
INDUSTRY OVERVIEW

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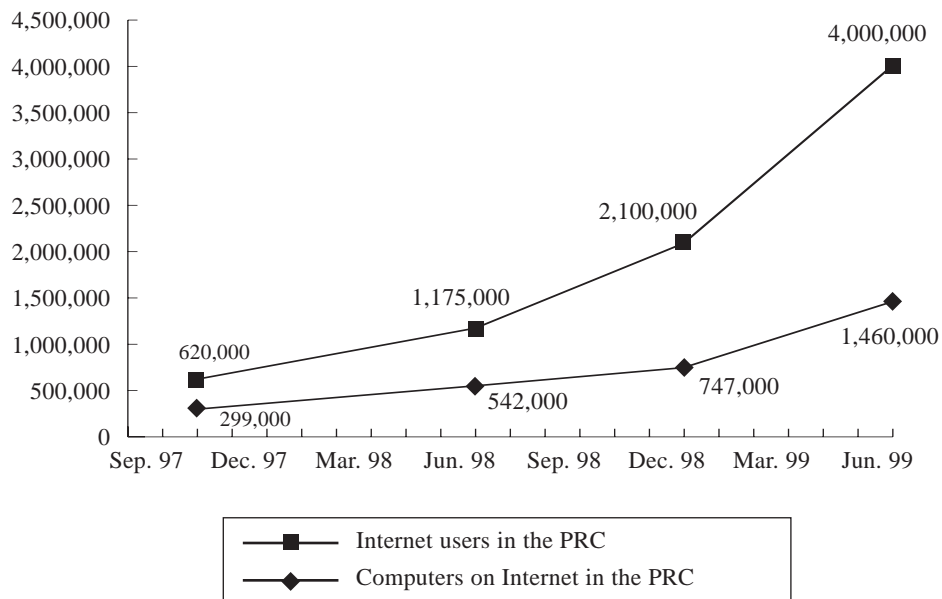
General

The Directors consider that data broadcasting is a new medium in the PRC and potentially a strong competitor of Internet in the PRC for dissemination of digital data. As such, the potential of data broadcasting in the PRC can be reflected in the development of Internet in the PRC.

The Internet and data broadcasting in the PRC

In April 1994, the PRC was connected to the 64Kbps international network and began to have access to the Internet. It set up its connection with the Internet by installing the required telecommunication links and equipment. Since then, about six hundred ISPs, including the 5 major networks in the PRC having access to the Internet, namely, ChinaNet, China Science and Technology Network, China Education and Research Network (“CERNET”), China Golden Bridge Network and China United Telecommunication Corporation Internet have been established. As at 30th June, 1999, there were approximately 4 million Internet users and 1.46 million computers accessing the Internet in the PRC.

Numbers of Internet users and computers on Internet in the PRC



Source: CNNIC

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The operation of the Internet in the PRC is greatly dependent on telecommunication networks, which were largely owned and controlled by China Telecom. Under this market structure, the service fees paid by the ISPs to China Telecom for securing the use of international telecommunication links between overseas Internet and China Telecom Internet Centre, domestic telecommunication links between China Telecom Internet Centre and operating centres of ISPs, and to local Post and Telecommunications Bureaus for the use of telephone lines were very high. Such costs were ultimately borne by the end-users who typically have to pay a sign-up fee, a service fee (which is in the form of a monthly lump sum or is calculated according to actual usage) and telephone charges (which is based on connection time). According to a research paper published in the Industry Forum in May 1999, the cost of acquiring the same amount of data from the Internet in the PRC, in terms of average purchasing power, is 4,032 times of that in the United States of America. The State Planning Commission and MII announced further reduction of the telecommunication fee in October 1999. Due to the narrow-band telephone networks and the congested gateways, the Internet users in PRC frequently encounter long delays or failure in accessing the Internet and in downloading information from the Internet. Depending on the number of Internet users who are concurrently accessing network resources, the actual transmission rate at the user end can be as low as approximately 1Kbps for Internet connections supporting a transmission rate of 28.8Kbps to 33.6Kbps.

Potential of data broadcasting

The Directors consider that data broadcasting is potentially a strong competitor of the Internet in the PRC. According to Statistical Report of the Development of China Internet issued in July 1999 by CNNIC, approximately 56.8% of the respondents put "browsing for information" on the top of their lists of reasons for accessing the Internet. This, together with the rapid growth of the number of Internet users, shows a large demand for information in the PRC. At present, Internet can be accessed in the PRC mainly through telephone networks whereas data broadcasting transmits digital data through TV networks. While Internet users in the PRC are complaining about the high cost, long delays and slow response in accessing the Internet due to the price structure of telecommunication services, data broadcasting provides an alternative means to Internet for browsing information.

Internet adopts point-to-point data transmission which is characterised by mutually exclusive consumption of transmission capacity. Data broadcasting adopts point-to-multi-point transmission to enable large chunks of data to be transmitted swiftly and simultaneously through TV networks to a large number of subscribers. Data broadcasting overcomes the problems of connecting to and transmitting data over the Internet in the PRC. Furthermore, due to the point-to-multi-point transmission characteristic of data broadcasting, the marginal cost for cable TV network operators to transmit data to each additional subscriber is virtually zero. As data broadcasting transmits data through existing TV networks and no service fees have to be paid by TV network operators to telecommunication network operators as in the case of Internet access providers, in the long run, the cost of subscribing to data broadcasting services is much lower than that of subscribing to Internet services in the PRC.

The huge number of existing cable TV subscribers also demonstrates the potential of data broadcasting in the PRC. According to China Computerworld, a press in the information technology service industry in the PRC, to date, cable TV networks have a coverage in terms of geographical area of approximately 50% in the PRC and approximately 70% in the major cities and the total number of cable TV subscribers, who are potential subscribers to data broadcasting services, amounted to about 80 million. According to an article dated 1st April, 1999 in China Computerworld, the market anticipates that the number of cable TV subscribers will increase at a rate of 5 million per year in the coming years. Such increase outnumbers the Internet users in the PRC as at June 1999.

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Data broadcasting vs Internet as a medium for dissemination of digital data in the PRC

Data broadcasting has several advantages over Internet as a medium for dissemination of digital data:

- Digital signals are exchanged via the Internet by point-to-point interactive transmission between pre-determined transmission and reception points. As such, the transmission capacity of the Internet is limited by its exclusive consumption characteristic. Each user connected to the Internet will occupy some transmission capacity of the network and restrict the access of other users. Such feature of the Internet may dampen the transmission speed of the network and may even result in connection failure. On the other hand, data broadcasting offers simultaneous delivery of data to all users where the TV signal reaches.
- A majority of the Internet users in the PRC access the Internet through the narrow-band telephone networks whereas data broadcasting transmits digital data through broad-band TV networks. Due to the quality of the existing telephone networks in the PRC, the maximum transmission rate of dial-up connection to Internet in the PRC through telephone network is approximately 33.6 Kbps whereas the transmission rate of VBI and FC data broadcasting can be up to approximately 256 Kbps and 5 Mbps respectively.
- The use of Internet consumed the scarce resources of the telecommunication networks in the PRC whereas data broadcasting utilises the unused capacity of TV networks.
- Due to the exclusive consumption feature of the Internet, the transmission cost over the telecommunication network is positively related to the number of Internet users. The marginal cost for cable TV network operators to transmit data to each additional subscriber by way of data broadcasting, on the other hand, is virtually zero. In the long run, the cost of subscribing to data broadcasting services is much lower than that of subscribing to Internet services.
- As data broadcasting adopts technologies of transmitting digital data through the existing infrastructure of the TV network operators, substantial investment and time cost for infrastructure construction can be saved.

Data broadcasting is a one-way transmission system. It offers a cost effective solution for applications which principally support one-way data transmission. However, applications with the majority of data transmitted in one direction and low return volume can adopt a hybrid system comprising a data broadcasting system which carries the bulk of data one-way and a modem link which carries limited data the other way.

With the development of broad-band Internet access, which may involve substantial investment in telecommunication infrastructure, the problem of low-speed and connection failure of Internet in the PRC may be eased off.

Development of data broadcasting in the PRC

In the past years, there was a trend for the major satellite and cable TV network operators in the PRC to install VBI data broadcasting systems, mainly to broadcast real-time stock quotations. VBI transmission has a lower transmission rate than FC transmission, thereby restricting the provision of multimedia services. In the past, only subscribers with data broadcasting plug-in boards installed in their PCs can receive data by means of data broadcasting. As a result, the subscriber base of data

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broadcasting services could not be expanded on a large scale. It is expected that the implementation of FC data broadcasting and the introduction of TV set top boxes for its reception will enable data broadcasting to become a mass medium of the new generation.

On the other hand, since the respective data broadcasting systems currently installed by various TV network operators were developed by different companies and institutes, they are often incompatible with each other. In addition, as most of these data broadcasting systems do not conform to the CCST standard, they do not support the transmission of Teletext and may even interfere with TV pictures.

The Directors are not aware of any internationally recognised standards for data broadcasting. Further, given that the television broadcasting standards and Teletext standards adopted in the PRC are different from those adopted in other developed countries, any standards adopted in other countries may not be applicable and relevant to the PRC market. In view of the chaos in the data broadcasting industry in the PRC as a result of the lack of a set of industry standards, SARFTV appointed the Broadcasting Technology Research Institute (廣播科學研究院) to set the industry standards for VBI data broadcasting. All the data broadcasting systems installed by the TV network operators will then be required to pass the examination and be certified by the examination centre of Broadcasting Technology Research Institute and all reception modules have to conform with such standards. The Broadcasting Technology Research Institute held an industry forum regarding the setting of the industry standards for VBI data broadcasting in November 1999. During the industry forum, certain companies engaged in the data broadcasting industry agreed to form a drafting committee for the standardisation of VBI data broadcasting in the PRC and, each member of the committee shall contribute to the drafting, research and verification works undertaken by the committee. Members of the drafting committee will also form a data broadcasting alliance to assist the setting and implementation of industry standards, make suggestions for and assist administrative authorities to implement the industry rules and regulations. It is expected that the standardisation of the data broadcasting industry will further stimulate the growth of the data broadcasting market in the PRC.

The PRC's entry to the WTO may bring along other foreign competitors as it is expected that customs tariffs on imported goods (as in the context of data broadcasting industry, data broadcasting hardware or parts and components therefor) will be substantially reduced or eliminated. Companies in the PRC which need to import parts and components for their production will on the other hand benefit from the possible reduction of custom tariffs. So far as the PRC's data broadcasting industry is concerned, the possible entry of foreign competitors after the PRC's entry to the WTO may expedite the development and popularity of data broadcasting in the PRC.

TV broadcasting in the PRC

Data broadcasting relies on TV networks for transmission of data. Hence the development of data broadcasting will largely depend on the development of TV broadcasting in the PRC.

Administration

The broadcasting system of digital data over TV networks is subject to and regulated by the rules and regulations governing TV broadcasting in the PRC, the general framework of which is illustrated as follows.

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The TV broadcasting industry in the PRC is administered by the MII and SARFTV. SARFTV is responsible for national radio and TV administration while LARFTV is in charge of local radio and TV administration within its respective jurisdictions. The MII is responsible for the overall planning of TV broadcasting networks, the administration of the TV industry and the setup of technological standards for TV broadcasting transmission networks.

Under the Regulations on Radio and Television Administration promulgated in August, 1997 by the State Council of PRC, SARFTV is responsible for working out national plans for the establishment of radio and television stations and determining the number, layout and structure of radio and television stations. SARFTV plans national TV networks in a unified manner according to national standards and the TV networks are constructed and developed at different levels. LARFTV constructs and manages the local TV networks within its administrative region in accordance with relevant regulations in the PRC. A transmission network as mentioned in the regulations refers to the entirety of radio or TV transmitting stations, relay stations (including transponder stations), radio or TV broadcasting satellites, satellite uplink and downlink facilities as well as micro-wave stations, monitoring and testing stations, cable radio and TV transmission networks, etc.

SARFTV assigns frequencies (or frequency bands) for radio and TV broadcasting. It is also responsible for the examination and issuing of certificates for the assigned frequencies. TV network operators have to offer programs within the standards approved by SARFTV. In organising and constructing a TV transmission network, the departments responsible for the project shall aim at making full use of existing network resources including various public communication networks and ensuring the smooth and high-quality transmission of TV programmes.

TV programmes can only be produced by entities engaged in editing, production and broadcasting of TV programmes in the PRC which are established upon the approval of the administrative department of radio and television under the people's government at or above the provincial level ("TV Broadcasters"). No TV Broadcasters may broadcast any programme produced by organisations which do not have a license to produce TV programmes.

TV Broadcasters are prohibited from the production and broadcast of programmes containing any of the following contents:

1. content which endangers the unification, sovereignty of the PRC and territorial integrity;
2. content which endangers national security, national prestige or the interests of the PRC;
3. content which instigates national splits and undermines national solidarity;
4. content which divulges secrets of the PRC;
5. content which slanders or insult citizens;
6. content which disseminates pornography or superstition or exaggerates on violence; and
7. any other content prohibited by law or administrative regulations and rules.

TV Broadcasters have to examine TV programmes prior to broadcast and conduct re-examination of the programmes prior to re-broadcast and accordingly bear the consequence of a breach of broadcasting prohibited contents.

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Future development

According to a speech made by officials of the FTVIBNC on “the present condition and future development of broadcasting business over TV and computer networks” delivered in November 1997, cable TV networks in the PRC have been proceeding towards integration at national level, digitisation and multifunction performance. The development of cable TV networks started at the district level, to the municipal and county level, the provincial level and eventually the national level. As at the end of August 1999, except for certain provinces and municipalities, TV networks established by SARFTV have been integrated at the national level. With the increasingly sophisticated digital, computer and Internet technologies, the cable TV network operators in the PRC develop integrated information businesses to fully utilise their wide-band resources. The existing one-way networks will gradually be replaced by two-way networks and the newly constructed networks will adopt two-way systems.

Information services can be developed and computer networks can be integrated at the national level by utilising the existing cable TV trunk line networks, in particular the wide-band cable TV user connection networks, the satellite networks and the national microwave networks.

In 1999, the State Council approved the establishment of China Network Information Company (中國網絡資訊公司) which will engage in the development of broad-band Internet connection in the PRC utilising cable TV networks. The State Planning Commission also approved SARFTV for the research and development of standard for multi-function set top boxes. FTVIBNC expected that the market for information-related electronic home appliances will be promising following the development of business of cable TV networks and the setting of industry standards for cable TV networks.

According to FTVIBNC, the major targets of the development of TV broadcasting industry in the PRC include, among other things, digitising of networks and user equipment by 2000, domestic cable TV household subscription rate reaching 30%, the number of domestic household subscribers reaching 80 million, adoption of optical fiber for and the standardisation of the cable TV trunk line networks, introduction of multimedia TVs and the introduction of the technology of unifying TVs and PCs to commercial and domestic users.

According to the China Statistical Yearbook 1999, there were 1,403 cable TV network operators at county level in the PRC in 1998. At present, over 2000 administrative counties in the PRC have access to cable TV networks. Subscribers to cable TV services in PRC amount to about 80 million, ranking the first in the world. Cable TV has become the most pervasive communication tool with the highest household coverage in the PRC.

The market is focusing on exploring business opportunities in services provided through cable TV networks. Cable TV network operators in Shenzhen, Shanghai, Dalian, Qingdao, Suzhou, Nanjing, Guangdong and Tianjin have undergone trial runs in respect of Internet connection, computer networking, video-on-demand, audio-on-demand, e-commerce, IP telephony, videophone and video conferencing. Recently, some PRC companies announced their acquisitions of interests in or the formation of joint ventures with various cable TV networks.

Development of distance education system in the PRC

In the past years, the development of distance education systems over the Internet was hindered by its high operating costs and low transmission rate. The Directors are of the view that potential of distance education is high since the education level in the PRC is generally low, with large

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discrepancies in different geographical areas. The quality of education provided by schools in different regions also varies significantly. Given that parents in the PRC generally place great emphasis on their children's education, high quality distance education is in great demand in the PRC.

In a working conference entitled "National Digitisation of Education" (全國教育信息化) held in June 1999, the Ministry of Education revealed the national plan for the development of distance education in the PRC which will involve a total investment of about RMB18 billion. The Ministry of Education set a three-year target to develop an elementary distance education network by utilising the CERNET and satellite education TV networks in the PRC. Trial runs will be conducted in selected tertiary, secondary and primary schools. Software manufacturers are encouraged to develop distance education software and information resources. In addition, in the next two years, the Ministry of Education will experiment distance education programmes in 592 impoverished areas (100 of which are National Focus Support Establishments) by implementing reception modules for TV data broadcasting and equipments to enable off-line browsing of Internet and developing various education software and net curricula for primary, secondary and tertiary education and further education for professional teachers. To develop distance education, the Ministry of Education will implement measures to encourage investment and technology inputs in the development of public information data bases and education software. The Directors believe that the development of distance education will bring along enormous commercial opportunities.

Factors influencing the development of data broadcasting in the PRC

The Directors consider that the favourable factors influencing the industry include the following:

- Subscribers to cable TV networks substantially outnumbered PC users with access to the Internet;
- Broad-band transmission, hence high speed transmission can be achieved on cable TV networks;
- Cable TV networks have very flexible fee structure, as compared to Internet access providers in the PRC as they broadcast data to subscribers through their existing networks and no service fees have to be paid for securing the use of telecommunication networks as in the case of the Internet access providers;
- Data can be broadcast through existing cable TV networks by means of FC data broadcasting; and
- Parents in the PRC generally place great emphasis on their children's education and multimedia distance education using data broadcasting is expected to be in great demand.

The Directors consider that the unfavourable factors influencing the industry include the following:

- The negotiation in relation to the allocation of TV channel resources would be more difficult in regions where TV networks are monopolised or controlled by the major local network operators; and
- There are TV network operators who are less receptive to new technology, which characterises data broadcasting.