CORRELATOR DESIGN GROUP

Telephone Meeting

10 August 1982

Present: Hvatum, Clark, LaCasse, Escoffier, Rogers, Peterson, Ewing

Mercifully, we decided not to address the data acquisition interface issue which was discussed here last time and was heavily debated again this morning at the Data Acquisition Group meeting. (The upshot of the latter meeting was that interested parties would submit their tentative interface suggestions plus simple block diagrams as VLBA memos for discussion at later Correlator Group meetings. Clear block diagrams are especially useful for these discussions since we are too poor to afford video teleconferencing.)

Alan Rogers announced a new memo on the "channelization" problem; it is being distributed soon. He has had discussions with Bill Carter, who is concerned about the VLBA's support of astrometry and geodesy. Will the VLBA be sufficiently compatible with Mark III? Alan thought so.

Ray Escoffier discussed his Memo #101 (Correlator block diagram based on VLA). His "tape recorder" block includes all geometric delay corrections, excepting the baseline vernier delay (+/- 1 bit). He would not necessarily use the VLA-1 chip today, but he notes that the VLA-1/-2 effort was a happy project. Estimates he has seen for custom ECL (?) chips have been in the range $100K + $25/chip, which he thought rather high for the VLBA system. Barry added that VLA-1 does offer the possibility of 3-level sampling for spectroscopy at no extra cost.

John Peterson outlined his current VLSI correlator chip project. The goal is a 3x3 level, 16 lag, 16 complex 20-bit accumulators running at 16-25 Mbit/sec. He will send a memo with specifications and block diagram. A multiplier section prototype is in hand and is being tested; an accumulator prototype is coming soon. He estimated fabrication cost at $50/chip based on chip fabrication, checkout, evaluation, and packaging and on a 25% yield.

In a previous Computer Group meeting the question of the interface between the correlator and the post-processing system was discussed. We note that the basic output of the VLA is the time-averaged correlation function, and, from our point of view, that would be the easiest for the VLBA correlator system. This point is amplified by the "new wave" global fringe fitting algorithms, which apparently need access to a very large dataset before the best fringe estimates can be produced.

Ewing held forth for the general principle of placing specialized, routine tasks in optimal processors. One should use the full, general-purpose computing environment only for those jobs that require great flexibility; such resources are quite expensive. His memo #1XX ("VLBA Overall Dataflow") indicates a "Fringe Processor" block between the correlator and the correlator control computer. At minimum, such a processor would transform high-resolution data to the frequency domain. Other steps might include phase-calibration of channels (especially needed with Mk III data), coherent combination of channels to produce the synthesized delay response, fractional bit-shift corrections, and other filtering or windowing operations.

Rogers responded that users, even Jim Moran, seem to be satisfied with Haystack's new way of handling the fractional bit-shift correction. He will distribute a memo telling all. This technique does not require frequent FFTs of the correlation function, and may save processing for the VLBA. He expects that a 10- to 20-second integration time will be adequate for most VLBA work.

Ewing raised the issue of frequency-domain correlation; he is making contact with the Japanese on this score. Barry brought up one possible by-product of this approach which is the possibility of placing the FFT processors for each station at the telescopes. This would allow high-resolution sampling and increased flexibility in using the finite tape-recorder channel at the price of increased complexity at the remote sites. He offered to make an analysis for the group of the costs and benefits.

Our next scheduled meeting is at 1530 EDT, September 7. Telephone number to be announced.

M. Ewing, 8/10/82