DEDICATED SOVIET VLBI-NETWORK "QUASAR"

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ABSTRACT. The radiointerferometrical network "QUASAR", composed of six dedicated VLBI stations linked via a geostationary satellite channel with the Center of Operations, is under construction in the Soviet Union. It is proposed to construct "QUASAR"-stations abroad, in China, Bulgaria and India. A short review of basic scientific and technical features of the project is given in this paper.

In 1988 the USSR Academy of Sciences made a decision to construct a dedicated VLBI network of six radiotelescopes situated over the territory of the Soviet Union (near Leningrad, at Ukraina, North Caucasus, near Ashkhabad,at Lake Baikal, and at Kamchatka peninsula) and linked with the Center of Operations, which is under construction in Leningrad, via a special geostationary satellite channel. It is also considering the possibility of locating other "QUASAR"-stations abroad: in China, Bulgaria and India. The system is named "QUASAR". For the realization and further exploitation of this system, the Institute of Applied Astronomy has been organized by the USSR Academy of Sciences and it involved in this project different groups of scientists and engineers from Leningrad and Moscow.

The network will provide data for precise determination of inertial, dynamical and terrestrial coordinate systems and their mutual orientation as well as for high resolution mapping of cosmic radiosources.

The network will be operated in two modes:
- "Off-Line": using digital magnetic tape recorder with band of 144 MHz per station and
- "On-Line": with the transmission of radiointerferometrical signal from stations to the Center of Operations via a satellite channel with the speed of 4.5 Mbit per second per station.

The technical specifications of the network ate given in Table 1.

Four stations (near Leningrad, at North Caucasus, near Lake Baikal and Ashkhabad) and the Center of Operations are under construction at the present time. The first three stations of the network together with the Center of Operations will be operational in the beginning of 1992 and all six stations in 1994. During this period we are intending to construct and to introduce into the activity some "QUASAR"-stations abroad. The deadline for project realization is 1995.

Table 1. "QUASAR"-network specifications

1.1 Geometrical characteristics

Network	Maximum baseline	Longitude coverage	Latitude coverage
National	6700 km	119°	23°
International	7300 km	119°	48°

1.2 Antenna system

Antenna for:	Number	Diameter
observations of radiosources	8	32
observation of navigation satellites	8	1.3
Transmission signal via geostationary satellite:		
Far East, India, China, Center of Operations	4	12
other stations	5	4
monitoring of troposphere electrical characteristics	8	1.5
control of RT32 surface by radioholography	2	0.5

1.3 Receiving system. Radiometers for:

	Wavelength
observations of radiosources	0.7, 1.35, 3.5, 6, 13, 18/21
observation of navigation satellites	19
monitoring of troposphere	1.5, 1.0
control of RT32 surface	2.5

1.4 Time-frequency system

H-maser standard	10^{-14} - 10^{-15}
Primary time synchronization	20 ns via GLONASS

1.5 Data transmission system

"Off-Line"	magnetic tapes, 144 MHz per station
"On-Line"	satellite channel, 4.5×8 or 9.0×4 Mbit/s

1.6 Control and monitoring system

Central site computer	CM-1425
Number of workstations	15
"On-Line" system via satellite channel	64 Kbaud
Digital telephone line via satellite channel	64 Kbaud

1.7 Satellite: Geostatonary satellite GORIZONT with channel

bandwith	36 MHz
up-link / down-link frequencies	14 GHz / 11 GHz

1.8 Processing system

Correlator (Mark-III format)	1 Step	2 Step
number of stations	3	10
bandwidth per station	120 Mbit/s	288 Mbit/s
bus type	CAMAC	VME
input data	magnetic tapes and satellite channels	
Mainframe	VAX-6320 cluster	
total RAM	128 Mb	
disk memory	20 Gb	
Workstations	VS-3100, BESTA-88	
Software	VAX/VMS, UNIX	

1.9 Collocation

Laser ranging systems, gravimeters, seismic and meteorlogical data stations