Brief Communication

The initial development of networking in Chinese libraries

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Abstract.

Reflecting on the present zeal and efforts shown by Chinese librarians in networking, the paper gives an account of the existing main networks in operation.

Dedication

This paper is dedicated to my late supervisor, Professor R.T. Bottle. He travelled in China in 1986 and, after the visit, he said: 'China is a vast country. The construction of networks is of fundamental importance to the development of its national economy'.

1. Introduction

Thanks to the policy of reform and opening to the outside world, China is one of the countries with the highest economic growth rate in the world today. The rapid economic development has brought an ever-growing demand for information on, and in, Chinese libraries and information services, since many facets of the national economy, education and scientific research, or social activities are information-oriented. As a result, the development of library and information services has been fuelled by the unprecedented opportunities, and immense progress has been achieved in many ways.

Perhaps the most obvious and essential achievements have been in the area of library automation and networking. The several original impediments, such as fragmentary jurisdiction of different library systems, vast area of territories in terms of telecommunications and, most of all, financial constraints for a developing country, etc, by no means have been solved. Their influence, however, has been mitigated or somewhat concealed by other, favourable situations. The major impetus to the development comes from the following factors.

1.1. The ideological emancipation of the people as the driving force for networking development

The philosophical and ideological progress, above all, has created a most favourable climate for the government and people to take both macro and micro measures to develop library and information services. To a larger extent, the success of the reform is shown by ideological emancipation of the people, in addition to the material harvest. In the library field, people's initiatives are encouraged and respected. The acceptance of fee-based services for part of library activities, the rise of the information industry, the global resource-sharing, etc, all mean breaks with the past. These changes have laid a solid foundation for further development.

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1.2. The establishment of a nationwide authoritative entity to take care of the information infrastructure construction

In view of the centralised nature of our country, it is of prime importance to set up an authoritative body directly involved in the national information superhighway under the leadership of the State Council. At this juncture, the State Joint Conference on Economic Informization (SJCEI) was established on 10 December 1993, with representatives consisting of experts and officials from the Post and Communication Ministry, Ministry of Machine-Building and Electronics Industry, State Planning Commission, State Science and Technology Commission, State Economic Commission, State Education Commission and the Chinese Academy of Sciences. SJCEI meets irregularly to discuss matters concerning the formation of overall information programmes, development of an information industry, information infrastructure construction, etc. It is the decision-making body which directs and supervises information activities in China.

1.3. The improvement in national information infrastructure

Fuelled by the current wave of information superhighway construction the world over, efforts in the Chinese national information infrastructure have been speeded up to cope with the rapid economic growth. With the completion of 22 new optical cable trunk lines in the Eighth Five-year Plan (1991–1995), plans have been drawn up to have a grid of eight lateral and eight longitudinal optical cable trunk systems formed in the Ninth Five-Year Plan to serve every region in China, along with the introduction of Synchronous Digital Hierarchy (SDH) transmission [1]. In conjunction with the creation of the national trunk lines, the national 'Three Golden Projects' (and now extended to 'Eight Golden Projects') are also being started, which are the initial steps towards China's information superhighway.

The project of 'Golden Bridge' aims to set up a nationwide computer network devoted to making economic information available to the public; 'Golden Customs' will link all customs and foreign trade enterprises electronically, with the intention of creating paperless trading, while 'Golden Card' seeks to replace cash with electronic credit cards.

With the completion of all these projects, a much better information environment will have been created for information utility and exchange.

2. Main networks in China used by libraries and information services

2.1 CHINADDN, the foundation of national information infrastructure

The wide availability of optical cable networks affords a solid basis for the modern information system, and the China Public Digital Data Network (CHINADDN) is the system to make efficient use of a part of such network resources to provide data communication facilities. Its first phase of construction was completed in October 1994, with 776 ports of E1 speed (2.048 megabytes per second) and 2,588 ports of other speeds. It connects about 500 large cities and coastal ports in China and has links with the networks of the USA, Japan and Hong Kong [2]. It is capable of providing point-to-point and point-to-multipoint communications, frame relay, virtual private networks, etc.

2.2. CHINAPAC, an advanced network platform for the information-oriented development of the national economy

CHINAPAC, China's public packet-switched data communication network, is constructed by using the existing physical circuits afforded by CHINADDN and general-user telephone lines, in addition to the facilities of network management and switching in data packets. It can accommodate communication among different systems and types of computers.

The network is mainly composed of three parts; the primary backbone network, provincial networks and city networks. The primary backbone network of CHINAPAC was first in operation in September 1993, which, at that time, covered 31 cities and 5,800 ports. With the construction efforts made since then, the network now covers more than 600 cities, with about 60,000 ports. It can interconnect with international data networks, or Hong Kong and Macao public networks by using international protocol X.75 from Beijing, Shanghai or Guangzhou. As of now, it has interconnection with 44 overseas packet-switched data networks in 28 countries and regions. Moreover, it is expected that the network will soon be further extended to connect all the cities at district or municipality level and 90% of the territories in the more developed and coastal areas in China [1].

CHINAPAC functions as an advanced network platform for the information-oriented development of the national economy. It provides the basic functions

as specified by the United Nations' International Telecommunication Union (ITU). In addition, it is also capable of:

(1) supporting the systems network architecture (SNA) network protocol, which will enable users of IBM equipment to form their own network system via the public packet-switched networks;
(2) frame relay;
(3) multipoint broadcasting transmission;
(4) forming virtual private networks;
(5) compatibilty with T3POS, to facilitate access by terminals of the 'Golden Card' system using Point of Sale (POS) equipment;
(6) providing various interface speeds of 1.2, 2.4, 4.8, 9.6, 19.2, 64, 128 and 256 kilobytes per second.

2.3. NCFC, the first embryonic form of China's sci-tech network

Aided financially by the State Planning Commission and the World Bank, the National Computing and Network Facilities of China (NCFC) was constructed in Zhongguancun District, Beijing. It connects more than 30 institutes of the Chinese Academy of Sciences (CAS), Beijing University campus network (PUnet) and Qinghua University campus network (TUnet). As Fig. 1 shows, NCFC contains physically three major parts: the backbone network (completed in 1993), three campus networks (completed in 1992) and the linkage with domestic and international networks. The network has been connected with X.25-type protocols and linked with transmission control protocol/Internet protocol (TCP/IP) too. In May 1994, NCFC linked with the Internet after the signing of a contract with the US National Science Foundation (NSF) by the CAS. It is the first network in China to have communications with the Internet.

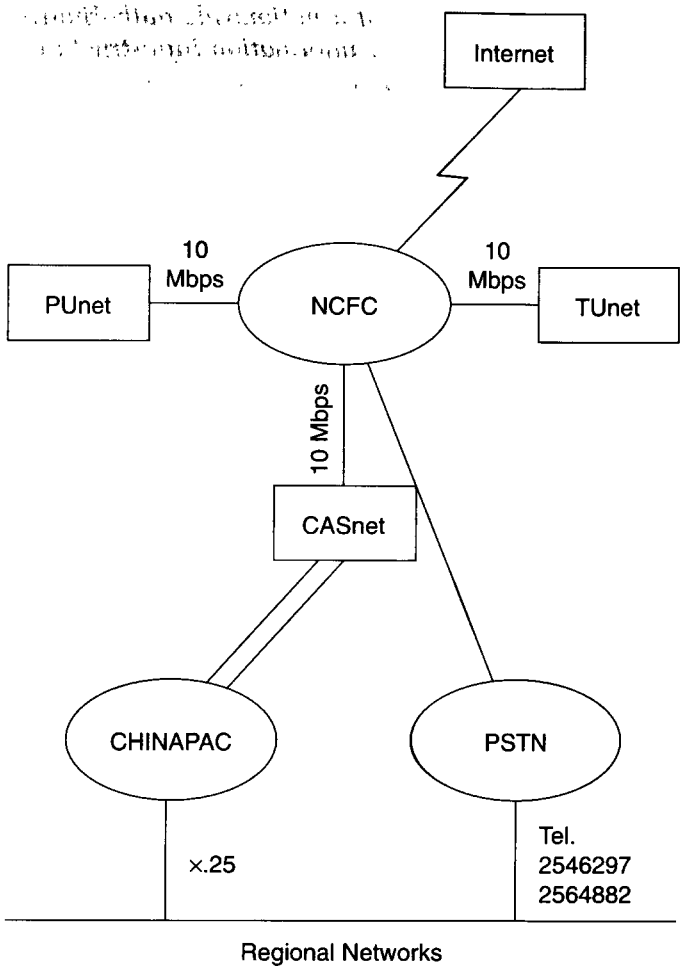

Fig. 1. Schematic diagram of NCFC.

2.4. CERNET, China's education and research network

Under the leadership of the State Education Commission, CERNET began its construction in 1994. Its first phase will be completed in 1996, with the target of building its backbone network and tandem centres in ten areas. The second phase will last until the end of the century, with the aim of networking all universities and colleges in China and interconnecting with domestic and international data networks.

CERNET is a hierarchical network, comprising the backbone network, regional networks and university campus networks. The network administration centre is located in Qinghua University, with ten tandem centres of regional nodes scattered throughout the country in ten universities.

At present, CERNET plans to make full use of the existing public communication facilities, such as CHINADDN, to accelerate its construction. The main cost of the first phase will be covered by government funds and, later on, all the expenditure will be covered gradually by the income from charges to users.

2.5. CHINANET

CHINANET, built by the Post and Communication Ministry, provides flexible ways of linking with the Internet, by dialling, frame relay, etc. Services of the network include electronic mail, file-transfer protocol, Telnet, gopher, World Wide Web, etc.

3. Major efforts made by librarians in library networking construction

3.1. APTLIN project

Immediately after NCFC came into operation, the project of developing the Library and Information Network of the Chinese Academy of Sciences, Beijing University and Qinghua University (APTLIN) was under way. The target goal is to promote, on NCFC, resource sharing (online public access catalogue (OPAC), online cataloguing, interlibrary loan, etc), online information retrieval, distributed database creation and services, message-handling systems, etc. As of now, this project has made substantial progress in terms of the OPAC, online cataloguing and online library loan services [3].

3.2. Public Library Network of Zhujiang Delta Area

Sponsored by the Zhongshan Library of Guangdong Province, the Public Library Network of Zhujiang Delta Area started construction in 1991. The Network, partly based on CHINAPAC and GDPAC (the data transmission network in Guangdong Province), is a library and information network with Zhongshan Library as the administration centre and the Guangzhou Library and Shenzhen Library as the main nodes. The Network covers all the county libraries (around twelve libraries) in the Zhujiang Delta area and efforts have been made to link with the National Library of China and other provincial libraries with X.25 and TCP/IP. At present, the Network provides functions such as electronic mail, OPAC, online cataloguing, interlibrary loan, etc [4].

3.3. Local area network construction

If efforts by librarians were concentrated on automating professional activities such as acquisition, cataloguing, circulation, etc, just a couple of years ago, the present scene concerns how to get the stand-alone systems to be networked. Realising the global trend of information systems, librarians are making every effort to link their specific systems with a higher network: university and college libraries first link all their equipment into a local area network (LAN), after which they try to get the LAN connected to the campus network, then CERNET, the Internet, etc; special libraries first make efforts to construct a LAN, then to link the LAN with their parent organisation's network, then regional and national networks and the Internet. Priority has been given by librarians to the building of LANs for fear that they would be lost in the coming information age.

3.4. Database creation

In conformity with the improvement of the national information infrastructure, great importance has been attached to the creation of databases, for people regard databases as the goods and trucks in relation to the superhighway. According to Chen's survey [5], in China, in 1991, there were 806 registered databases containing some 58 million records. At present, measures to improve database creation efforts are threefold:

(1) efforts in building large-scale databases based on disciplinary subjects are encouraged. This measure is aimed at reducing overlapping efforts in building small or dispersed databases which are often of no real value in practical use;
(2) attention has been paid to launching CD projects. More and more existing databases have been published and distributed on CDs. The recently released CAJ-CD (Chinese Academic Journals on CD), a full-text database covering 110 major Chinese academic journals, is a good example of this trend;
(3) priority has been given to the use of the created databases. In many cases, the use-rate of databases is judged as a key factor in evaluating their quality.

4. The trend in the development of library networking in China

From now on, networking efforts will be on the priority list of library activities in China. Technological advances, coupled with the increasing information demand on libraries, encourage people's initiatives in networking construction. Information access and distribution, online cataloguing and online interlibrary loan, i.e. resource sharing, will be areas in which progress will have to be made in terms of network functions and in which librarians have great expectations.

To a certain extent, China will be an information importing country for quite a long time. In this connection, librarians will make full use of networks to obtain as much information as possible for their patrons with limited budgets. At present, great importance has been attached to standards, interfaces and protocols, which are deemed now as common

languages to communicate with others and share their achievements in the global village.

One further area to be noted is that, apart from obtaining information from various networks, Chinese librarians also hope to play their part in putting as much information as possible into various networks in the true sense of resource sharing. They realise this is a matter of rights and duties, at least, for information specialists. Therefore, many librarians are involved in database creation, electronic publishing, etc.

Today, it is really an exciting and exhilarating time to be associated with libraries and information services. With the information age approaching, the future will be even more eventful for librarians and the people working with them. Networks in China, though much backward at present in comparison with the advanced ones, will certainly be interconnected with the networks throughout the world and will become one of the backbones for information access and distribution for the whole of mankind.

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