Network Training: Anywhere, Anytime, Anyplace?

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Abstract

The purpose of this document is to briefly describe the higher education environment that exists here in Hawaii and discuss some of the training challenges that we face. With an efficient and effective training program, we can minimize the impact of diminishing resources and still accommodate a rapidly increasing population. Training is one of the most critical ways that information is disseminated to the user community and it is essential that it be accessible and available for everyone regardless of their location.

Our unique geographical location and isolation combined with the expansion of the network to all islands are creating an interesting challenge. Users are finding that the network greatly increases their access to information and resources, and fosters global collaborative efforts thereby reducing the isolation that our island chain often imposes on us. This is creating a tremendous increase in the demand for training on the use of network resources and tools.

We are in the infancy stages of planning a system-wide support strategy that can and will use different delivery mechanisms and media. We are experimenting with a variety of techniques to determine which would be appropriate for use in our environment. One idea is to harness the power of the network, utilize the rich tool set of information delivery mechanisms, and incorporate it into our training strategy. Our ultimate goal is for people to be able access and receive training and assistance anywhere, anyplace, anytime.

I. Background and Infrastructure

To better understand the challenges of network training in the State of Hawaii, it is necessary to understand its geographical diversity. The State of Hawaii is surrounded by the Pacific Ocean. The minimum distance between this island chain and its nearest land mass is approximately 2500 miles making it one of the most physically isolated places in the world. The State of Hawaii is comprised of 8 major islands: Niihau, Kauai, Oahu, Molokai, Maui, Lanai, Kahoolawe, and Hawaii also known as the "Big Island" (see Figure 1). Of these 8 islands, two will not be included in this discussion – Kahoolawe is uninhabited and Niihau is privately owned. The primary means of travel between islands is by plane.

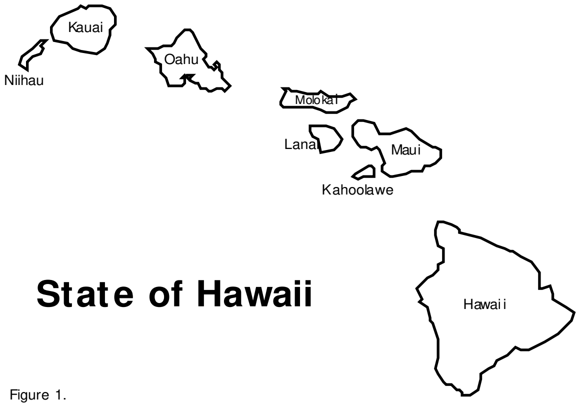


Figure 1.

The Information Technology Services division (ITS) of the University of Hawaii (UH) is responsible for planning, developing, deploying, and supporting all aspects of information technology for research, education, and administrative functions for the entire UH System. The University of Hawaii system is extensive; it is comprised of fifteen campuses and educaiton centers located on six islands. The campuses provide a variety of graduate, 4-year and 2-year degrees and various certificate programs (Table 1). Each campus supports its own areas of specialties providing diverse educational opportunities for students. The entire UH system supports over 50,000 students, faculty, and staff members. The primary campus, University of Hawaii at Manoa, is located on the island of Oahu. Each campus maintains its own decision-making and budget autonomy. Because of the autonomous nature of each campus, the success of any technology project is highly dependent on the cooperative efforts among technology leaders of each campus.

Campus/Education Center	Location	Primary Degree
UH at Manoa	Oahu	graduate, 4-year
UH at West Oahu	Oahu	4-year
Kapiolani Community College	Oahu	2-year
Honolulu Community College	Oahu	2-year
Leeward Community College (LCC)	Oahu	2-year
LCC at Waianae	Oahu	2-year through LCC
Windward Community College	Oahu	2-year
Kauai Community College	Kauai	2-year
Maui Community College (MCC)	Maui	2-year
MCC at Hana	Maui	2-year through MCC
MCC at Molokai	Molokai	2-year through MCC
MCC at Lanai	Lanai	2-year through MCC
UH at Hilo	Hawaii	4-year
UH Hilo at West Hawaii	Hawaii	4-year through UH Hilo
Hawaii Community College	Hawaii	2-year

Table 1.

Two distinguishing features of the UH system that affect our network training efforts are the need and demand for distance education and the network infrastructure. Because of the physical separation of campuses by the ocean and the inability to provide all academic programs on each campus, UH relies heavily on its distance education program and technology to provide equal access to educational opportunities. The distance education program allows students to pursue higher education opportunities and, ultimately, obtain degrees not offered on their campus.

The distance education program is distributed over the Hawaii Interactive Television System (HITS), a microwave-based system, which provides two-way video and two-way audio to most campus media studios (see Figures 2 and 3). The instructor can see the students at each site and the students can see the instructor and communicate interactively via microphones. Due to the limited amount of channel capacity, we are approaching the maximum number of classes that can be delivered via HITS. In addition, classes are being delivered over our state-wide public education cable system where students can view the classes from home via their local cable station.

The UH inter-campus data network infrastructure combined with each campus' network infrastructure combine to form the University of Hawaii Network (UHNet). UHNet connects each campus to UH Manoa via T1 connections (see Figures 4 and 5). Currently, access to the Internet is provided via a T1 link to NASA Ames Research Center in Moffett Field, California. The high-speed connectivity between campuses allows everyone on each campus to communicate, collaborate, and access electronic resources anytime of the day or night. Primary uses of the network are to: exchange data and information among faculty, students, colleagues, and researchers on a global basis; disseminate information; provide access to world-wide resources; participate in discussion groups; and conduct electronic "office hours." Distance and isolation are no longer regarded as barriers to educational opportunities.

The UH inter-campus data network is a key component in the UH system. As awareness of the Internet and its services increases, more people are requesting access to UHNet and are becoming dependent on it to support their daily education and research activities. This demand has prompted ITS to re-visit how training is provided for the following:

- general Internet information; what is Internet? Why do I want to use it?
- electronic mail and how to participate in discussion forums such as LISTSERVs, interest groups
- remote login and how to access various information services
- file transfers and archives and what to do with the files once you retrieve them
- electronic newsgroups (USEnet News)
- information delivery and retrieval tools such as Gopher, Veronica, WWW, and Mosaic
- live, interactive communications using multicasting technologies

Traditionally and historically, all ITS classes were instructor-based presentations held on the Manoa campus. This made it difficult for those on the neighboring islands, as well as from other campuses on Oahu, to attend. Those who could not attend were only provided with paper-based, "how-to" documentation. ITS was unable to meet the training needs for the large majority of its state-wide community. Thus, training requirements of ITS' user community needed to be re-defined to provide ubiquitous training opportunities. The wide diversity of users' locations, schedules, base-level knowledge, and learning styles requires the development of a training plan and schedule that will allow network training to be accessible anywhere, anytime, and anyplace.

II. Development of Training Requirements

The change in ITS' teaching methods and delivery is evolutionary. Initially, electronic mail (e-mail) was introduced into distance education classes as a method of encouraging discussions among the instructors and students outside of their allocated air-time. Many of the students in these classes had limited experiences using computers and network services such as e-mail. Tasked with having to provide training for these students, ITS' first attempted to use part of the classes' air-time to conduct a training presentation and demonstration. This attempt proved to be minimally successful; students at sites without a technical coordinator were initially hesitant to use a computer to send e-mail. Overcoming that hurdle, they then encountered a wide variety of problems which resulted in their extreme frustration. As a result, the next round of training combined the presentation with a hands-on lab session. The lab session immediately followed the presentation which required ITS staff members to be simultaneously present at each site. This situation quickly became a coordination nightmare to send 3-5 staff members to the different islands at the same time compounded by the fact that various distance education classes were held on different days. Although it greatly increased the students' proficiency and success of the training, the coordination efforts, travel costs, and staffing requirements were excessive.

These experiences combined with other factors such as the increasing number of distance education classes that are offered and a growing awareness of other network services and resources are forcing a re-evaluation of network training requirements. The training requirements that have been identified are:

- the ability to address an audience that may be physically separated on different campuses/islands
- the ability to provide multiple levels of training to an audience with a wide range of computing and network experience
- the ability to be delivered and/or accessed at non-standard hours
- the ability to address the diverse learning styles of the individuals

III. Training Strategies

With the requirements as defined above, it is evident that having only one training strategy will not be sufficient to fulfill all the requirements. Training will need to be provided via a variety of delivery methods using various media and technologies for both traditional and non-traditional learners. For the purpose of this discussion, a "traditional learner" is one who relies on books and lecturers as their primary source of information.

III.A. Paper-based, "how-to" documents

ITS currently has a library of "how-to" documents on various topics. These are distributed on paper or electronically and are available on request.

III.B. Live presentation, optional hands-on lab

As described in the prior section, one strategy that is currently used is the live, in-person presentation optionally followed by a hands-on lab session. With this method, the needs of the traditional learner are met. The in-person lecturer can answer questions immediately and reinforce the information delivered through the hands-on lab session. And to address the needs of those people who are unable to come to the Manoa campus, the presentation is broadcast live over HITS so that participants can remain at their home campus but still attend the training session. One problem is that air time is scarce; thus, ITS may be unable to increase the types and number of classes that we broadcast over HITS. Broadcasting via HITS restricts attendees to the media centers on their home campus. One future possibility to increase access is to additionally broadcast the class out to the general public via the local educational cable channel.

III.C. Video recording of live presentation

For those who are unable to attend the live broadcast, the HITS broadcast can be recorded and made available for check-out. It provides viewing flexibility; one does not need to be physically present in their media center to get the information. However, they lose the opportunity to interact with the instructor and gain immediate answers to their specific questions.

III.D. Video training modules

To assist those who need hands-on experiences, video training tapes are being developed to provide tutorials and exercise lessons. These tapes will be short and concise. Each module will focus on a specific topic. People can borrow the ones that they need. The tapes will be available for check-out for home viewing. These tapes will also be made available in various campus public-access labs.

III.E. Delivery of training via the network

In addition to the traditional training methods described above, ITS is investigating the use of new network tools as delivery mechanisms for training. The World-Wide Web (WWW) and Mosaic, two new network tools, are taking the Internet by storm. WWW, developed at "Conseil Europeen pour la Recherche Nucleaire" (CERN), the European Laboratory for Particle Physics, allows you to navigate through electronic information using hypertext links. Mosaic is a multimedia, graphical interface to WWW, developed by the National Center for Supercomputing Applications (NCSA) at the University of Illinois. This application allows you to view graphics and compressed video, listen to audio clips, and navigate through the maze of information via a point and click interface. Access to information is ubiquitous as electronic links, hidden to the user, globally interconnect electronic information. Currently, Honolulu Community College is developing a Mosaic Internet training document which can provide a visual and interactive training forum.

III.F. Delivery of live training via the network

Another relatively new technology to make its debut on the Internet is multicasting which allows distribution of video over the Internet from a single source to many recipients. By using this multicasting technology, we would be able to broadcast our live classes over the network and avoid having to contend for video bandwidth on HITS. Initially, multicasting required the use of a fairly high-end workstation to run the necessary programs, however, applications are now being written for fairly low-end microcomputers.

CU-See-Me, a Macintosh application developed at Cornell University's Information Technology department (CIT), allows you to receive a video signal on your Mac. Additionally, if your Macintosh can accept a video signal as input (using Mac AVs or Macs with a video card), you can broadcast from your Mac to another. Currently, CU-See-Me does not support an audio source so you can only see the video and type in text which can be seen by the others.

Maven, another Macintosh application being developed at University of Illinois Urbana-Champaign (UIUC), allows the transmission of audio. An effort is in progress to combine CU-See-Me and Maven so that a single application can transmit and receive both video and audio. Use of technologies such as this will greatly increase the support of distance education classes. Instructors can communicate with all their students "live and in-person" without relying solely on HITS. Students on the various campuses can "meet" with each other and collaborate on class projects or study sessions without having to physically fly or drive to a central meeting point. ITS trainers/lecturers can provide the live, interactive question and answer sessions and potential hands-on training using these technologies.

IV. Conclusion

These network technologies allow residents in the State of Hawaii to communicate electronically and visually and participate globally with people located throughout the world at any hour of the day. The Internet and its applications, tools, and services are breaking down the traditional barriers of time and distance.

The future for ITS, the University of Hawaii, and the population of the State of Hawaii is bright. As these network technologies develop and mature, new and innovative training strategies and techniques will be developed. ITS will then be able to provide training for everyone – anywhere, anytime and anyplace.

Author Information

Jodi-Ann Chu is the Manager of Information Services for the Information Technology Services Division at the University of Hawaii. She is responsible for the system-wide User Support Area. Her primary responsibilities include coordination and evaluation of technology support services, and establishing training guidelines and training for all faculty, staff and students for administrative and academic computing. She is also responsible for planning, developing and implementation of all information services. Ms. Chu is the Project Manager of a cooperative effort with the State of Hawaii Department of Education which provides Internet access from 240 schools She holds a Bachelors of Science degree in Computer Science and a Masters of Science degree in Information and Computer Sciences from the University of Hawaii.

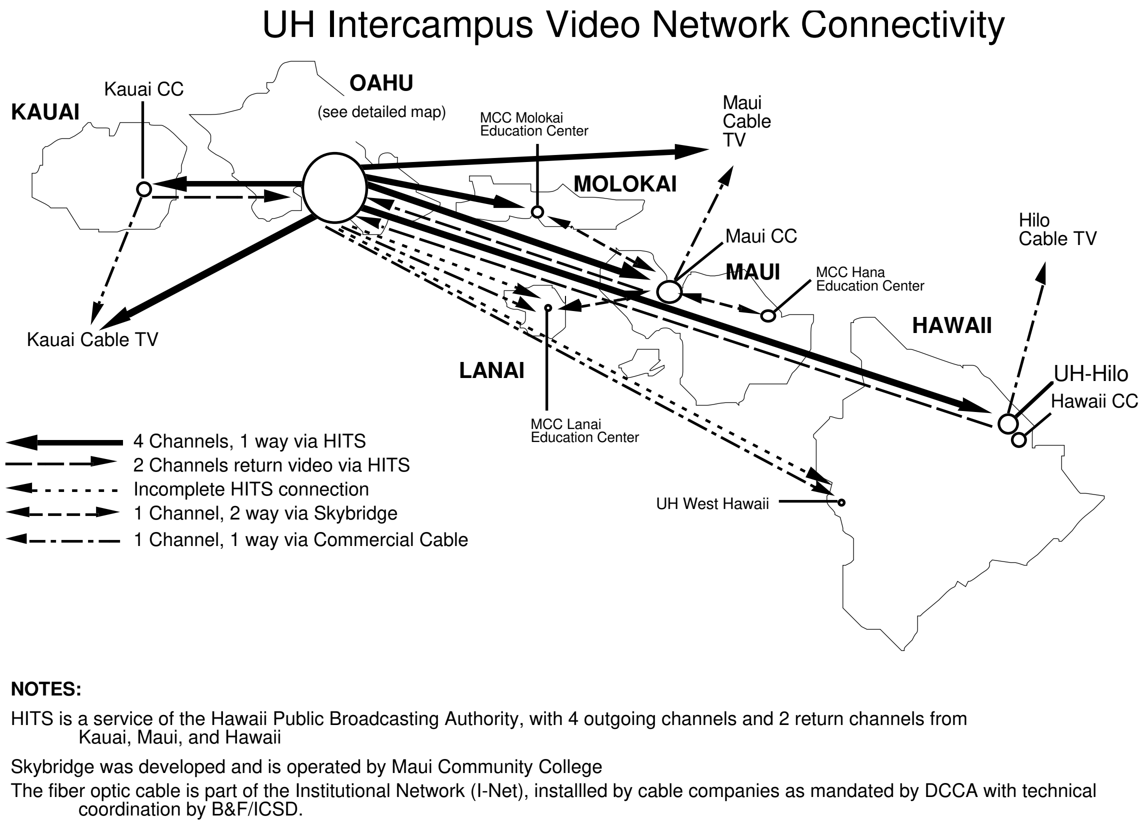


Figure 2.

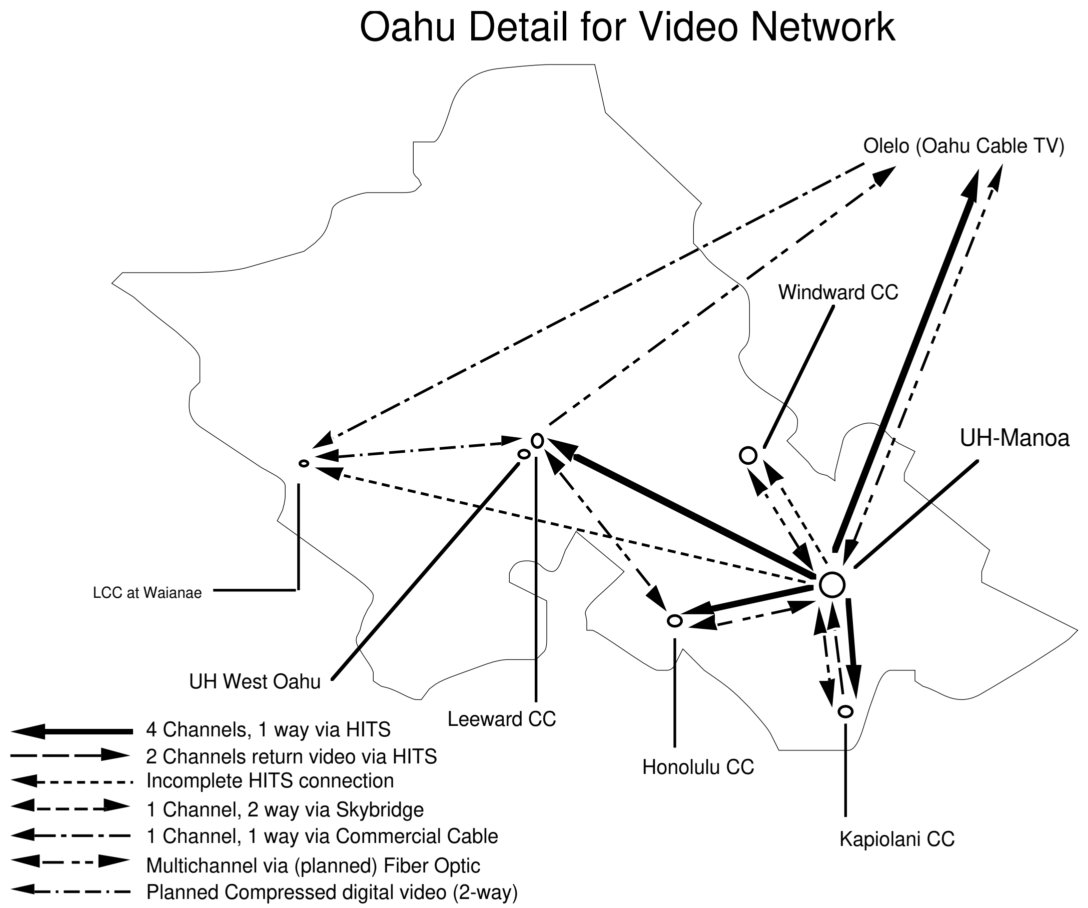
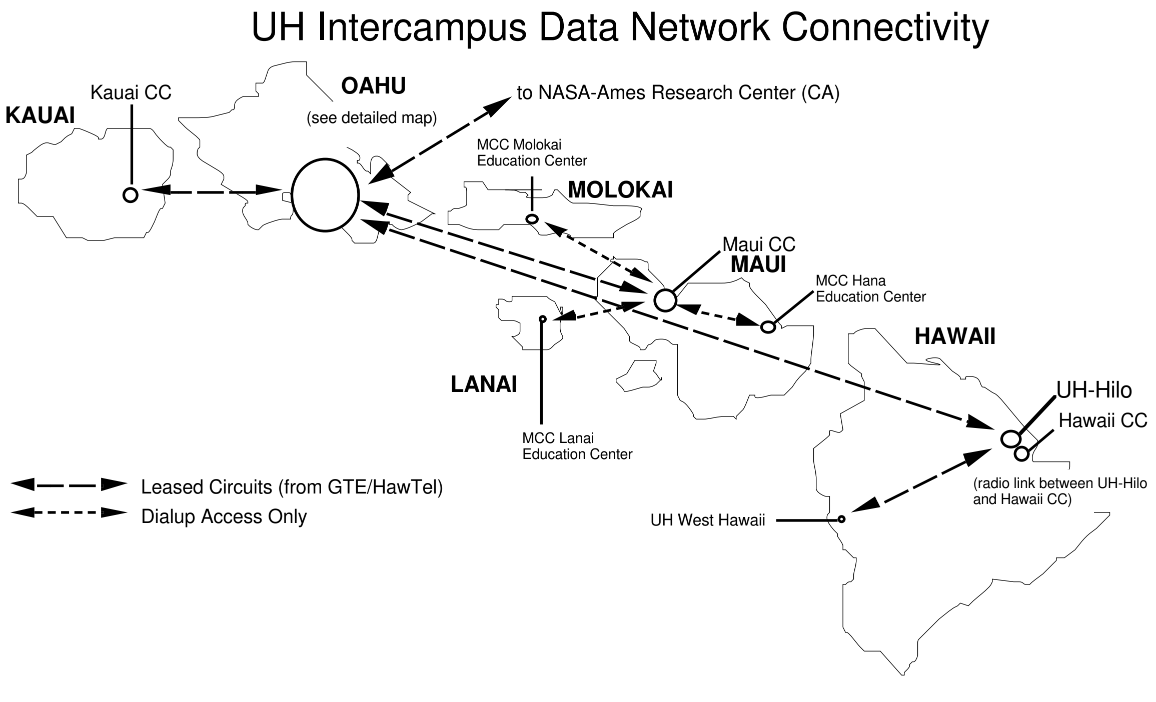


Figure 3.



NOTES:

These fiber optic portions of HAWAIIAN are being provided by cable companies as mandated by DCCA.

Temporary T1 circuits leased to community colleges with one-time funding for one year (3 yrs for Windward CC).

Figure 4.

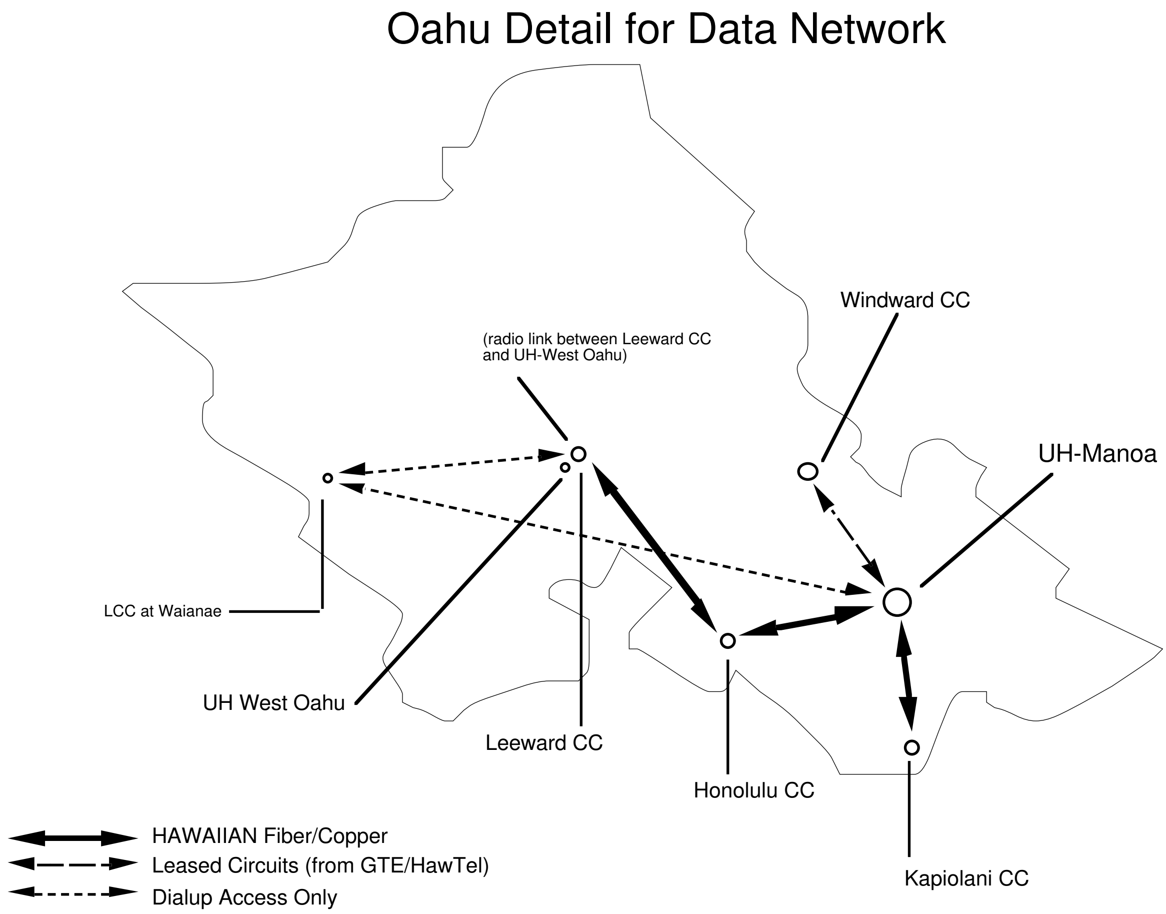

Oahu Detail for Data Network
Windward CC
(radio link between Leeward CC and UH-West Oahu)
UH-Manoa
LCC at Waianae
UH West Oahu
Leeward CC
Honolulu CC
Kapiolani CC
HAWAIIAN Fiber/Copper
Leased Circuits (from GTE/HawTel)
Dialup Access Only

Figure 5.