

Online Journal of Space Communication

Volume 6
Issue 12 *The Role of Satellites in Distance
Education (Spring 2007)*

Article 2

Satellite Distance Education in China

Tom Wang

Follow this and additional works at: <https://ohioopen.library.ohio.edu/spacejournal>



Part of the [Astrodynamics Commons](#), [Navigation, Guidance, Control and Dynamics Commons](#), [Space Vehicles Commons](#), [Systems and Communications Commons](#), and the [Systems Engineering and Multidisciplinary Design Optimization Commons](#)

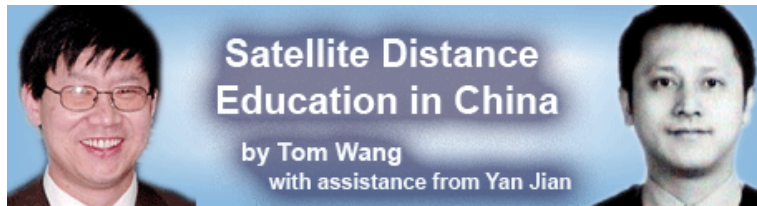
Recommended Citation

Wang, Tom () "Satellite Distance Education in China," *Online Journal of Space Communication*: Vol. 6 : Iss. 12 , Article 2.

Available at: <https://ohioopen.library.ohio.edu/spacejournal/vol6/iss12/2>

This Article is brought to you for free and open access by the OHIO Open Library Journals at OHIO Open Library. It has been accepted for inclusion in Online Journal of Space Communication by an authorized editor of OHIO Open Library. For more information, please contact debord@ohio.edu.

Issue 12: China - Overview



1. Satellite Distance Education Development in China

The establishment of the China Education Television (CETV) station in July 1986, the broadcast of the first special TV channel for satellite education and the opening of the second special channel are widely regarded as three milestones in the early stage of satellite distance education in China.

Satellite distance education in China has been developing with the rapid growth of the Chinese economy, the nation's attaching greater importance to education and the enlarging of society's need for education.

- In October 1996, the third channel of CETV (CETV3) began to broadcast officially.
- In 1997, Tsinghua University set up the first modern distance education system of China, and for the first time in China, applied digital technology and transmitted educational programs via satellite.
- In 1998, Ministry of Education (MoE) of the P.R.C. initiated modern distance education and designated Tsinghua University, Zhejiang University, Beijing University of Posts and Communication and Hunan University as the first batch of experimental units. Since that time, these universities have successively established their own distance education networks.
- In 1999, the State Council ratified the "Action Scheme for Invigorating Education towards the 21st Century" put forward by MoE, declaring that it would construct a modern distance education network based on China Education and Research Network (CERNET) and satellite TV education network, making use of cable-TV networks and communication networks of all districts to promote the development of a modern distance education system for China.
- In 2000, the "Project for Reconstructing China Satellite TV Education Network" and the "Project of Expanding CERNET's Capability" was begun, and the engineering and constructing of educational resources commenced at that same time.
- In September 2000, MoE ratified and began a "Demonstration Program for Reducing Poverty via Modern Distance Education";
- In October 2000, China Education Broadband Satellite network (CEBSat) was launched, which showed that China's modern educational technology had entered into a new era.
- In February 2001, Li Ka Shing announced in Guizhou province that the "Project of Modern Distance Education for Western Primary and junior Secondary Schools" would start. MoE and Li Ka Shing Foundation decided to implement

jointly the program of poverty-reduction and the project of modern distance education for western primary and junior secondary schools, which would in two years build approximately ten thousand demonstration schools that could receive educational resources and information through the CEBSat multimedia platform in poor counties and towns of western China.

- In 2003-2004, with the State Council's approval, the MoE, the National Development and Reform Commission and the Ministry of Finance began to implement jointly the experimental unit work of modern distance education for primary and junior secondary schools in the countryside, according to the rule of "Making an outline, establishing experimental units first, seeking breakthrough in important districts and progressing step by step."
- In January 2004, a special digital channel for modern distance education for Communist Party members in the countryside began to broadcast. By October 2005, 12 provincial experimental units, that include 169,607 township and administrative village reception units, had been established, covering approximately 185.6 million people.
- In March 2004, the State Council ratified the "2003-2007 Plan for Revitalizing China's Education" put forward by MoE, which stressed the need to implement the "Project of Educational Informationalization" and to accelerate the "Project of Expanding the Capacity of CERNET and CEBSat."
- In May 2003, CETV opened a channel for Air-classroom.
- In October 2005, CETV opened a channel for early-period education.

Over the past 20 years, Chinese satellite distance education has been incorporated into such fields as higher education, basic education and vocational training. Beginning with analog TV in the early stages, multimedia and communication technologies, including digital TV, IP data broadcasting, and multimedia courseware were added later, direct to classroom broadcasting and two-way video meeting systems.

The text below is to introduce important systems of satellite distance education in China for comprehensive distance education, higher education and basic education.

Also, analyzed briefly is the development tendency and direction of satellite distance education technology.

2. Comprehensive Satellite Distance Education System

2.1 China Education Television (CETV)

Set up in 1986 and attached to the Ministry of Education of the P.R.C., CETV is a nation-oriented professional TV station, producing and broadcasting all sorts of educational or teaching TV programs. In 2007, it has 5 channels:

- CETV-1 is a comprehensive education channel, providing educational and teaching programs such as instructional information and services via Asia-Pacific 1A satellite located at 134 degrees East longitude;
- CETV-2 is a teaching channel, mainly providing the courses of China Central Radio and TV University and, at the same time, providing the TV curricula of China Liaoyuan Radio and TV School as well as other training programs. All programs are transmitted via Sino NO.1 satellite which is located 110.5 degrees East longitude, covering China and southeast areas of Asia;
- CETV-3 services Beijing, covering Beijing and its surrounding area via cabled-TV networks, mainly providing programs concerning children and community services;
- CETV-Air classroom is a teaching channel, mainly providing programs of training and continuing education for teachers and principals;
- CETV-Early-period education channel provides professional and individualized programs for the infants and children 0-8 years old.

CETV1's footprint covers more than 85 percent of the provinces and county cable-TV networks throughout China. At the same time, CEBSat, run by CETV, has become the most important satellite distance education system of China.

2.2 China Education Broadband Satellite Network (CEBSat)

CEBSat, put into operation in 2000, is the infrastructure by which the MoE carries out its projects of modern distance education and information.

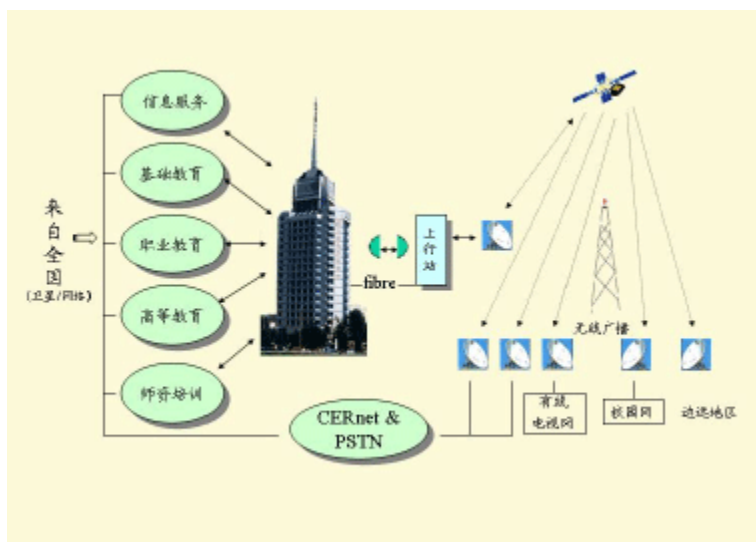


Fig. 1: Sketch of CEBSat

- CEBSat is interconnected with the high speed terrestrial networks of CERNET, forming a large-scale satellite-land consolidated bi-directional network of distance education. This linkage will promote the sharing of educational resources and be a leap forward in providing education in western regions of China.

- CEBSat is an important infrastructure of the Project of Interschool-Communication sponsored by MoE and its system of national life-long learning.
- CEBSat provides levels and varieties of distance educational services for higher education, basic education, teacher-training and vocational training.
- CEBSat programs are broadcast via the 6A and 6B transmitters of Sino No. 1 satellite.
- CEBSat terminal devices are low-cost, thus are so easy to popularize.

At present, CEBSat has 25 IP data broadcasting programs, 5 TV programs and 2 audio programs providing two-way, asymmetrical interactive services.

3. Satellite Distance Education System for Higher Education

In 1999, the "Action Scheme for Invigorating Education towards the 21st Century" was approved by the State Council regarded modern distance education as one of the key projects. Tsinghua University, Zhejiang University, Beijing University of Posts and Communication and Hunan University were designated as the key experimental units. As of 2007, there had been 67 experimental universities and 0.8 million students registered in distance education programs. If China Central Radio and Television University (CCRTU) were included, the numbers would be 68 universities and 2.3 millions of students.

According to the early 2002 statistics, the main technologies adopted by experimental universities includes satellite transmission, video meeting transmission and special multimedia classrooms for networked education. Some 47 percent of these universities have adopted satellite transmission, 70 percent have applied video meetings, and 90 percent used web-based multimedia technology. Satellite data transmission has become an important means of modern distance education in China.

3.1 China Central Radio and Television University (CCRTVU)

The preparation of CCRTVU started in February 1978, and a year later its opening ceremony was held. CCRTVU now consists of 44 provincial Radio and TV Universities (PRTVUs), 930 branch schools at prefecture and city level, 2,021 county level work stations and 22,237 teaching units. These institutions make up a nationwide open and distance educational system that is managed at different levels. The end of 2002 witnessed 2 million registered students getting degree education at all levels. Radio and TV Universities of China (RTVUs) has become the largest system of open distance education and teaching, ranking No.1 among the 10 huge open universities of the world.

CETV began to provide channels for CCRTVU's courses via satellite in 1988. By the end of 2002, CCRTVU had established a three-net-in-one teaching platform, i.e. integrating satellite TV networks, computer networks and teaching/management networks into one. At present, all PRTVUs use either 1000Mb or 100Mb computer-based school networks, nationwide RTVUs have established

867 VBI information reception stations, 600 sets of digital satellite TV reception systems and 560 sets of IP reception systems.

Radio and TV Universities of China have seen over 2.3 million college graduates and more than 1 million secondary vocational school graduates. The non-degree graduates of continuing education and in-service training programs are over 40 million and tens of thousands of farmers have received training through various practical agricultural courses. Three million teachers and principals of primary and junior secondary schools have been trained. RTVUs are the main force by which China implements modern distance education.

3.2 Tsinghua University, Zhejiang University, Beijing University of Posts and Communication and Other Experimental Universities

Having famous universities working directly with the Ministry of Education to the MoE was the key to establishing nationwide modern distance education in China. Tsinghua University, Zhejiang University, Beijing University of Posts and Communication and other experimental universities have invested money and expertise in developing modern distance education systems that link satellite communication and computer networks as a common infrastructure.

- Tsinghua University established a distance education system that merged computer networks, digital satellite networks and cable TV networks that cover all the country. Tsinghua transmits its teaching courses compressed at MPEG2 (2M code rate) via Ku band spectrum of 6MHz bandwidth via Asia No.2 satellite to outside-university teaching centers throughout China. Its teaching system is three-net-in-one, mixed, multipoint, real-time and interactive. Tsinghua is the fourth leading university in China, providing interactive classroom discussions which makes questioning and distance answering possible.
- Peking University's data transmission system relays the information that must be broadcast to CETV via optical fibers. The information is then broadcast via the CEBSat and Sino No.1 satellite platform.
- Zhejiang University has adopted a multimedia broadcast and distance teaching system that transmits its content via satellite. Its satellite distance education communication network used Ku band spectrum of 4MHz bandwidth on the Sino No.1 satellite before Aug. 2003. Now it has changed to the Ku band spectrum of Asia No. 2 satellite.
- Beijing University of Posts and Communication's satellite broadcasting distance teaching network is based on CEBSat. It has established satellite broadcasting classroom via CETV's radio and TV channel to distribute its programs to all the country. At present, there have been 27 stations in all provinces and cities of China which have made use of this network bringing more convenient access to students and making learning more efficient.

Being basic units of advanced teaching and management, these experimental universities have seen an escalation in the enrollment of a large number of

undergraduate and graduate students as well as students of vocational and continuing education.

4. Satellite Distance Education System for Primary and Junior Secondary Schools

4.1 The Western Primary and Junior Secondary Schools Project

The "Project of Modern Distance Education for Western Primary and Junior Secondary Schools" sponsored and implemented jointly by MoE and Li Ka Shing Foundation, started in February 24, 2001. Li Ka Shing Foundation provided 80 million yuan to install 5,000 modern distance education satellite receivers to primary and junior secondary schools in economically poor western rural regions, including Tibet. The MoE also subsidized 5,000 receivers. It has plans to build jointly approximately 10,000 demonstration schools that will receive educational resources and information via CEBSat's multimedia platform.

The goal of this project is to find a way to radically improve basic education and stimulate local economic development in western regions by applying modern distance education technology.

By December 2002, this project had established 10,000 distance education demonstration units for 3 minority nationalities and 240 economically poor counties in 12 provinces, autonomous regions and municipalities directly under the State Council.

4.2 The Distance Education for Primary and Junior Secondary Schools in the Countryside Project

With the State Council's approval, the MoE, the National Development and Reform Commission and the Ministry of Finance began in 2003-2004 to implement jointly an experimental distance education project for primary and junior secondary schools in the countryside. Following the pattern in China of first outlining a plan then establishing experimental units seeking breakthrough in important districts and progressing step by step", this program sought to solve the problem of a shortage of teachers and low quality schooling. It equipped 11,000 primary schools in the countryside with laser discs and disc players, and provided high quality teaching resources to 5.1 million pupils. Satellite receivers were installed in 384,000 primary schools to meet the demand for educational resources. Computer classrooms for 37,500 junior secondary schools in the countryside were installed to give 31 million junior secondary school students access to high quality teaching resources and information technology education, equivalent to that received by their counterparts in cities. Ultimately, this project's goal is to lay a favorable foundation for an information society in China.

By November 2005, this program had established 141,724 satellite reception stations, 96,607 disc play units, 291,631 sets of devices for disc teaching and

25,389 computer classrooms, covering 29 provinces and districts, benefiting 50 million primary and junior secondary students.

4.3 Bainian Shuren Group

The Bainian Shuren Group is a joint-stock company. Its interests include fields such as basic education, continuing education, rural vocational education and minority nationality languages education. It is dedicated to compiling and integrating both domestic and foreign educational and learning resources and broadcasting them via satellite communication networks, cableTV networks and via internet. BSE is the only company with the permission to set up satellite operations, and for this purpose, Bainian Shuren Group rents 3MB bandwidth on Sino No.1 satellite's 7A frequency to broadcast IP data and MPEG4 video over more than 100 channels, 24 hrs per day, via a satellite station run by its own staff.

The distance education network for primary and junior secondary schools run by Bainian Shuren Group now cover 22 provinces, autonomous regions and municipalities directly under the State Council. It has more than 5,000 clients who receive its satellite programs.

5. Future Development of Satellite Distance Education Technology

Analyzing the development of satellite distance education technology in China, we can see the following trends:

- Digitalized multimedia technology, including text, audio and video processing, has partly replaced analog TV, and is entering the mainstream in today's distance education field. In the near future, it will entirely replace traditional analog TV.
- Broadband Multimedia Business (MPEG2/4), including real-time broadcast, streaming media, and multimedia courseware, driven both by market and technology, accounts for a larger and larger proportion of distance education resources. Further applications are developing towards multiple channels of higher resolution MPEG4 signals (H.264) using higher compression ratios.
- Internet will be applied more widely in distance education to reduce cost and improve access. IP has become the virtual standard for distance education networks.
- CEBSat will become the main way of implementing distance education to resolve effectively the problem of covering more areas and improving broadcast efficiency by combining satellite data broadcast networks, cable TV networks and Internet to provide alternative paths.
- External-interaction merged with satellite data broadcast will still be the important technology for making education resources accessible to outlying areas while ground broadband networks can not cover all areas. The cost of two-way satellite communication is still relatively high.
- Two-way interactive business exchange and video meetings will be applied more and more widely in distance education. This application is more

compatible with people's learning habits than passively listening/watching for improving teaching quality.

- Create resources, producing quality courseware and developing anti-copy technology are major challenges facing distance education. These are important factors in ensure teaching effectiveness and protecting knowledge property rights.
- Standards for resources, transmission devices and system construction will be given more and more attention due to the requirement for intercommunication and sharing of resources.

6. Epilogue

Modern distance education is an outgrowth of contemporary computer and communication technologies and their extraordinary development. Different from correspondence education and radio and TV education, distance education is much more flexible. People can learn in ways that are more convenient, at anytime and in anyplace.

China is a large country with imbalanced economy and education. To make high quality educational resources flow to non-developed areas, satellite distance education is needed to play an important role in modernization.

It is believed that satellite distance education in China will see leaping development in the next 5 to 10 years.

The editor of the Online Journal of Space Communication gratefully recognizes the collaboration of Lin Yao for making this article available for publication.