

## QUASI REAL-TIME POSITIONING OF SPACECRAFTS USING THE INTERNET VLBI SYSTEM

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Communications Research Laboratory is developing new real-time VLBI system using Internet protocol (IP) technology to reduce network-cost and to expand connection sites of VLBI network. We call this system IP-VLBI or Internet VLBI. We are developing the system consisting of a personal computer (PC)-based sampler equipped with a PCI-bus Versatile Scientific Sampling Processor (VSSP) board and FreeBSD (and/or Linux) software to carry out an automated observation, real-time data transmission, reception and correlation. The IP-VLBI system developed at CRL is dedicated to taking over current geodetic VLBI system which usually receives 14 to 16 frequency channels at S and X bands. A VSSP board can sample 4 channel data simultaneously, hence 4 sets of boards (i.e., 4 PCs) can cover the current geodetic VLBI system and the system assembled this way is called K5. In parallel with the development of the real-time system, we are also developing a quasi-real time (QRT) VLBI system. In the QRT system data are stored in a hard disk at first, then transmitted to a correlation site with the available transmission speed of network. Off-line operation is also possible. In this case, data are transmitted after observations are made using an FTP or equivalent file transmission protocol.

We started the development of technique to determine spacecraft's position in quasi real-time using the IP-VLBI system in collaboration with the Institute of Space and Astronautical Science (ISAS). A number of VLBI observations receiving Japanese spacecraft GEOTAIL and NOZOMI have been carried out since June 2002 to establish an observation method and to evaluate the measurement accuracy, and found that it is possible to measure group delay without ambiguities for telemetry signals. Phase delay measurements are also tried to increase the measurement accuracy and results will be reported in the meeting.