

May 1986

PRIVATE AUTOMATIC COMPUTER EXCHANGE (PACX)

HISTORICAL BACKGROUND

In 1972, the Computing Center studied the development and implementation of a Gandalf data switch which was used to improve terminal access to several HP2000 systems on the University of Iowa campus. As timesharing resource utilization grew in the University of Hawaii, a need for a data switch to maximize utilization of ports also emerged. In 1978, the Computing Center acquired a PACX I (128 X 128). Since 1978, the growth of use of computers and numbers of computer systems universitywide required upgrades to a DUAL PACX II (256 X 256) and then to the currently existing QUAD PACX IV. (1024 X 512). The system will be upgraded to a PACX 1000 (1024 X 1024) in mid June, 1986.

PACX IV systems are also located at MSO, and at Leeward, Maui, and Kauai Community Colleges. A PACX 2000 is located at the EWC. A PACX 2000 is planned for installation at the Diamond Head Campus of Kapiolani Community College during the Fall Semester, 1986. A PACX 2000 is also planned for installation at the HILO College and at Hamilton Library during the next 12 - 24 months. All currently installed PACXs are either connected or will be connected to each other this calendar year to complete formation of a PACXNET with automatic routing of calls.

DATA SWITCH REQUIREMENTS

As computer resources and the number of users requiring access to those resources grow, there are needs to maximize utilization of computer and terminal resources, monitor and control the communication network, provide diagnostics to minimize network downtime, and to minimize the cost of communication. Data switch solutions for these needs should provide some basic features:

Provide a large number of terminal (workstations, personal computers, terminals) maximum access to computer ports.

Allow each terminal user to access as many different computer resources as authorized.

Facilitate fast and reliable communications between terminal users and the computer ports, or between terminal users.

Provide ability to monitor data flow through the network as a diagnostic aid in isolating problems.

Provide statistical data on utilization of terminals, computer ports, and communication links for network management analysis.

PACX SYSTEM OVERVIEW

PACX systems maximize utilization of terminal and computer resources through efficient port switching and contention. Terminal users are able to access local or remote terminals and computer resources through keyboard class selection using simple commands. If a resource is busy, users may take advantage of unlimited class queueing capabilities.

PACX enables total systems configuration flexibility with a modular approach, and provides for expansion of terminal and computer ports when required. All critical system elements including cross connection matrix boards, control logic, port and terminal buffer boards, and processor control logic are backed up through online duplicate redundancies for maintenance of 100% uptime. Multi microprocessor based architecture permits future technological enhancements when they become available.

PACX systems are transparent to both speed and protocol and supports a full range of terminal and computer port interfaces. PACX will transparently handle any code and format of binary serial data up to a maximum of 19,200 bps asynchronously and the system will perform fully loaded without any possibility of blocking. Speeds up to 19.2Kbps are supported on all channels simultaneously over an unrestricted bandwidth of 19.66 Mbps for PACX 1000 Systems and 38.9Mbps for PACX 2000..

System parameters may be altered online by the system manager during normal operations as often as necessary without affecting ongoing cross connections. System reconfiguration is accomplished by entering on a system console or alternately on the system control panel. The Disk operating system allows loading, storage, and retrieval of system configuration and software from 3.5" diskettes. A redundant diskette drive is also available. Battery backup is available for system memories to enable restarts after power failure without requirements for operator intervention.

PACX imposes no limitations to user changes in baud rates after a connection is made, i.e. users may modify baud rates or data formats while online.

Some additional PACX features include:

- programmable messages for signon/signoff, welcome, class messages, automatic logoff messaging to computer ports on terminal line drops;

- System and service class password protection;

- Alphanumeric service class selection;

- Class restriction;

- Terminal to port speed matching;

Terminal to terminal, (e.x., PC to PC) communications;

Automatic logic and power supply switchover;

Automatic routing of connections through a network of multiple PACXs (PACKNET). A PACKNET can support up to 16,000 devices;

Dial port assignment;

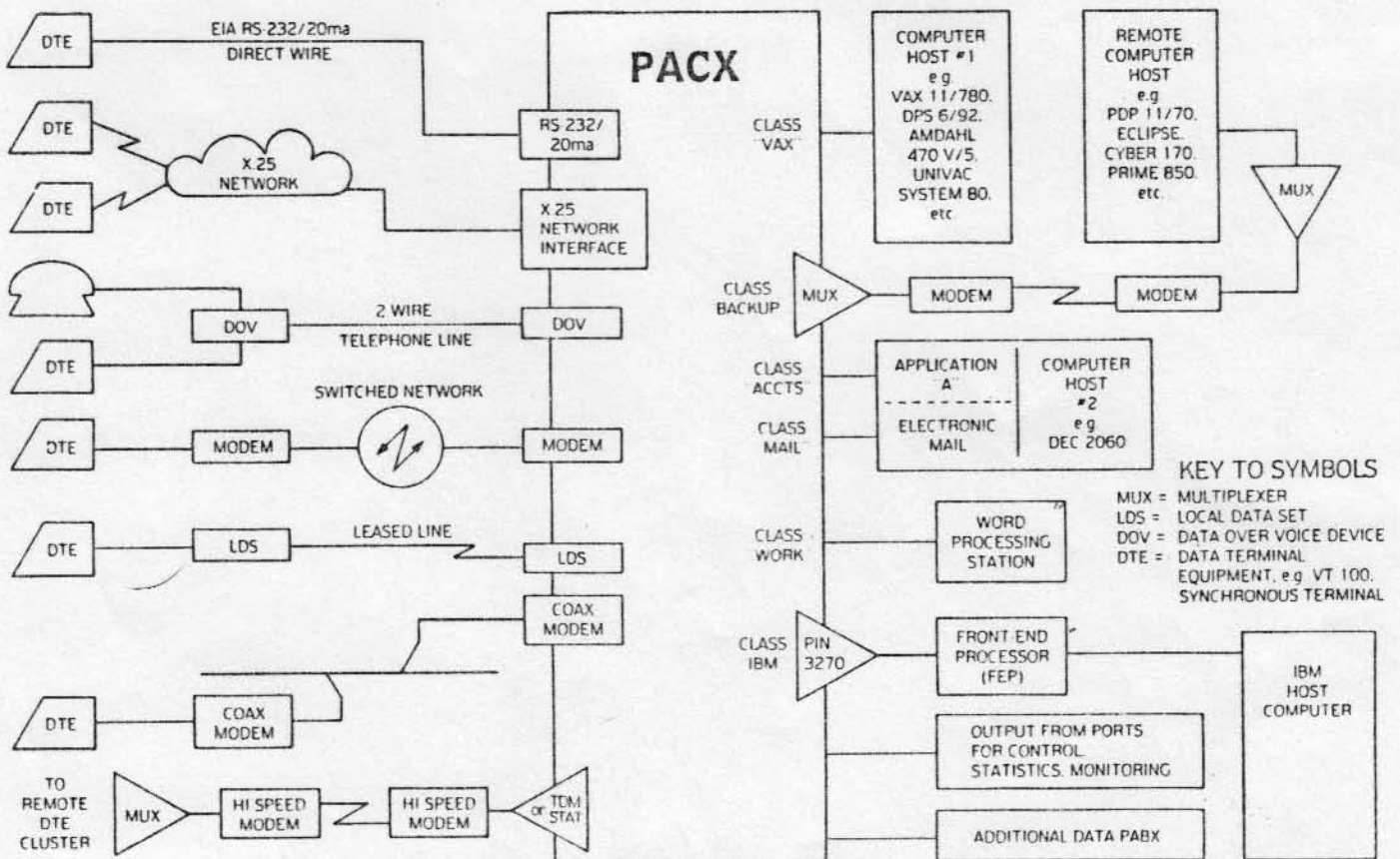
Wide variety of interface boards including gateways for X.25 packet switched networks, RS232C/V.24, V.28, RS 422, RS 423, 20ma current loop, and data-over-voice;

Connection of remote devices through statistical multiplexors, TDM multiplexors, T1 links, fiber optic cables, twisted pair, and coaxial cables;

No modem operation for almost all on campus locations for speeds up to 2400 bps and higher speeds up to 19.2Kbps for locations in the vicinity of PACX.

Plus more.

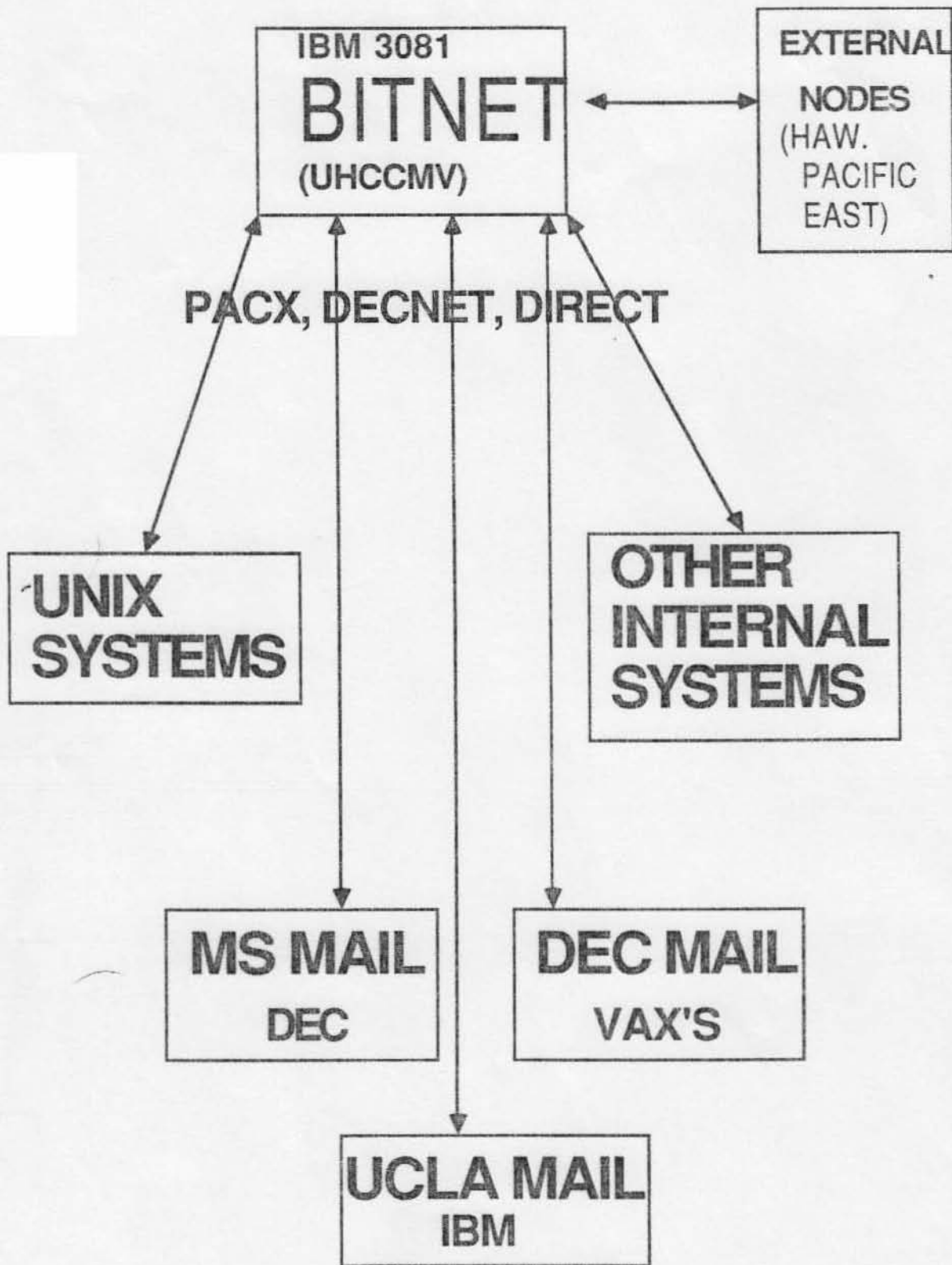
PACX CONNECTIVITY EXAMPLE



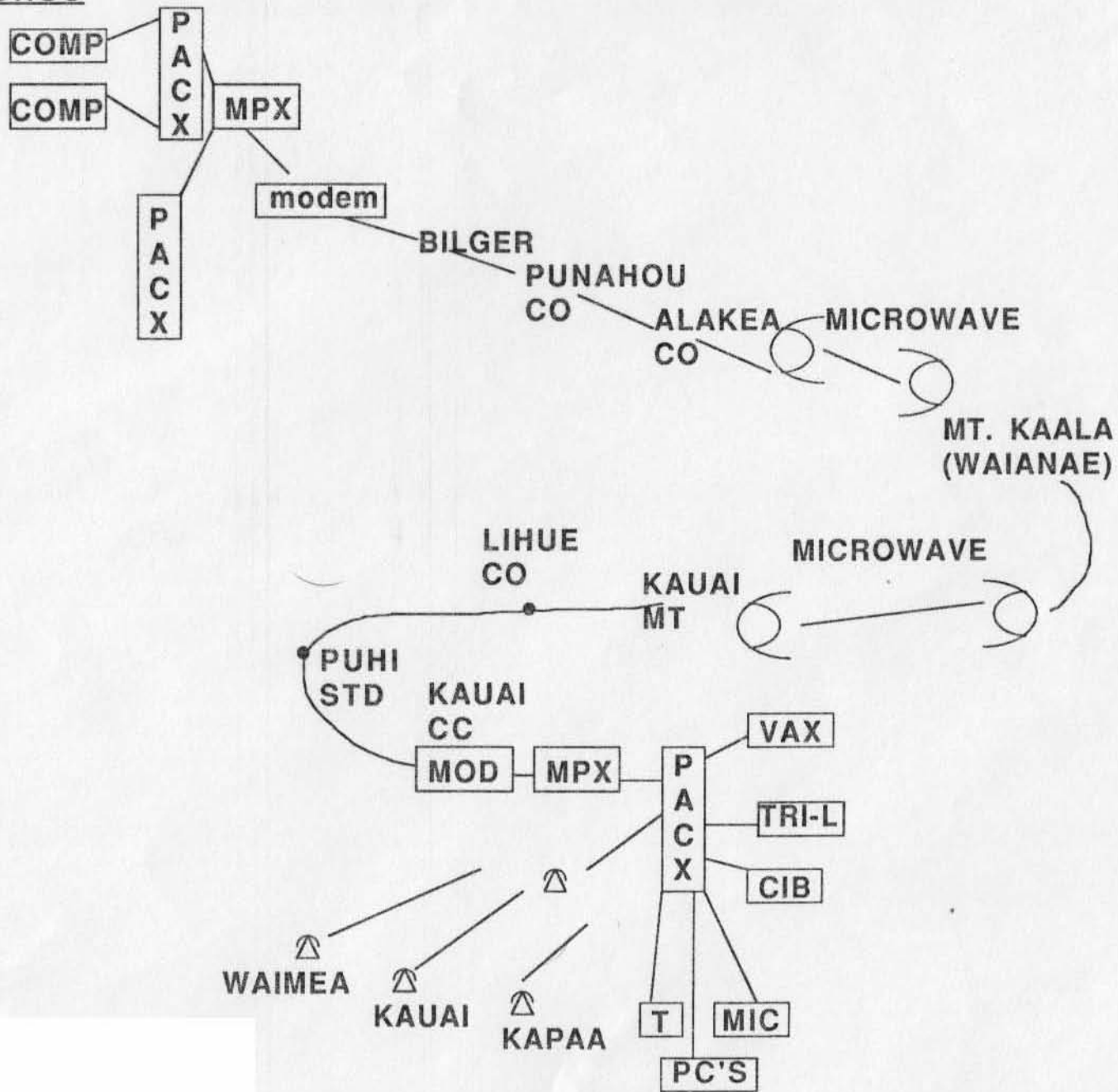
UH PACXs
May, 1986

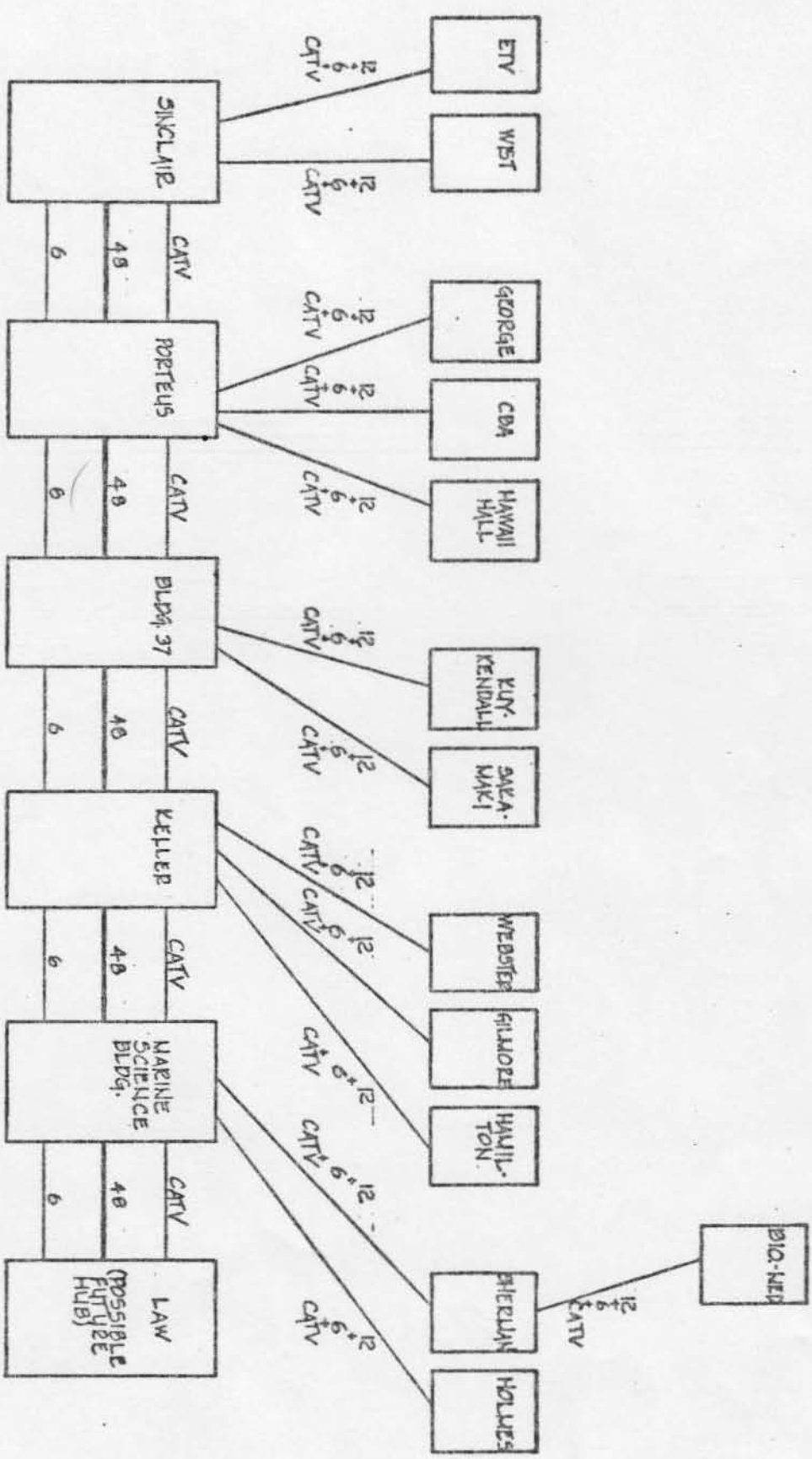
<u>Location</u>	<u>PACX Type</u>	<u>Systems Accessed</u>
Hilo College	PACX IV (Planned)	VAX 750, Library
Kauai CC	COMPACX (PACX IV) (256x256)	VAX 750, VAX 750, UHCC, Library Systems (Planned)
Kapiolani CC	PACX 2000 (Planned)	Sys 38, VAX 8200
Maui CC	COMPACX (PACX IV) (128x128)	VAX 750, MICROVAX, Library Systems (Planned)
Leeward CC	PACX IV (256x256)	PDP 11/70, VAX 8200 Library System
Library (Hamilton)	PACX 2000 (Planned) (256x256)	HDPS-6
Management Systems Office	DUAL COMPACX (PACX IV) (256x256)	VAX 785, VAX 785, VAX 785, VAX, 785, VAX 785, PDP 11/70
UH Computing Center	PACX 1000 (1024x1024)	HP 3000 S64, DEC 2065 IBM 3081, CDC CYBER 180-810, HDPS-6, HP 3000, HP 9000 (Planned), VAX 8650 (Planned), VAX 750
East-West Center	PACX 2000 (512x512)	VAX 785, VAX 785, VAX 780, VAX 780

NOTE: All PACXs either connected to UHCC or will be connected to form PACNET in 1986.



UHCC EXAMPLE OF MAUI, KAUAI COMMUNICATION CIRCUITRY





LEGEND:

- 48 STRANDS MULTI-MODE FIBER
- 12 STRANDS MULTI-MODE FIBER
- 6 STRANDS SINGLE MODE FIBER
- 1 CATV CABLE

TENTATIVE FIBER NETWORK PLAN