Shengzheng conference has risen the informationization to a height of the will of the state for the first time. The policies and schemes from this conference will greatly support and promote China's development of information industry. [2]

Every fact show that to promote informationization has become a basic national strategy of China.

- **Current Issues of Developing Internet in China**

  - **Technology Issue**

The technology issue included 3 aspects. Firstly, there are two systems of networking protocol: TCP/IP and OSI. The drawbacks of TCP/IP are insufficient IP addresses, poor security and weak network management mechanism. OSI improve the above issues. However, it can be expected that TCP/IP and OSI will merge with each other and evolve together instead of taking the place of each other. Secondly, due to the fact that the communication flow through Internet are increased rapidly, and multimedia applications are increasingly flourishing, Internet is required to provide much higher information transferring speed than present. As a result, ATM technology becomes a hot topic of development of Internet technology. Thirdly, the security of Internet is an issue that has confronted the technologists for a long time. The current firewall technology is still not perfect yet.[1]

  - **Cultural Issue**

Some people see Internet as a kind of "Cultural Invasion", though this view cannot represent most Chinese people. Important is language barrier. Because most information on Internet use English and most Chinese users have poor English level, this factor prevents Internet going wide in the public. The current computer-aided translation system can seldom satisfy the needs of the users. Chinese (font) information is scarce on Internet. Moreover, the exchangeable information with foreign culture is more rare.

  - **Regulation Issue**

As of today, China has no copyright protection for the information products broadcast from Internet. The legal privileges and responsibilities of Internet users are

not clarified. Although there are a lot of issues on Internet that need coordinating and resolving by regulations, actually network management is in a status of "No regulations and no obeying".[6]

➢ **Security Issue**

Since the email documents on Internet are basically text documents, there is no guarantee that the business secret would not be stolen or privacy would not be revealed. Seriously, the bad-will hackers can apply illegal means to break into some private networks to steal business secrets, which stop some users going into Internet. [11]This prevents Internet developing widely, to a degree.

➢ **Information Resources Issue**

China has just started Internet only for three years and lag behind in the explorations of information. The databases on Internet are small in quantity, low in capacity and poor in structure.

➢ **Information Services**

Because of the very lack of Chinese font information, the unfriendly user interface, and the scarce number of information services, the people are reluctant to going to Internet. [9]

➢ **Fee Issue**

In China, the charges for Internet accesses, services and communications are still high. Moreover, a majority of the users are still not skillful to look for what they want from Internet, which cause the users to suffer a heavy burden by using Internet.

- **Possible Solutions**

➢ To strengthen investment on infrastructure, avoid redundant construction.

The development of infrastructure of communications to some degree constraints the development of national economy. To expedite the informationization of national economy, the country should strengthen investment on communications infrastructure. Naturally, investment on Internet should be posed on some key technologies, such as networking protocol, data transferring technology and security technology.

- To strengthen exploration of information resources

The explore the information resources in a well-organized way is a prerequisite for utilizing them. To strengthen the exploration is a key for pushing forward the development of Internet in China.[5]

- To strengthen security for on-line information

A focus should be posed on purchasing and developing advanced technology of network security.[12]

- To emphasize the diffusion of Internet

More efforts should be put into strengthening customer services, organizing technologists to solve the problem of Chinese translating on Internet, and presenting a better Internet interface for the users.

- To expand the network channels

- To take advantage of successful foreign experience, protrude China's characteristic

So far, China does not have competitive products to participate international competition. Thus, China should pay attention to studying all the useful experience in this area.

- To give priority to regulating and consummate the management and legal system for Internet

A big issue is preventing computer crime and help Internet to develop healthfully in China.

4. The Future of China's Internet And Information Technology

It's amazing to observe that as a developing country, given a serious lack of funding and previous experience, China has developed Internet to today's scale within a short term of 4 years. This achievement firstly demonstrates Chinese people's

intelligence, and more important, that the Chinese people have such a strong desire for information in today's transformation. With respect to China's natural condition, there are a few forecasting about Internet's trend in China.[12]

- **Information Is Formatted into Chinese**

"God may speak Hebrew, but computer does speak English". This fact causes a big inconvenience to Chinese people. Reasonably, formatting the information on Internet into Chinese is a important task to diffuse Internet in China. As of today, there are many businesses working on Chinese information services, which promotes the course.[8]

- **Bandwidth of the Backbone Lines Are Expanded**

At present, the bandwidths of the backbone lines are too narrow to satisfy the requirements of information transferring, which became " the headaches" of most users and confront Internet's development in China. Reasonably, expanding the bandwidths of backbone lines is inevitable in the near future so that more unit and personal users can establish their network or access Internet.

- **ISPs Continue to Flourish**

In China, ISPs' development has injected continuous impetus to Internet. On the other hand, the prosperity of Internet has provided ISPs a broader space and a bright future. Fair competition and reasonable charging system are bases for ISPs' continuing growth. At present, the state-owned business "China Telecommunications" still occupies a monopoly in the area. This is expected to change in the future as a result of deregulation.[2]

- **Business On-line Service Will Diffuse**

Unlike in America, business on-line services started very late in China and soon were merged into ISP services. However, due to the big potentials, business on-line services will gained more impetus in the future.

- **INTRANET and Featured Information Network Will Appear and Develop**

- **Tele Conference and Other Communication Systems Have Promises**

Integrated with various nascent technologies, like Internet Telephony, Internet fax and so forth, teleconference technology will become a favorite business tool.

5. Conclusion

China's way of developing Internet is distinct from America.

America has experienced more than thirty years' development on Internet. Due to the maturity of web technology, Internet came into extensive business applications and permeated into every aspects of the society since 1995. In China, there was not a full course of Internet's growth. China jumped over the historical phases of the diffusion of PC, and networking in the institutes, and directly into the times of network (Internet). This jump is occurring given China still has poor condition of telecommunications, charging system and national unawareness of information times. As a result, many problems are inevitable. Importantly, China has no way to simply imitate America's successful experience on developing Internet. In other words, China has to find its own way to informationize its national economy, a way to let Internet come into its own in China.

China has a long way to go. However, a nation having one fourth of the population of the world is aggressively preparing an upcoming global information epoch. This is a great thing.

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