

## Development of a VLBI data recording system 'K5'

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### 1. Introduction

Communications Research Laboratory has developed a scientific data sampling board that is attached to a PCI bus of a personal computer (PC). Using this board, a versatile purpose data sampling PC (Versatile Scientific Sampling Processor, VSSP) has been developed. Recently this technology is used to produce a new Very-Long-Baseline Interferometry (VLBI) data recording system, 'K5', which can substitute VLBI data recording systems so far. Standard VLBI data recording system converts the observed data into digital signals with 16-channel, 256-Mbps data rate. This process is usually done with a data sampler, and the data is recorded on magnetic tapes. On K5 system the sampler and the recorder are substituted with PCs and PCI data sampling boards.

### 2. The performance of the PCs used in K5 system

In order to record VLBI data with 16-channel, 256-Mbps, one K5 system uses 4 PCs and each PC records 4-channel data. Each PC is necessary to record the data with 64 Mbps. In order to realize this recording rate, ATA100 type hard disk drive is adopted. In addition to this, a standard VLBI observation continues 24 hours. Therefore, if the data recording continues one whole day, 690 Gbytes data storage area is required. Actually though, the data recording does not done continuously. Therefore, four 120 Gbytes HDDs are installed on one PC. They will be practically enough for one-day observation. As the result, the total amount of the data recording area is up to 1920 Gbytes. Other specifications of the PC are as follows: 1.2 GHz CPU and 256 Mbytes RAM. The operating system of the K5 PC is FreeBSD. Adopting FreeBSD, it has become very easy to control the data recording from distant place and to obtain the data via network after the observation.

### 3. The difference between K5 system and VLBI data recording system so far

In VLBI observation so far, a data recorder and a data sampler are used for data recording and the data is recorded on magnetic tapes. After the observation, the recorded tapes are sent to a correlator for data analysis. This implies that whether the observation has succeeded or not cannot be known without processing the data. In K5 system, data transport between the observation sites become much easier because the system uses PCs. As the result, the observer can make some test observations before the observation session, send the test data via computer network, and analyze the data in order to check the observation status is good. This will contribute the certainty of the observation. In addition to this, the observation data format so far depends on the type of the recorder and the correlator, hence it is difficult to convert a data format to another and analyze the data to obtain the result. On the contrary, in K5 system the correlator as well as the recording system is substituted by PCs, and composed by softwares. Hence, it is easy for the user to create some software as he/she needs to convert the data from one format to another. In addition, it is also easy to control the observation and data acquisition via computer network, accessing from a distant place. Adopting PC technology as the center of the VLBI observation system, data recording and data handling became more flexible.

### 4. Summary

A PC-based VLBI data acquisition system 'K5' has been developed by CRL. PC technology makes the VLBI observation system more flexible, enabling the user to develop some necessary software to modify the system as he/she needs. In addition, the accessibility to the computer network makes it possible to control the observation and data transportation from a distant place. Now the technologies that have been developed with VLBI becomes more accessible, which are expected to be used as various scientific techniques used in various scientific field.