# RAPID TURN AROUND EOP MEASUREMENTS BY VLBI OVER THE INTERNET

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## Abstract

As a technology development center of the International VLBI Service for Geodesy and Astrometry, Communications Research Laboratory has been developing next generation systems for VLBI observations and data processing. One of the systems is the real-time VLBI observation and correlation system, called K5 VLBI system, which transfers VLBI observation data over the Internet. In the conventional VLBI observations, radio signals from celestial radio sources are received at radio telescopes and are recorded to magnetic tapes. Therefore, the timeliness to obtain results was limited by the slow delivery of tapes from observing sites to a correlation site. In the K5 VLBI system, on the other hand, the observed data are transferred either in real-time if the connecting network is fast enough, or in near real-time if data buffering is required. The K5 observation unit is consisted with four FreeBSD PC systems each with a newly developed data sampling board. The unit is capable of sampling 16 base-band signals at various sampling speeds and quantization bits up to 16Msps (samples-per-second) and 8 bits-per-sample, respectively. The sampled data can be transferred to the network by using TCP/IP protocol or can be recorded to internal hard disks as ordinary data files. The current prototype unit has achieved data recording at the data rate of 128Mbps. The K5 correlation unit is also under development using FreeBSD PC systems. The correlation unit is a software correlator which receives data from observation units over the network and then performs cross correlation processing. Since easily rewritable software programs and general PC systems are used, the processing capacity and the function of the correlator can be easily expanded and upgraded.

Initial test observations have been performed successfully between observing stations at Kashima, Japan and Westford, Massachusetts, USA. The test observations were performed from October 7 to 9, 2002. The K5 observation unit was used at Kashima and the Mark-V system developed by Haystack Observatory was used at Westford. The observed data were recorded to hard disks at each site, and transferred to the other site after the observations by using FTP. The data were then processed by the software correlator at Kashima and by the hardware correlator at Haystack Observatory. As the results, fringes were detected by both ends. Thus the test observations demonstrated the current capability of the rapid turnaround of the VLBI data processing by using the high speed Internet connections. Similar test observations are currently under preparation and the plan is to demonstrate the capability of estimating Earth Orientation Parameters with unprecedented turnaround time for international geodetic VLBI observations.