

The China Digital Seismograph Network

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The China Digital Seismograph Network (CDSN) program was initiated in May 1983. On October 1, 1986, the CDSN began to distribute the network-day tapes to the research community. On October 22, 1987, the CDSN began full operation. The CDSN are supported by the State Seismological Bureau, People's Republic of China and the United States Geological Survey. The operation and maintenance of the network are taken by the staffs at the 10th Division of the Institute of Geophysics, State Seismological Bureau (IGSSB). At present the CDSN includes ten field stations, *i.e.* Beijing (BJI), Lanzhou (LZH), Enshi (ENH), Kunming (KMI), Qiongzong (QIZ), Shanghai (SSE), Urumqi (WMQ), Hailar (HIA), Mudanjiang (MDJ), and Lhasa (LSA), two national centers, *i.e.* the Network Maintenance Center (NMC) and the Data Management Center (DMC), both at the Institute of Geophysics, State Seismological Bureau, Beijing. Figure 1 shows the distribution of CDSN stations and support facilities. Table I lists the station parameters of CDSN.

Operating status of the CDSN

Operation and data availability of the CDSN have improved significantly and kept at a high level during 1992 and 1993. Data from the CDSN are used widely by research institutions. The Data Management Center (DMC) of the CDSN has provided users with 1000 MB-CDSN event data and 150 MB-NEIC CD-ROMs data, for studying the mechanism of earthquake source and the structure of crust and upper mantle. The CDSN data availability is 98.6% for 1992, and 98.1% for 1993 (table II).

New CDSN program

In order for the CDSN to become a fully participating partner in the GSN program, it will be necessary to upgrade the CDSN station and the DMC equipment to meet IRIS standards. Since November 1992, the new CDSN program has been carried out jointly by the Institute of Geophysics, State Seismological Bureau and USGS Albuquerque Seismological Laboratory.

Major goals of the second-phase technical upgrade of the CDSN

According to the «*agreement-in-principle*» between the State Seismological Bureau, People's Republic of China and the United States Geological Survey for upgrades to the CDSN, the second-phase technical upgrade of the CDSN commenced in November of 1992 and is planned to be completed by the end of 1995. Its major goals are:

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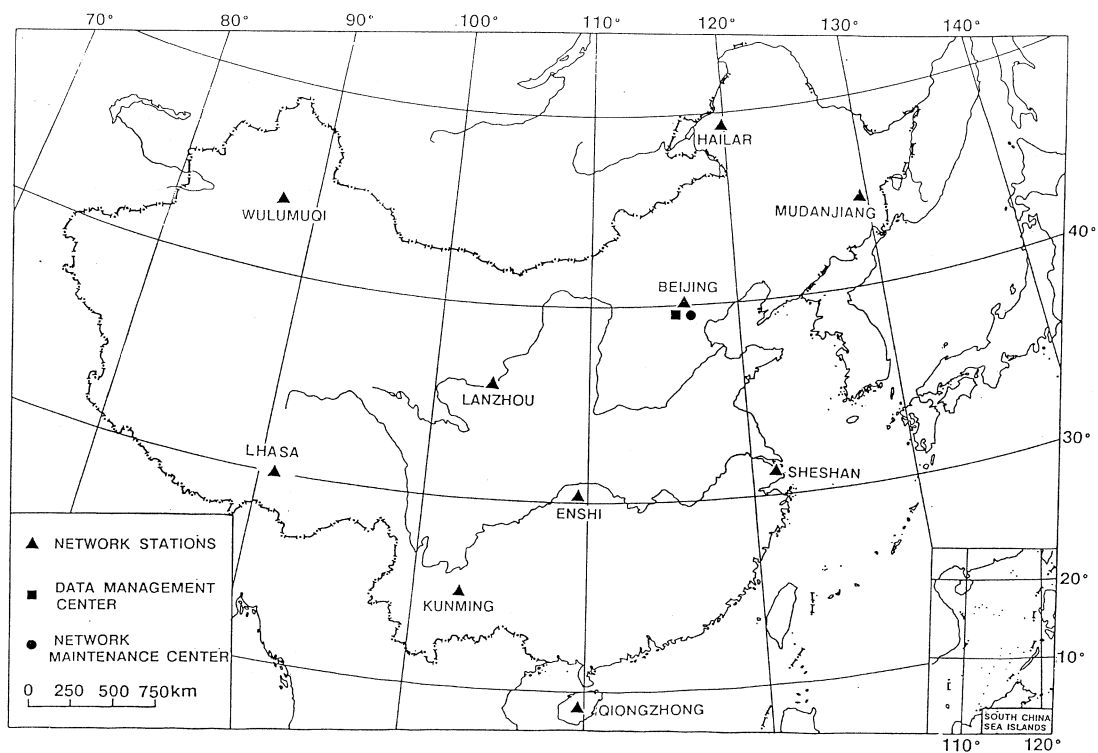


Fig. 1. Map showing distribution of CDSN stations and support facilities.

Table I. Station parameters of CDSN.

Serial N.	Station	Code	Location		Elevation (m)
			Lat. ^o N	Long. ^o E	
101	Baijiatuan (Beijing)	BJI	40.0403	116.1750	43
102	Lanzhou	LZH	36.0867	103.8444	1560
103	Enshi	ENH	30.2717	109.4868	487
104	Kunming	KMI	25.1232	102.7400	1945
105	Qiongzong	QIZ	19.0293	109.8432	230
106	Sheshan (Shanghai)	SSE	31.0956	121.1867	10
107	Urumqi	WMQ	43.8136	87.7047	970
108	Hailar	HIA	49.2666	119.1666	610
109	Mudanjiang	MDJ	44.6163	129.5918	250
110	Lhasa (Tibet)	LSA	29.7008	91.1167	3789

Table II. Availability of CDSN data.

Station	Code	Data availability (%)	
		1992	1993
Baijiatuan (Beijing)	BJI	100	96.56
Lanzhou	LZH	98.9	100
Enshi	ENH	98.6	91.22
Kunming	KMI	100	100
Qiongzong	QIZ	94	100
Sheshan (Shanghai)	SSE	98.6	100
Urumqi	WMQ	100	95
Hailar	HIA	96.7	100
Mudanjiang	MDJ	99.45	100
Lhasa (Tibet)	LSA	100	98.43

- 1) expansion of the network to include additional stations to provide denser area coverage (for this purpose, the Lhasa station in Xizang, Tibet, was installed in December 1991);
- 2) broadening the frequency band from BB to VBB, adoption of continuous recording mode, adding very-short period and/or low-gain records at some stations;
- 3) change of the present instrumentation at 10 field stations and Network Maintenance Center (NMC) for newly-produced GTSN digital instruments;
- 4) change of the PDP-11/44 computer system at DMC for update SUN 4 Sparkserver 490 and SUN 4/65 workstations, adopting new software for data management;
- 5) realization of data transmission for domestic stations to DMC and international satellite link.

Progress of the second-phase technical upgrade of the CDSN

At present the second-phase technical upgrade of the CDSN is progressing successfully.

A set of the CDSN equipment has been installed at Baijiatuan (Beijing) Station (BJI). Presently this station is operating in the VBB configuration and has been producing the new data in SEED format since June 2, 1993. The site of Mudanjiang station (MDJ) has been improved installing GTSN equipment. The establishment and operation (first-phase equipment) of Lhasa station (LSA) have been accepted jointly by PRCSSB and USGS. Both sides had highly evaluated the operation status and data quality.

The technical upgrade of DMC has now been basically accomplished, by configuring SUN computer system to replace PDP-11/44 computer system and adopting new software. A block diagram of DMC of NCDSN hardware configuration is shown in fig. 2. The plans for data transmission from station to DMC have been made. The international satellite link has been operational via installing the satellite track system since December 8, 1993. It is planned that a set of SUN workstation with Analyst Review Station (ARS) software will be installed in each station of NCDSN so that station staff can analyse and use data. At present, DMC staff are getting familiar with using ARS software. A set of Seismic Analysis Code (SAC) software is being used for earthquake analysis, especially for fast determination of large earthquake parameters.

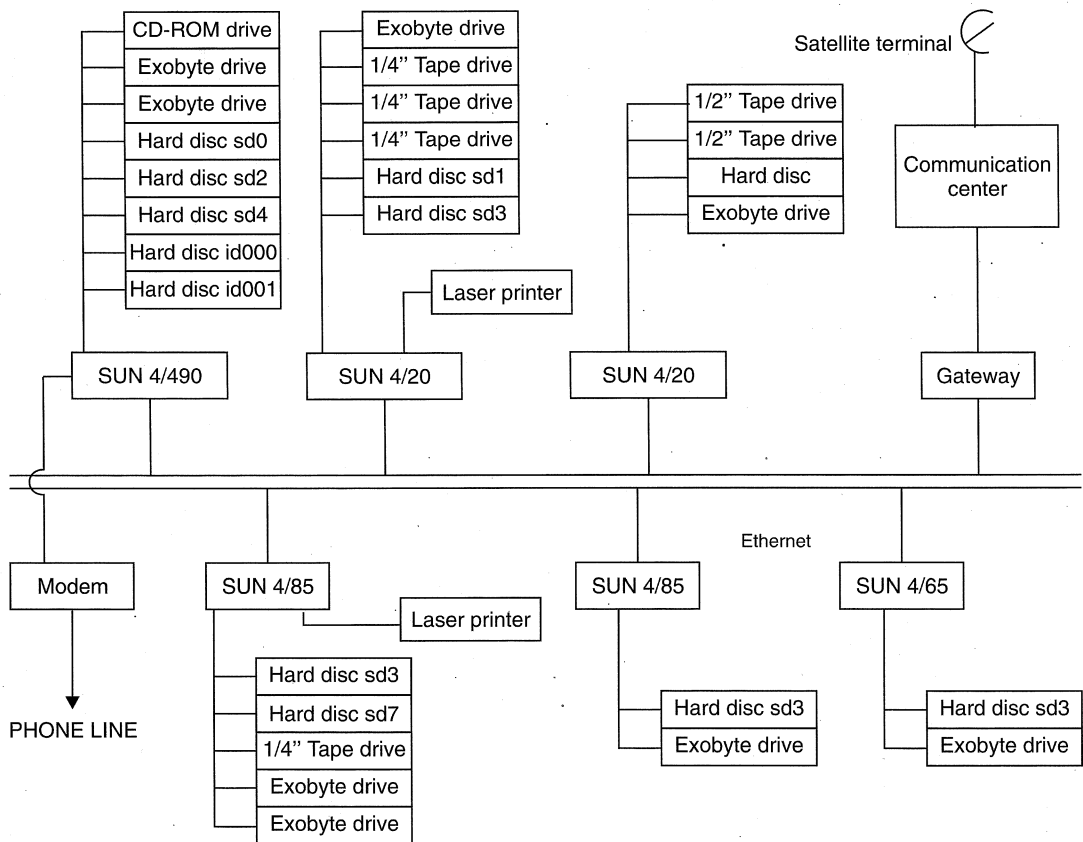


Fig. 2. Block diagram of DMC/NCDSN hardware.

Plan for 1994 and task groups

Plan of the CDSN for 1994

We will install GTSN instruments at Mudanjiang (MDJ), Lanzhou (LZH), Urumqi (WMQ), Enshi (ENH) and Kunming (KMI) stations. Staff at the CDSN and staff at the Albuquerque Seismological Laboratory will continually improve DMC software for data managements and processing. During the first half-year, 1994, we will determine and test data transmission from stations to DMC, and realize data transmission via international satellite link and access to event data.

In april 1994, we will draw up a plan for the installation of four additional stations. These new stations will be installed with the equipment used in the first-phase of the CDSN.

Task groups

Several task groups have been formed in order for the CDSN to operate properly and upgrade successfully. These groups include:

- 1) CDSN quality control group for checking and quality control of the CDSN data;
- 2) NCDSN station group for installation of the GTSN equipment in 10 stations;
- 3) Data communication group for management of the satellite communication system;
- 4) SUN system management group for daily management of SUN system and data base resources;
- 5) CDSN data application group for events detection, determination of earthquake parameters and study of broadband seismology.