F. DAVIS INSTITUTIONAL NETWORK (I-NET)

OVERVIEW

A summary of the issues and problems indicated by an analysis of the current institutional networking in Davis appears in Chart F1 on the page that follows.

> Institutional Network Definition
> An institutional network (I-Net) is a communications network primarily designed to serve non-residential users. The Davis Cable Ordinance (8B.01.210) defines an "Institutional Network" to mean: "*a communications network financed, constructed and/or operated by the operator of a cable communications system that is available for the use of city and other local agencies."* In many communities, cable operators construct "institutional networks."

An I-Net typically links community institutions together through a network backbone. Community institutions in Davis include the school district (DJUSD) and all of its facilities (schools), the University of California, Davis campus and their remote (off-campus) sites within the city, other educational institutions, the City of Davis and all of its public facilities, other governmental agencies in Davis: e.g., USDA and Yolo County (county offices and Davis library), and designated non-profit agencies.

Building a Davis I-Net is possible because as the cable franchisee physically rebuilds their existing aging cable system with more advanced systems, the community can request additional capacity be installed. (Other sections of this preliminary report on community needs have demonstrated the need for a rebuild of the cable system in Davis.) The incremental costs of providing additional capacity for an I-Net are minimal when installed as part of a cable system rebuild. As the cable company opens up the streets to run new cable lines they can also run additional fiber lines for use by the community. This additional capacity (the strands of fiber, and the equipment to use them), allows for voice, video, or high-speed data links between facilities. The fiber links also allow for more reliable and secure links between facilities and acts as the network backbone, which allows PEG users to link their facilities together.

The remaining sections of this chapter describe the legal basis for requiring an I-Net, the community need for an I-Net, as well as the community's general and specific I-Net needs and goals. Some potential solutions are proposed, however, it is expected that the cable franchisee will work with the appropriate staff to define the technical specifications based on the franchisee's rebuild plans.

The following documents are appended to this chapter.

Appendix F-1	I-Net Needs of Various Davis Groups
Appendix F-2	City of Davis Major Facilities Site List
Appendix F-3	City of Davis Non-Profit Affiliated Sites
Appendix F-4	DJUSD I-Net Sites
Appendix F-5	All City of Davis Sites

Chart F1: Issues and Problems

Issues	Problems
Budget cuts	Local government agencies are facing increasing budget pressures; city can't be expected to meet PEG and I-Net needs on its own
Government training	Government needs to have efficient-training; video programming need to expanded
Educational training	Schools need high speed access to the world, other schools, and other local institutions in order to offer basic and advanced information systems curriculum.
Origination	Signals only originate from a small number of locations while significant community events originate in many locations
Past performance	The cable company failed in adequate maintenance of the system.
PEG demand	PEG services are not able to meet public demand for service.

LEGAL BASIS FOR REQUIRING INSTALLATION OF AN I-NET

The cable franchising process allows local franchising authorities to require institutional networks as part of cable franchise agreements and to provide capacity on these networks for public, educational and government use. The Cable Act specifically allows the City to establish the following requirements in a request for renewal proposals:

(1) "*that channel capacity be designated for public, educational or government use, and channel capacity on institutional networks be designated for educational or governmental use, and may require rules and procedures for the use of channel capacity designated…*" 47 U.S.C. S.531(b).

(2) "*for facilities and equipment*." The legislative history explains that this includes requirements for institutional networks, studios, equipment for public, educational and government use, two-way networks, and so on. 57 U.S.C. S.544.

In addition, the previous franchise agreement required the installation of an institutional network in Davis, that has not yet been installed (Ordinance No. 1483 Section 32.). Furthermore, the Davis Cable Ordinance states that:

"*A Franchise may include provisions under which a Franchisee will construct an Institutional Network, which may be owned in whole or in part by the City or the Franchisee. The City may acquire any portions of an I-Net owned by a Franchise pursuant to Section 8B.02.0230. A Franchise may also include provisions for support of PEG access. Such public benefits constitute part of the rent or compensation paid by a Franchisee to the City in return for the right to occupy the public rights-of-way……*."(8B.03.150 Public Benefits)

The Cable Ordinance contains additional provision for an institutional network under the Application for …Renewal Franchise section (8B.03.030) as follows:

(d) "*In determining whether to grant an initial franchise or renew a franchise, city may consider*:"

(1) "*In the case of an applicant for renewal, whether the applicant has substantially complied with the applicable law and the material terms of any existing cable franchise ordinance…*"

(7) "*…whether the applicant has proposed to provide adequate facilities, equipment, channels and other support for PEG use (which includes institutional network use, pursuant to section 8B.01.020) of the cable system,….*"

The Cable Ordinance identifies the content of the application to include:

(b) "*….any application for an initial or renewal franchise must describe in detail the cable system that the applicant proposes to build or maintain…set out the system construction*

or rebuild schedule, and show that the applicant will provide adequate channels, facilities and other support for public, educational and government use (including institutional network use) of the cable system…" (8B.03.020)

Finally, the Cable Ordinance addresses the need for "interconnection" with other cable systems in order to provide, among others, an institutional network:

(b) "*Upon request of city, every cable communications system shall be required to interconnect with every other cable communications system within city, or adjacent to city, on fair and reasonable terms for purposes of providing public, educational, and governmental and institutional network services. In the event of a dispute, the city manager may issue an order establishing the terms and conditions under which interconnection shall occur, and any franchisee shall comply with the order.*" (8B.02.150)

THE NEED FOR AN INSTITUTIONAL NETWORK IN DAVIS

There is a need for an extensive community I-Net in Davis. The need for such an I-Net has been identified by the Telecommunications Task Force, by respondents in the various surveys conducted for this preliminary report on community needs, by the focus group workshops, and in the various strategic planning documents reviewed for this preliminary report on community needs. They all confirm the need for connectivity between and among governmental buildings, school buildings, community non-profit organizations, and major community performance and meeting venues that can best be met with a network of connections within the cable system.

Local governments, schools and public gathering places are important assets in any community; legislation concerning local affairs is debated at City Hall, counties handle vital property tax services; schools educate our children; concert halls and performing arts facilities keep our cultural traditions alive and growing. These public “institutions” have their own specific needs in terms of a cable TV system. For instance, the Davis Joint Unified School District (DJUSD) has a critical need to connect local schools to the I-Net for educational, public safety and managerial purposes. The City of Davis has a critical need to connect all city facilities to the I-Net for public safety, operational and managerial purposes, especially those facilities that are not currently connected to the city's internal fiber optic network. The clearest need is for public institution locations to be connected with one another to promote public access to information and programs produced by these institutions.

The city is home to numerous “PEG institutions” with I-Net connection needs. These include municipal and county government offices and facilities, several private educational institutions, private and public performing and visual arts facilities, and community meeting facilities. There are also public educational institutions, including approximately 16 public school buildings in the Davis Joint Unified School District, the main campus of the University of California at Davis, and a satellite campus of Sacramento City College of the Los Rios Community College District. Further, Davis is home to a USDA regional office building, and offices of the Army Corps of Engineers, the Yolo/Solano Air Quality Management District and Yolo County. Some

sites, including remote UCD facilities (i.e., off-campus but within the city), have meeting spaces with video origination needs that make them important potential I-Net sites.

An I-Net would serve to connect all of Davis' PEG facilities and community venues and governmental sites to the headend and to each other for video and other forms of communication. These upgraded transmission capabilities should include digital and direct optical connections and should be adaptable and expandable. Furthermore, the system should be as transparent as possible in that once a user has access to a transmission path, the user should not require the operator's cooperation to bring in or transmit a particular application.

The proposed I-Net will also need to provide certain city-affiliated groups with I-Net connections at selected sites throughout the city. These would be full Internet peers, with the equipment necessary to make their connection to the I-Net functional, not just wire from the wall. Some sites will require bi-directional video capability. These groups are mostly non-profit organizations that work closely with the City of Davis in the provision of local government services (municipal and social services) to Davis residents. It is anticipated that a handful of these city-affiliated or non-profits groups with I-Net connections will require free access to Internet cable service. However, in order to better utilize this access the groups will need to work with a non-city agency or agencies to help determine their needs and design their systems. Such a role would be similar to the functions DCTV or DCN currently play in the community.

Davis PEG users need an I-Net that is available in all areas of the community to a changing configuration of users. The network should be able to both transmit and receive video and data information at any participating location. Specifically, Davis PEG users need advanced I-Net services with transmission capacity sufficient to allow broadband, configurable bandwidth, bi-directional access for all schools, government buildings, emergency services, libraries, public recreation centers, social service agencies, cultural and performance venues, community meeting rooms, and government research and development sites. In other words, Davis needs a flexible I-Net that can be adaptable enough to accommodate the changing locations and needs of users. Appendix F-1to this document lists the I-Net needs of various Davis groups. Appendix F-3 lists the I-Net needs of community non-profit organizations. Appendix F-4 lists specific I-Net connections requested by educational access channel representatives.

Among many community benefits, this kind of I-Net would make it possible for PEG programmers to present live programming of the widest community interest. For example, if PEG programmers can transmit video from venues such as the Davis Veterans' Memorial and Varsity Theaters, and DJUSD facilities, major cultural events can be televised live. Similarly, a live feed connection to the county system in Davis would allow "real time" coverage of election results and other Yolo County government business, such as Board of Supervisors' meetings. Interconnection to the University's cable system will permit live coverage of cultural events at the Mondavi Center for the Performing Arts. The community has stressed the importance of having all community cultural facilities included in the I-Net.

Additional applications of such a network are many: town meetings, community polling, interactive seminars, and community events could all be televised live. Some cities have applied I-Net technology to create "virtual city halls." Davis citizens have historically been very involved with their local governments, and there is an increasing need to provide information

and channels of communication between citizens and their local and regional governments. Therefore, Davis needs an I-Net that will allow its citizens, through PEG programming providers, to access government meetings, services and information in order to foster the maximum public understanding of and involvement in the public process.

Likewise, I-Net communications are important for internal government operations. For example, a network of high capacity connections could allow for remote TV monitoring of traffic patterns and conditions. If all fire stations were linked together, emergency personnel could be trained without removing them from service or interfering with their ability to respond to any emergency which might occur during training. Similarly, City of Davis department heads believe that city operations would benefit from having all city office facilities connected for the exchange of video and text information.

The Davis Public Library (operated by Yolo County), has specific I-Net needs. In order for the library to better serve as an information exchange center for the community it requires a cable system with I-Net capability. Desired applications include the use of library rooms as shared citywide meeting rooms for two-way video conferencing purposes. For example, a reading of children's stories might take place at the library, but be viewed remotely at all other public, educational, or social service facilities using the network. This same video link could also provide local cable television access programming. An I-Net link to the library would allow the City and County to provide such services internally, thereby maximizing municipal resources.

The City of Davis has built a limited city-owned internal fiber optic network, primarily for ATM-based data transmission. This municipal network mainly supports the interconnection of the city's data processing system among the dispersed city office locations. Seventeen major city sites have been connected but there is a need for the eventual connection of up to 74 other locations for a total of 91 sites. See Appendix F-2 for a list of the 17 major facilities currently connected and Appendix F-5 for a list of all municipal sites that should be included in an I-Net. Selected pieces of these networks could potentially connect to or complement a community-wide cable TV I-Net.

The City of Davis' telecommunications service needs require expansion beyond the present traditional data network services and include interactive two-way video and telephone applications. Other traditional communications services such as traffic signaling, utility telemetry, and public building environmental control systems are logical candidate applications for the citywide network. In addition, many of these same applications are logical candidates for connecting all DJUSD facilities to a citywide I-Net. However, a larger system will have to be in place to meet these and future needs.

In order to be useful to PEG and governmental users, the I-Net must be available throughout the community to adapt to a changing variety of meeting and performance venues and changes and reconfigurations of PEG and institutional user facilities. The need to adapt to changing locations of users and events suggests that the I-Net should also allow for flexible program origination via the Internet and mobile sources such as wireless data and video devices, as well as adapting to future or changing technology delivery systems. For example, I-Net fiber optic lines should extend throughout the community and terminate in "nodes" which could be connected by

wireless transmitters/receivers to meetings, training activities, performances or other events taking place anywhere within the range of a particular "node." Another example of the need for flexible and mobile connections to the I-Net is the stated need of the Davis Police and Fire Departments to initiate two-way communication from the scene of an emergency through a wireless link.

If an I-Net is not in place, local public agencies cannot transmit from remote sites without such a backbone. Local public agencies cannot do many of the enhanced services and upgrades with PEG that have been identified as needs by the community without the requisite backbone.

Each cable operator must be required either to participate in a single city institutional network, as described in the Appendix (F-1 through F-5), or to provide all facilities and equipment necessary to link city-owned facilities and other public buildings (including schools, libraries, public safety facilities, performance venues, and others, detailed on schedules one through three) via a reliable and secure institutional network.

There is a need and interest that the network be constructed, operated and maintained to ensure that there is a clearly defined standard for quality and availability. Responsibilities for maintenance and operation need to be clearly defined, particularly if fiber from multiple operators will need to be coordinated. The City of Davis must be able to determine the source of any network problems, and have those problems corrected promptly, given the nature of the services the network is used to provide.

METHODOLOGY

The community needs identified in this section were ascertained through consultation with other agencies including the DJUSD, DCN, DCTV, and UCD, as well as from the work of the Telecommunications Task Force. Information on I-Net needs was also drawn from various strategic planning documents and other written information submitted to the City of Davis by many local non-profit organizations. A community I-Net was also identified as a community need by the focus groups, the Telecommunications Task Force, and through the various surveys.

DAVIS I-NET GOALS

The community has identified nine goals for the creation of a Davis I-Net. These are captured below, first in a list, and then followed by a more detailed explanation of each of the nine goals.

1. To provide new links between government agencies that would:
    a. increase functionality between entities
    b. allow for future sharing of resources between entities
    c. be economically feasible
2. Upgrade current City, DJUSD and UCD infrastructures
    a. especially for city public safety sites
    b. greater capability
    c. cost savings

3. Provide the infrastructure necessary for PEG uses
4. Enhance DJUSD and City services
5. Integrate School District, UCD, and Governmental Systems
6. Provide for public access through city affiliated non-profit centers
7. Anticipate future needs
8. Reduce recurring costs
9. Incorporate UCD needs

Goal 1: New Ways of Linking Together

Current systems are designed around slow, expensive data links that limit the way and the locations that information can be used, accessed, or shared. High-speed links between sites will allow for direct access to information, which in turn allows for better sharing, partnering, and consistency. Such an I-Net would be far too costly to install by one institution. Installation costs are significantly reduced when incorporated into a cable system rebuild.

Goal 2: Upgrade Current Infrastructures (City, DJUSD and UCD)

DJUSD facilities are internally wired in a manner that would accommodate an I-Net, however, the facilities are not currently linked to one another adequately. This significantly restricts their ability to access and share information. Connectivity through T1 lines is costly and out of date. The District Technology Plan envisions a fiber backbone infrastructure connecting all the schools, district administrative sites, City of Davis offices and the University of Davis that would provide a high-speed and superior capacity schools network.

The City of Davis internal network is a combination of connectivity tools. Some sites are connected via fiber while others are using T1s. Not all city facilities are connected to the internal network. Some sites have only a single copper phone line that is not even connected to the city phone system, while other sites have no connection at all.

A. Public Safety Communications

A good public safety system has built in security and redundancy, high-speed access permitting real time exchanges of information, and an emergency notification system. Davis' public safety and emergency response officials believe that there is a need for improved warning systems, redundancy and higher access speeds, and greater security and reliability of automated systems in Davis. Increased ability to notify citizens through modern telecommunications systems, such as cable television, telephone messaging alerts, Internet and e-mail announcements, would enhance the city's opportunities to disseminate emergency messages in the most timely and critical fashion.

- Emergency Notification System
  Because Davis is physically separate and isolated from its nearest neighbors (a minimum of 10 miles of agricultural land surrounds the city on all sides), it is important that Davis officials be able to send emergency announcements unique to Davis, by means separate from communications systems serving Sacramento and other surrounding cities. Increased ability to notify citizens through modern telecommunications systems, such as cable television, telephone messaging alerts,

Internet and e-mail announcements, would enhance the City of Davis' opportunities to disseminate emergency messages in the most timely and critical fashion.

Connecting County OES and the National Weather Service data and forecasting centers to City emergency operations locations could significantly improve information available to emergency planners and assist in accurately notifying the public concerning weather emergencies. Such inter-agency connections could be accomplished via the I-Net through compliance with the interconnectivity requirements in the Davis Cable Ordinance (discussed under, B. Legal Basis for Requiring Installation of an I-Net, above).

Davis needs an emergency alert system that can be directly activated by local officials and that allows those officials to override all video and audio channels -- including local access (PEG) channels.

The system should be capable of allowing local authorized officials to send prerecorded messages and live voice messages over all cable channels and should permit authorized officials to replace video on all channels with a text message. It should also allow authorized officials to transmit emergency text and video messages in several languages. The system needs to be designed so that authorized officials can activate the emergency alert system using a touch tone phone from city public safety buildings or from remote locations. It must include security features to prevent activation of the system by unauthorized persons. The override system should be designed so that, during an emergency, cable system operators do not need to take any action before local officials can activate and use the system. Also, the system should be capable of triggering pre-recorded text-based messages on cable TV to direct viewers to take predetermined emergency response actions.

Because it is likely that an emergency, such as flooding or fire, will affect specific areas of the community and not others, it would be preferable to have an emergency alert system that could “target” specific regions of Davis.

While the system should be capable of activation in Davis separately from other operator alert systems, the system must be configured to allow participation in the national emergency broadcast system and must allow for alerts related to regional emergencies.

- Need Redundancy and higher access speeds.
  The City of Davis currently relies on SBC and Yolo County Telecommunications for linking most public safety sites. New I-Net links to all these facilities will allow for higher speed access between public safety sites giving staff access to real time information. In addition, DJUSD needs redundancy and higher access speeds. They currently rely on SBC T1 lines. Higher speed access allows employees better telecommunication links.

- Security and reliability/redundancy
  These new links will become the primary method for sites to communicate with one another. The current infrastructure can be consolidated and made available as a backup system. This allows for the creation of a redundant system, adding another level of protection for public safety systems able to communicate with staff at all sites.

B. Increase in Abilities

An upgraded and fully connected infrastructure will provide greater capability than currently exists, including point-to-point, multi-cast video and audio capability. There is a need to transmit audio and video from point-to-point and to multi-cast audio and video. This greater capability will improve access, provide time and cost efficiencies and increase the ability of staff to perform their daily tasks. Areas that will see greater capability include:

1) Improved Training Abilities:
   - Currently, the DJUSD has the need to transmit classes from one school to another, an I-Net will enable them to do so. They may utilize PEG facilities and equipment in concert with an enhanced I-Net for this capability.
   - The DJUSD needs to be able to develop information systems curriculum based on using high speed broadband links between students and other facilities.
   - The City of Davis Fire Department currently has the need to telecast live video from one station to the other stations as part of its overall training program. This would reduce the impact training has on staffing coverage. Utilization of PEG facilities and equipment in concert with an enhanced I-Net would provide for this capability.
2) Higher speed access will enable better use of telecommunication links from schools, city sites, and telecommuting sites (homes).
3) An I-Net will allow smaller sites (like pools and remote offices) to have better access to automated systems, and in many cases it will allow access for the first time.
4) On-Demand Capability. The I-Net should provide streaming and training on-demand multi-cast capability to meet the needs of the City of Davis, DJUSD and UCD. Staff training is more cost effective when the training sessions can be accessed on-demand.
5) DJUSD needs to provide access to projects, services and learning resources that require high bandwidth such as: scientific research, in-depth shared database work, international sister school meetings, online course offerings, national and international cooperative projects, and national, state and international educational meetings.

C. Cost Savings

An I-Net will enable the City of Davis to shift its access to automated systems or a more cost-effective network infrastructure than currently exists. In fact, an I-Net will permit the

City and the DJUSD to expand their use of automated systems, which require such a network backbone to implement. It is further likely that DJUSD would be able to leverage state and federal funding aimed at computer access to schools once an effective, comprehensive connection between the schools and the district is established. The cable company can install an I-Net, upgrade the infrastructure and add capacity at the same time they do their system rebuild at minimal incremental cost. It would be cost prohibitive for the City of Davis, the District, or UCD to build the infrastructure necessary to independently install such a network backbone.

In addition, shifting from SBC access to use of the I-Net for data and telecommunications lines for certain city and district connections would result in a cost saving for these public agencies for those shifted connections.

Goal 3: Provide the infrastructure necessary for PEG uses

In order for the PEG systems to link together and throughout the city the I-Net infrastructure must be in place. This infrastructure provides the backbone necessary for the schools, the school district, and the university and city facilities to share resources, systems and information throughout the city by linking to other systems or facilities. Without this infrastructure, PEG users (City, DJUSD, UCD) could not send and receive video, add drop points, or provide the ability to broadcast or transmit to and from multiple and/or remote locations.

Goal 4: Enhanced Services

Simply by virtue of being connected to the I-Net infrastructure as envisioned in this document, the City of Davis, DJUSD, and affiliated agencies will be able to provide an enhanced level of service to the community.

A. COMMUNICATION AND CONTROL

Links to remote sites with automated systems would enable communication between city offices, school district offices and their respective automated systems. Such communication would permit remote control and monitoring of the automated systems and the remote sites. The following are just a few examples of the enhanced services that such infrastructure links would provide to the City and/or the School District:

- Well/Pump Sites: It would also provide a backup to the current wireless system.
- Street Signals: It would also provide for backup or replacement of current systems.
- Fire Alarm Systems.
- Energy Management Systems.
- Building Security.
- Ball Field Lighting Control: Allow centralized control.
- Irrigation Control Systems.

B. PUBLIC KIOSKS TO ACCESS COMMUNITY INFORMATION

An I-Net infrastructure will enable the placement of public kiosks at locations where people normally meet and congregate such as government offices, community centers and

commercial sites. Kiosks linked to the I-Net will allow the public access to a wider range of community services and information at many more sites than are currently available.

Goal 5: Integrate/Interconnect Governmental Systems

An I-Net will link up schools, DJUSD sites and UCD, city, county, state, and federal offices, which will facilitate the sharing of information/systems. The City of Davis is currently linked to Yolo County offices via several relatively slow T1 lines for the public safety systems. An I-Net would permit the integration of all governmental systems, not just a select few limited by cost. The City of Davis and UCD could link to the I-Net at the International House (I-House), as UCD currently links to this location which is within the city limits.

Goal 6: Provide Public Access

One of the major advantages of an I-Net is the ability to provide access to the Internet and city systems from public facilities and other local community service locations at no (or minimal) cost for those who may not have access to these emerging technologies. This is especially important as the city provides more and more information on-line because there is an increasing public demand for access by those without a personal computer or cable access. This need for alternative access is more critical for those on fixed incomes. This goal would be minimally met through public kiosks and free access for local non-profit organizations as follows:

A. ENSURE THAT ALL PUBLIC FACILITIES HAVE A KIOSK LINKED TO THE INTERNET

This will allow the public additional sites to access the Internet. The city currently has a few "kiosks" at public facilities for general access. These have proven to be very popular and demand for the service is high.

B. PROVIDE ACCESS TO THE INTERNET FOR A MINIMUM OF 25 NON-PROFIT COMMUNITY GROUPS AFFILIATED WITH THE CITY OF DAVIS

- This will provide access for their participants who may not have any other means of access.
- It will allow community groups to more effectively communicate to their members or gather information necessary to perform their roles: including providing aid, support, job information, training and general information to citizens, potential clients and their constituencies.

Goal 7: Anticipate Future Needs

The I-Net must be designed to anticipate future community needs. These likely will include the capability for information on demand, access to the I-Net by and for all local non-profit organizations and continuing integration of governmental, educational and social service systems. The public does not always know who provides what service, but if systems were better integrated it would not matter; quick access to the provider of a specific service would appear seamless.

For example, the Davis community has considered creating a municipal power utility. An increasingly dynamic I-Net would provide such an entity the ability to read meters remotely. In addition, the one thing we know for certain is that there will always be new ways of doing

business. The I-Net must anticipate these types of changes and be able to meet the demands created by them. Future needs may also include:

- The ability to access city systems from any city facility rather than limit staff to current City of Davis major sites.
- Sharing databases between entities.
- Sharing resources between entities.

Goal 8: Reduce Recurring Costs

The existing data systems throughout the community are currently paying for links between facilities, entities, and organizations. These costs are relatively low for each link but because there are hundreds of these links being paid for over years of time they become an enormous burden. An I-Net would reduce, possibly eliminate, these recurring costs. In addition, the City of Davis utilizes a courier service, making two trips or rounds to all facilities daily. An I-Net with bi-directional audio and video and improved data transfer capabilities may reduce the number of stops or rounds cutting overall costs.

The City of Davis utilizes the advantages of an I-Net on a small scale now through their internal computer network. Expansion of this use through installation of an I-Net would be prudent in the current environment of continually reduced resources.

The fiscal realities of today and into the foreseeable future require public institutions to be more efficient and do more or provide greater services with fewer expenses. Installation of an I-Net through the cable franchise process will enable Davis public institutions to become more efficient and reduce costs now. The alternative is to implement an I-Net piecemeal over time and at much higher costs.

Goal 9: Provide for UCD Needs

Access to UCD's campus network from entities within the city currently requires that the network traffic transit the commodity Internet. UCD is interested in making use of the I-Net itself to bypass the commodity Internet in communicating with municipal and community affiliations, thus improving performance and reducing Internet costs. This would require a direct connection between the campus network and the I-Net.

In a similar fashion, UCD seeks a direct connection (referred to as "peering") between the campus network and the cable provider's Internet backbone for the exchange of traffic strictly between those entities. This will provide improved performance to the cable provider's Internet subscribers, and lower Internet costs for both UCD and the cable provider.

Additionally, there is a need for the University to gain high-speed access to its remote sites (i.e., UCD sites that are off-campus, but inside the city limits). For low to moderate capacity demands, this can be accomplished via the I-Net. For those locations that require extraordinarily high capacity, direct use of fiber optic cabling would be required.

DESIGN OF THE I-NET

PROPOSED I-NET COMPONENTS

The following components are required in order for the proposed I-Net to meet these stated goals:

- Provide multiple-strands of fiber to each designated location for data access.
- Provide the ability for bi-directional audio and video at designated locations.
- Provide links between DJUSD facilities for use by the DJUSD as an extension of the current DJUSD network.
- Provide links between City, DJUSD facilities, UCD, the Davis Public Library (County library) and all I-Net partners or key affiliates, e.g., DCN, other public agencies, local non-profit organizations.
- Provide links to all city/school public facilities.
- Provide for community accounts to access the Internet (free link equipment and service).
- Provide for links to city/private kiosk locations to the Internet (free link equipment and service).
- Provide links to UCD "remote" facilities (i.e. within the city limits).

POSSIBLE INSTALLATION MODELS

1. All designated facilities would have a minimum of 3 pairs of single mode fiber strands run to them from a central hub site.
2. All primary designated facilities would have at least 3 pairs of fiber strands run to them from a central site. All secondary facilities would be provided with high speed Internet access which would allow for links back to the appropriate networks via the public backbone of the Internet.

MAJOR I-NET COMPONENTS

There are six major components to the Davis I-Net as envisioned above:

1. It must link City of Davis facilities to other City of Davis facilities. The I-Net establishes the physical link, using city-owned equipment.
2. It must link DJUSD facilities to other DJUSD facilities.
3. The I-Net must include access for non-profits. It should allow a certain number of high speed Internet access links to be designated as non-profit links which would be assigned by the City of Davis.
4. Allow linkage of governmental agencies. This includes Yolo County links within the city, links to other local government agencies, and links to DJUSD and UCD.

5. Public kiosk links via the I-Net. Allow the City of Davis to establish kiosks which allow the public to access city services from commercial sites.
6. Link facilities and infrastructure, such as well and pump monitors and controls, street signal lighting, irrigation controls, security systems, energy management systems, building/site security, and fire alarms.

I-NET ISSUES

Several issues require further discussion to determine additional I-Net design and installation components.

- What defines access?
- What defines high speed, now and in the future?
- Should the architecture be open or limited?
- Need to address the high cost of ongoing equipment. Should the I-Net provide the physical link using our equipment or provide a virtual link through the cable provider's network and equipment?
- Should there be a centralized "hub" location? If so, by whom should it be operated? How will it be funded? One of the goals stated in the MOU between the City of Davis and DCN is to facilitate the sharing of information and systems throughout the community.
- Determine what type of fiber to lay - dark fiber vs. lit fiber. Costs are high for dark fiber due to the need for equipment at both ends but the City of Davis would retain control of the fiber. This leads to the question of who maintains the fiber and makes repairs when there are breaks. On the other hand, lit fiber has minimal costs to the city but the City of Davis has no control over the links, which raises security issues.
- How is access determined (how many drops and which community groups would get access) and how will installation be carried out?
- Develop a peering network that allows local traffic to remain local and not have to access outside systems and maintain access to local portals.

A MODEL

There is so much capability that an I-Net can provide. The following vision shows one possible model of just how such a network would look in the City of Davis.

The City of Davis I-Net

There is an I-Net in place, linking up governmental agencies onto a common backbone. Each agency has routers and firewalls in place to insure security. The I-Net would be a separate network put in place by the franchise holder and used by the partner agencies for any need that did not compete with the franchisee for intra- and inter- agency links. At first, these faster links would allow the linking of the public safety system to more reliable and less costly (than existing) data circuits. In the future these links would be used to share data and systems between agencies where appropriate. All I-Net components would be linked to a

central office where a non-profit organization (perhaps one like DCN), or a governmental agency would be responsible to insure the equipment and the appropriate cross connects are in place. These links would allow the direct linking of partnering agencies. Funds for shared equipment would come from the revenues collected, as part of the franchise agreement and the costs would be paid for by the franchisee. If a non-profit entity coordinates the I-Net network, perhaps the I-Net could help fund the organization's costs to do so.

This central office would also coordinate the hookup of local non-profit community groups. These free links to the Internet would be provided for in the franchise agreement and would use the same method of access provided by the franchise holder to regular home/small business customers. This would allow small non-profit community serving groups to have access to the Internet at a low/or no cost (these entities would still need equipment - computer and cable modem to use the link).

The following is a summary of the problems discussed in this Section and the needs indicated by each of the issues and problems:

(See Chart F2 on the following page.)

Chart F1: Issues, Problems and Needs

Issues	Problems	Needs
Budget cuts	Local government agencies are facing increasing budget pressures; city can't be expected to meet PEG and I-Net needs on its own	There is a need to reduce costs for installation of high-speed links between government and key community sites to achieve feasibility.
		There is a need to achieve cost savings in government through a greater shift to automated systems or to a more cost-effective network infrastructure than currently exists.
		There is a need to reduce or eliminate recurring costs for hundreds of separate data and communications system links by combining into a single I-Net backbone.
Government training	Government needs to have efficient-training; video programming need to expanded	I-Net: An Institutional Network connects government, educational and government-related institutions via a broadband fiber connection, thus enables government and educational groups to communicate quickly and effectively and to move voice, data and audio to locations throughout the city.
		PEG spectrum can be used for any PEG purposes -- video, audio or data.
		Annual PEG support. Supporting the operational and staffing needs of PEG is critical to the ongoing viability of the services PEG provides.
		Continued provision of downlink services for the PEG channels.
		Remote origination sites are needed at a broad range of community facilities in order to increase the variety of locations at which programming can originate. Key locations throughout Davis include: Veterans' Memorial Theater/Center; Davis High School; county library; Third and B; The Davis Joint Unified School District; the Davis Senior Center, among others.
Educational training	Students do not have sufficient access to the internet to be able to learn how to develop automated systems.	The DJUSD needs an I-Net connecting all schools and government agencies to use as part of the training curriculum to develop student's skills in developing content on a high speed system. An I-Net is needed to provide the backbone of their automation training environment.
Origination	Signals only originate from a small number of locations while significant community events originate in many locations	Remote origination sites are needed at a broad range of community facilities in order to increase the variety of locations at which programming can originate. Key locations throughout Davis include: Veterans' Memorial Theater/Center; Davis High School; county library; Third and B; The Davis Joint Unified School District; the Davis Senior Center, among others.

		I-Net: An Institutional Network connects government, educational and government-related institutions via a broadband fiber connection, thus enables government and educational groups to communicate quickly and effectively and to move voice, data and audio to locations throughout the city.
		Mobile programming capability
		Two-way activated, bi-directional link between all PEG facilities and headend.
Past performance	The cable company failed in adequate maintenance of the system.	There is a need for cable installations to comply with safety codes and where found not in compliance, to be rectified in reasonable time.
		Installation of an I-Net in Davis was an established need in the previous franchise negotiations and was included in the agreement.
		Based on past customer interests and needs, it is reasonable to expect that the system will have to be upgraded again in the future.
		City needs to be able to confirm that franchise fees reflect the number of subscribers.
		There is a need for interconnectivity to register on-line for classes, programs and appointments. There is a need to interconnect regionally to share local programming of regional interest and for distance learning.
PEG demand	PEG services are not able to meet public demand for service.	Annual PEG support. Supporting the operational and staffing needs of PEG is critical to the ongoing viability of the services PEG provides.
		An interconnected bulletin board system used by all PEG entities to streamline the process of producing, maintaining and coordinating community outreach and information dissemination.
		Remote origination sites are needed at a broad range of community facilities in order to increase the variety of locations at which programming can originate. Key locations throughout Davis include: Veterans' Memorial Theater/Center; Davis High School; county library; Third and B; The Davis Joint Unified School District; the Davis Senior Center, among others.
		Peg system designed to be used by diverse audiences--using equip, technologies, accessible hours, accessible training, operation