Technology Coordinator Report

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Abstract

The main effort of the Technology Coordinator during 2000 was devoted to completing the VLBI Standard Interface hardware specification (so-called VSI-H). This specification is now complete and has been approved by both IVS and the astronomy community. Work is now beginning on the software counterpart, VSI-S. The VSI-H specification is available in the Special Reports section of this volume and at `http://dopey.haystack.edu/vsi/index.html`.

1. VLBI Standard Interface

After 18 months of effort, the VSI-H specification was formally approved on 7 August 2000 by the VSI Technology Coordination Committee. This followed many discussions and many iterations of VSI-H draft specifications, including an international 2-day meeting at Haystack Observatory in January 2000. The specification has been subsequently approved and adopted by both IVS, representing the geodetic community, and GVWG, representing the astronomy community. The VSI-H specification is the hardware part of the VLBI Standard Interface Specification, which will allow the transmission of data to and from heterogeneous VLBI Data Transmission Systems (DTS). The VSI goal is to specify a common interface to be compatible with traditional recording/playback system, network data transmission and even direct-connect systems. In order to do this, the design of the VSI must completely hide the detailed characteristics of the data-transport mechanisms and deal only with the interfaces to the outside world.

The following assumptions were made in the development of the VSI specification:

- The DTS is fundamentally a receiver and transmitter of *bit streams*
- The *meaning* of individual bit streams is not specified; normally, a bit-stream will be a stream of sign or magnitude bits associated with particular samples, but the actual meaning is to be mutually agreed upon between the data-acquisition system and the correlator.
- The received and transmitted bit-stream clock rates may be different (e.g. the playback rate to the correlator may be speeded-up or slowed-down); however all bit-stream clock rates on acquisition must be the same, and all bit-stream clock rates on transmit must be the same.
- The data-acquisition time-tag of every bit in every bit-stream must be fully recoverable with no ambiguity.

Some of the 'features' of the VSI-H specification include:

- definition of a 1 Gbit/sec 'Quantum Channel':
    1. 32 parallel bits streams
    2. 32 MHz (extensions to 64, 128 MHz for 2, 4 Gbit/sec 'quantum channel')
- One standard 80-pin connector per 'quantum channel':
- Standardized electrical and timing specifications

- Low-voltage differential-signal (LVDS) electrical signal interface
- Method of time-tagging data is totally internal to DTS and not specified by VSI-H
- Built-in Test-Vector Generator/Receiver capability
- Model-delay capability to simplify direct connection to correlator
- Two levels of compliance defined to ease transition to new systems
- Easy media translation (i.e. tape copying)

Work is now beginning on the software part of the VSI specification, dubbed VSI-S. We hope to complete this effort by the end of 2001.

I wish to extend special thanks to all the other members of the VSI Technology Committee for their many efforts to bring the VSI-H specification to reality:

- Wayne Cannon - York University, Canada
- Brent Carlson - DRAO, Canada
- Dick Ferris - ATNF, Australia
- Dave Graham - MPI, Germany
- Tetsuro Kondo - CRL, Japan
- Nori Kawaguchi - NAO, Japan
- Misha Popov - ASC, Russia
- Sergei Pogrebenko - JIVE, Netherlands
- Jon Romney - NRAO, U.S.
- Ralph Spencer - Jodrell, England
- Rick Wietfeldt - JPL, U.S.

The success of VSI-H may be measured in part by the fact that at least three institutions are already developing equipment designed to be in compliance with the VSI-H specification. The full 30-page VSI-H specification, along with an interesting historical chronology of its development, is reprinted in this volume and is available at `http://dopey.haystack.edu/vsi/index.html`.

2. Other Activities

Other planned and ongoing activities in the technology coordination area are:

1. Formation of a few small subgroups with interest in particular technology areas. The members of these subgroups will be drawn from IVS technology centers and other experts in the field. These sub-groups, interacting primarily via e-mail, will be asked to develop a list of concerns and goals and to suggest the steps needed to achieve them. The VLBI Standard Interface group serves as a prototype for this type of activity.

2. Coordination of an index of published papers and memos in all of the relevant VLBI technology areas. Ideally, this will be a Web-based index with links to electronic versions of the referenced material. All IVS technology development centers, as well as other experts in the field, will be invited to contribute.

3. As an ongoing activity, promote and encourage inclusion of topical sessions on advanced VLBI technology at international meetings and workshops.