

# Development of Telecommunications Undertakings in China

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**T**ELECOMMUNICATIONS PLAYS A VERY IMPORTANT role in today's information society. It is closely linked to the economic development and social progress of a country. In China, there has been a growing demand for information exchange in all aspects of life, especially in major and coastal cities, and special economics zones.

The Chinese government pays attention to telecommunications as a strategic policy. It is one of the top priority sectors, equal to energy and transportation.

In this article, the history, current status, and future plans of telecommunications undertakings in China are presented.

## Brief History

When the People's Republic of China was founded in 1949, the telecommunications industry was very limited. There were only ten repair shops with 2,800 workers and staff, engaging in maintenance and repair of imported telecommunications equipment, or assembly of imported components. Annual production was 1,000 radio stations, 20,000 telephone sets, and 14,000 lines of telephone exchanges (see Figure 1).

During that period, the national telecommunications networks were underdeveloped; the total number of telephone sets in China was only about 263,000. The total capacity of exchanges was 310,000 lines, and the number of long distance circuits was about 2,800 (see Figure 2).

Over the last forty years, tremendous changes have taken place, but during two different periods. Telecommunications undertakings in the first thirty years, i.e., before 1980, developed slowly. The government paid little attention, so there was less investment from the central government. After 1980, when the government's policy of opening to the outside world started to be implemented, telecommunications construction began developing rapidly.

## Current Status

### Services

In the past ten years China's telecommunications networks registered considerable progress in terms of equipment capacity, level of technology, and reliability. By the end of 1989, telephone sets numbered 10.89 million against 1.749 million ten years before. Automatic local telephones were 90% of total capacity, and Stored Program Control (SPC) telephone exchanges had a capacity of 2.28 million lines, covering one quarter of the country's local telephone exchanges (8.889 million lines). The capacity of long distance communications saw a substantial increase with 87,137 long distance telephone circuits in total, compared with 18,800 ten years before (see Figure 2). Across the country, 519 cities were able to access the national automatic switching network. The number of authorized users of Direct Distance Dialing (DDD) service reached 624,000. The building of coaxial cable carrier systems, microwave transmissions systems, and domestic satellite communications brought much improvement to domestic long distance telecommunications services.

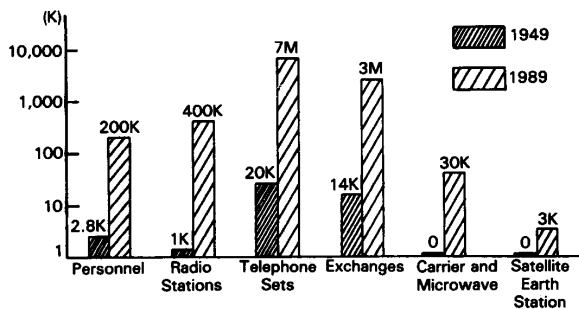


Fig. 1. Annual production capability.

In international telecommunications services, even greater changes have taken place. Various new communications technologies such as cable, microwave, and satellite systems have completely replaced shortwave radio stations and open-wire lines. Satellite communications has become a major medium for international communications. International Direct Distance Dialing (IDDD) calls can be made to 182 countries and regions from more than 200 Chinese cities.

In 1990, the Ministry of Posts and Telecommunications (MPT) further expanded the construction of telecommunications facilities. The capacity of local telephone exchanges was increased by more than 1 million lines. The number of telephones installed reached about 13.5 million. Long distance circuits increased by 20,000. The total number is now more than 100,000. The degree of network intelligence was enhanced. By the end of 1990, 40% of long distance circuits were connected to automatic exchanges.

### Administration

China's rapid progress in telecommunications should also be attributed to the adoption of a P&T administrative system that conforms with the actual situation in China. Under this system, leadership of the functional hierarchy of the MPT works vertically with the aid of local governments at different levels. Each level performs its own duty to manage both the public and private networks within its area. It is believed that such an administrative system suits the comprehensive and integrative nature of telecommunications networks. It facilitates technological and operational management of telecommunications services and unifies control, coordination, accounting, and local governments' support. In China, where the economy is not well-developed and development is unbalanced, this administration approach makes it easier to concentrate limited financial resources on key communications projects.

### Technology

Up to 1989, the telecommunications sector under the Ministry of Machinery and Electronic Industries (MMEI) had 250

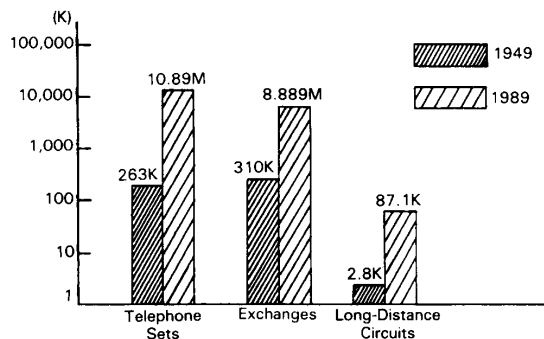


Fig. 2. Telecommunications services.

manufacturing facilities and more than 20 research institutes employing about 200,000 people, including 25,000 technical personnel. Annual capacities were 3 million lines of telephone exchanges, 7 million telephone sets, 400,000 radio stations, over 30,000 carrier and microwave equipments, and 3,000 satellite earth stations (see Figure 1). The annual industrial output value amounts to over 4 billion Yuan (RMB).

China's telecommunications industry has taken steps toward assembly, copying, and self development. Now China can develop and manufacture 21 categories of equipment such as satellite earth stations, optical-fiber systems, electronic exchanges, mobile communication systems, and terminals. Among the mass-production products are small coaxial cable carrier equipment below 3,600 channels, medium coaxial cable carrier equipment of 4,380 channels, 750 kV ultra-high tension electrical carrier equipment, and submarine cable carrier equipment of 120 channels. China has launched several communications satellites, and erected dozens of earth stations and hundreds of mobile earth stations. For optical-fiber communications, equipment below the fourth order group are manufactured and those of the fifth order have been developed. A number of pieces of equipment manufactured in China, such as 5 m diameter antenna shipborne earth stations, ship-to-shore rapid communications systems, 480 and 1,920 channel digital microwave relay systems, digital SPC exchanges of 10,000 lines, and JKQ-9 analog SPC Private Automatic Branch Exchange (PABX) have approached world state-of-the-art.

In a nutshell, China's telecommunications industry is made up of comprehensive subsectors dealing with relatively large scale high technologies. It can generally meet the demand of China's national economic development. It has fairly strong scientific and technological personnel strength capable of tracking the world's advanced technologies and developing various kinds of advanced equipment. However, as compared to the economically developed countries, China needs long and arduous efforts to catch up with the advanced level of the world in terms of science and technology and communications networks.

### Policy

The basic idea for the development of China's telecommunications undertakings is based on its self-reliance and international cooperation. China has imported a large number of advanced communications facilities, such as local and long distance SPC telephone exchanges, optical-fiber systems, and satellite communications equipment. These equip telecommunications networks and renovate existing ones. On the other hand, adhering to the principle of self-reliance, China has devoted its efforts to the research and development of indigenous technologies in all the above areas.

In March 1989, China's central government reiterated that telecommunications is one of the key sectors in the development of the national economy. Efforts should be focused on:

- Growth of services such as local and long distance telephones, and telex
- Construction of long distance communications facilities and telecommunications hubs
- Application of new and high technologies in information communications
- Research and development of new technologies in communications
- Local production of advanced systems for SPC exchanges, mobile telephone, microwave, optical-fiber, and satellite communications systems

### Future Plans

Though China has enjoyed rapid growth in the communications capacity, there remains a very large demand for services. Take local telephone services as an example. Despite an average annual increase of 1 million lines in recent years, the imbalance between demand and supply is getting even worse. At present, there is a waiting list of more than 500,000 subscribers for telephone installation. Serious shortage of long distance telephone circuits has resulted in low call completion rates. Lack of momentum in the construction of national transmission facilities on backbone routes has become a serious problem, leading to hampered integrative capability of telecommunications networks.

In order to realize the goal of quadrupling China's Gross National Product (GNP) by the end of the century, the MPT of China has set the target of octupling the capability of posts and communications and the amount of traffic carried by the year 2000 (compared to 1980). The number of telephone sets in China will reach 33.6 million compared with 4.2 million in 1980. Telecommunications networks will be mostly automated nationwide, with long distance automatic direct dialing available in cities above the county level. New technologies such as optical-fiber and satellite communications will be used extensively between major cities. Computers and databases in large cities will be interconnected into networks and various data communications services will be introduced. After reaching the target, telephone penetration in China will stand at 3% against 0.38% in 1980, about 25% in major cities such as Beijing, Tianjin, Shanghai, and Guangzhou, 20% in provincial capitals, economic centers, and large coastal cities, above 5% in medium-sized cities and county seats, and an average of 1% in rural areas all over the country.

At present, the Chinese government is drafting the 8th five-year plan (1991–1995) and the medium- and long-range development programs for the nations' science and technology up to the year 2020. For telecommunications, the major efforts will focus on digital systems especially optical-fiber, satellite communications, microwave, SPC exchanges, and mobile communications. Emphasis will be placed on application research and ASIC development. Great efforts will be taken to achieve high-reliability large-scale integration, all solid-state, and computerization. Improvement of manufacturing facilities will be made to achieve economy of scale with mass production and development capabilities established to meet domestic as well as world market demands.

### Biography

**Changxin Fan** is the director of the Information Science Institute at the Xidian University, Xi'an, China, a full professor of Information Engineering at the University, and advisor for doctoral degree candidates authorized by National Education Committee of China.