

Attachment 5.1

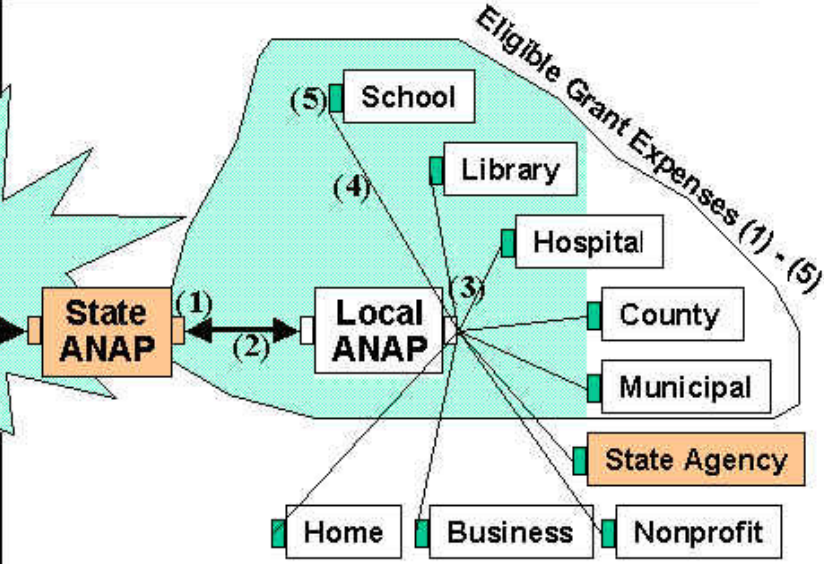
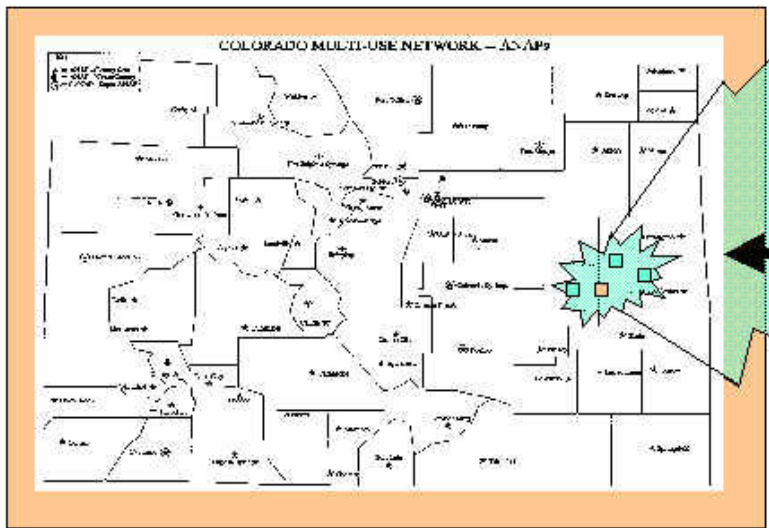
HB 99-1102 - The "Beanpole" Project

Improved telecommunications will help disperse population growth and economic opportunity more evenly throughout Colorado.

The public sector, acting as “anchor tenant,” can provide a market solution to improving telecommunications in under-served areas of the state.

Result is network of private provider high speed access connection points (ANAPs) throughout state available to businesses, homes, nonprofits, public facilities.

<p>Multiuse Network – 76 ANAPs State pools buying to provide market incentive to private providers to set up 76 State ANAPs</p>	<p>Beanpole Bill – 100s ANAPs Communities pool buying to provide market incentive to private providers to set up 100s of Local ANAPs.</p>
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MARKET STIMULUS
 •\$6M Existing Spending Authority
 •\$7M Requested Spending Authority (to pool buying power)
 \$13.5M Capital Construction Funds

STATE EXPENDITURES
 •State ANAPs (lease)
 •Edge Switches (lease or buy)
 •Facilities Refurbishment
 •Curb-to-building Cable

MARKET STIMULUS
 •\$30M State Grants (Bill)
 •\$\$\$ Local Match
 •\$\$\$ Private Provider Discount
 •\$\$\$ Homes/Business/Nonprofit

ELIGIBLE GRANT EXPENSES
 (1) State ANAP Access (lease)
 (2) Local to State ANAP line (lease)
 (3) Local ANAP Access (lease)
 (4) Office to Local ANAP line (lease)
 (5) Edge Switch (lease or buy)

H.B. 99-1102, The “Beanpole” Fund

H.B. 99-1102, *Concerning encouragement of private-sector telecommunications investment by providing incentives for the public sector to serve as “anchor tenant”, and making an appropriation therefor*, provides for the “Community Incentive Funding” and community level aggregation called for in the State of Colorado’s 1998 *Strategic Plan for a Statewide Telecommunications Infrastructure*.

The administration of the H.B. 99-1102 funding resides in the Department of Local Affairs, which has contracted with the Colorado Rural Development Council to design, implement, and manage the \$4.6 million “Beanpole” Fund program. The status of the “Beanpole” Project is closely tied to the progress of the Multi-Use Network and its phased implementation. There is specific legislative language indicating that the use of these funds must go to where the MNT network is being implemented first and to communities with the greatest potential for success.

The “Beanpole” Project has assembled an Advisory Committee (DOLA appointed) to review grant guideline, establish evaluative criteria, and participate in grant reviews. On October 1, 1999 the first request for proposals were released for technical planning grants. The project plan is to have several communities ready to apply for funds as soon as the MNT implementation schedule is established. Updates and more information about the “Beanpole “ Project including grant guidelines, RFPs, FAQ, and other information are available on-line at <http://ruraltelecon.org/cif.htm>.

Dr. Florine Raitano (fraitano@csn.net), Executive Director, Colorado Rural Development Council, has been contracted with to implement and manage the “Beanpole” Project for the Department of Local Affairs. Dr. Jeffrey Richardson (jeff.richardson@state.co.us) now the CIO for the Colorado Commission on Higher Education (CCHE) retains a role in the implementation and oversight of this project.

HOUSE BILL 99-1102

BY REPRESENTATIVES Young, Bacon, Dean, George, Hagedorn, Larson, McPherson, Miller, Plant, Smith, Swenson, Taylor, and Webster;

also SENATORS Teck, Chlouber, Reeves, and Wattenberg.

AN ACT

Concerning encouragement of private-sector telecommunications investment by providing incentives for the public sector to serve as "anchor tenant", and making an appropriation therefor.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. Legislative declaration - encouragement of private-sector investment - public sector as "anchor tenant". (1) The general assembly finds, determines, and declares that advanced communications services provide a means of dispersing population growth and economic opportunity more evenly throughout all geographic regions of the state; however, only by aggregating demand at the state and at the local, community level, through rationally planned and coordinated purchases of telecommunications technology by the state and its political subdivisions, can the state and its political subdivisions take advantage of economies of scale and assume the role of "anchor tenant" in encouraging private-sector investment in the infrastructure adequate to provide state-of-the-art communications service throughout the state and within all communities in the state for both public- and private-sector use.

(2) The general assembly further finds that the department of personnel, acting under executive order, has taken steps necessary to begin acting as an anchor tenant by developing a statewide digital network, called the multi-use network, built on leased private-sector resources. The general assembly further finds that similar action at the local level is needed to enable communities to serve as anchor tenants. Therefore, the general assembly hereby directs the department of local affairs, created in section 24-1-125, Colorado Revised Statutes, to administer a community-based access program of incentive grants available to all communities in the state to aggregate the telecommunications traffic of the public offices within the community. The general assembly also hereby directs the executive director of the department of personnel to interconnect this community-based traffic with networks established by the state, to the extent the available resources permit. Finally, the general assembly hereby finds that an appropriation of four million six hundred seventy-six thousand dollars will be necessary to demonstrate the feasibility of the effort.

SECTION 2. 24-30-903, Colorado Revised Statutes, is amended BY THE ADDITION OF A NEW SUBSECTION to read:

24-30-903. Duties and responsibilities. (7) The executive director of the department of personnel shall carry out all duties and responsibilities set forth in this section in a manner that is consistent with the objective of maximizing access to digital networks of the state by all public offices of all levels, branches, and political subdivisions of the state within every community of the state. In particular, within available resources and as soon as is feasible, the executive director shall provide connections proposed and approved by the department of local affairs, created in section 24-1-125, C.R.S., through the community-based access grant program established under section 23-11-104.5, C.R.S., and may act as a network provider between or among all public offices as defined in said section. To the extent possible and if technically feasible, the bidding and the method of awarding the contract for telecommunications services under section 23-11-104.5, C.R.S., should be structured in a manner as to allow the greatest number of providers to participate in the bidding and the award of the contract.

SECTION 3. Article 11 of title 23, Colorado Revised Statutes, is amended BY THE ADDITION OF A NEW SECTION to read:

23-11-104.5. Community-based access grant program - powers and duties of department of local affairs - definitions - legislative declaration. (1) As used in this section:

(a) "Aggregate" means to aggregate or consolidate the telecommunications service requirements of all or a substantial portion of the public offices within a community into a coordinated and rational network plan for the provision and procurement of telecommunications services so as to maximize economies of scale and combine the buying power of the entities operating such offices.

(b) "Community" means a geographically contiguous and distinct population, self-defined for the purposes of applying for the grant resources described in this section, and having a sponsoring fiscal agent that is a political subdivision of the state.

(c) "Connect" and "connection" refer to the establishment of a full-time, dedicated, digital network connection between a public office and the state network.

(d) "Department" means the department of local affairs, created in section 24-1-125, C.R.S.

(e) "Director" means the executive director of the department.

(f) "End-user equipment" means hardware and software that are identified with a specific public office or other physical location and that can operate independently of the state network. The term includes, without limitation, personal computers, network servers, local area networks, and video conferencing equipment.

(g) "Private-sector telecommunications provider" means a private corporation, whether or not operated for profit, that offers telephone, cable, wireless, or other telecommunications services to the public.

(h) "Public office" means any building, office, or facility that is physically located within the geographic boundaries of a community and is owned or operated by:

(I) An agency or political subdivision of the state or of any local government, including, but not limited to, a state administrative agency, a public school or college, a library, a county or municipal government, and a public hospital or health care facility; or

(II) A nonprofit hospital.

(2) The department shall establish a community-based access grant program under which the department shall allocate capital construction funds appropriated to the department for this purpose to communities seeking to aggregate the telecommunications services required by the public offices within the community to connect to the digital network operated by the department of personnel pursuant to article 30 of title 24, C.R.S. Said telecommunications services shall be procured by the communities from private-sector telecommunications providers.

(3) The use of moneys allocated under this section shall be limited as follows:

(a) Expenditures shall be made only in accordance with proposals that result in material improvements in the availability and competitive cost of advanced, digital telecommunications services to the community as compared to other communities of comparable size and characteristics.

(b) Expenditures shall be made only for services procured by the community from private-sector telecommunications service providers.

(c) Expenditures shall be made only for costs associated with:

(I) Terminating communications equipment at a public office;

(II) Leased digital telecommunications services associated with connecting a public office to the state's digital network; and

(III) Appropriate cost-recovery charges for the use of the state's digital network.

(d) No expenditures shall be made for costs associated with connecting public offices that already have connections; except that such public offices may be reimbursed for their net, new incremental costs incurred as a result of their inclusion in the community's plan for the aggregation of telecommunications services.

(e) No expenditures shall be made for end-user equipment, applications development, maintenance, training, or other similar costs incurred by a public office or organization.

(f) Moneys shall be disbursed only to the fiscal agent acting on behalf of a community.

(4) The department shall receive and evaluate proposals for funding under this section, subject to the following policy directives:

(a) The proposal process shall be conducted with the overall goal of providing funding to every community whose proposal is of high quality and competitive with those of communities of comparable size and characteristics.

(b) Priority shall be given to those communities proposing to aggregate the traffic of, and obtain participation from, the greatest proportion of the public offices within the community. To qualify for consideration, proposals shall list all public offices in the community and, as to each such public office, shall specify whether or not the public office is to be connected under the proposal. In addition, increased priority shall be given to those communities that show participation of private- and nonprofit-sector telecommunications consumers in the total aggregated demand.

(c) In accordance with measurable criteria established in advance by the department, the department shall consider the degree of cash and in-kind matching funds to be provided by the community, consistent with the community's resources.

(5) Notwithstanding the provisions of subsection (3) of this section, the department may allocate up to ten percent of the capital construction appropriation for technical assistance, training, engineering, and consulting to prepare plans, program documents, life-cycle cost studies, requests for proposals and other studies, and documents associated with and necessary for the development of proposals under this section.

(6) The department shall coordinate the allocation of the capital construction funds appropriated to it for the purposes of this section with the schedule of deployment for the state's digital networks.

(7) In the funding of aggregated access for communities, the department shall require that public entities participating in the aggregation of traffic locally demonstrate the ability to divert or separate local traffic, including but not limited to internet and voice traffic, from the point of aggregation to a local destination.

(8) The department shall allocate the capital construction funds appropriated to it for the purposes of this section in such a manner as to reduce geographic disparity throughout the state in the availability and cost of advanced communications services.

(9) On or before April 1, 2000, the department shall report to and make an appearance before the business affairs and labor and capital development committees of the House and Senate. Thereafter, the department shall report to and make an appearance before the capital development committee at the conclusion of each fiscal year of operation of this program.

(10) The general assembly hereby finds and declares that the aggregation of local public telecommunications services is a new state program and that administration of the program requires services of a specialized, technical nature that are not available within the state personnel system. The director is therefore authorized to contract with a private person, corporation, or entity for the administration of the community-based access grant program described in subsection (2) of this section if the contract otherwise complies with part 5 of article 50 of title 24, C.R.S., concerning contracts for personal services.

(11) During the initial year of funding, the department of local affairs shall allocate the moneys made available for the purposes of this section in a manner that:

(a) Provides technical assistance for strategic telecommunications planning to communities that require help in preparing competitive proposals for future funding;

(b) Evaluates the relationship between the size of a community and the ability to successfully attract investment through aggregation; and

(c) Gives priority to proposals that demonstrate a high probability of success through sufficient prior strategic telecommunications planning, local managerial expertise, and technical feasibility of the chosen bid from the private vendor.

SECTION 4. Appropriation - adjustment in 1999 long bill. (1) (a) In addition to any other appropriation, there is hereby appropriated, out of any moneys in the capital construction fund created in section 24-75-302, Colorado Revised Statutes, not otherwise appropriated, to the department of local affairs, for the fiscal year beginning July 1, 1999, the sum of three million one hundred seventy-six thousand dollars (\$3,176,000), or so much thereof as may be necessary, for the community-based access grant program established by this act. Of this amount, the sum of two million eight hundred thousand dollars (\$2,800,000) represents the amount of money to be deposited into the capital construction fund from the Colorado advanced technology institute share of the proceeds of supernet, and the sum of three hundred seventy-six thousand dollars (\$376,000) represents funds transferred to the capital construction fund outlined in section 3 (1) (f) of the general appropriation act for the fiscal year beginning July 1, 1999.

(b) From the local government severance tax fund created pursuant to section 39-29-110, Colorado Revised Statutes, the sum of one million five hundred thousand dollars (\$1,500,000) cash funds exempt, or so much thereof as may be necessary, shall be made available to local governments for the community-based access grant program established by this act.

(c) In addition to any other appropriation, there is hereby appropriated, out of any moneys in the general fund not otherwise appropriated, to the department of local affairs, for the fiscal year beginning July 1, 1999, the sum of one hundred twenty-four thousand dollars (\$124,000), or so much thereof as may be necessary, for the implementation of this act.

(2) For the implementation of this act, appropriations made in the annual general appropriations act for the fiscal year beginning July 1, 1999, shall be adjusted as follows:

(a) The general fund appropriation to the capital construction fund outlined in section 3 (1) (f) is reduced by one hundred twenty-four thousand dollars (\$124,000).

(b) The capital construction fund exempt appropriation to the department of transportation, construction projects, is reduced by five hundred thousand dollars (\$500,000).

SECTION 5. Safety clause. The general assembly hereby finds, determines, and declares that this act is necessary for the immediate preservation of the public peace, health, and safety.

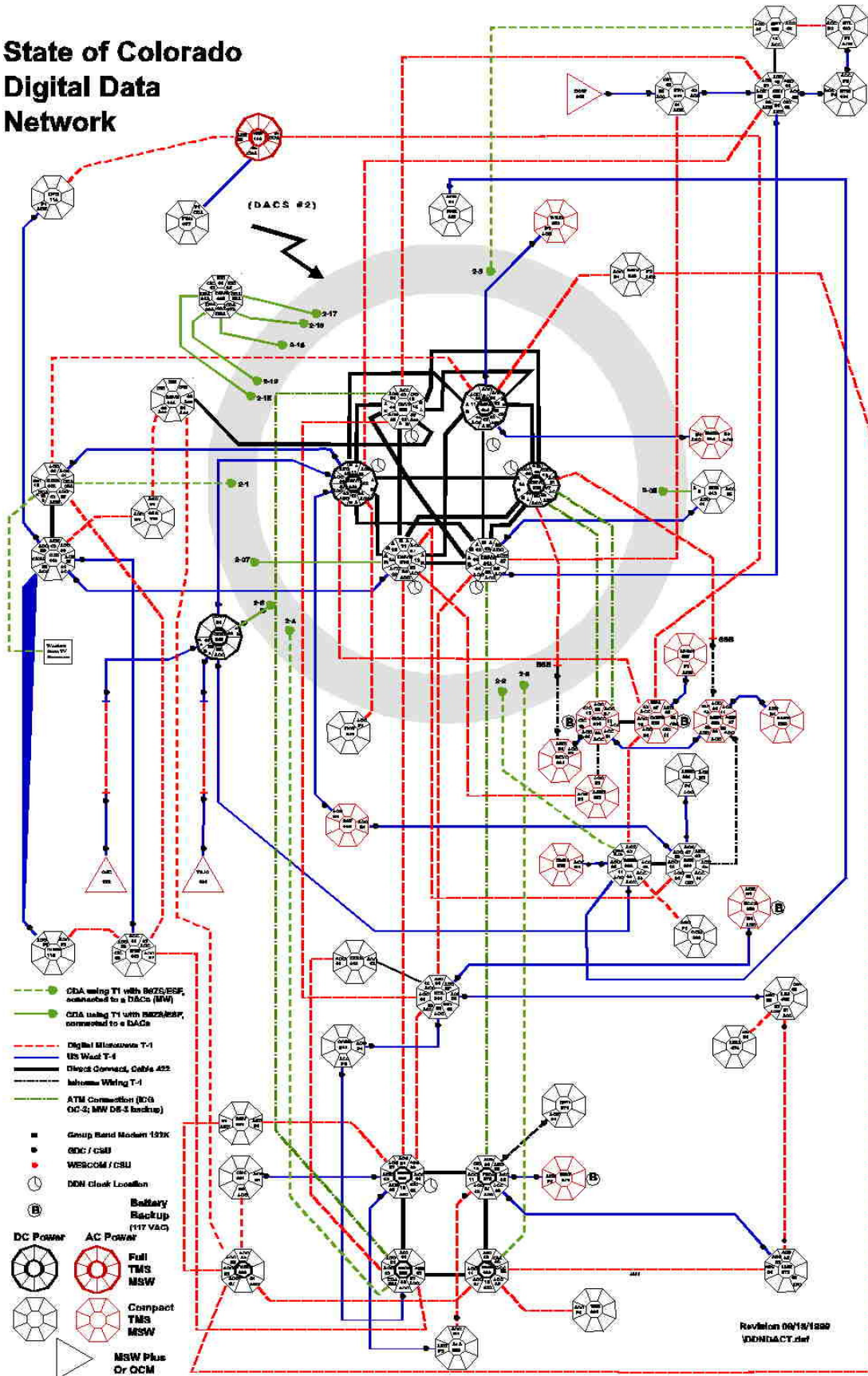
Approved: May 17, 1999

Editor's note: Section 23-11-104.5, contained in section 3 of this act, will be renumbered on revision as 24-32-3001 and relocated as a new part 30 of article 32 of title 24.

Attachment 5.2

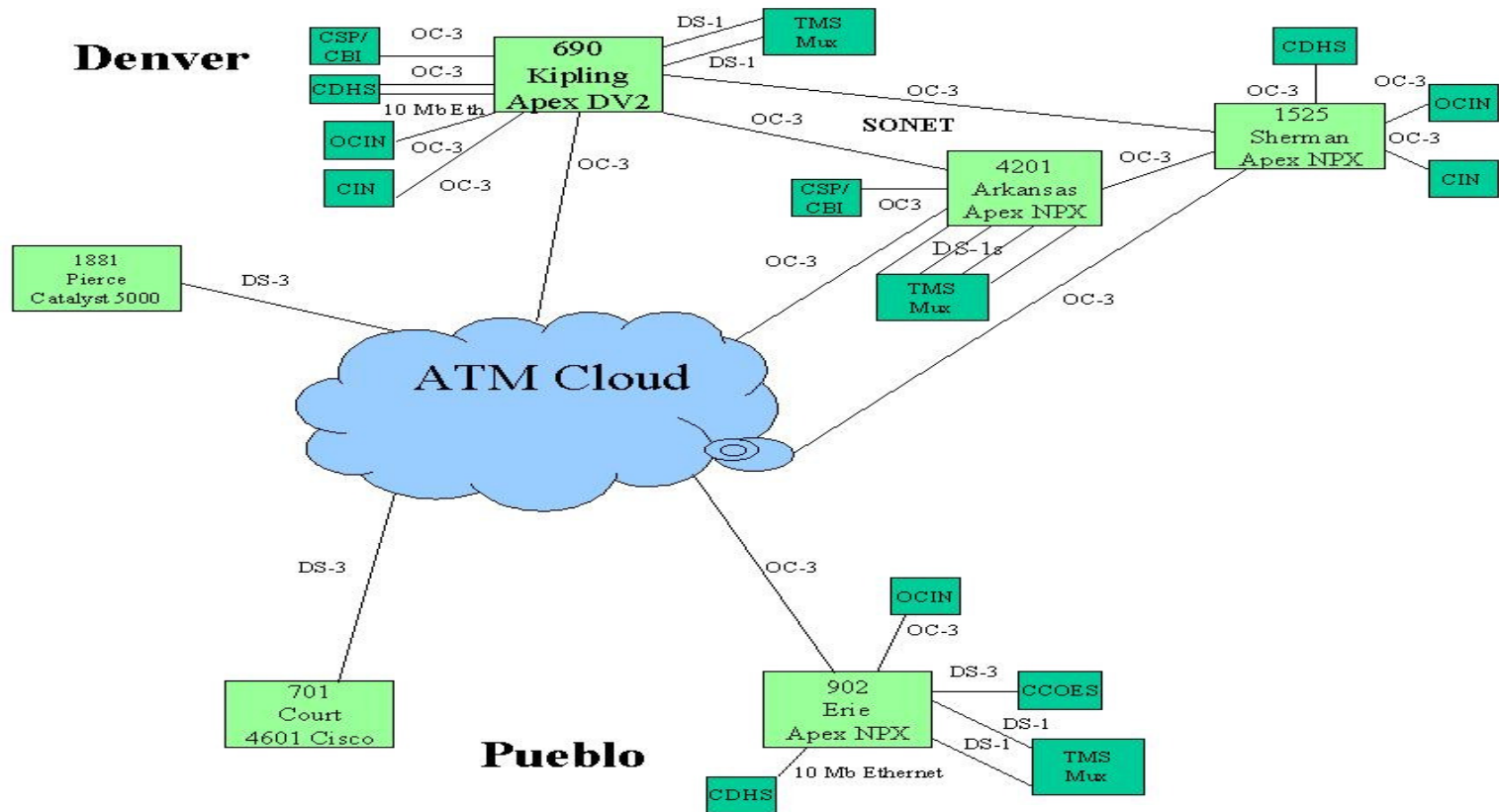
Digital Data Network (DDN) Diagram

State of Colorado Digital Data Network



Attachment 5.3

ATM Network Diagram and Site Inventories



See 'PHUD Locations' Spreadsheet

Attachment 5.4

ANAP/SANAP Bandwidth/Port Requirements

Attachment 5.4

MNT Edge Sites and Upgraded Bandwidth Requirements

The following is a list of anticipated State MNT Edge Sites with bandwidth requirements. This list is not all inclusive but must be used as the minimum requirements of the State to each location. Pricing for each circuit must be provided to each location from the MNT backbone wide area network infrastructure. The total response for pricing will be used in the cost evaluation response from the Offeror.

County	City	Address	BW
1. Adams	Brighton	450 S 4th St.	5Mb
2. Alamosa	Alamosa	208 Edgemont Blvd	10Mb
	Alamosa	1205 W. Ave.	10Mb
3. Arapahoe	Littleton	5900 S. Santa Fe. Dr.	10Mb
4. Archuleta	Pagosa Springs		
5. Baca	Springfield	772 Colorado	1.544Mb
	Springfield	741 Main	10Mb
6. Bent	Las Animas	525 Bent Ave.	5Mb
	Las Animas	215 Second St.	5Mb
7. Boulder	Boulder		
	Longmont	2255 Main St.	10Mb
	BRAN		
8. Broomfield	Broomfield		
9. Chaffee	Salida	641 W. 3rd Ave.	10Mb
10.	Buena Vista	13125 US Hwy 24 & 285	10Mb
11. Cheyenne	Cheyenne Wells	51 South First St	10Mb
12. Clear Creek	Georgetown	405 Argentine	10 Mb
13. Conejos	Conejos	Courthouse	10Mb
14. Costilla	San Luis	354 Main St.	10Mb

15. Crowley	Crowley	12750 Highway 96, LN 13	10Mb
16. Custer	Westcliffe	205 S. 6 th	10Mb
17. Delta	Delta	5 th & Palmer	10Mb
18. Denver	Denver	1525 Sherman St. (SANAP)	75MB
19. Denver	Denver	4201 E. Arkansas (SANAP)	60Mb
20. Denver	Denver	1200 Larimer (SANAP)	75Mb
	Denver	6060 Broadway	20Mb
	Denver	10900 Old Smith Road	10Mb
	Denver	UCHSC	60Mb
21. Dolores	Dove Creek	490 N. Main St.	10Mb
22. Douglas	Castle Rock Littleton	5900 S. Santa Fe Dr.	10Mb
23. Eagle	Eagle		
24. El Paso	Colorado Springs	2126 N. Weber	10Mb
	Colorado Springs	2862 S. Circle Dr.	10Mb
	Colorado Springs	5675 S. Academy	10Mb
25. Elbert	Kiowa		
26. Fremont	Canon City	East Canon Complex	20Mb
27. Garfield	Glenwood Springs	202 Centennial	10Mb
	Glenwood Springs	15000 Old Golden Rd	10Mb
28.	Rifle	Correctional facility	10Mb
29. Gilpin	Central City	203 Eureka St.	10Mb
30. Grand	Hot Sulphur Spgs.	346 Grand County Rd 362	1.544Mb
	Hot Sulphur Spgs.	308 Byers Ave.	5Mb
31. Gunnison	Gunnison	600 N. Adams	10Mb
32. Hinsdale	Lake City	311 N. Henson	10 Mb
33. Huerfano	Walsenberg	23500 US Hwy 160	10Mb

34. Jackson	Walden	396 La Fever	10Mb
35. Jefferson	Golden	13300 W. 6th Ave.	10Mb
36. Jefferson	Lakewood	690 Kipling (SANAP)	100Mb
	Arvada	10185 Ridge Road	10Mb
37. Kiowa	Eads	1305 Goff St.	10Mb
38. Kit Carson	Burlington	251 16th St.	10Mb
39. La Plata	Durango	100 Rim Dr.	40Mb
40. Lake	Leadville	K-12	10Mb
	Leadville	505 Harrison Ave.	10 Mb
41. Larimer	Ft. Collins	317 W. Prospect	10Mb
	Ft. Collins	105 W. Pitkin	10Mb
42. Las Animas	Trinidad	Correctional Facility	10Mb
	Trinidad	600 Prospect St.	10Mb
43. Lincoln	Hugo	326 8th St.	5Mb
	Hugo	103 3rd Ave.	10Mb
44.	Limon	Correctional facility	10Mb
45. Logan	Sterling	12850 County Rd 370	10Mb
46. Mesa	Grand Junction	711 Independent Ave.	10Mb
	Grand Junction	1175 Texas Ave.	10Mb
	Grand Junction	222 S. 6th	45Mb
47. Mineral	Creede	2nd & Creede Ave.	10Mb
48. Moffat	Craig	785 Russel St.	10Mb
49. Montezuma	Cortez	UCHSC	10MB
50. Montrose	Montrose	1140 G 1025 Lane	10Mb
	Montrose	800 South Third St.	10Mb
51. Morgan	Fort Morgan	17800 County Rd. 20	10Mb
52. Otero	La Junta	300 Colorado Ave.	10Mb

53. Ouray	Ouray	401 4th St.	10 Mb
54. Park	Fairplay	501 Main	10Mb
55. Phillips	Holyoke	246 S. 6th	10Mb
56. Pitkin	Aspen	530 E. Main St.	10Mb
57. Prowers	Lamar	2400 S. Main	10Mb
58. Pueblo	Pueblo	902 Erie	10Mb
	Pueblo	1410 W.13th	10Mb
	Pueblo	701 Court	15Mb
59. Rio Blanco	Meeker	555 Main St.	10 Mb
	Rangely	209 E. Main St.	5Mb
60. Rio Grande	Del Norte	1015 6th St.	10Mb
61. Routt	Steamboat Springs	136 6th St.	10 Mb
62. Saguache	Saguache	705 Christy Ave.	10 Mb
63. San Juan	Silverton	1557 Greene St.	10Mb
	Silverton	1550 Greene St.	5Mb
64. San Miguel	Telluride	Dave Ed Building	10Mb
65. Sedgwick	Julesberg	106 W. first	10Mb
66. Summit	Breckenridge		
67. Teller	Cripple Creek		
68. Washington	Akron	150 Ash St.	10Mb
69. Weld	Greeley	1800 8th Ave	10Mb

70. Yuma

Wray

340 S. Birch

10 Mb

Attachment 5.5

Existing Major Contracts

See 'Existing Contracts' Spreadsheet

Attachment 5.6

Waiver Process

Attachment 5.6 WAIVER PROCESS

The State of Colorado ATM Specification Guidelines for Waivers

1. The specification establishes requirements for the MNT “Goal architecture”. In ALL cases where an Item Under Test (IUT) cannot meet the requirements of the specification, a waiver is required. This document describes possible cases where a waiver may be considered. It also provides guidelines for information required to support consideration of a waiver request. Requests for consideration of waiver shall be forwarded with supporting information to the MNT Project Director or the designated individual in Colorado Information Technology Services Telecommunications Services section. The MNT project team shall respond to waiver requests within 30 days after receipt of justification information described for each waiver case.
2. Possible scenarios for waiver consideration

Case 1. The IUT does not meet requirements of a referenced specification or standard for a NEW capability because the specification or standard has not yet been published. (For example, ATM FORUM Specification on PNNI 2.0)

A waiver will generally be granted. IUT Vendor and Offeror should demonstrate an understanding of the implications of the working DRAFT specification or standard and should show a plan, schedule and cost for upgrading the IUT to full compliance once specification or standard is finalized.

Case 2. The IUT does not meet requirements of a referenced specification or standard for a NEW capability although the specification or standard has been published. (For example, UNI 4.0, Net Mgt).

A waiver will be considered on a case-by-case basis depending upon the IUT vendor’s and Offeror’s plans, schedule and projected cost for upgrading the IUT to full compliance. If the vendor and/or Offeror has no plan for providing the required upgrade, a waiver will not be granted.

Case 3. The IUT Does not meet requirements of a referenced specification or standard for a NEW capability because the referenced version of the specification or standard has not yet been published, although earlier versions have been published. (For example, the MNT ATM Specification requires compliance with PNNI 2.0, whereas PNNI 1.0 has been published.

A waiver will be considered on a case-by-case basis depending upon the extent to which the IUT is compliant with the published version of the spec or standard at issue and the IUT vendor’s and Offeror’s plans, schedule and projected cost for upgrading

the IUT to full compliance. If the vendor has no plan for providing the required compliance, a waiver will not be granted.

Case 4. The IUT does not meet requirements of a referenced specification or standard for an EXISTING capability although the specification or standard has been published. (For example, UNI, PNNI, Network Management).

A waiver will be considered on a case-by-case basis depending upon the extent to which the IUT is compliant with older versions of the spec or standard at issue and the IUT vendor's and Offeror's plans, schedule and projected cost for upgrading the IUT to full compliance. If the vendor has no plan for providing the required compliance, a waiver will not be granted.

Attachment 5.7

State End Site Locations

Attachment 5.7

The attached Excel Spreadsheet is a listing of circuits currently documented in a Database owned and maintained by the Division of Telecommunication/Network Services. It is acknowledged that it is incomplete and not inclusive of all circuits currently subscribed to by the State. It does, however, represent a minimum of what will be needed.

See 'Current Circuits' Spreadsheet

Attachment 5.8

Schools and Libraries - Infrastructure Needs

- 1. Distance Learning In Colorado: A Grassroots Initiative (Revised 4/99)**
- 2. Addenda**
- 3. Libraries**
- 4. In The Matter Of Conducting A Technology Infrastructure Inventory And Needs Assessment To Determine The Status Of Internet Access In Rural Areas (Comments Submitted by the Colorado State Library, July 5, 1999)**

Distance Learning in Colorado: A Grassroots Initiative

Just as we and our parents grew up in the industrial age, today's learners are growing up and will spend the rest of their lives living and working in the information and post-information ages where they must be able to analyze, evaluate, and synthesize rapidly changing information. No longer will the ability to merely repeat memorized facts be sufficient. Today's learners must be able to think critically, work cooperatively and interact with peers from differing cultures. Geographic and socio-economic isolation have restricted access to these skills for many Colorodans. To succeed in the future, all Colorado residents, regardless of where they live, need the opportunity to the same, or equal, educational programs and resources and to interact with people from diverse backgrounds. Affordable telecommunications services can bridge this gap. As the Colorado Telecommunications Advisory Commission put it, "Zip codes should not dictate the quality of your education." (1989)

Through the use of a myriad of distance learning technologies, students, faculty members, administrators and other learners in nearly all Colorado institutions of higher education, most school districts and Boards of Cooperative Educational Services (BOCES/BOCS), many public libraries, and numerous businesses are participating in, or investigating, distance learning projects to improve curricular offerings and instructional, staff development and community education programs to give learners access to quality interactive programs and resources. Higher education, school district, and library personnel and business employees are choosing from numerous programs delivered via advanced telecommunications networks to select programs which best meet their individual professional development and educational needs. Not only is access to programming and resources increased, but the skills necessary to use these resources effectively are also taught.

Colorado learners of all ages participate in courses and special programs delivered via interactive technologies. Students and teachers learn via satellite from such projects as the Arts and Science Teleconferencing Service, Oklahoma State University; Satellite Telecommunications Educational Programming, STEP, Spokane, Washington; the TI-IN Network, San Antonio, Texas; Kansas State University; and Utah State University. Additionally, many locally designed and developed distance learning activities provide enhanced educational opportunities via regional, interactive networks using such technologies as: Instructional Television Fixed Service (ITFS), T1 - compressed digital video, cable television and fiber optics networks and the Internet. Regardless of the technology used, distance learning is providing Colorado learners access to quality educational opportunities in areas of limited resources.

Therein lies the seed for success and confusion which has historically been distance learning in Colorado. Because of many factors, including a long held belief in district and institutional autonomy and the use of local funds to finance projects, many institu-

tions have developed and utilize non-compatible systems. While there currently are several efforts under way to interconnect these disparate systems, most efforts throughout the years to accomplish this have ended in frustration. As a result, the Colorado General Assembly formed the *Telecommunications Advisory Commission* (TAC) during the 1989 legislative session. While not the first effort to coordinate distance learning and other telecommunications efforts in Colorado, TAC was charged with developing a statewide telecommunications plan for delivering educational programming and information resources. After public hearings and consultation with education and telecommunications specialists, the commission designed a plan calling for the establishment of voluntary regional telecommunications clusters which, when complete, would be interconnected by a statewide telecommunications backbone. This plan was designed to take advantage of existing networks and initiatives.

Until sunseting in June 1995, Telecommunications Advisory Commission successfully brought together representatives of many educational institutions, distance learning projects, the telecommunications industry, state government and other segments of the Colorado community to discuss various issues including: technology selection, interconnectivity, and control. Several current initiatives are the result of this effort to plan for Colorado's educational telecommunications needs.

- The State telecommunications compressed digital video network, *CIVICS*, which interconnects regional and institutional interactive video networks via the State's microwave network;
- The *Higher Education Telecommunications Alliance*, HETA, which coordinates the interactive video projects of the five Colorado higher education governing boards and the community college system overseeing their interconnection with the CIVICS network;
- *Connect Colorado*, a regional video and data network in southeastern Colorado which was developed in response to the Telecommunications Advisory Commission's plan for regionalization of telecommunications infrastructure. This network is an partnership of the school districts, BOCES, hospitals and libraries in southeastern Colorado (from Fowler east); the Colorado community college system, Otero and Lamar community colleges and Southeastern Communications, a subsidiary of Southeastern Power. This
- The *Multi-use Network Taskforce*, MNT, which has worked for two years to develop a workable design for a high speed statewide telecommunications network interconnecting each Colorado county seat, prison and institution of higher education – other government offices, schools, libraries and public hospitals will connect to aggregated network access points (ANAPs) in each community ; and
- The *Beanpole Bill Taskforce* which has worked to implement the MNT's second recommendation to provide "community incentive funds" to provide capital construction funds to local communities so that these agencies can complete the "last mile" loop through HB 99-1102.

Continued support for a statewide telecommunications network for the delivery of instructional, professional development and educational programming to, from, and among Colorado's communities has come from several sources including Colorado's Department

of General Support Services (GSA), Commission on Information Management (IMC); Commission on Higher Education (CACHE); Department of Education (CDE) and, more recently, the office of Governor Bill Owens.

Colorado Interactive Distance Learning Projects

School District and BOCES Distance Learning Projects using terrestrial telecommunications networks (elementary and secondary students are primary audience): (in alphabetical order)

- The **Aurora Public Schools** Continuing Education Department delivers self-paced learning opportunities for discouraged and traditional learners through the use of telecourses delivered via Rocky Mountain PBS, Channel. *Operational*
- The **Colorado Information Infrastructure** (CII) interconnects eleven school districts, two community colleges and the Centennial BOCES via the State's CIVICS network. This was funded, in part, through a grant from the Colorado Public Utilities Commission (\$540,000) and US Department of Commerce through a National Telecommunications Infrastructure Administration grant (\$350,000). Sites include the high schools in: Briggsdale, Gilcrest, St. Vrain SD, Prairie, Grover, Johnstown, Eaton, Estes Park, Ault, Berthoud and Longmont. *Operational*
- **Colorado Online School Consortium**, a statewide consortium of fourteen urban and rural school districts, is working with teachers in each district to develop web-based courses for delivery beginning August 1999. A Colorado Technology Literacy Grant (\$344,000) provided funding. *Operational*
- **Denver Public Schools** provides two-way, interactive foreign language classes to elementary schools over their educational access cable television channels. This network also delivers staff development programming to teachers throughout the district. *Operational* Future availability of eight ITFS (Instruction Television Fixed Service) channels will expand program delivery to include gifted and talented programs and elementary science classes. *Planned* Denver Public Schools also uses the Internet and World Wide Web to provide instruction to its students. *Operational*
- The **East Central BOCES' Interactive Learning Network, Phase I** uses a digital fiber optic network to interconnect four BOCES' school districts (Bennett, Strasburg, Byers and Deer Trail) offering high school and Morgan Community College courses to high school and adult learners. The BOCES received grants from the Colorado Department of Education through Schools of Choice, Educational Telecommunications and Project Lead programs to partially fund this network. *Operational* House Bill 95-1316 was enacted specifically to allow this network and Phase II (below) to operate. It allowed telecommunications carriers to enter into private contracts (at less than normal rates) for distance learning, remote arraignment and telemedicine over interactive video networks.
- The **East Central BOCES' Phase II network** uses an analog fiber optic network to interconnect six rural school districts (Arickaree, Arriba-Flagler, Genoa-Hugo, Limon, Woodlin and Kit Carson). It has received funding from the federal Rural Electrification Administration (\$291,000) and the Colorado Department of Local Affairs (\$149,000) *Operational* **Phase III** will interconnect phases I and II and provide connectivity among the remaining BOCES districts. *Planned*
- **Jefferson County School District** uses the Internet and World Wide Web to provide instruction to the students in Colorado's largest school district. This district

is the lead agency in the Colorado Online School Consortium (above). *Operational*

- **Mesa County School District 51**, the UTEC vocational education center and other educational institutions in the Grand Junction area are investigating the development of a compressed digital video network to interconnect schools in the Grand Valley. It would link with the WestCEL project (below). *Planned*
- **Monte Vista School District C-8** is providing Colorado high school students with the opportunity to participate in classes via the Internet. Students interact with their teachers and other students through the Internet. Upon successful completion of these standards-based courses, students receive a high school diploma from Monte Vista School District. *Operational*
- The **Mountain BOCES**, through a cooperative agreement with Colorado Mountain College (CMC) will interconnect six communities (Avon, Glenwood Springs, Parachute, Rifle, Steamboat Springs, Frisco) via an expansion of CMC's compressed digital video network for instructional and administrative applications. This was funded, in part, through a grant from the Colorado Public Utilities Commission (\$350,000). *Operational*
- The **Mountain BOCES** data network connects each BOCES district to each other and the Internet via a T-1 network. This project was funded by a TLC grant (\$1,000,000). *Operational*
- **Net-TLC+** is an interactive web site providing migrant education teachers, parents, community members and administrators in twelve northern Colorado school districts with a collaborative workspace for sharing ideas, meeting with mentors, having online discussions and participating in professional development opportunities. This project has been funded by a Colorado Goals 2000 grant (\$600,000) and a Colorado TLCF grant (\$364,000). *Operational*
- **Northern Front Range school districts** and institutions of higher education have jointly received Federal Communications Commission approval for twenty ITFS channels for the Fort Collins, Loveland and Greeley area. They are being used to provide instructional programming to learners in schools, businesses and homes within a thirty-mile radius of each community. *Operational*
- The **Pikes Peak Schools of Excellence Cluster** uses Pikes Peak Community College's Instructional Television Fixed Service (ITFS) network to deliver courses to high school and adult learners north, east and south of their campus in Colorado Springs (below). *Operational*
- **Poudre School District R-1** operates an interactive cable TV network for the delivery of instructional and professional development programming. The network interconnects three high schools, the district media center and the administration building. Nearly all district schools and subscribers on the community's two cable television systems can receive their signal. *Operational*
- The **Southeastern BOCES** is a partner in the Connect Colorado (above) network. The BOCES is investigating the use of their fiber optic network to interactive instruction and professional development. *Planned*
- The **San Luis Valley BOCES Regional Distance Communications (ReDiCo)** Network interconnected five rural school districts (Alamosa, Del Norte, Moffat, Rio Blanco and San Luis) and Adams State College for delivery of college, voca-

tional and high school courses via a compressed digital video network. This network received funding from the Colorado Department of Local Affairs (\$199,000). *Operation suspended* This project led to the Trinidad State Junior College/San Luis Valley Education Center Network video project (below). *Operational*

- Phase I of the **South Platte BOCES'** interactive video network (Brush, Fort Morgan and Wiggins high schools and Morgan Community College) provides instructional, educational and administrative opportunities to students, teachers, administrators and community members via a hybrid fiber optic and microwave network. This network received support from Colorado Department of Local Affairs grant (\$243,000) and TCI of Colorado for the use of a fiber optic strand as part of its cable franchise agreement with the cities of Brush and Fort Morgan. *Operational*
- The **Trinidad State Junior College/San Luis Valley Education Center Network** will provide instruction and other resources to high school and adult learners through a compressed digital video and data network interconnecting four San Luis Valley high schools (Center, San Luis, Sierra Grande, and Monte Vista) with Trinidad State Junior College and the San Luis Valley Education Center in Alamosa. This was funded, in part, through a grant from the Colorado Public Utilities Commission (\$405,000). *Operational*
- **Trinidad State Junior College/Community Care Network** project interconnects schools and health care facilities in La Veta, Branson and Primero with health centers in Trinidad and Trinidad State Junior College. This was funded, in part, through a grant from the Colorado Public Utilities Commission (\$350,000). *Operational* The two Trinidad State Junior College networks are interconnected.
- **WestCEL** is a cooperative digital network thirty-three mountain communities from Walden to Rangely to Ouray) for data and video transmission. Its thirteen-site interactive video sites provide instruction and professional development opportunities for participating students. Sites include Grand Junction HS, Palisade HS, Meeker SD, North Park SD, Steamboat Springs SD, Hayden SD, DeBeque SD, Plateau Valley SD, Delta HS, Paonia HS, Montrose HS, Ouray SD, UTEC vocational education center, Colorado North West Community College (two campuses) Mesa State College and Western State College. WestCEL can connect to the CIVICS network through Western State. *Operational*

Post Secondary Education Distance Learning Projects using terrestrial telecommunications networks (elementary and secondary students are secondary audience): (in alphabetical order)

- **Adams State College** is a leader in many compressed digital video projects. It participated in the San Luis Valley ReDiCo network during its two years of operation and with other members of the Higher Education Telecommunications Alliance, is a major force in the development of this cooperative agreement. Adams State's Alamosa campus is connected to Colorado State University and other Colorado government and higher education sites via the CIVICS network. *Operational*
- **Colorado's community colleges and four year schools**, working in cooperation with Colorado's public broadcasting stations, are national leaders in the use of *Te-*

- lecourses* to provide learners of all ages, including high school students, with college credit courses. Telecourses have more learners participating than any other telecommunications-based delivery system. *Operational*
- The **Colorado Community Colleges and Educational Occupations System** (CCCOES) operates a compressed digital video network in conjunction with the CIVICS network interconnecting all community colleges. *Operational*
 - **Colorado Mountain College** operates a compressed digital video network interconnecting their campuses for instruction and administrative purposes. **Operational** Six high schools in the region connect to this network for college and high school credit courses, staff development and other training. *Operational*
 - **Front Range Community College** offers courses to students throughout Colorado, the country and the world via the World Wide Web. Over eight hundred students participate in these courses each semester. *Operational*
 - The **Higher Education Telecommunications Alliance** (HETA) is a cooperative effort of Colorado's five higher education governing boards and the community college system. Its members worked with the Department of General Support Services to design CIVICS, the compressed digital videoconferencing network portion of the state's digital network, and helped plan its use. Through this network post-secondary institutions and school districts are able to share courses and other programs. Network and user equipment is currently in state office buildings in Grand Junction and Denver, Adams State College, Colorado State University, the University of Northern Colorado, the University of Colorado Health Science Center, Fort Lewis College, Mesa State College, area health education centers and nearly all community colleges. Additional institutions of higher education and school districts are being connected through state and national grants. *Operational* The network continues to grow as additional school districts seek to connect.
 - **Pikes Peak Community College** delivers high school and community college courses to learners throughout Colorado and in other states via the Internet and their Instructional Television Fixed Service (ITFS) broadcast system. This ITFS system delivers live one-way audio/two-way video programs to high school and community learners in high schools, homes and businesses in the PPCC service area. While ITFS programming originates from PPCC, school districts have a key role in determining programming and schedules. *Operational*
 - **Red Rocks Community College** delivers courses to high school and community learners in three mountain communities (Bailey, Black Hawk, and Idaho Springs) via a compressed digital video network. Faculty at RRCC and each high school design and deliver instructional programs to students in the other sites. *Operational*
 - The **University of Colorado** has operated a digital fiber optic network since 1987 to link CU's four campuses. This network interconnects with ITFS systems in Boulder and Colorado Springs to provide programming to schools and industry along the Front Range and with a satellite uplink to provide programming nationally. *Operational*
 - The **University of Colorado Health Science Center** (CUHSC) is connected to Area Health Education Centers (AHEC) in Clifton, Alamosa and Greeley via CIVICS, the state's compressed digital video network to provide remote diagnosis

and training. *Operational* The CUHSC is expanding this network to other AHEC's through their own videoconferencing bridge.

- The **University of Northern Colorado** was the first Colorado institution of higher education to utilize a compressed digital video network to provide instruction, counseling and other student support services on the Western Slope and in the Denver metropolitan area. UNC's Greeley campus is connected to many Colorado colleges, universities and government offices via the Colorado Division of Telecommunications' CIVICS compressed digital video network. *Operational*

Colorado State Government interactive video projects using telecommunications networks: (in alphabetical order)

- The **CIVICS** Network is a compressed digital video operating over the State's digital microwave network. Government sites are in the State office Building (Grand Junction) and the State Services Building (Denver). These are interconnected to HETA (above) and CCCOES (above) higher education sites. *Operational*
- The **Department of Corrections** interactive video network will operate over the CIVICS network. It will connect state correctional institutions with county court facilities for remote arraignment. *Planned*

Colorado school districts' distance learning projects are resources for their entire communities. An excellent example is the East Central BOCES' *Interactive Learning Network*. Community members are encouraged to participate in college classes alongside high school students. Many do, taking college courses without leaving their local communities. Other community members benefit from special programs for such groups as fire fighters and lawyers. This is of major value, as this region of the Eastern Plains has no local institution of higher education. Additionally, the network has been used by the *I-70 Chamber of Commerce* which replaced the competing chambers of commerce in the four participating communities. Other school districts make their satellite receive sites available to community members for a multitude of community and economic development programs,

In the past four years several major legislative and regulatory events made it possible for school districts, BOCES and institutions of higher education to implement regional, interactive video networks for instruction, professional development and economic development programs.

- During the 1995 legislative session the Colorado General Assembly passed **HB 95-1316** allowing local exchange carriers to enter into private, noncost-based contracts for interactive video applications for distance learning, telemedicine (diagnosis and treatment of patients) and remote arraignment. This allows local telephone companies to give school districts, BOCES and others discounted rates for these applications. The East Central BOCES took advantage of this law to develop contracts with the telephone companies in its area for two fiber optic distance learning networks.
- During the spring of 1995, the **Public Utilities Commission** reached an agreement for US West to pay reparations for poor service and installation problems. The initial payment was for \$4,000,000 with US West agreeing to set aside up to \$8,000 per day as long as significant problems continued. Through a grant appli-

cation process, grants totaling nearly \$5.4 million were awarded to nearly thirty educational institutions, libraries and non-profit organizations for community based projects.

- During the 1996 legislative session the Colorado General Assembly passed **SB 96-197** providing twenty million dollars to public and private schools and institutions of higher education and public libraries to provide distance learning, technology-assisted learning and enhanced information access to communities throughout Colorado. This legislation also tasked the Colorado Commission on Higher Education (CCHE), with the assistance of the Department of Education (CDE) and the Commission on Information Management (IMC), with designing a statewide telecommunications network for education. Funds were awarded through a competitive grant process overseen by the Technology Learning Committee.
- Also during the 1996 legislative session, the Colorado General Assembly passed **SB 96-102** tasking the IMC, with the assistance of CCHE and CDE, with designing a statewide telecommunications infrastructure for government and education. This bill led to the establishment of the Multi-use Network Task Force in 1997.
- The federal **Telecommunications Act of 1996** provided for the establishment of a discount program for schools, libraries and public health facilities. Based upon the degree of poverty in their service areas, schools and libraries are eligible for discounts ranging from twenty to ninety percent off their telecommunications and Internet costs and the costs of installing local area networks. After long delay, funds for the first cycle have begun to flow to schools and libraries in Colorado and across the nation.

While many school districts take the lead in the development and implementation of distance learning programs, they involve their communities in the planning, development and utilization of these educational and economic development tools.

Addenda

A recent “news” update (after April, 1999) to this paper...

The “MathStar” Grant

The *MathStar* distributed learning grant is funded by the US Department of Education to develop models of professional development and student instruction in the areas of middle school math reform and innovative uses of technology. First year pilot sites are located in the San Luis Valley in the towns of San Luis, Blanca, La Jara, Monte Vista and Del Norte. The Project will expand to sixty-five sites over the five year life of the grant.

Telecommunications technologies will be key in linking the teachers and students in these communities providing opportunities for distance learning, resource access, sharing and collaborating. Three of these sites have interactive video classrooms connected through the Trinidad State Junior College network. All have and/or need large bandwidth access to the Internet for student and teacher activities. The federal e-rate program will help them pay for these large telecommunications pipes.

Colorado Library Internet Connectivity

The following pages are a recent commentary on a PUC docket regarding Internet access needs in rural Colorado. The Colorado State Library surveys all Public libraries annually and has for the past few years collected information about the use of technology and of Internet connectivity in Colorado Libraries. This information is somewhat limited in quality by the fact that many respondents have little exposure to the connectivity options available in non-rural areas. Although the results are better each year, there is a pent-up demand for higher speed, dedicated access in Colorado's non-urban libraries.

The Colorado State Library has a goal of assisting all Colorado Libraries attain dedicated, high-speed access to the Internet as soon as possible. To this end, it provides Federal library technology funds to several dozen Colorado libraries each year for connectivity or upgrading connectivity to the Internet. In addition to these funds, Colorado will be receiving approximately \$5 million in library technology grants from the Bill and Melinda Gates Foundation within the first two years of the Colorado Multi-Use Network implementation.

The Colorado State Library is confident that this infusion of investment, combined with the e-rate discounts available to many libraries will help accomplish its goal of full connectivity soon.

IN THE MATTER OF CONDUCTING A TECHNOLOGY INFRASTRUCTURE INVENTORY AND NEEDS ASSESSMENT TO DETERMINE THE STATUS OF INTERNET ACCESS IN RURAL AREAS.

**Comments Submitted by the
Colorado State Library
July 5, 1999**

In response to the Public Utilities Commission's request for information regarding the availability of adequate technology, infrastructure and advanced telecommunications services in rural areas, the Colorado State Library is pleased to present information related to the Commission's important study of these issues. In this document, the Colorado State Library will provide information on two important aspects of providing adequate technology, infrastructure and advanced telecommunications services in rural areas.

First, the Colorado State Library, through the Access Colorado Library Information Network (ACLIN) is working within rural communities to provide access to information not otherwise available to them. Second, individual libraries in rural communities serve as conduits to technology for those unable to afford such technology in their home. Unfortunately, libraries face the same struggles, such as prohibitively high costs and unavailability of needed services or bandwidth, that other telecommunications users face in accessing such advanced services. This document will explore both avenues in attempting to address the Commission's questions.

I. Libraries Play A Role in Providing Internet Access to Rural Residents

ACLIN: Created in 1992, the Access Colorado Library and Information Network (ACLIN) is a statewide, Internet-based library network that provides every Colorado resident with no-cost access to library catalogs and other information resources to meet information needs associated with education, business, health, personal growth, and general quality of life. The network insures access to information for even remote areas of the state.

The network is administered by the Colorado State Library on behalf of the Colorado library community, whose cooperation and participation make the network possible. Network funds for maintenance and development are a combination of federal and state funds. Colorado libraries also contribute by providing connections to their computer systems, serving on committees for planning and technical design, providing training and support for each other and the public, and delivering the service locally to Colorado residents.

The purpose of ACLIN is resource sharing. ACLIN leverages the rich resources of Colorado's best library resources at universities and at larger metropolitan area libraries to benefit every community in the state, thus improving access to information in even the

most remote areas of Colorado. Before ACLIN existed, nearly one-third of all Coloradans did not have free dial-up service, and access was particularly limited in rural communities. Today, 90 percent of Colorado residents are within local dial-up access of ACLIN, and the rest can reach it using an 800 number.

ACLIN is also the only service in the state that provides free text-based access to library and Internet resources to residents who have a phone line and a modem-equipped computer. In many instances, this is the only online access available to individuals, schools, and libraries that have older computers and modems, which are incapable of accessing and displaying more modern Internet resources. ACLIN's technical role is network access provider, source for aggregation of resources, ongoing technology development for more uniform and equitable access, and provider of technology assistance and resources to Colorado's smallest and least technologically proficient public and school libraries.

Local Libraries: Local libraries also play a role in providing advanced services access to communities throughout Colorado. The primary mission of libraries, in this electronic age, is to provide the public with access to the full panoply of electronic information resources. They are institutional providers of public access and instruments of universal service.

In urban areas of Colorado, libraries have access to a broad range of technological solutions to assure their patrons that the information they seek is available quickly. In rural areas, however, libraries suffer from the same limitations that other community users face, such as insufficient bandwidth, prohibitively expensive solutions and, at times, no solutions to simple access problems.

Currently, there are 28 urban libraries and 80 rural libraries that have a total of 350 outlets throughout Colorado. (See Attachment A) All have varying degrees of Internet access and speed with which to access the Internet. Most of these differences are based on geographic location and will be explored below.

II. Current Technical Status of Libraries

ACLIN: ACLIN currently operates a multi-platform (NT and Unix) network host site linked to the Internet via a T-1 connection. ACLIN contracts with Qwest to operate a statewide dial-up access network through a series of 15 local dial-up "points of presence" in most of Colorado's larger cities. ACLIN also operates its own 800-line dial-up service, which is available only to users in areas of the state not covered by its Qwest dial-up locations.

Access to ACLIN is entirely dependent on the equipment available to the end user. It can support both text and graphical access, which has become more important over time. Most resources on the Internet are now graphically-based and cannot be accessed via ACLIN's dial-up service. In the near term, this means that many new resources such as

museum multi-media exhibits online or historical photo collections are inaccessible to rural users of the ACLIN network in any usable form.

Local Libraries: Currently, 228 library outlets (91%) have some kind of Internet connection. This means that in most communities in Colorado, even without every household having a computer, most Coloradans have access to the Internet through their local library. In addition, 130 library outlets (57%) have dedicated connections of various kinds, 70 outlets (31%) have dial-up connections and 28 (12%) have both dedicated and dial-up connections according to the Colorado State Library survey of library connectivity conducted earlier this year. (See Attachment B)

In addition, of those that provided dedicated connections, speeds ranged from 56 Kbps to 1.5 Mbps. There were no speeds higher than 1.5 Mbps. (See Attachment C)

III. What ACLIN and Libraries Want to Provide

Ideally, ACLIN and local libraries would like to provide full graphical access at reasonable speeds to all communities. To illustrate the importance of speed, a December 27, 1995 Wall Street Journal article entitled "Cable Modems are Tested and Found to be Addictive" compared downloading capabilities with a dial-up line (14.4 Kbps), a 56 Kbps line and a 1.5 Mbps line. For a simple image, the dial-up line took 2.3 minutes to download, the 56 Kbps line took 35.7 seconds and the 1.5 Mbps line took 1.3 seconds. For a complex image, the dial-up line took 18.5 minutes to download, the 56 Kbps line 4.8 minutes and the 1.5 Mbps line took 10.7 seconds. (See Attachment D)

This becomes very important when libraries typically have to limit access to the Internet to 20 minutes to accommodate all patrons. Simply speaking, if the library has a dial-up line, the patron may spend their entire time downloading one image. If the access is faster, they will have access to more information and be able to utilize the library resources more efficiently. More speed means better access, faster and cheaper!

To address this problem, the Colorado State Library has devoted over \$3 million dollars of grant funding in the past few years to improving the network capabilities of Colorado's libraries, most recently in a push to get dedicated (i.e., a full-time, higher speed connection, typically 56 Kilobaud or greater) connections for all Colorado libraries. In many communities, however, 56K dedicated lines are in short supply or are prohibitively priced due to rural distance issues.

Ideally, all libraries and schools in Colorado should have access speeds of 1.5 Mbps or greater to accommodate the efficient utilization of the rich resources available through the Internet. Assuming some of the regulatory and competitive hurdles can be overcome, multiple solutions could be available. Solutions such as xDSL, cable modem, wireless and wireline could be available in every community, as would flat-rate dial-up Internet access in every local calling area.

Dedicated, high-speed connections will be needed in the next few years if Colorado's rural communities are going to have access to multi-media resources, which are becoming more prevalent in the information sector of our economy. Companies such as CNN Online, Time, 20th Century Fox, Turner Online, USA Today Info and others are all moving towards releasing new multimedia content on the Internet. ("Top Web Sites to Add Interactive Multimedia", Information Today, Jan. 1996 at 33, 35) Sufficient bandwidth will be necessary to access this information efficiently.

IV. Barriers to Providing Better Access

In attempting to assist libraries in improving their technological capabilities, ACLIN found that many solutions were insufficient to meet the needs of the communities for a variety of reasons. First, in much of rural Colorado, access to dedicated, high-bandwidth linkages is limited or absent. In Burlington, for example, while the State Library is offering grant funds to upgrade connections, there are no T-1 linkages available in the community. In addition, punitive distance costs typically make higher bandwidth fiscally impossible, even if it were technically available. In Buena Vista, at the "end" of a county service infrastructure, charges for a 56K connection were recently quoted at approximately \$500 per month. This can be as much as a quarter of a small library's budget. Libraries in these remote situations are also becoming sharply aware of the contrast of these charges with examples such as the 256K of dedicated access available via xDSL technology in some urban areas for \$40 per month.

In addition, many of the necessary elements of rural telecommunications infrastructure, such as switches and the local loops, are obsolescent. Even with the faster speeds afforded by more modern elements, such as fiber, the other hardware components of the rural infrastructure could not sustain these speeds. The already "exhausted" digital microwave service into Park County limits bandwidth available at extremities such as Leadville. Although Leadville is less than 20 miles from the fiber laid along Interstate 70 that service is not available in that community because it would have to cross a LATA boundary to get there. In addition, low cost, high-bandwidth technologies such as xDSL are not available at most rural switches, to serve communities such as at La Veta or Akron.

Rural libraries also, generally, cannot find out about service availability in most instances without placing an active order for service. Such orders are necessary to determine anticipated delays in installation. Anecdotal reports indicate up to a 9-month wait for connection in these areas.

These barriers limit what ACLIN and libraries can accomplish in bringing the Internet and other high-speed services to communities.

V. Conclusion & Recommendations

As noted above, both ACLIN and local libraries are striving to provide Internet and information access in rural communities. Many of these efforts have been successful as

noted by the increasing number of libraries with Internet access. However, barriers remain.

Recommendation: Use libraries to assure access to advanced services. While it may be impractical and improbable for the Commission to require equal access by providing high-speed Internet access to every household in Colorado at this time, we believe that ACLIN and local libraries can assist the Commission in coming closer to that goal. However, even that limited goal will require changes in current market behaviors that can be influenced by the Commission.

For example, the Commission could institute state universal service subsidies for community service organizations, such as libraries, to assure that even the most remote communities could take advantage of the important services and information high-speed Internet access provides. Further, revisions that mitigate the difficulties LATA lines impose would be important first steps to assuring affordable high-speed access. Finally, the Commission can provide public information, as it is doing in this study, to make clear the differences in service that exist today.

We appreciate the Commission's interest in this subject. We stand ready to assist the Commission in providing services to communities throughout Colorado.

ATTACHMENT A
ATTACHMENT A

Colorado Public Libraries with No Internet Access

