

# UNIVERSITY OF HAWAII

Management Systems Office

## MEMORANDUM

June 30, 1986

TO: UHM Deans and Directors  
FROM: Roger G. Angell, Director *RA*  
SUBJECT: Fiber Optic Data Communications Cable for UHM

### On-Line Student System Project

The ISIS on-line student registration and records project (also referred to as the Rainbow System) is proceeding with its plan to "wire" those buildings which house a college or school Dean's office or Student Academic Services office. The purpose is to provide on-line access to student and course data and permit colleges to eventually register their own students. The details (e.g., staffing & procedures) have not been worked out, but a first step is to install a high-speed communications system to serve those locations.

### Fiber Optic Network

A high-capacity fiber optic "backbone" will be installed between selected buildings, called hubs. College/school buildings will be connected to the hub in their vicinity via smaller fiber optic cables. I hope to have fourteen buildings connected by December of this year. As additional funds are available, the network will be extended further.

The selection of fiber puts UHM at the leading edge, both of technology and comparable institutions. Many are talking about it or planning installations, but we are about to do it. This network should serve the needs of the campus for the next forty years and provide access to a variety of computing services. The student system will utilize only a small portion of the cable system's capacity; other uses will be encouraged and permitted through a request/approval/chargeback process which has not yet been established.

The economics of each additional application will have to be carefully considered because fiber is not yet competitive with alternative media for some applications. Specifically, leased telephone lines are still cheapest for connecting small numbers of terminals to host computers. Yet for other applications, such

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as computer-to-computer connections, fiber is the only alternative. In addition, high installation costs and the congestion and shortcomings of our underground conduit system discourage most "private" cable systems.

#### Video Cable

Fiber is not yet economical for television transmission, so a CATV coaxial cable will be installed along with the fiber optics. The first expected use of this cable will be to connect a HITS origination studio, somewhere on campus, to the Public TV building on Dole Street. In time, equipment will be added to permit other concurrent uses, such as reception/distribution of video signals from Oceanic or Hamilton, and to KHET/HITS or classrooms. Users of this cable will probably have to fund the splitters and amplifiers necessary to connect to it.

#### Anticipated Buildings

(\* Indicates buildings to be connected to the ISIS student system.)

The following buildings will be wired as "hubs" by the end of this year, interconnected with 54 strands of fiber and one CATV cable:

Marine Science Building  
Keller Hall  
Building 37\* (Cashier's Building, behind Art)  
Porteus Hall  
Sinclair Library\*

The following buildings will probably be connected to a hub by the end of this year, via 18 strands of fiber and one CATV cable each:

ETV Building  
Wist Hall Addition\*  
College of Business Administration\*  
George Hall\*  
Hawaii Hall\*  
Webster Hall\*  
Kuykendall Hall  
Hamilton Library\*  
Holmes Hall\*

If additional funds can be secured, or provided in part by the colleges, the network will be extended in 1987 to:

Gilmore Hall\*  
Sherman Hall  
Biomedical Science Building\* (a new hub)  
Moore Hall\*  
Law School\* (a new hub)  
Lower Campus administrative buildings

This still does not include all of the buildings the ISIS project wants to service, so work will continue, probably dovetailing with the replacement of the telephone switch and its wiring. (The fiber optic project is otherwise independent of the telephone switch project.) Some buildings will not be network nodes (i.e., not connected by fiber), but will be serviced from a node for specific applications.

#### Your Approval Required

I believe I need to obtain your approval to connect your building to this network. "Connect" means (1) bring the cables from the existing underground conduits into the building, generally into the main utility room; (2) install an electronic equipment cabinet in that room; (3) for buildings to be connected to ISIS, run coaxial cables from that cabinet to the Dean's office or student academic services office to connect ISIS terminals.

I would appreciate receiving a memo from those Deans and Directors whose buildings are in the above list, indicating your approval. If you would first like to discuss anything further, or review the project plans, please contact me as indicated below.

#### Further Expansion and Uses

As mentioned earlier, the intent of the network is to connect terminals and PC's to the ISIS system. The present target group is colleges, not departments. (We are developing ways to permit department terminals to connect to the system, but for retrieval only.) Once installed, these terminals can be used to access other existing administrative applications (e.g., budgeting), and will provide the base for implementation of additional applications (e.g., personnel). A subsequent memorandum will detail the ISIS plans for allocating terminals or emulator cards to the colleges, and uses/limitations of existing ASCII terminals.

As for the network itself, I have had discussions with various research institutes about connecting the Geophysics Building (and others in the vicinity) to the fiber, and I understand the Vice President for Academic Affairs is interested in extending the CATV cable (only) to classroom buildings. As interest increases,

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the network proves itself, the UHM conduit system is improved, and connection costs decline, even more buildings will be added and uses found.

Economies permitting, the fiber can be used to interconnect research and administrative VAX computers and connect them to the San Diego satellite link; interconnect PACX terminal switches on campus (at MSO, UHCC, Hamilton Library, and EWC); replace telephone lines from Remote Job Entry stations to Keller Hall; connect small clusters of ASCII terminals to the PACX switches; and interconnect PC local area networks.

Don't expect this to come cheaply; we're talking about bandwidths of 56Kb\* (PC file transfers), 1.544Mb (T1 multiplexers), 2.3Mb (ISIS terminals), 10Mb (VAX networking), and 6MHz (video channels), on a fiber strand or coaxial cable capable of 400MHz. By comparison, most terminals run at 1.2 or 2.4Kb, and the fastest Hawaiian Telephone offering is 9.6Kb. But much higher speeds are required to meet current and future requirements.

#### Funding

The ISIS project will fund a large part of the initial phase, at least for the hubs, and for the buildings to be connected to ISIS. Funds for other buildings will come all, or in part, from the users in those buildings. For example, Hamilton Library is funding part of the cost of its connection, and the HITS project will fund all of the cost of the ETV Building connection. The system office has also contributed to the project. Some of you will be asked to bear some of the expense of your connection. Such contributions may be considered in determining the service charge for use of the network for non-ISIS purposes.

The cost of connecting a building to its nearest hub depends primarily on the distance involved and will generally be in the \$10,000 to \$20,000 range so long as no trenching is required.

#### For More Information

Please disseminate this information to your staff as appropriate. A campus-wide announcement will be made later. If you have potential applications and/or would like to discuss anything further, feel free to call me at 948-8328.

\* Kb: 1,000 bits/second; Mb: 1,000,000 bits/second;  
MHZ: 1,000,000 cycles/second.

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cc: Vice Presidents  
Assistant Vice President Day  
Assistant Young  
Margaret Haig  
C. J. Baehr, HPTV