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VLBA CORRELATOR MEMORANDUM NO. VC 012

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To: VLBA Correlator Group Date: 16 Jan. 1984

From: Martin S. Ewing

Subject: Minutes of Corr. Group Mtg 11 Jan. 1984

Attending:
-Pasadena: D. Rogstad, J. Peterson, T. Seling, B. Rayhrer, J. Dillon, J. Vavrus, M. Ewing
-Green Bank: K. Kellermann, R. LaCasse
-Charlottesville: R. Escoffier, B. Porter, H. Hvatum
-Boulder: L. D'Addario

MEETINGS

In our first effort of the new year, we are experimenting with "inclusive" technical meetings. It is difficult to have an informal technical session over the telephone, but there are important contributors at other sites. We will try. It seemed useful to have local pre-phone and post-phone sessions.

The present schedule has biweekly meetings, Wednesday mornings at 10 or 10:30 AM, Pacific. (See VLBA Memo 304.) Anyone is welcome to attend, but our intent is to have working sessions, not review meetings, at least in most cases.

SPECIFICATIONS

Broadband channels: D'Addario and Ewing seem to be approaching agreement that we can keep the spec. for 64 Mb/s in the correlator, since there seems to be no extra requirement for more correlations/sec. The impact is only in the overall complexity of signal routing and synchronization, which is difficult to assess, but probably will not overwhelm our work. John Peterson and Benno Rayhrer will review Vol III, Chapter VII (the latest correlator description) with reference to the question of cost and schedule impact of 64 Mb/s vs 16 Mb/s maximum channel rate.

Multilevel Sampling: Peterson's VLSI effort is evolving toward reinclusion of accumulators on the chip (contrary to the impression given in the phone meeting - MSE). This lies behind the concern that was expressed for support of 4-level sampling. The question was, what weighting of quantization levels is best

for our correlator? D'Addario thinks that 4,1,-1,-4 is optimum for SNR, and will try to produce the appropriate literature references. All agree that suppressing the lowest (+/-1) products is acceptable. In this case, the range of product values is that same as the weighting, i.e., 4:1 in magnitude. With an offset counting scheme (only up-counting) 3 addend bits are required. There is a corresponding impact on silicon real estate.

There is general agreement that 3-level sampling with optimized recording code has adequate SNR. This approach was not adopted in the current spec. because of the extra complexity of formatting and decoding. Present sentiment around the table appears to favor reconsideration of 3-level due to its favorable impact on the correlator, which may be much greater than the per-antenna cost of formatting. Peterson will give us his appraisal of the tradeoffs for the VLSI design.

Computing standards: The consensus of the correlator group is that VAX/VMS is the best choice for the correlator "host" computer. (Numerous microprocessors of unspecified type will be controlled by the VAX.) The preference for VAX/VMS is based on Block II experience and investment, both software and hardware. Extra expense (several manyears) and delays would be the consequence of any other choice. We are open-minded if there are compelling arguments project-wide, but this is our vote.

There is less agreement about the application language(s) in which correlator code will be written. Concern has been voiced (e.g., memo by G. Hunt, 12/30/83) that (1) there should be a common language for the whole VLBA, (2) the life-cycle cost, including maintenance, is very important. Hunt has proposed Fortran, probably Fortran-77, as the standard. While agreeing that languages should not proliferate needlessly, the correlator group made the following points:

(1) There is a large investment in Forth and Pascal programs for control and fringe processing, respectively, in Block II.

(2) It is not clear that any one language is suitable for the full range of VLBA work. Fortran does well for AIPS processing, but would never be chosen (by us) for real-time multiprocessing. Forth, C, and Pascal are all considerably better than Fortran for this work. (Data structures, pointer variables, and interactivity are important.)

(3) Native VAX Forth, as developed by JPL, is a civilized language; it is much easier to work with and maintain than older 16-bit versions. (Rogstad is preparing listings for Craig Walker to examine.)

(4) The VLBA is a large project, and it is not expected that the same programmers will maintain all VLBA code. It is reasonably efficient to have some Forth-oriented programmers and some Fortran programmers working on the project.

(5) The complexity of maintenance has more to do with the complexity of the system than with whether a standard language is used. In fact, selecting a language that is optimal for expressing the computational problem can easily reduce the maintenance effort.

(The above will be put in a VLBA Memo.)

PROJECT MANAGEMENT

D'Addario is said to be addressing the "project book" idea. The project book would be a complete, current specification maintained on computer, probably CVAX::. In connection with this, we need to have a good VAX communications capability. The best would be a DECnet link from Pasadena to NRAO. Ewing and Al Braun are currently experimenting with a 4800 baud dialup link.

Will we ever be able to manage a continuous logical link? Cost of a dedicated line seems too high. Dialup connections are awkward for MAIL purposes. Using a public packet network (e.g., Telenet) might be an attractive alternative.