ABSTRACT
This presentation describes how the cultivation of intra-campus and inter-campus partnerships has led to the development of interactive television (ITV) capability at over 60 educational and governmental sites throughout Michigan, and has recently expanded to a twelve-state consortium. ITV via dial-up circuits has proven to be a powerful and cost-effective distance learning technology. The external partnerships included the development of the Michigan Collegiate Telecommunications Association (MiCTA). Organized in 1982, MiCTA today is comprised of 66 college and university institutions, over 60 public sector and governmental entities (K-12 systems, state agencies, cities, counties, hospital consortiums and libraries) and over 50 associate companies.

A second external partner is the Michigan Association of College and University Purchasing Administrators (MACUPA), which proved to be instrumental in the implementation of the distance learning network. The use of ITV for curricular applications at several institutions and future technological extensions will be discussed.
MiCTA, formerly the Michigan Collegiate Telecommunications Association, is a non-profit association of colleges, universities, K-12 school districts, libraries, non-profit hospitals, counties, municipalities, and other non-profit entities. MiCTA was organized for the purpose of identifying and resolving common telecommunications issues and problems, providing a clearing house of information relative to telecommunications, gaining information on telecommunications products and services, improving the competency and enhancing the professional status of member administrators, influencing the development of telecommunications services at reduced costs and improved quality, participating in governmental and regulatory proceedings affecting telecommunications issues, and otherwise promoting the common telecommunications interests of the membership.

MiCTA was originally formed in 1982 as an informal organization by a small group of college and university telecommunications administrators. In 1987, an event occurred that led to the present MiCTA organization.

Early in 1987, we contacted all of the major long distance carriers and told them that we would like to negotiate long distance rates on behalf of Central Michigan University (CMU). The carriers responded with their standard plans designed for colleges and universities. They indicated that they did not customize rate schedules for individual customers. The only known exception to that at the time was the federal government. Our 15 million minutes of annual long distance traffic was not enough to consider negotiating with us. We realized that we needed to bargain from a much stronger position than we had. CMU organized a meeting with the informal MiCTA group. We told the group that we felt we could significantly lower long distance rates by negotiating as a group. MiCTA agreed and told us to go ahead and negotiate on their behalf.

We went back to the vendors and told them we wanted to negotiate rates on behalf of MiCTA. At first their response was lukewarm. Our biggest problem was convincing the vendors that MiCTA was a viable organization that could influence vendor choice for individual member institutions. We began steps to organize MiCTA formally, and received our charter from the State of Michigan in August 1989. During the negotiations, we demonstrated the solidarity of the membership and offered an endorsement by MiCTA for the chosen vendor. MiCTA indicated that it would strongly encourage its members to purchase service from the endorsed vendor. We also expressed the intent to create our own network if the attempt to negotiate rates failed. We even shared the outline of the planned network with the vendors. They began to listen!

The results of the negotiations were astonishing. The proposals by the vendors cut the then existing rates by well over 50% to Michigan colleges and universities. The program went into effect in mid-1989. MiCTA members have been saving in excess of 15 million dollars annually on outgoing 1+ calls alone as a result of this process. The program was renegotiated with the vendors in 1992 and again in 1995. Each negotiation has led to lower prices and more services available under the program.

The MiCTA program for long distance services uses the concept of a virtual private network. Most MiCTA members are connected directly to the long distance provider via a T-1(s) circuit. This gives the MiCTA member access to a multitude of services. Highlights of the program are as follows:

- Significant discounts on all outgoing services
- Significant discounts on incoming 800 services
- Significant discounts on international services
- Significant discounts on calling card services
• Significant special commissions for 0+ calls
• Significant special commissions for vendor resale services
• Significant special commissions for direct termination
• Switched 56kbps data and video at voice rates
• Reduced cost T-1 access charges
• No initial setup or installation charges
• No contract to sign (30 days and out)

The rates on the program are available to MiCTA members of any size, including K-12’s. While some of the largest universities might be able to negotiate rates that approach these on their own, the majority of institutions would never be able to get comparable rates. The biggest advantage to the largest universities has come as a result of the majority of schools being on the same virtual private network, thereby greatly increasing the volume of on-net traffic, which is priced at very low rates. Consequently, this reduces the overall rates to these largest universities to a level that even they would not be able to achieve on their own.

The rates negotiated included dial-up data as well as voice. The rate for switched 56 Kbps voice/data for on-net traffic was initially 1.7 cents per minute. This led MiCTA to pursue another project that has resulted in a distance learning network, revenue and other benefits to its members. We felt that the low rates would make dial-up two-way interactive video feasible. We formed a video task force to investigate the issue in November 1989.

The task force introduced compressed video concepts to the MiCTA membership in January 1990. Two dial-up Switched 56 circuits were used to place a switched call to Sprint’s Meeting Channel. This was followed in April 1990 by a trial of PictureTel’s codec at the University of Michigan. In the Fall 1990, AT&T and Pierce-Phelps conducted compressed video trials at the University of Michigan, Western Michigan University and North Central Michigan College. The locations were connected by nailed-up T-1 circuits. The trial confirmed that the quality of T-1 based compressed video was acceptable for distance learning applications.

In January 1991, the task force developed recommendations for standards on equipment and classrooms and issued a report to the MiCTA membership. The membership used the report as a basis for creation of network policies and standards. MiCTA agreed to two main principals. Instruction would be delivered at half T-1 (12 circuits or 672 Kbps bandwidth) using the CCITT (now ITU-TSS) H.261 video algorithm (H.320 overall standard). These principals were extremely important to assure that all locations would be able to interoperate and would be able to do so at a reasonable cost.
During February and March 1991, MiCTA partnered with AT&T to conduct a survey to determine the video needs of MiCTA members. MiCTA solicited for and received letters of intent from 35 colleges and universities. This was important as it helped support our claim that a dial-up compressed video service was a viable one from the point of view of the vendors. The next several months included visits to vendors and classroom sites throughout the United States in order to assimilate the knowledge and information necessary to develop a quality RFI.

In November 1991 MiCTA issued a compressed video network RFI specifying CCITT H.261 algorithm, both common intermediate format (CIF) and quarter common intermediate format (QCIF) at 30Hz (30 frames per second), and 672 Kbps bandwidth transmission. Room designs were included in the RFI specifying half T-1 utilization for classrooms and quarter T-1 utilization and below for video conferencing. The RFI called for the statewide, dial-up, compressed, video/distance education program to be carried via our virtual private network.

The RFI was analyzed in February 1992. MiCTA involved the Michigan Association of College and University Purchasing Administrators (MACUPA) to ensure that the process followed state and federal regulations and that MACUPA would accept the process. This was important, as it allows any Michigan college or university to bypass the usual bidding process and simply specify that voice, data and video products and services be purchased from the MiCTA agreements. Sprint was endorsed for the transmission network. GPT/British Telecom were approved for the codec and two vendors were selected for classroom/conference room designs.

MiCTA tests and evaluates equipment from vendors on an ongoing basis. Since our original selection of GPT/British Telecom, we have approved CLI, NEC, VTEL and PictureTel codecs for use on the network. Codecs from other manufacturers are currently under evaluation. Also, additional systems integrators have been approved.

The RFI and subsequent negotiations resulted in significant savings in hardware, design, and integration services. As a result of all Michigan colleges and universities agreeing to meet the standards, everyone can dial-up all other locations directly without going through a service bureau. This has resulted in very low cost video. The cost for transport of the interactive video is currently 1.8 cents per minute per channel for all time periods. For distance learning, all Michigan colleges and universities have agreed to use half T-1 (12 channels). This results in a cost of $12.96 per hour. This cost is very reasonable, and with the absence of any other land-based statewide-network in Michigan, it is indeed the only way low cost two-way interactive video is presently possible on a statewide basis. Also, these video rooms can be placed anywhere that the switched public network goes, which is virtually everywhere worldwide.

The first worldwide half T-1 switched video call was made from Central Michigan University to the University of Michigan in August 1992. Since then the MiCTA network has grown to:

- 60 Switched dial-up video rooms
- 3 multi-point bridges
- expanded to 12 states through MHEC
- expanded to several other states via extended learning programs
- added international rooms

For other than distance learning applications, the rate for dial-up 112 Kbps video using this arrangement is $2.16 per hour. This has allowed us to market the service (where permitted by law) to students, student organizations, faculty and staff, and others in the community. The low cost allows for significant excess revenues.

Below is a map of MiCTA's video locations:
MiCTA has been in the forefront of the development of two-way interactive video for distance learning applications. Among our accomplishments in this area are:

- first to dial-up half T-1 compressed video
- first to connect remote analog fiber systems via compressed link
- first to interoperate with satellite uplink systems
- first to interoperate with CATV systems
- first to interoperate with microwave systems

MiCTA recognizes that our environment is continuously changing, and there will be a need to upgrade our network in the future. With this in mind, we have arranged for an ATM trial with GTE, partnering with Sprint and MichNet (and possibly a hardware manufacturer, unknown at the time of the deadline for this article). We hope to test jpeg, mpeg and mpeg-2 during this trial.

In 1992, MiCTA was asked by the Midwestern Higher Education Commission (MHEC) to develop programs similar to our virtual private network and our video network on behalf of the commission. MHEC consists of nine states in the Midwest -- Indiana, Illinois, Kansas, Michigan, Minnesota, Missouri, Nebraska, Ohio, and Wisconsin. MHEC formed a telecommunications committee that took MiCTA's basic concepts and expanded the scope to the nine MHEC member states. The MHEC negotiations, having a much larger base, resulted in even lower hardware and
In February of 1996, MHEC contacted MiCTA to request that we negotiate a virtual private network arrangement for them. They indicated that they were forming an alliance with the North Central Regional Education Laboratory (NCREL) and would like us to include K-12 school districts throughout the nine state MHEC area. They also asked us to include the three additional MHEC eligible states of Iowa, North Dakota and South Dakota. MiCTA agreed and negotiations with Sprint (our endorsed carrier) to amend our current MiCTA virtual network agreement began in mid 1996.

MiCTA amended its bylaws at the Fall 1996 conference to allow for college, university and K-12 districts from outside of Michigan to become members. In December 1996, the MiCTA/Sprint agreement was amended to include the entire 12 state area. The rates negotiated are very good. In some cases they represent reductions of about 75% over the previous MHEC agreement. The new MiCTA/MHEC/NCREL program is just beginning to be rolled out. Early indications are that it will be a great success.

MiCTA has developed strategic partnerships to help develop the programs we have available. Among them are:

- **IXC networks.** Negotiations through the RFI process have brought about strategic alliances with AT&T, MCI, LCI and Sprint. Sprint is MiCTA's endorsed vendor for voice, data and video through July 1998.
- **LEC networks.** We continue to work with Ameritech and GTE for network products.
- **Data networks.** MiCTA has partnered with MichNet (MERIT) and Sprint to provide connectivity to the Internet. MichNet is our approved ISP vendor through July 1998.
- **Codec manufacturers.** MiCTA continues to conduct inter-operability tests to ensure connectivity and to ensure backwards compatibility.
- **Other hardware and software manufacturers.**

MiCTA has developed relationships with "sister" organizations and governmental entities to help deliver these programs. Among them are:

- **MHEC**
- **State of Michigan**
- **Michigan Information Network (MIN)**
- **Legislators regarding telecommunications law**
- **regulators regarding tariff changes and interpretation**
- **MichNet (MERIT)**
- **Michigan Community College Association (MCCA)**
- **State and regional organizations:**
  - **ETOM**
  - **MADL**
  - **Michigan Department of Education & Department of Management and Budget**
  - **Regional Medical Emergency Consortium and other hospital groups**
  - **Libraries**
  - **Michigan Association of College and University Purchasing Administrators (MACUPA)**
  - **Funding organizations such as:**
    - **The Kellogg Foundation**
    - **Ameritech**
MiCTA will continue to pursue partnerships in a wide range of areas. Our efforts have shown that the power exercised by educational institutions joining together can greatly influence the development, cost, and quality of products and services available to all of us.