

Notes on VSI meeting

22 August 1999

Alan R. Whitney
MIT Haystack Observatory

Attendees

Wayne Cannon, George Fiel, Sasha Novikov – Crestech; Jon Romney – NRAO; Dick Ferris, ATNF; Rick Weitfeldt, JPL; Alan Whitney, Haystack Observatory

Introduction

An informal VSI meeting was held on Saturday, 22 August 1999 at the University of Toronto to discuss the current state of the VSI specification and suggestions for updates and changes. The purpose of these notes is to inform all members of the VSI committee of these discussions so that we may proceed efficiently to make the necessary remaining decisions regarding the VSI. The attendees were provided with a 10 August 1999 draft version of the VSI specification which included modifications based on the Birmingham, England meeting with Wayne Cannon, Tetsuro Kondo and Alan Whitney.

A short presentation on VSI was given to the joint GVWG/IACG group at the Toronto meeting. We were given strong encouragement to continue our work and come to a conclusion on the VSI hardware interface specification as soon as possible. I stated that a goal for the finalization and acceptance of this specification is the end of the 3rd quarter 1999. The GVWG/IACG group also encouraged the development of additional VLBI standards where possible, with the suggestion that channelization issues be addressed at some point. I explained the intent that the VSI hardware specification is the first step in an intended series of layered VLBI standards.

Addition to the VSI Committee

The GVWG/IACG group suggested that the addition of a representative from a Russian institution would help to complete the representation of the worldwide VLBI community. Further discussion within the committee led to the suggestion that Misha Popov be invited to join the committee. Alan Whitney will contact Misha and issue an invitation.

Discussion of Current VSI Proposal

All attendees agreed that the basic structure of the current VSI draft specification is acceptable, though a number of issues were discussed and recommendations made:

Specify active DIB streams --The specification should include some way of specifying which of the DIB input bit streams are active since it would be wasteful for the DTS to transmit inactive bit streams. After some discussion, it was decided that the best way to do this is simply to supply a bit mask of active streams through the DIB control interface. Similarly, a corresponding mask may be specified to the DOB to specify active output channels.

Clock rates – The clock rate specification should include 2 MHz to encompass existing VLBA and Mark III/IV modes. Furthermore, DIB and DOB should allow clock rates $\sim\pm 1\%$ from the nominal to accommodate special circumstances such as space VLBI. Where applicable, some of the various 1PPS ticks may also be affected (particularly R1PPS).

Hardware time code – After some discussion, it was agreed that the idea of a hardware time code, as suggested by Kawaguchi, is good and should be accepted. It was suggested that primary signal connectors should include a pair of pins for differential RS-422A signals which can be used for this purpose. On the DOB side, the RS-422A would be ‘write only’, and on the DIB side would be ‘listen only’. Though a ‘hardware time code’ is the most obvious use of this communications channel, it forms a more general channel that can potentially be used for more extensively information transfer. No baud rate is currently specified, but RS-422A supports baud rates to 10Mbaud.

Cable lengths – The consensus of those present was that a 15m (instead of 20m) maximum cable length would satisfy their needs. The 15m maximum length also is within the nominal RS-232 specification.

Electrical -- Much discussion of ECL vs other technologies for electrical signal interfaces took place. This was spurred largely by the recently-received memo from Dick Ferris which includes a thorough discussion of several non-ECL candidates for signal interfaces. Several attendees felt that the current ECL specification is out-of-date considering newer established technologies that are now available, including LVDS and several high-speed serial-link technologies. After much discussion, it was decided that the current serial-link technologies are not yet sufficiently established for confident adoption of one which is guaranteed to be long lived. However, the LVDS technology is well established with many sources and is generally considered superior to the older ECL technology. The PCB area required is about 1/3 of an equivalent ECL interface and the power dissipation about 1/5th that of an ECL interface. *After much consideration and discussion, the convened group unanimously recommends the adoption of LVDS for all signal interfaces except for an ‘alternate 1PPS’ input to the DIB, which is desired to be TTL.*

Connectors and Cables – Along with the consensus to adopt LVDS was a desire to miniaturize the signal connectors. Dick Ferris recommends consideration of AMPLIMITE type 50-pin subminiature D-connectors with Amphenol Skewclear 100-ohm 24awg twinax jacketed round cable. These connectors are considered to be reliable and rugged and require a much smaller footprint on PCB’s or I/O panels. The recommended cable has very low skew, crosstalk, RFI and susceptibility to EMI.

Nomenclature – It was suggested that the following nomenclature changes be made:

- CORRICK should be changed to CORR1PPS (recognizing, of course, that in the case of playback speedup or slowdown, CORR1PPS may be at a rate from wall clock 1pps).
- In Figure 1, CORR (Correlator) should be changed to ‘Data Processing System’

Test generator – the issue of specifying a particular test-signal generator was briefly raised and generally approved, but no details were discussed.

Clarity – Some attendees suggested that the specification could be clarified in several places. The chairman takes these suggestions under advisement.

Future Work of VSI Committee

It was suggested that once the VSI-H specification is settled that the VSI committee should turn its attention to the specification of channelization and coding standards.