State of Colorado
Department of Administration

Division of Communications

Long - Range Plan 1982

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STATE OF COLORADO

DEPARTMENT OF ADMINISTRATION
1525 Sherman Street, 7th Floor
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December 11, 1981

Honorable Richard D. Lamm
Governor
State of Colorado

Dear Governor Lamm:

I am pleased to submit for your consideration the 1982 Long Range Plan for the Division of Communications.

The Plan represents a major step forward in the organization and activities of the Division. For the first time, the Division will be developing statewide communications on a network basis, rather than developing individual agency subsystems in a piecemeal fashion.

Two networks are of particular significance. The SAFETYNET communications concept has already been endorsed by many of the state's public safety agencies. The COLONET telephone concept provides the state with the opportunity to develop a network that will be compatible with the rapid changes in telecommunications technology we expect to see in the next few years.

I would like to emphasize that the threshold issue that will determine whether the Division can meet the goals set by this Plan is the completion of the last phase of the state microwave system. It is already a year behind schedule because of funding problems. The microwave system must be completed before any of the proposed networks can be put into place.

The Plan should be read with two points in mind. First, the networks proposed in the plan only affect state operations, and are not designed to compete with private sector telecommunications companies. Second, the Plan is designed to be upgraded every year, in order to keep up with developments in the telecommunications field, and to reflect current budget realities. Predicting what will be needed five years from now is hazardous in any area of state government, but particularly so in a rapidly changing area like telecommunications. Nonetheless, the Plan is a much needed first step in the right direction.

I would like to thank the many state agencies and public safety organizations that participated in developing and reviewing the plan.

Sincerely,

R. Garrett Mitchell

Approved

Richard D. Lamm

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DIVISION OF COMMUNICATIONS LONG-RANGE PLAN

Executive Summary

"Long-range planning does not deal with future decisions, but with the future of present decisions."
--Peter F. Drucker

The Division of Communications currently functions as an adjunct to the State of Colorado's public safety system. It was created by statute to plan and coordinate all the communications needs of the State of Colorado. The goal of this plan is to move the Division of Communications toward the functions intended in the enabling legislation, without sacrificing the contributions the Division currently makes to the Colorado public safety system.

In order to understand the current situation, an historical review is helpful. What ultimately became the Division of Communications had its origins thirty years ago in legislation allowing the Colorado State Patrol to develop a communications division to handle its mobile radio needs. In 1969, as part of a general reorganization, responsibilities for communications were removed from the Highway Department, and placed in the Division of Communications under the Department of Administration. It is instructive to compare the evolution of the Division of Communications with the development of the Division of Automated Data Processing (ADP), created the same year. While ADP has moved toward fulfilling its legislative mandate of functioning as the chief data processing planning center for all state agencies, the Division of Communications has remained to a very large extent, an offshoot of the Colorado State Patrol.

For quite a few years, this was a satisfactory arrangement. The State Patrol, and other public safety entities, made the greatest demands on state communications needs, and through resources, such as the Highway Users Trust Fund (HUTF) and the Law Enforcement Assistance Administration, were able to fund the capital projects the Division of Communications was asked to install and maintain.

But this situation has changed in recent years due to developments in both the political arena and in the realm of technology. The availability of HUTF and Federal funding to finance Colorado's communications needs is rapidly diminishing, and can be expected to decline further in the coming years. At the same time, changes in communications technology have impacted many areas of State operations outside of the public safety sector. And the rate of change can be expected to increase as telecommunications comes to be viewed as an acceptable alternative to various labor intensive business operations.

These changes require that the Division develop the capability to analyze not only the State's public safety needs, but <u>all</u> its communications requirements, in order to properly design future communications systems.

Given the current capabilities of the Division of Communications, this is a major challenge. Although it is unwise for the public sector to outpace the private sector in the use of state-of-the-art technological systems, a number of states are already experimenting with satellite communications and fiber-optic technology. Meanwhile, in Colorado, the Division of Communications struggles to maintain equipment that was

considered state-of-the-art in World War II, including police radios that use vacuum tube technology so antiquated the Division has to fabricate replacement parts.

Assuming it is still the Legislature's desire to have the Division of Communications coordinate the communications planning function for the State system, major changes will have to be made in the Division's operations over the next five years to meet this mandate. This plan is intended as a first step toward the achievement of that goal.

Long-Range Goal:

The Division should develop communications networks that will serve both public safety and administrative needs of the State of Colorado.

At present, the Division tends to design subsystems for individual agencies as funding and personnel permit. Because of the anticipated increase in telecommunications needs by all state agencies over the next decade, the Division should orient itself toward the development of networks for radio, telephone and other telecommunications formats, and then design the subsystems to be compatible with the configuration of the network.

Major Recommendations

1. For the forseeable future, the backbone of any State of Colorado communications network must be the state microwave system.

Unfortunately, upgrading of the final phase of the system, the crucial Front Range component, has been delayed because of funding cutbacks. If the system is not upgraded by 1984, the FCC will order it shut down. If the system is shut down, there will be no way of implementing any of the recommendations contained in this plan.

2. The Development of a Statewide Public Safety Radio Communications Network (SAFETYNET) should be a major priority of the Division of Communications. (cf. pp. 9 - 28)

Within five years, Colorado should be able to boast a truly effective, inter-active public safety radio communications system. This means there should be guidelines for local public safety agencies about how to coordinate their communications systems with the State system; that the State system should be upgraded and completed; and that different agencies should be able to communicate with each other through mutually compatible channels.

3. The Division should work toward the development of a state-owned Colorado Telephone Network (COLONET). (cf. pp. 29 - 41)

In an era of ever-increasing costs and declining sources of new revenues, the State of Colorado has the opportunity to effect significant cost savings through the development of a state-owned telephone system. Creation of a system incorporating the completed microwave network would result in an intra-state telephone system that would meet most of the State's needs at below current operating costs.

4. The Division should develop the capability to coordinate communications planning among all State of Colorado agencies,and be able to assess the usefulness and cost-effectiveness of new communications technology.

At present, the Division focuses primarily on two-way radio and

telephone systems. As various state agencies begin to depend more on the usage of video technology, teleconferencing, and more sophisticated word processing systems, there needs to be some central state planning function.

At present, few state agencies submit plans of their future communications system needs to the Division. Even if they did, it is doubtful that the Division, given its current funding and personnel constraints, could perform the necessary planning functions. Immediate study of this problem, including an inventory of the State of Colorado's total communications operations, is needed, as is an inventory of the possible funding sources for capital expenditures.

5. The Division of Communications should work more closely with the Division of ADP in designing future networks.

As telecommunications technology has become more sophisticated, the distinction between data processing and data transmission has become blurred. This trend can be expected to accelerate in the future, and the two planning divisions should work together on a more formalized basis to prevent redundant and inconsistent planning results.

6. The Division should serve as liaison between state government and the public broadcasting community.

Because of resource limitations, it is unlikely that the Division will be able to make major efforts in the area of video communications

in the next few years. However, there are concerns voiced by the public radio and television community that could be addressed by the Division, at least on an administrative and technical level. In addition, the Division should monitor the development of the cable television industry in Colorado to determine whether there are opportunities for shared programs with these private entities.

DIVISION OF COMMUNICATIONS FIVE-YEAR PLAN OVERVIEW

(Key: 0 - planning stage; X - implementation)

Program	Action	Year 1	Year 2	Year 3	Year 4	Year 5
Public Safety	Development of a statewide program for unifying and upgrading the state public safety communications network - SAFETYNET	0	X	X	X	X
Telephones	Development and implementation of a state-owned and operated telephone/ microwave communications network - COLONET	0	0	0	X	X
Data Transmission	Development and implementation of a statewide plan to integrate data transmission into the state telephone microwave network.	0	X	X	X	X
Planning/ Technology Assessment	Development of a process for inventory and evaluation of state telecommunication needs.	0	0	X	X	X
Internal Operations	Increase the technical engineering and planning roles of the Division	0	X	X	X	X

I. PUBLIC SAFETY COMMUNICATIONS

I. Public Safety Communications

A. Overview. The primary purpose of any state-funded communication must be the development of an effective, reliable public safety communications system. The Division of Communications owes its origins to this public need, and has historically received the bulk of its funding from public safety organizations.[1]

Citizens tend to take for granted the fact that in an emergency it is possible to communicate with police, fire, sheriff or other public safety entities, and that help will be sent as fast as possible. But, in point of fact, centralized planning to develop a comprehensive public safety communications network has been lacking in Colorado, with the result being that the vast number of public safety organizations have developed communication systems that are independent and often not compatible with each other.

Efforts to develop an effective statewide communications network are further hampered by the demands of Colorado's topography. No other state in the lower 48 has such difficult geographic features from the point of view of radio communications. Every mountain, every valley poses a problem in communications planning. As close as thirty miles from downtown Denver there are areas that cannot be penetrated by the State Patrol mobile radio system. On the Western Slope, the problems caused by a combination of mountainous terrain and relatively few population centers make the problem even greater.

The problem is further compounded by the obsolete equipment still being used by public safety organizations around the state. The Division continues to repair police and Highway Department radios that are twenty years old, even though the effective life of such equipment is about eight years.[2] The problem with old equipment is not only that replacement parts are difficult, if not impossible to find, but that the technology has changed so rapidly in the intervening years that the radios no longer can meet the needs of the current communications system.

The State Patrol can identify dozens of incidents where incompatible equipment prevented communication between State Troopers and other local law enforcement agencies during emergency conditions.[3]

While a number of major components of a public safety communications system have been put into place by the Division over the past few years, this has been done on a reactive basis. Typically, a public safety agency determines that it needs improvements in its communications system, secures the necessary funding, and then approaches the Division for technical assistance, installation and maintenance.

The weakness in this approach is that the subsystems are developed without reference to an overall State plan. Because of the constantly expanding needs of Colorado's public safety agencies and the limitations of budget and radio channel availability, it is now appropriate that the Division play a more proactive role in the development and planning of public safety communications systems. The first step toward achieving this goal will be the formal adoption of the Colorado Public Safety

Radio Communications Network (SAFETYNET) concept.

Although the precise configurations of the system remain to be worked out, the following requirements are deemed essential to the network:

1. It must serve the major public safety organizations in the State, including, but not limited to:

   a. Colorado State Patrol

   b. Department of Highways maintenance division

   c. All police and sheriffs' offices statewide

   d. Division of Disaster Emergency Services

   e. Division of Emergency Medical Services

   f. State Forest Service

   g. State Wildlife Service

   h. Colorado Bureau of Investigation

   i. State Institutional Police, Public Safety Security and Guard Services

2. It should incorporate the major telecommunications formats used by public safety organizations. This includes, but is not limited to:

   a. mobile radio

   b. point-to-point radio

   c. microwave

   d. data transmission

   e. telephones

3. It should have a minimum set of goals over the next five years, including, but not limited to:

   a. Development of the state microwave system as the communications backbone of the public safety system.

   b. Development of the capability of mobile radios to communicate with related jurisdictions.

c. Development of the capability to radio-issue all-points emergency communications throughout the state.

d. Development of specifications and purchasing programs allowing for compatible system development.

e. Development of a coordinated state procedure for assigning frequencies to public safety agencies.

f. Development of a program for accelerating the replacement of outdated public safety communications equipment.

In order to meet these goals, the Division should involve the representatives of the public safety agencies in the SAFETYNET planning process. A Public Safety Communications Committee, composed of representatives of all affected agencies, should be created to oversee the implementation of the SAFETYNET plan.

In addition to informing the Division of their communication needs, the Committee should serve as a mediator in interjurisdictional disputes concerning allocation of communications services, and act as an ombudsman for local agencies who have had complaints concerning the Division's operations as it affects their jurisdictions. Success in meeting these goals would eliminate two of the most frequently voiced objections to statewide public safety communications planning.

B. Programs. The SAFETYNET concept will involve the following programs:

a. Microwave upgrade. The microwave system began

in the late 1950's, utilizing then-current vacuum tube technology. Over the years, advances in technology have led to gradual replacement of components of the system with solid state hardware.

By 1974, the original system had become obsolete, expensive, and in some cases, impossible to maintain. The State recognized this problem and began a review of alternative communication methods. With Legislative support, a phased replacement program was initiated in FY 1975-76.

The replacement program was aimed at developing expansion capabilities not only for radio communication, but for elements of the state telephone system as well as alternative communications networks as they develop.

At present, phases 1, 2, 3, and 4 of the replacement program have been implemented. As originally scheduled, the last phase was to have been completed and operational by June, 1982. Funding was withheld for the completion of phase 5, however, with the unfortunate consequence that the single most important segment, the Denver microwave and switching system, has yet to be upgraded.[4]

To give but one example of the problems caused by the inadequacy of the current microwave system, during the recent emergency test of the Ft. St. Vrain nuclear power plant, the Denver microwave segment broke down, which meant that the Division of Disaster Emergency Services (DODES), which functions as the command and control service for state emergencies, had no remote radio communications system whatsoever![5]

If an emergency occurred which had destroyed the telephone lines in the Golden area, effective coordination of emergency control operations would have been severely limited.

It is important to emphasize that until phase 5 of the microwave replacement schedule is implemented, all other statewide plans for improving the public safety communications system cannot be put into place. The state microwave system is essential for the development of a unified state approach to public safety communications, as well as other communication projects.

If the State does not complete the rebuilding of the system by the end of 1984, the FCC will close the entire microwave system down, for failing to meet minimum current requirements.[6] Traditionally, the microwave system has been viewed as an adjunct to the Colorado State Patrol, and the Highway Users Trust Fund has been viewed as the main funding source for this program. As will be demonstrated throughout this plan, the microwave is essential to all elements of State communications, not just public safety.

b. Radio Communications. Virtually all public safety organizations depend on land mobile radio to handle their operational responsibilities. Most use a combination of mobile radios operating out of cars or trucks, fixed radio relay systems (antennas and transmitters) and a centralized dispatching system that coordinates most activities. Ideally, the system as

a whole should allow for reliable transmissions both within the agency and with neighboring jurisdictions.

Colorado's radio network has experienced a steady evolution from simply serving law enforcement needs in the 1950's to serving the current users, including highway, local government, natural resources, fire, institutional law enforcement, agriculture and general government administrative agencies.

This continuous expansion of radio communication has placed a major strain on the available radio spectrum and choice of radio communication sites. Demand has virtually exhausted the supply of public safety frequencies. Fifteen to twenty-five users are now on sites that once served only two or three.

Because of the haphazard way in which public safety communications evolved in Colorado, the current situation impairs the proper operations of public safety agencies. Instead of having clear channels where they can communicate among themselves and with neighboring jurisdictions, the public safety agencies are experiencing frequency congestion and interference levels normally associated with much more densely populated states. A phenomenon known as "bleeding over" is experienced in many areas of the state. In Montrose, for example, the State Patrol has often found its messages garbled with those of police and other local jurisdictions because of the over-crowding on the airwaves.[7]

Another barrier to the achievement of an efficient radio communications system is the lack of up-to-date radio equipment, and incompatible hardware

among various public safety organizations.

In order to correct these problems, it is necessary for the Division's centralized planning functions to expand. The following are designed to more rationally apportion the available radio channels, increase the capability of radio communications to serve all the public safety entities in the state, and eliminate costly duplications within the State system:

1. Dispatching system replacement program. Radio communications systems operated by public safety entities are coordinated by "command control centers", commonly known as dispatching centers. The purpose of these centers is to dispatch emergency equipment and personnel, disseminate administrative orders to field units, and provide citizen access to public safety emergency services.

Obviously, the degree to which these control centers work determines how well the public safety entity responds to a problem. As with the other elements of the State communications system, control centers originally served only law enforcement needs, but are now called upon to handle a wide assortment of public safety emergency services. Some of the centers, which began in the late 1940's, are no longer technologically or operationally capable of meeting the demands placed upon them.

There are two major problems facing the current dispatching system statewide. First, much of the equipment is obsolete. Second, the

tremendous rise in the number of public safety communications organizations has led to duplication in the number of dispatching systems in a given locality. To cite one example, in Craig there are two twenty-four hour dispatch centers located less than a mile from each other, operated by different jurisdictions. Simply by consolidating the two centers, personnel costs alone would be cut by as much as 1/3 for both organizations.[8]

In 1975, the State developed a conceptual plan for upgrading the command control systems. The plan recommended replacing the obsolete radio control consoles, renovating the primary center plant facilities, improving citizen access and expansion of the systems toward long-range command control system goals. It provided methods for receiving and handling incoming emergency calls, for recording emergency calls, for data entry and retrieval, and for furnishing recorded road and weather information. In most of the existing locations, plant facilities would be modified to restrict unauthorized personnel access and to increase operational security.[9]

The original plan provided for a program to replace and upgrade the thirty major command control centers over a six year period. To date, only seventeen of the thirty centers have been upgraded, utilizing primarily Federal funds. With the loss of much Federal funding anticipated in the near future, completion of this project will be more and more dependent on State funding as a substitute.[10]

2. Multi-jurisdictional communications. A major goal of the SAFETYNET concept is to enable

different jurisdictions to communicate with each other over established radio channels. The Division is proposing the adoption of a statewide plan for use of dedicated frequencies which would allow for interagency mutual aid communications among law enforcement and public safety agencies.[11] This plan could be implemented in FY 1982-83.

3. Frequency Utilization. As mentioned earlier, the airwaves are becoming very crowded. One way to control the situation over the short term is to reduce the necessary range of radio communications, so that the same channels can be used by different agencies out of range of each other. The Division is developing a conceptual plan that will establish "mobile radio districts" for police, highway maintenance and emergency systems.[12] These districts will be much smaller than previous districts, requiring less powerful transmitters. Broadcasts between districts will be sent by the State's relay system. Currently, there are 4,320 mobile units being operated by state and local government entities. In order to function according to the "mobile radio district" plan, many of these units will have to be replaced. Because they are nearing the end of their effective service life, the timing is right for implementing the "mobile radio district" plan, and developing new specifications for the replacement equipment. Assuming available funding, the program should be completed by FY 1988-89.

A second issue dealing with frequency utilization does not at the present time suggest a solution. The problem is not unique to Colorado, and was studied at some length by the North Carolina Task Force of Public Telecommunications. Their statement of

the problem is as follows:

"Currently, there is no office in state government specifically designed to coordinate all two-way radio frequencies used by state and local agencies. Although the Federal Communications Commission (FCC) allocates frequencies at both state and local levels, it uses (the local state chapter of) the Associated Public-Safety Communications Officers to help coordinate police radio frequencies. The FCC works with a different group for fire department frequencies. Neither the police nor the fire group is responsible for coordinating radio frequencies for Emergency Medical Services, Wildlife and so forth. This means that state and local agencies may sometimes be in competition for scarce frequencies from the FCC; that no one is responsible for planning across systems so that agents from different offices can communicate with each other during emergencies; and that the state loses the benefits of both the monetary savings and improved services that could be achieved by joint planning."[13]

The situation described in the North Carolina report is exactly the same in Colorado, where the Colorado Chapter of the Associated Public-Safety Communications Officers has handled frequency coordination on behalf of the State on a purely voluntary basis. By all accounts they have performed well, but the fact remains they are operating in what properly should be a state function. Should they, at some point, no longer be able to fill this responsibility, the State, and most likely the Division, will be forced to take control.

c. Public Safety Communications Subsystems.

In addition to developing an overall plan for improving Statewide communications, the Division is also responsible for the planning and construction of subsystems suited to the communication needs of individual public agencies. Currently, the Division works with 14 public safety agencies. The philosophy behind subsystem development is to attempt, where possible, to integrate the subsystem into the SAFETYNET system. Some current projects include:

1. Criminal Investigation Radio (CIR). Known informally as the CBI subsystem, this was created to allow for covert investigation activities. The system has been extended to include the needs of the Organized Crime Strike Force. The Division is currently implementing a plan designed to increase the range and capacity of the system.[14]

2. Emergency Medical System. Responsibility for the development and coordination of a comprehensive emergency medical services (EMS) system, including ambulance services, training of Emergency Medical Technicians and EMS communications, was delegated to the Department of Health, through enactment of the Colorado EMS Act of 1977. The bill assigned the Division of Communications the responsibility to coordinate the statewide EMS communications system "with the existing state telecommunications network to the extent possible" and to ensure entry of local government entities into the statewide communications system.

Development of EMS communications networks are being accomplished by a coordinated effort between the Emergency Medical Services Division of the Colorado Department of Health, the Division of Communications and local

entities. The Division of Communication's role, mandated by the EMS Act, is to provide technical assistance in the development of these systems and facilitate their interface with the state telecommunications network. Since 1974, the Division of Communications has assisted the EMS Division in developing EMS communications systems in Regions 2, 4, 6, 7, 8, 10, 11 and 13. The Division of Communications is currently assisting the EMS Division in developing EMS communications systems in Regions 9 and 12. During the period 1982-85, it is anticipated that the Division of Communications will need to provide technical assistance to the EMS Division in developing or upgrading EMS communications systems in Regions 1, 3 and 5 and in areas affected by energy development (especially in Region 10 and 11).

The costs of the Division of Communication's assistance to the EMS Division in developing EMS communications systems have been covered out of Federal grants to the EMS Division. The EMS Division and Division of Communications have executed a Memorandum of Agreement defining their mutual roles and responsibilities. Due to reductions in the federal budget and changes in the federal EMS grant programs, the availability of federal funding support in the future is questionable and will in any case be limited, thus restricting the ability of the Division of Communications to continue to assist the EMS Division in carrying out the critical functions mandated by the Colorado EMS Act.

A review of existing federal communications rules and regulations is presently being conducted by the Federal Communications Commission. One major concern, voiced not only by the State of Colorado but many other

states as well, is the lack of statewide and local frequency coordination for Special Emergency Radio frequencies related to EMS. It has been recommended by the National Highway Traffic Safety Administration that state and local coordination of the affected frequencies be delegated to the state health departments. If this becomes a reality, the Division of Communications will need to play an important role in assisting the EMS Division in this coordination process.

The role of the State Microwave system (SAFETYNET) will be vital in the development and upgrading of EMS communications in Colorado. Local and regional EMS communications systems will need to rely heavily on the State microwave system to provide essential access to crucial medical assistance available in the major State resource hospitals in the Denver area. In addition, in some areas, access to the microwave system will be essential to provide basic ambulance-to-base hospital communications where transport times and distances are lengthy and the topography obstructs continuous direct ambulance-to-base hospital contact. Incorporation of such microwave links is an integral part of the Region 9 Development project and will need to be added elsewhere.

3. Division of Disaster Emergency Services (DODES). DODES is responsible for coordinating all activities related to disaster management. The existing radio communication capability available to DODES is limited to several systems operating in the military, aeronautical, amateur and public safety portions of the radio spectrum, which are used in support of specific DODES functions during a disaster response.

At present, DODES has developed communication plans for emergencies dealing with the Ft. St. Vrain nuclear plant, and the Rocky Flats weapons plant. In planning for other DODES' needs, the Division of Communications will be asked to provide communications in anticipation of specific potential disaster situations, and will design communications systems to meet these specifications.

In addition, once the microwave system is completed, DODES will have access to the SAFETYNET system to communicate with all agencies in the State on an emergency basis. In the interim, DODES has use of a mobile communications van that can link up with existing State communications systems.[16]

4. Search and Rescue

Subsystem. This system is designed for use by volunteer search and rescue groups. Authorization for use is granted by the Colorado Search and Rescue Board, in conjunction with DODES and is monitored by the Division of Communications. Technically, this subsystem is part of the Disaster Response System operated by DODES.

The status of this subsystem will depend on the final plans developed for DODES. Ideally, it should be integrated into the SAFETYNET system.

5. Natural Resources

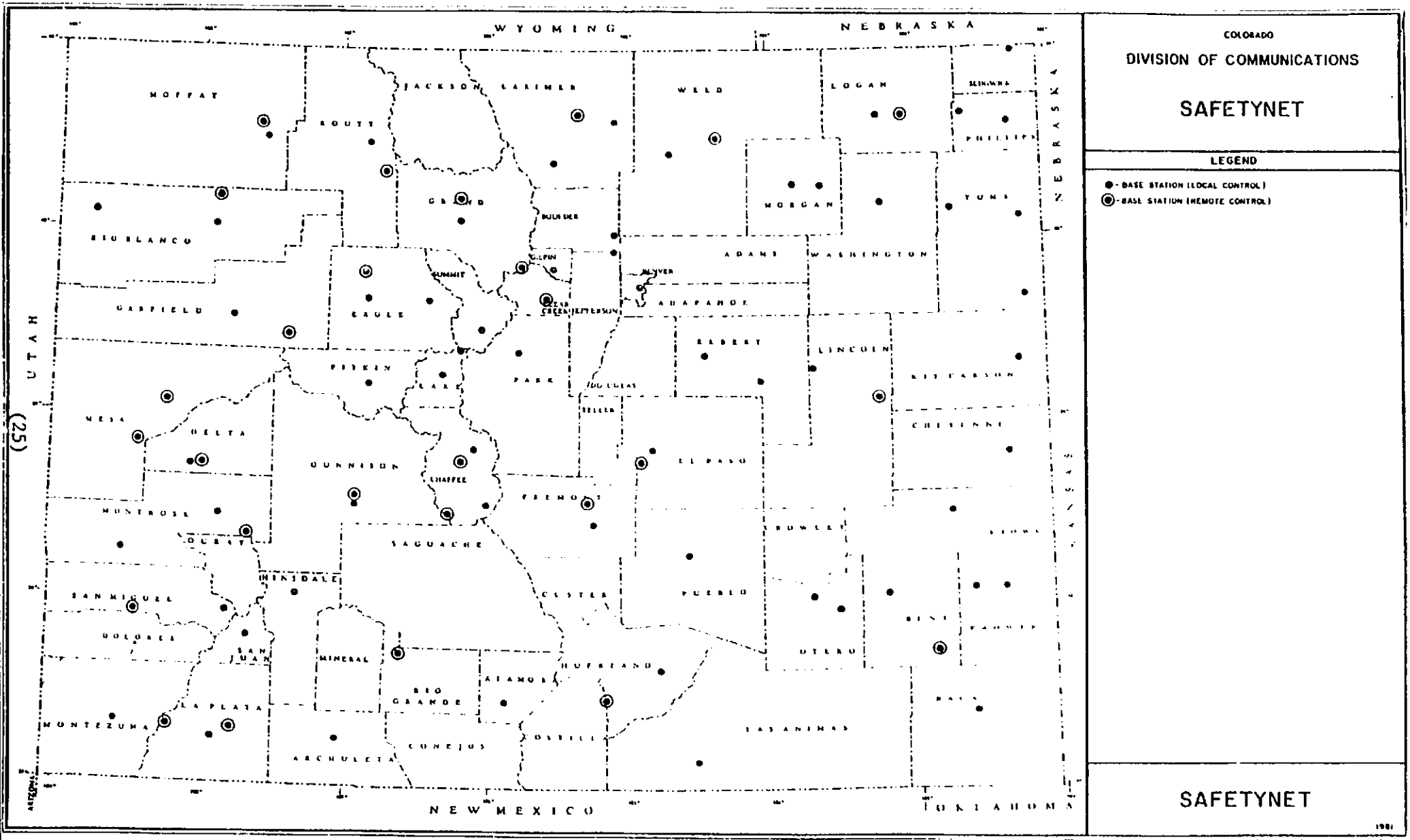
Subsystem. This includes the Division of Wildlife, Parks and Recreation and the State Forest Service. Unlike most other State subsystems, the

primary need is to communicate from mobile unit to mobile unit via repeaters, rather than from mobile unit to a central dispatching system.

Because of the unique needs of this system, it will not be designed to conform with the SAFETYNET system.

6. Institutional Public Safety. The Division currently services five campuses (UNC, CSU, Ft. Lewis, CU and Adams State). The Division will eventually develop subsystems for all State institutions.

7. New subsystems. The Division, functioning as a service agency, will design subsystems for any Colorado public safety agency asking it to do so. Based on experience, additional agencies will develop systems in the future.



COLORADO

DIVISION OF COMMUNICATIONS

SAFETYNET

LEGEND

- ● - BASE STATION (LOCAL CONTROL)
- ◉ - BASE STATION (REMOTE CONTROL)

SAFETYNET

1981

FOOTNOTES

Section Two - Public Safety Communications

1. For an analysis of sources of funding used in Division programs over the past decade, see Exhibit A in the Appendix.

2. Source: Communications Needs Assessment Report, Colorado Department of Highways, June 1981, pps. 7-13.

3. Source: Communications Needs Assessment Report, pps. 21-34.

4. The funding and implementation schedule of the program was originally approved as follows:

Phase 1 - Denver to Grand Junction Funded FY 1975-76, Operational June 1976	COST:$734,000
Phase 2 - Pueblo to Buena Vista Funded FY 1976-77, Operational June 1977	423,000
Phase 3 - Buena Vista to Durango Funded FY 1979-80, Operational May 1980	1,136,846
Phase 4 - Denver to Sterling Pueblo to Lamar Pueblo to Trinidad, Alamosa Funded FY 1980-81, Operational June 1981	1,153,830
Phase 5 - Denver to Pueblo-Limon Funding request denied, FY 1981-82	1,214,099

5. Source: DODES study, "1981 Exercise Report (Ft. St. Vrain)" August 12, 1981.

6. Source: Part 90, FCC Rules and Regulations.

7. Source: Communications Needs Assessment Report, p.29.

8. Source: MONTELORES Communications Consolidation Project, 1975, Division of Communications.

9. Source: Dispatch Center Upgrade Study, 1977, Division of Communications.

10. Current funding status of dispatch centers is indicated in the following chart:

	YEAR FUNDED	FUNDING SOURCE	COST
PHASE 1	(1976-1977)		
Limon	1979-1980	State	$ 30,000
Pueblo	(Not Funded)		*
Lamar	1978-1979	Federal/Local	$ 30,000
Montrose	(Not Funded)		*
Salida	1979-1980	Federal/Local	$ 50,000
PHASE 2	(1977-1978)		
Alamosa	1978-1979	Federal/Local	$100,000
Sterling	1980-1981	Federal/Local	$ 35,000
Greeley	1980-1981 (Greeley funded for fiscal year 80-81 will be implemented by May 1981)	State	$100,000
Eagle	(Not Funded)		*
Grand Junction	(Not Funded)		*
PHASE 3	(1978-1979)		
Craig	(Not Funded)		*
Colorado Spgs.	(Not Funded)		*
Durango	(Not Funded)		*
Hot Sulphur	1979-1980	Federal/Local	$ 20,000
Springfield	1978-1979	Federal/Local	$ 50,000
PHASE 4	(1979-1980)		
Fort Morgan	(Not Funded)		*
Burlington	1978-1979	Federal/Local	$ 35,000
Canon City	1978-1979	Federal/Local	$ 40,000
Delta	1977-1978	Federal/Local	$ 10,000
Gunnison	1978-1979	Federal/Local	$ 10,000
PHASE 5	(1980-1981)		
Nucla	1980-1981	Federal/Local	$ 15,000
Trinidad	(Not Funded)		*
Julesburg	1978-1979	Federal/Local	$ 10,000
Wray	1978-1979	Federal/Local	$ 10,000
Yuma	1978-1979	Federal/Local	$ 10,000
PHASE 6	(1981-1982)		
Las Animas	(Not Funded)		*
Steamboat Springs	(Not Funded)		*
Leadville	1978-1979	Federal/Local	$ 10,000
Holyoke	1978-1979	Federal/Local	$ 10,000
La Junta	(Not Funded)		*

* Implementation details and cost projections can only be developed for individual command-control centers, based upon a known resource schedule.

11. Source: Colorado Chapter, Associated Public Safety Communications Officers, Inc., "Statewide Plan for Colorado-Nationwide Police Radio Network"; "Statewide Plan for Colorado Public Safety Mutual Aid Mobile Network"; "Colorado Law Enforcement Emergency Network"; "Colorado Law Enforcement Mobile Radio Network"; "Colorado Linking Channel".

12. Source: SAFETYNET Frequency Redistricting Plan - To be published by the Division of Communications Dec., 1981

13. Source: Interconnections, North Carolina Task Force on Public Telecommunications, 1979, pps. 2-3.

14. Source: C.I.R. Plan, Division of Communications, 1979.

15. Source: Response to Senate Bill 454, Division of Communications, 1978.

16. Source: Communications Van, Division of Communications, 1980.

II. TELEPHONE COMMUNICATIONS

II. Telephone Communications

A. Overview. The second area where the Divison of Communications has historically assumed a planning role is telephone system design and operations.

The Division's major telephone responsibility has been to maintain and upgrade the 54 separate systems currently operated by State agencies. Currently, Mountain Bell provides 45 systems, and 9 are provided by private interconnect companies.

Because these systems have been installed over a long period of time, the technical capabilities and operational level of hardware in these systems vary from obsolete to state-of-the-art.[1]

In 1968, the FCC, in its Carterfone Decision, declared the "telephone company tariff regulations prohibiting the interconnection of customer owned equipment to the public telephone system are invalid." This decision terminated the protected monopoly of the telephone companies, which led to increased competition and made telephone equipment and services available from a multitude of sources. Competition forced all suppliers to make available to the consumer equipment containing the most advanced telephone technology. This change has had a significant impact on the State of Colorado.

It should be noted that the effect of the initial FCC decisions allowed open competition for the selection of terminal equipment, such as phones and

switching equipment. Later decisions and court cases further expanded the scope of competition to connecting services as well. For the first time, AT&T found itself in competition for supplying long-distance circuits with private companies such as MCI and others.

These changes radically altered the nature of the telephone industry, and the scope of telephone communications planning. But in the near future, an even more radical revolution in telephone services can be expected since both the FCC and the U.S. Congress are studying alternatives leading to a deregulation of the national phone system. The consequences of this movement will be of considerable importance to the Colorado state telephone systems in the near future.

It is anticipated, for example, that sometime in the next two years the traditional long-term leasing arrangements between Mountain Bell and their subscribers for switching equipment will be terminated, requiring the subscriber to either purchase the existing system or select a more current alternative from a host of suppliers. Colorado operates many telephone systems that are obsolete, which suggests that when these leasing arrangements are terminated by deregulation, the costs of purchasing and replacing current equipment could be as high as $14.5 million, over a very short time period.

This is an extreme, but not impossible, example of the potential short-term effects of deregulation. The consequences, however, may not be entirely negative. With the advent of deregulation, the State could consolidate the current telephone communications systems; tie them into the operations of the microwave system, and develop a State owned

system that would allow for intrastate communications at a level of operating costs far below current costs.

All these factors indicate that the Division should be concentrating on three major areas in telephone communications over the next five years:

--Development of the State microwave system as the backbone of the State telephone system;

--Modification and upgrading of the State's telephone subsystems; and

--Development of a deregulation contingency plan.

B. Programs.

1. Colorado Telephone Network (COLONET). With the completion of phase 5 of the State microwave system, Colorado will have available a 300-channel long-range communications system. Only a small proportion of these channels will be dedicated in the forseeable future to public safety communications purposes. Considerable capacity is available for other purposes.

This opportunity comes at a time when the traditional telephone configurations used by the State of Colorado are being dismantled. Reference has already been made to the upheavals caused by the early states of deregulation, but these changes will be dwarfed in the near future.

At this point, it is impossible to guess what the exact timetable and scope of the deregulation process will be, but the general outlines are clear. First, change will occur in the very near future.[2] Second, a number of

services currently provided by the common carrier, such as TELPAK, will be discontinued.[3] Third, there will be a total deregulation of the terminal equipment market over the next few years, leading to a radical change in pricing structures.[4] Fourth, alternative services for long-distance calling being offered by Specialized Common Carriers (MCI, Union Pacific, Johns-Manville, etc.) might be cheaper than services offered by AT&T.

All these factors necessitated the development of a long-range approach to State telephone communications that is tailor-made to meet the State's anticipated needs, rather than oriented toward compatability with the service an individual supplier may offer.

The following are Colorado's anticipated needs: A telephone system that allows for the use of high-speed digital voice/data technology, so that the increasing data transmission needs of State agencies can be incorporated into the system; a telephone system that provides the necessary infra-structure for migration to the "Office of the Future" during the coming decade; a telephone system that allows cost stabilization for instrastate communications, enabling better utilization of limited financial resources; and most importantly, a telephone system that works.

Deregulation will require Colorado to either purchase its current hardware, now leased, or to develop a new system. The timing is right for the development of an omnibus Colorado Telephone Network (COLONET) plan.

The components of the COLONET plan are as follows:

a. State microwave system. Upon completion, this system will provide a means of carrying all intrastate communications needs for the forseeable future.

b. SAFETYNET system. By consolidating the public safety communications subsystems into a unified network, the microwave system will be freed up for non-public safety uses, thus allowing the system to be prioritized in the event of a disaster.

c. Replacement of switching and terminal equipment. In order to allow access to the microwave, state of the art equipment will be installed in strategic locations around the State, including the Highway Department in Denver, CSU in Ft. Collins, Pikes Peak Community College in Colorado Springs, Mesa College in Grand Junction, USC in Pueblo and Ft. Lewis College in Durango.

d. Benefits. When completed, the COLONET system will allow for a variety of current and future telecommunications needs. Voice transmission, data transmission, electronic mail, remote paging and slow-scan image (video) transmission all will be possible via the COLONET system. In short, the State would have a system that could meet the demands of telecommunications technology through the decade.

Even more important, a State-owned system could be expected to generate considerable savings over alternative arrangements. The experience of designing and implementing the Capitol Complex telephone system demonstrated savings of $13,000 monthly in equipment and service costs,

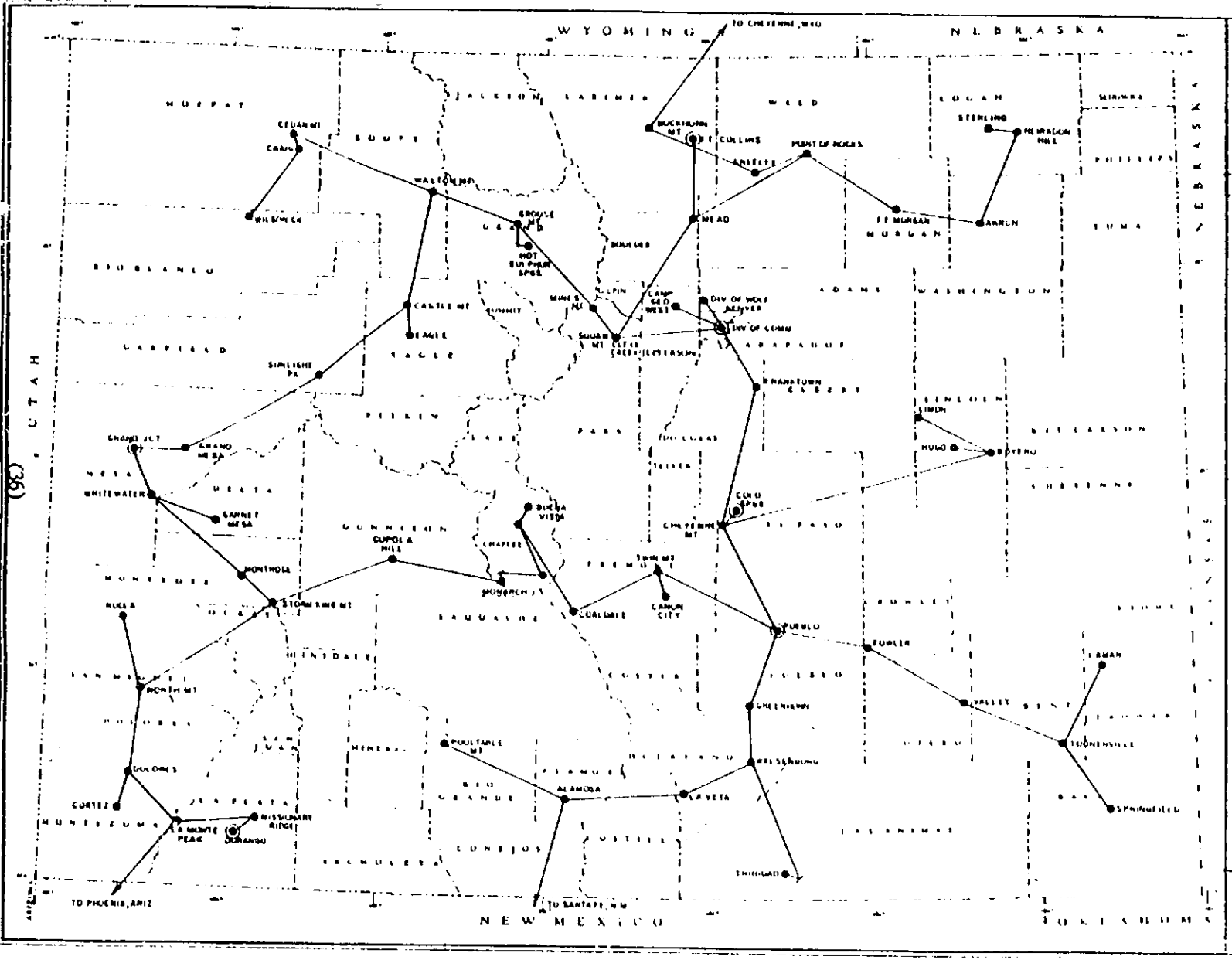
and $20,000 monthly in toll costs.[5] Use of bulk services for intrastate calls have also proved cost-effective.[6]

The savings potential for a State-owned system is even greater. Long-distance intrastate telephone calls routed on the COLONET circuits could cost as little as $.03 per minute, compared with the current rate of $.30.[7] The savings on intrastate calls, based on 1981 rates, would amount to $3.5 million annually. The per mile data circuit costs would decrease even more dramatically from the current rate of $4.09 per mile to less than $1.00.[8]

Given these cost savings, it is estimated that the completed COLONET system, which would cost $14.5 million, would achieve pay back in 5 to 7 years.

2. Deregulation Contingency Planning. The development of the COLONET system will, in part, be dictated by the changes in regulatory policy affecting the telephone industry nationwide. The task of monitoring these changes has been assumed by the Division, and a Deregulation Contingency Plan, designed to monitor changes in the telephone industry and inform the Executive and Legislative branches, when relevant, is being prepared. On-going monitoring of telephone deregulation is a continuing function of the Division and will intensify during FY. 1982-83.

3. Maintenance. Currently, Mountain Bell provides all maintenance services. The Deregulation Contingency Plan must deal with possible options for future years.



COLORADO

DIVISION OF COMMUNICATIONS

COLONET

LEGEND

- MICROWAVE SITES
- COLONET SWITCHING CENTERS

COLONET

FOOTNOTES

Section Three - Telephone Communications

1. See enclosed chart, "Telephone Systems Serving Colorado State Government".

2. Congress is currently working on a major revision of the 1934 Communications Act.

3. Federal (interstate) TELPAK was discontinued May 1, 1981; Mountain Bell has filed its intention to discontinue intrastate TELPAK with the Colorado P.U.C. effective April 1, 1983.

4. These provisions are in the current Senate version of the revision of the 1934 Communications Act.

5. Source: "Monthly management reports", Division of Communications.

6. Source: Ibid.

7. Source: "Study of Intrastate Cost Savings", Division of Communications, 1977.

8. Source: "Channel Mile Cost Study", Division of Communications, 1981.

TELEPHONE SYSTEMS SERVING COLORADO STATE GOVERNMENT

(Denver Metro Area)

	AGENCY	LOCATION *	SWITCHING SYSTEM TECHNOLOGY	TELEPHONE INSTRUMENT TECHNOLOGY *
1.	Colo. State Gov't, Capitol Complex	Denver, (13 Bldgs.)	Stored Program Computer Control	Tone Dial
2.	Dept. of Highways	4201 E. Arkansas, Denver	Electromechanical	Rotary Dial
3.	Auraria Higher Education Center	1111 W. Colfax, Denver	Dedicated Logic	Rotary Dial
4.	Fort Logan Mental Health Center	3520 W. Oxford, Englewood	Electromechanical	Rotary Dial
5.	Department of Military Affairs	Camp George West, Golden	Electromechanical	Rotary Dial
6.	Department of Military Affairs	300 S. Logan, Denver	Electromechanical	Rotary Dial
7.	Lookout Mountain School for Boys	Golden	Electromechanical	Rotary Dial
8.	Mountview Girls School Youth Services	3900 S. Carr, Lakewood	Electromechanical	Rotary Dial
9.	Arapahoe Community College	5900 S. Santa Fe, Littleton	Dedicated Logic	Rotary Dial
10.	Revenue Dept., Taxation	1375 Sherman Street	Stored Program Computer Control	Tone Dial
* 11.	Denver Work Incentive Program	1330 Fox	Dedicated Logic Customer provided equipment	Tone Dial
* 12.	Division of Disability Determination	2121 S. Oneida	Dedicated Logic Customer provided equipment	Tone Dial
13.	Community College of Denver North Campus	3645 W. 112 Ave.	Stored Program Computer Control	Tone Dial
14.	Community College of Denver, Red Rocks	12600 W. 6th Avenue, Golden	Stored Program Computer Control	Tone Dial
		* See Exhibit 8		* See Exhibit 9

Note: All systems leased/rented from Mountain Bell unless marked *.

* - State owned.

TELEPHONE SYSTEMS SERVING COLORADO STATE GOVERNMENT
(Denver Metro Area)

	AGENCY	LOCATION *	SWITCHING SYSTEM TECHNOLOGY	TELEPHONE INSTRUMENT TECHNOLOGY *
15.	State Home & Training School	10285 Ridge Rd., Arvada	Stored Program Computer Control	Tone Dial
16.	Colorado Dept. of Health	NJH Building, Colfax & Colo. Blvd.	Stored Program Computer Control	Tone Dial
17.	Colorado Bureau of Investigation & General Gov't Computer Center	2002 S. Colorado Boulevard	Stored Program Computer Control	Tone Dial
* 18.	Colorado School of Mines	Golden	Stored Program Computer Control Customer provided equipment	Tone Dial
* 19.	Colorado Department of Health	4210 East 11th Avenue	Stored Program Computer Control Customer provided equipment	Tone Dial
* 20.	Attorney General	1525 Sherman Street	Stored Program Computer Control Customer provided equipment	Tone Dial
* 21.	Judicial Branch	2 E. 14th Avenue	Dedicated Logic Customer provided equipment	Tone Dial
22.	Colorado University Medical Center	4200 East 11th Avenue	Electromechanical	Rotary Dial
23.	Division of Wildlife	6060 N. Broadway	Stored Program Computer Control	Tone Dial
		* See Exhibit 8		* See Exhibit 9

Note: All systems leased/rented from Mountain Bell unless marked *.

* - State owned.

TELEPHONE SYSTEMS SERVING COLORADO STATE GOVERNMENT

(External of Denver Metro Area)

	AGENCY	LOCATION	SWITCHING SYSTEM TECHNOLOGY	TELEPHONE INSTRUMENT TECHNOLOGY *
				* See exhibit 9
1.	Colorado State University	Ft. Collins	Electro Mechanical	Rotary Dial
2.	Mesa College	Grand Junction	Electro Mechanical	Rotary Dial
3.	Adams State College	Alamosa	Electro Mechanical	Rotary Dial
4.	University of Southern Colorado	Pueblo	Electro Mechanical	Rotary Dial
5.	University of Northern Colorado	Greeley	Electro Mechanical	Rotary Dial
6.	University of Colorado	Boulder	Electro Mechanical	Rotary Dial
7.	Western State College	Gunnison	Electro Mechanical	Rotary Dial
8.	Ft. Lewis College	Durango	Electro Mechanical	Rotary Dial
9.	Trinidad Jr. College	Trinidad	Electro Mechanical	Rotary Dial
10.	Pueblo Vocational Community College	Pueblo	Electro Mechanical	Rotary Dial
11.	Colorado State Hospital	Pueblo	Electro Mechanical	Rotary Dial
12.	University of Colorado	Colorado Springs	Stored Program Computer Control	Tone Dial
13.	Pikes Peak Community	Colorado Springs	Stored Program Computer Control	Tone Dial
14.	Northeastern Junior	Sterling	Electro Mechanical	Rotary Dial
15.	Colorado State Veterans Center	Home Lake	Electro Mechanical	Rotary Dial
16.	Colorado School for Deaf and Blind	Colorado Springs	Stored Program Computer Control	Tone Dial
17.	Colorado State Penetentiary	Canon City	Electro Mechanical	Rotary Dial
18.	Division of Wildlife	Ft. Collins	Electro Mechanical	Rotary Dial

Note: All systems leased/rented from Mountain Bell unless marked *.

* - State owned.

TELEPHONE SYSTEMS SERVING COLORADO STATE GOVERNMENT

(External of Denver Metro Area)

		AGENCY	LOCATION	SWITCHING SYSTEM TECHNOLOGY	TELEPHONE INSTRUMENT TECHNOLOGY *
					* See exhibit 9
	19.	Division of Employment	Greeley	Electro Mechanical	Rotary Dial
	20.	Division of Employment	Colorado Springs	Dedicated Logic	Rotary Dial
	21.	Dept. of Highways Eisenhower Tunnel	George Town	Dedicated Logic	Rotary Dial
	22.	Dept. of Highways	Greeley	Dedicated Logic	Rotary Dial
	23.	Division of Employment	Pueblo	Dedicated Logic	Rotary Dial
	24.	Lamar Community College	Lamar	Dedicated Logic	Rotary Dial
	25.	State Home and Training School	Grand Junction	Electro Mechanical	Rotary Dial
	26.	Trinidad State Nursing Home	Trinidad	Electro Mechanical	Rotary Dial
*	27.	Health Department	Pueblo	Dedicated Logic	Rotary Dial
	28.	Dept. of Highways	Grand Junction	Electro Mechanical	Rotary Dial
*	29.	Colorado State Reformatory	Buena Vista	Dedicated Logic Customer Provided Equipment	Tone Dial
*	30.	Otero Junior College	La Junta	Dedicated Logic Customer Provided Equipment	Tone Dial
	31.	Colo. State University	Ft. Collins	Stored Program Computer Control Customer Provided Equipment	Tone Dial

Note: All systems leased/rented from Mountain Bell unless marked *.

* - State owned.

III. DATA COMMUNICATIONS

III. Data Communications.

A. Overview. Within Colorado State Government, statutory responsibility for data is divided between the Division of Automated Data Processing (ADP), charged with producing and maintaining a plan for data processing systems, and the Division of Communications, charged with producing and maintaining a plan for transmitting data via communications systems.[1]

Historically, the Divisions have functioned separately, although both are in the same department and subject to supervision by the executive director or his deputy. The rapid changes in telecommunications technology and the effects of telephone deregulation will dictate that both divisions work closer in the future.

Technology has eliminated the traditional distinctions between data processing and data communications. Consider that the digital telephone switching systems, proposed in the COLONET plan, are designed specifically to accommodate high-speed data transmission. But the switching systems themselves are actually sophisticated computers. The question arises, is the selection of COLONET equipment the responsibility of the Division of ADP or the Division of Communications? Unless the Divisions work closely together in the future, "turf conflicts" might occur between the two Divisions.

The consequences of deregulation will hasten this problem. Virtually all the data transmission needs of the State are currently provided by Mountain Bell rather than through State circuits. The backbone of the intrastate data transmission system currently is the Mountain Bell TELPAK system, which

provides bulk circuits at reduced prices. However, as referenced in the ADP Master Plan, Mountain Bell will discontinue the TELPAK service in 1983[2], requiring selection of a new data transmission provider.

Historically, ADP has not utilized State communications systems because of the antiquated nature of the microwave system, the understaffing of the Division of Communications, and the superior service provided by Mountain Bell.[3] With the development of the COLONET system, it is anticipated that these obstacles will be overcome, and that the State will be able to provide state-of-the-art data transmission service at better than competitive rates.

The need for more formal planning between the two Divisions has been recognized by the Division Directors, but it is generally agreed that the rank and file of both Divisions still do not work well with each other, and that a major goal must be to develop a closer coordinating relationship between the two Divisions. The programs presented in this section are designed to meet these needs.

B. Programs.

1. Public Safety Data Communications. At the present time, the Administration of Justice Computer (AJCC) is the only data subsystem that could be termed a true public safety activity.

Originally established with Federal funds to support immediate access to crime-related data for law enforcement command control operations, the subsystem now performs a number of para-legal and law enforcement

administrative functions as well.

The Division worked with the Colorado Bureau of Investigation and ADP during the early development and installation of this subsystem. Initial service was provided to command control centers along the Front Range. The system currently uses circuits leased from Mountain Bell.

With the completion of the microwave system, the AJCC should be switched to State operated circuits. In the long run, the subsystem should be a component of the COLONET system, allowing for greater information sharing at reduced costs.

2. Developing Alternatives to TELPAK. The immediate problem facing the Colorado data transmission system is the anticipated discontinuance of the TELPAK system by Mountain Bell in 1983. Planning is necessary to develop alternative options from both private providers and the State. Assuming completion of phase 5 of the microwave system in FY 1982-83, the Division would be able to provide dedicated channels via the microwave system by 1983, thus furnishing an interim solution to the problem. The long-run solution is to integrate the data transmission system into the COLONET system.

3. COLONET planning. Because the COLONET system, when completed, will provide high-speed digital data transmission, as well as serve as the backbone for intrastate "Office of the Future" systems, it is recommended that the Division of ADP and the Division of Communications work together on a more formal basis in developing the COLONET system. A COLONET Task Force, representing both Divisions,

should be created in FY 1982-83 to begin developing the technical plan for the COLONET system.

FOOTNOTES

Section Four - Data Communications

1. CRS 24-30-613; CRS 24-30-913.

2. Source: ADP Master Plan, Volume I, 1981, Division of Automated Data Processing, VI-4.

3. Ibid, VI-8,9.

IV. TECHNOLOGY ASSESSMENT/COORDINATED PLANNING

IV. Technology Assessment/Coordinated Planning

A. Overview. At present, the Division of Communications devotes virtually all its efforts toward maintenance and development of the mobile radio and telephone systems. Meanwhile, developments in the telecommunications field continue at ever-increasing pace, with no agency in the State of Colorado assigned to monitor and interpret these trends.

Instead, individual State agencies are functioning as consumers of telecommunications products and services, with no overall coordination. The need for coordinated planning is obvious, and the enabling legislation creating the Division of Communications anticipated that the Division would play the lead role in this area:

> "24-30-903. Duties and Responsibilities. (1) The state communications coordinator shall perform the following functions:
>
> (a) In consultation with state departments, institutions, and agencies, formulate recommendations for a current and long-range communications plan, involving telephone, radio, microwave, teletype, teleticketing, closed circuit television, automated data processing communications systems, and mail room facilities for approval of the executive director of the department of administration and the governor."

Yet, the Division has never functioned according to this provision, in part because of chronic funding limitations, in part because of its historical connection with public safety agencies.

Assuming the Legislature still intends that there be overall coordination for telecommunications planning, the following programs are designed to <u>begin</u> to meet these needs. The word "begin" is underlined because the transformation of the Division from essentially a service and

maintenance organization to a planning agency will require time, increased manpower, and the development of an aura of credibility among other agencies that it does not possess at this time. It is expected that successful completion of the microwave system, and the implementation of the SAFETYNET and COLONET programs will go a long way toward establishing the Division's credibility and enable it to assume new challenges.

B. Programs.

1. Statewide telecommunications inventory. At present, there is no reliable source of information on how much hardware, and of what type, is being purchased by the Colorado government systems. Before any overall approach to coordinating telecommunications services can be achieved, a baseline inventory must be established. It is recommended that such an inventory be taken in FY 1982-83. The State of Wisconsin, in preparing its Statewide Telecommunications Five Year Plan developed an inventory system that might be relevant to Colorado's needs.[1]

The second step in developing an ongoing planning process would be to require all agencies to present to the Division an outline of telecommunication needs on an annual basis. The Division will develop a reporting and procedures manual for State agencies during FY 1982-83.

2. Division staffing. The Division's personnel level has essentially stayed the same since its inception, although

the scope of its responsibilities has increased tremendously. At present, the Division has no staff devoted primarily to communications planning in the general sense outlined in this section.

The Division suffers from two major manpower deficiencies:

a. Technical planning. On an ad hoc basis, the Division is currently organizing a Technical Planning Group, aimed at developing coordinated implementation plans for the various communications subsystems the Division currently services. Personnel for this program are currently "borrowed" from the Division's engineering staff. This is at best a short term arrangement, and as the Division moves toward systematic approaches to communications, the need for a full time Technical Planning Group becomes more essential. Three slots need to be created:

1. Engineering aide - would handle technical drawings for engineering documents and update engineering standards for all communications systems;

2. Field coordinator - would work with various agencies and provide technical assistance so that the agency communications subsystems would be compatible with the Statewide networks; and

3. Technology evaluator - would evaluate new technologies to determine if they can be integrated into existing state communications networks, and would provide technical training for Division staff.

b. Long-range Analyst. The analyst would take the information obtained from the statewide communications inventory and work with the technology evaluator and the Division Director to develop long-range telecommunications strategies. The analyst would also keep an eye on regulatory and legislative changes in the telecommunications field, and assume an information sharing and teaching role for other State agencies. Programs would be developed to acquaint other agencies with the costs and benefits of new telecommunications programs, such as electronic mail and teleconferencing, as well as the creation of pilot programs to determine the applicability of these new technologies to Colorado operations.

3. Technology assessment. Much has already been said about the enormous changes taking place in telecommunications. These changes will not only have economic implications for the operations of government, but will have socio-political implications as well.[2] At present, the Division is not capable of assessing these matters. It does not have any technical experience with some mainstream technologies, such as video, let alone the more esoteric technologies coming into use, such as satellite and fiber-optics.

The Division must first demonstrate its ability to handle radio and telephone communications, but once that capability is achieved, the Division should take the lead role in evaluating new telecommunications applications as they come on line. In order to achieve this goal, the Division should work in consort with other state agencies that have developed experience in certain technologies or technical applications, such as

the State University system.

How precisely this assessment process should be structured is not presented in this plan. It is anticipated that if the SAFETYNET and the COLONET systems are developed, and if the Division is given additional planning staff in the near future, that a technology assessment planning process on a Statewide basis will evolve, as the need becomes more and more apparent.

Nonetheless, a number of issues relating to technological change will appear during the next five years that the Division must begin to address in the very near future:

a. Communications in the post-microwave era. Given current technology, the microwave system, incorporated into the SAFETYNET and COLONET programs, should prove sufficient to meet Colorado's communications needs until late in the decade. By then, a faster, more expanded backbone system may be necessary. Satellite systems, which would not be hindered by the constraints of Colorado's topography, may be an attractive alternative, as might fiber-optic circuits on a more localized basis. In order to provide sufficient lead-time for planning and budgeting, research on the successor to the microwave system should commence immediately.

b. Office of the Future applications. Though still in its early stages, most computer/telecommunications companies are working toward the development of fully-integrated electronic office systems that would connect word-processing, electronic

mail, facsimile , teleconferencing , data storage, data transmission and other processes into one giant electronic network. The concept appears to be particularly relevant in business operations where large volumes of inter and intra office correspondence must be rapidly processed.[3] Virtually every State agency will be impacted by this new approach to business operations, and Colorado should begin developing standards and procedures for evaluating the applications of these new systems to the State's needs. An inter-agency task force, involving the Division of Communications, should begin addressing these concerns no later than FY 1984-85.

FOOTNOTES

Section Five - Technology Assessment/Coordinated Planning.

1. Source: 1978 Statewide Telecommunications Five Year Plan, State of Wisconsin.

2. See, for example, Toffler's The Third Wave.

3. The State of Florida, in its Telecommunications Concepts & Planning for the 1980's, concluded that the major reason for upgrading its telecommunications network was to be able to accomodate "Office of the Future" equipment. An excerpt from the report:

"The most popular or common names for the anticipated changes in telecommunications in the 1980's include "The Electronic Office", "The Office of the Future", "Electronic Mail", and "The Integrated Electronic Office". Regardless of what it is called, the concept of an electronic working environment where multiple office functions are performed or aided by an integrated automated system will become a reality in the 1980's.

There are many reasons that will bring about the concept of an integrated office environment through telecommunications. One of the major forces is the nationwide trend to digital transmission by both telecommunication users and suppliers. The technology of digital transmission is linking together a wide range of disciplines involving data, facsimile, and voice communications. It has made possible higher speed, greater capacity, and lower error rate transmission media.

Another factor contributing to the Office of the 1980's is the continuing revolution in solid state electronics that will enable automated office systems with programmable processors to have the capacity and ability to accomplish their programmed tasks at an acceptable price.

However, the main driving force behind the trend to develop and implement the concepts for the Office of the Future appears to be the need to increase white collar productivity and decrease the cost of performing routing business communications and functions.

As a point of reference, it has been brought out in trade magazines and telecommunication conferences that over the past ten years, productivity in the factory has continued to rise but not in the office. Supporting this contention, capital investment per worker in the factory averaged $24,000 during this period. The pay off in productivity has been an increase of 84% in the ten year period.

For the same period of time, capital investment per white collar worker has only averaged $3,000 with a corresponding increase in office productivity of only three percent.

One reason for this minimal increase in office productivity is that most office tasks are performed the same way they have been for 100 years. For example, letters are still filed by hand; mail is manually picked up and delivered; and letters are typed, edited, retyped and copied by hand.

In an integrated environment for example, the correspondence would possibly be entered into a word processing terminal by either a secretary, manager, or office worker. A printout of the letter would be requested by the secretary for editing of any incorrect portions, for assigning a priority to the message, and for entering a MAIL command. An electronic mail system would make all decisions about how the letter should be sent and actually send it. The message could be retained in the secretary's SENT file or a hard copy provided from a printer for the files, if necessary.

The heart of the Office of the Future will be a highly modular telecommunications or network switch as referenced on the cover of this document. It is quite probable that this will not be a single physically controlled entity but will be a variable number of mini or micro processor controlled telecommunication switches dedicated to or dispersed for particular agencies, locations, functions, or applications. This network of telecommunication switches is envisioned to provide a media for voice, data, video, or electronic mail switching dependent upon the requirements of the using state agencies being served, its cost benefits, and increased productivity. In one location or agency merging voice and data communications may have the greatest pay off in cost benefits and productivity while word processing and data switching may yield a greater pay off in another area. There is no single configuration or approach that can be mandated, only an orderly implementation that makes sense to the using agencies and yields the desired results.

The implementation of the Office of the Future is not going to arrive overnight in state offices throughout the State. In fact, there may be elements or concepts of the electronic office that may never materialize either partially or in total, or may never lend themselves to the office environment of state agencies. However, the State must be prepared to implement and make maximum utilization of those concepts and innovations that prove viable.

In order to be prepared to take advantage of the innovations that will stand the test of time and provide the results desired, the Division of Communications has developed this document, Telecommunication Concepts and Planning for the 1980's. We believe the key to telecommunications success in the next decade will be the utilization of processor controlled telecommunication switches flexible enough to implement the most viable of the concepts discussed herein."

V. THE DIVISION OF COMMUNICATIONS - INTERNAL OPERATIONS

V. The Division of Communications - Internal Operations

A. Overview. The Division of Communications is primarily a technical service organization, prescribed by statute and dedicated to fulfilling the telecommunication needs and requirements of State government, its agencies and its political subdivisions.

In 1947, the General Assembly established the Division of Communications as a section of the Colorado State Patrol, to facilitate development of a statewide land mobile radio network.

During the first ten years, an extensive mobile radio network developed. Because the State Patrol was a Division within the Department of Highways, initial development of the network focused primarily on the needs and facilities of the Department of Highways and State Patrol.

In keeping with Legislative intent, the network was made available to political subdivisions throughout Colorado. In many cases, the State Patrol entered into cooperative agreements with these agencies to establish additional stations and control points in county and city buildings. This cooperative network expansion provided local government with communications capabilities where none had existed, increased network radio coverage and improved service to the public. Although autonomous law enforcement control occasionally resulted in unequal consideration of non-law enforcement and local government priorities, a functional cooperative network was created.

In 1956, a decision by the FCC permitted industrial and non-federal government use of private microwave systems. In 1958, Colorado initiated construction of the microwave system, beginning in the Denver metro area, to replace "radio links" and leased lines used for inter-connection and remote control of mobile radio systems. By 1964, the microwave system had evolved to an extensive statewide system linking virtually all of the Colorado land mobile radio network. The use of the microwave to support the mobile radio network also made it possible to extend network services into areas previously inaccessable with remote control methods.

During the 1950's and early 1960's, use of land mobile radio increased so dramatically that the FCC was forced to restructure regulatory control of mobile radio services. Following a 1964 FCC mandate, the Division began to divide the land mobile radio network, separating public safety radio services. This led to the development of the current subsystems, such as the Highway Maintenance system, Law Enforcement system, etc.

In 1966, the General Assembly initiated a study of Colorado State Communications. The major conclusion was that "Colorado is fortunate that .... there exists no wasteful duplication of mobile 2-way radio systems among the several departments and organizations. Furthermore, with the extensive system now existing, future needs for this type communications can be met efficiently by proper management and orderly expansion of present facilities. However, there is an urgent need for a central organization which will impartially perform the necessary functions for all state administrative bodies in the realm of all electronic communications."[1]

The General Assembly agreed with the recommendations of that study and enacted sections 34-30-905 CRS. By this action, the Division of Communications was transferred to the Department of Administration and granted the authority for State Government Communication coordination effective January 1, 1970.

Prior to this transfer, all Division personnel were devoted strictly to the State's land mobile radio network, with priority emphasis in support of fulltime public safety services provided by that network.

Although Statewide responsibility for telephonic, data and special transmission networks were transferred to the Division, staffing was increased by only 13 FTEs, 12 of which were prededicated to routine operations of the switchboard for the State Capitol Complex.

So while the transfer established a new and expanded role for the Division, the staff and funding necessary to fulfill that role was not a part of the transfer.

In addition, the bulk of the Division's capital funding continued to come from public safety sources. As a result, instead of expanding its role, the Division continued to function essentially as an offshoot of the public safety agencies.

Additional personnel resources have been requested in many preliminary budgetary submissions over the past ten years in an attempt to increase the Division's Engineering and Maintenance staff to a level commensurate

with the total tasks assigned. To date, the Division has been forced to function with essentially the same staff level as authorized in 1970. Only 5 fulltime employees have been added to the Division's staff during the past ten years. During this same period, land mobile radio systems have grown 54 per cent, and the voice, non-voice transmission demand 75 per cent.[2]

The pattern of funding Division positions and activities using Federal and/or project grants, an inheritance from its public safety origins, has limited the Division's ability to hire personnel. For example, two FTE positions were to be added in FY 1979-80 as fulltime but unfunded engineering positions. Funds to pay the associated salaries were to be developed from Federal and/or project sources. Although funds were acquired and the Division actively recruited throughout the year, the positions were not filled. Qualified applicants lost interest when they were informed that salary funding could not be guaranteed for more than one year or beyond the extent of the current funding source. The Division could not offer permanence, while the private sector could, at a higher salary.

B. Recommendations.

1. Division programs should be funded to a larger degree out of General Funds, where applicable.

It is time to recognize that projects such as the microwave system will benefit all State agencies, not just the public safety sector, and that these types of programs should be funded to a larger percentage out of the

General Fund pool. The Division is attempting to develop communications on a Statewide network basis, yet currently must await grants from specific agencies to plan and implement these programs. As a result, the temptation is to develop subsystems on a piecemeal basis, resulting ultimately in duplication and inefficiency.

2. The Division must be allowed to develop a staff capable of handling its increased responsibilities. Since 1970, the Division has created two new units to meet the demands of its increased responsibilities, a Telephone/Wire Services section and a Planning and Development section.[3] Staff for the Planning and Development section were transferred from the Engineering section, resulting in an immediate need for additional staff. This can be accomplished by adding the two FTE positions that were authorized but unfunded in FY 1979-80 as permanent funded positions. Additional FTE's are also needed for the Telephone section and the Planning section as soon as possible. Due to the increasing demands for new and improved service in information transfer, both sections rapidly exhausted their limited resources soon after being established.

A new position of Long-range Analyst must be authorized and funded. The position outlined in the Technology Assessment section of this plan would go a long way toward moving the Division to its intended role as coordinator of all State agencies.

3. The Division should aggressively inform other State Agencies of its expanded role so that Division services may be fully utilized. The Division should come to be viewed as a facilitator, rather than an obstacle to the development of effective intra-agency communications.

FOOTNOTES

Section Six - The Division of Communications - Internal Operations

1. "Report to the 46th General Assembly", Communications in Colorado, John B. Heffelfinger, Phase II, p. 32.

2. A list of agencies currently served by the Division is enclosed as "Exhibit 1".

3. The current structure of the Division is illustrated in Exhibit II.

Agencies Currently Served
by the Division of Communications

LOCAL GOVERNMENT AGENCIES

Aguilar Police Department
Akron Police Department
Alamosa Police Department
Antonio Police Department
Ault Police Department
Basalt Police Department
Brush Police Department
Buena Vista Police Department
Campo Police Department
Carbondale Police Department
Cedaredge Police Department
Center Police Department
Central City Police Department
Cheyenne Wells Police Department
Climax Police Department
Commerce City Police Department
Craig Police Department
Creede Police Department
Dacono Police Department
Del Norte Police Department
Delta Police Department
Dillon Police Department
Dinosaur Police Department
Dolores Police Department
Dove Creek Police Department
Durango Police Department
Eads Police Department
Eaton Police Department
Elizabeth Police Department
Erie Police Department
Estes Park Police Department
Evans Police Department
Fairplay Police Department
Firestone Police Department
Ft. Lupton Police Department
Frederick Police Department
Frisco Police Department
Fruita Police Department
Granada Police Department
Granby Police Department
Grand Lake Police Department
Gunnison Police Department
Haxtun Police Department
Hayden Police Department
Holly Police Department
Holyoke Police Department
Hooper Police Department
Hotchkiss Police Department
Hugo Police Department
Ignacio Police Department
Johnstown Police Department
Julesburg Police Department
Kremmling Police Department
La Jara Police Department
La Junta Police Department
Lamar Police Department
La Salle Police Department
Las Animas Police Department
Limon Police Department
Manassa Police Department
Mancos Police Department
Manzanola Police Department
Meeker Police Department
Minturn Police Department
Montrose Police Department
Nucla Police Department
Oak Creek Police Department
Olathe Police Department
Ouray Police Department
Pagosa Spgs. Police Department
Paonia Police Department
Platteville Police Department
Pritchett Police Department
Rangely Police Department
Red Cliff Police Department
Rocky Ford Police Department
Romeo Police Department
Saguache Police Department
Sanford Police Department
San Luis Police Department
Silt Police Department
Silverthorne Police Department
Springfield Police Department
Steamboat Spgs. Police Department
Trinidad Police Department
Vail Police Department
Walden Police Department
Walsh Police Department
Windsor Police Department
Wray Police Department
Yuma Police Department
Alamosa County Sheriff's Office
Archuleta County Sheriff's Office
Baca County Sheriff's Office
Bent County Sheriff's Office
Chaffee County Sheriff's Office
Cheyenne County Sheriff's Office
Conejos County Sheriff's Office
Costilla County Sheriff's Office
Custer County Sheriff's Office
Delta County Sheriff's Office
Dolores County Sheriff's Office
Eagle County Sheriff's Office
Elbert County Sheriff's Office
Fremont County Sheriff's Office
Garfield County Sheriff's Office
Gilpin County Sheriff's Office
Grand County Sheriff's Office
Gunnison County Sheriff's Office
Hinsdale County Sheriff's Office
Huerfano County Sheriff's Office
Jackson County Sheriff's Office
Kiowa County Sheriff's Office
Lake County Sheriff's Office
La Plata County Sheriff's Office
Larimer County Sheriff's Office
Las Animas County Sheriff's Office
Lincoln County Sheriff's Office
Mesa County Sheriff's Office
Mineral County Sheriff's Office
Moffat County Sheriff's Office
Montezuma County Sheriff's Office
Montrose County Sheriff's Office
Morgan County Sheriff's Office
Ouray County Sheriff's Office
Park County Sheriff's Office
Phillips County Sheriff's Office
Pitkin County Sheriff's Office
Prowers County Sheriff's Office
Rio Blanco County Sheriff's Office
Rio Grnade County Sheriff's Office
Routt County Sheriff's Office
Saguache County Sheriff's Office
San Juan County Sheriff's Office
San Miguel County Sheriff's Office
Sedgwick County Sheriff's Office
Summit County Sheriff's Office
Teller County Sheriff's Office
Weld County Sheriff's Office
Washington County Sheriff's Office
Yuma County Sheriff's Office
Akron Fire Department
Alamosa County Fire Prot. District
Alamosa Fire Department
Buena Vista Fire Department
Chaffee Fire Department
Cortez Fire Department
Delta County Fire Department
Delta Rural Fire Department
Holyoke Fire District
Las Animas Fire Department
La Junta Fire Department
Lamar Fire Department
Nucla/Naturita Fire Department
Pinewood Springs Fire Department
Rocky Ford Fire Department
Salida Fire Department
So. Arkansas Fire Prot. District
Sterling Rural Fire Prot. District
Washington Co. Rural Fire Department
Yuma Co. Rural Fire Department
La Junta County
Park County
Rio Blanco County
San Juan County
San Miguel County
Alamosa District Attorney
Aspen District Attorney
Canon City District Attorney
Commerce City District Attorney
Cortez District Attorney
Craig District Attorney
Durango District Attorney
Glenwood Springs District Attorney
Golden District Attorney
Littleton District Attorney
Monte Vista District Attorney

EXHIBIT 1 (Sheet 1)

Agencies Currently Served
by the Division of Communications

STATE GOVERNMENT AGENCIES

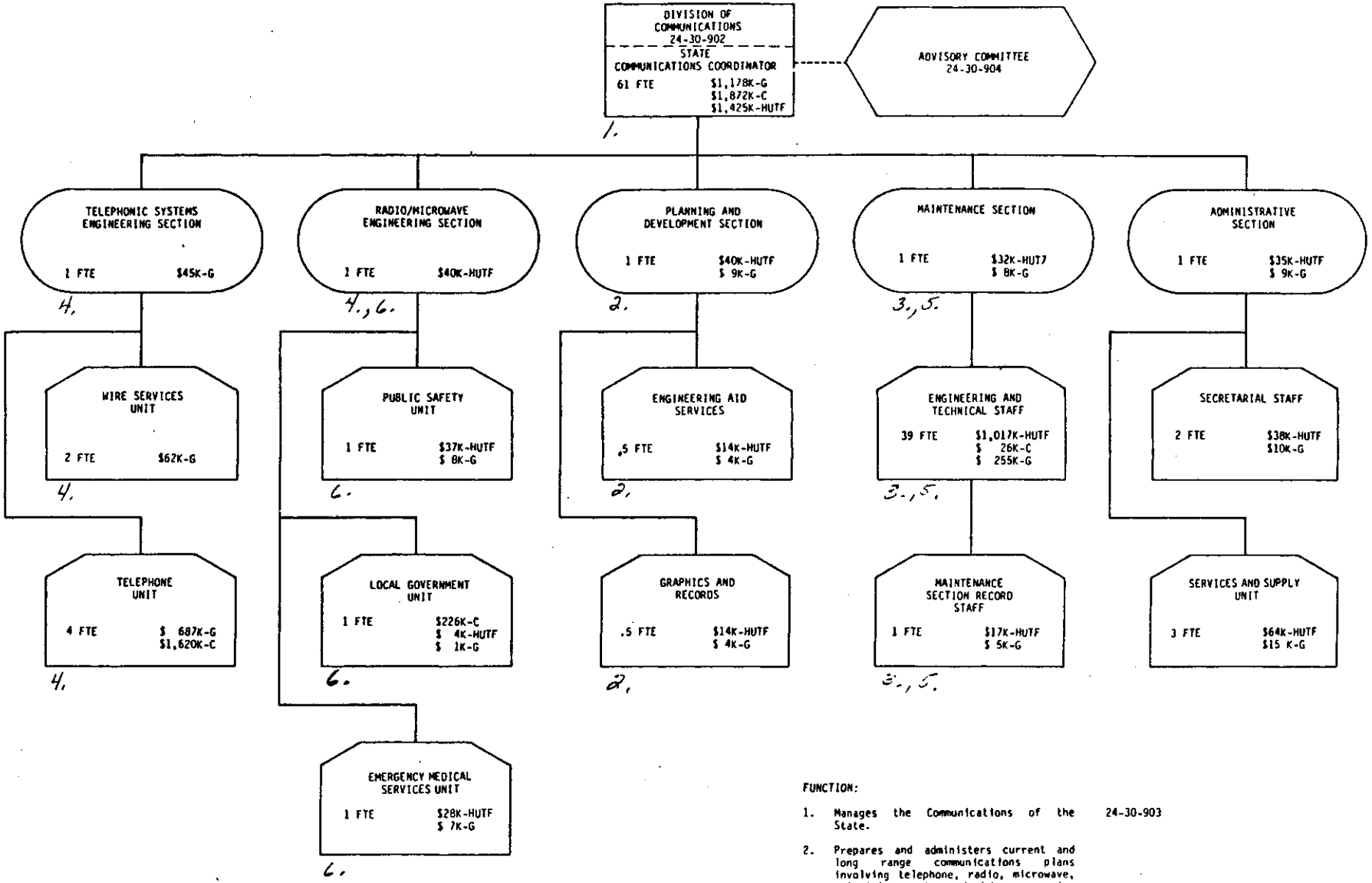
Adams State College
Adjutant General, Department of Military Affairs
Adult Parole, Department of Institutions
Animal Industry Division, Department of Agriculture
Arapahoe Junior College
Auraria Higher Education Complex
Brand Inspection Division, Department of Agriculture
Colorado Bureau of Investigation, Department of Local Affairs
Colorado School of Mines
Colorado State Hospital, Department of Institutions
Colorado State Penitentiary, Department of Institutions
Community College of Denver
Department of Agriculture
Department of Health
Department of Highways
Division of ADP, Department of Administration
Division of Water Resources, Department of Natural Resources
El Paso Community College
Fort Logan Mental Hospital, Department of Institutions
Lamar Community College
Legislative Branch
Liquor Division, Department of Revenue
Lookout Mountain School for Boys, Department of Administration
Military Affairs, Civil Defense, Dept. of Military Affairs
Motor Vehicle Division, Department of Revenue
Otero Junior College
Port of Entry Division, Department of Revenue
Secretary of State
State Forest Service
State Patrol, Department of Highways
State Reformatory, Department of Institutions
Tax Enforcement Division, Department of Revenue
Tri-District Probation, Judicial Branch
Trinidad Junior College
University of Colorado, Denver
University of Colorado, Colorado Springs
University of Northern Colorado
University of Southern Colorado

FEDERAL GOVERNMENT AGENCIES

U.S. Bureau of Indian Affairs
U.S. Federal Highway Commission
U.S. Fish and Wildlife

NON-GOVERNMENTAL AGENCY

Southern Ute Indian Tribe



FUNCTION:

1. Manages the Communications of the State. 24-30-903
2. Prepares and administers current and long range communications plans involving telephone, radio, microwave, television, automated data processing communication systems.
3. Maintains the State's Communications system and all its equipment, including towers and antennas.
4. Develop detailed communications systems with emphasis on microwave, VHF, EMS and telephone systems.
5. Performs maintenance for state and local government mobile radios.
6. Advises other state agencies and local governments on communication matters.

Exhibit II

APPENDIX

SAFETYNET & COLONET

5 - Year Implementation Schedules

Public Safety Communications Plan (SAFETYNET)

Year 1

Program	Action
Microwave	Complete installation - phase 5
Radio - Statewide	Formal adoption of a statewide plan allowing for intrajurisdictional communications via two-way radio. (Mutual Aid)
	Begin technical planning; police mobile radio districts.
Subsystems --Criminal Investigation	No action forseen.
--Emergency Medical Services	Completion; region 9, planning for regions 1, 3 and 5.
--Law Enforcement	
--Disaster Emergency Services	Develop integrated state plan for all subsystems.
--Search & Rescue	
--Highway Maintenance	
--Resources Systems	Continue planning process.
--University Security	Develop plan.
Telephones	Encourage development of 911 systems.
Maintenance	See "Division" 5-Year Plan
Administrative Control	Create SAFETYNET Advisory Board
Equipment Specifications	See "Division" 5-Year Plan

Public Safety Communications Plan (SAFETYNET)

Year 2

Program	Action
Microwave	See "Telephone" 5-Year Plan
Radio - Statewide	Phase 1, Dispatching system upgrade program.
	Phase 1, mobile radio district plan - Northeast Colorado sector.
	Implement intra-jurisdictional communications program.
Subsystems --Criminal Investigation	Develop detailed plan.
--Emergency Medical Services	Region 9; completed, regions 1,3 and 5; final plan.
--Law Enforcement	Mobile radio district, Phase 1.
--Disaster Emergency Services	Mobile radio district, Phase 1.
--Search & Rescue	Mobile radio district, Phase 1.
--Highway Maintenance	Mobile radio district, Phase 1.
--Resources System	Adopt final plan.
--University Security	Continue planning process.
Telephones	Encourage development of 911 systems
Maintenance	See "Division" 5-Year Plan
Administrative Control	Create SAFETY NET Advisory Board
Equipment Specifications	See "Division" 5-Year Plan

Public Safety Communications Plan (SAFETYNET)

Year 3

Program	Action
Microwave	See "Telephone" 5-Year Plan
Radio -	Continue implementation of Phase II of statewide mobile radio upgrade program.
Statewide	Continue Phase II, dispatching program.
Subsytems --Criminal Investigation	Adoption of final plan.
--Emergency Medical Services	Begin implementation, regions 1, 3 and 5.
--Law Enforcement	Mobile radio district, Phase II.
--Disaster Emergency Services	Mobile radio district, Phase II.
--Search & Rescue	Mobile radio district, Phase II.
--Highway Maintenance	Mobile radio district, Phase II.
--Resources System	Begin implementation.
--University Security	Begin implementation.
Telephones	Encourage development of 911 systems.
Maintenance	See "Division" 5-Year Plan.
Administrative Control	Create SAFETYNET Advisory Board.
Equipment Specifications	See "Division" 5-Year Plan.

Public Safety Communications Plan (SAFETYNET)

Year 4

Program	Action
Microwave	See "Telephone" 5-Year Plan
Radio -	Phase III, statewide mobile radio upgrade program.
Statewide	Phase III, dispatching program.
Subsystems --Criminal Investigation	Implement Plan.
--Emergency Medical Services	Continue implementation, regions 1, 3 and 5.
--Law Enforcement	Mobile radio district, Phase III.
--Disaster Emergency Services	Mobile radio district, Phase III.
--Search & Rescue	Mobile radio district, Phase III.
--Highway Maintenance	Mobile radio district, Phase III.
--Resources System	Complete implementation.
--University Security	Complete implementation.
Telephones	Encourage development of 911 systems.
Maintenance	See "Division" 5-Year Plan.
Administrative Control	Create SAFETYNET Advisory Board.
Equipment Specifications	See "Division" 5-Year Plan.

Public Safety Communications Plan (SAFETYNET)

Year 5

Program	Action
Microwave	See "Telephone" 5-Year Plan.
Radio -	Complete final phase, statewide mobile radio upgrade program.
Statewide	Complete final phase, dispatching program.
Subsystems	
--Criminal Investigation	
--Emergency Medical Services	Complete regions 1, 3 and 5.
--Law Enforcement	Mobile radio district, Final phase.
--Disaster Emergency Services	Mobile radio district, Final phase.
--Search & Rescue	Mobile radio district, Final phase.
--Highway Maintenance	Mobile radio district, Final phase.
--Resources System	
--University Security	
Telephones	Encourage development of 911 systems.
Maintenance	See "Division" 5-Year Plan.
Administrative Control	Create SAFETYNET Advisory .
Equipment Specifications	See "Division" 5-Year Plan.

Telephone Network Plan (COLONET)

Year 1

Program	Action
Microwave	Complete installation - Phase 5.
De-regulation contingency planning	Draft preliminary contingency plan; Continue monitoring of telephone industry de-regulation.
Equipment modifications	Begin planning for carrier switching and and station equipment modification. Develop network plans for Colorado Intrastate Telecommunications Transmission Network. Begin planning for telephone switching systems and station equipment modification.
Maintenance	Ongoing
*Network & System Management	Ongoing

*Currently have 3 FTE using all available time.

Telephone Network Plan (COLONET)

Year 2

Program	Action
Microwave	Begin planning for developing microwave-telephone interface.
De-regulation contingency planning	Continue monitoring of telephone de-regulation and tariff changes affecting regulated services. Provide necessary documentation of impact and testimony for rate cases.
Equipment modifications	Issuance of RFP's for modification of carrier switching and station equipment. Issuance of RFP's for telephone switching systems and station equipment modification. Develop automated billing and management programs for telecommunications network.
Maintenance	Ongoing
*Network & System Management	Ongoing

*Currently have 3 FTE using all available time.

Telephone Network Plan (COLONET)

Year 3

Program	Action
Microwave	Implementation of link-up between microwave and phone system - Phase 1 - Front Range.
De-regulation contingency planning	Continue monitoring of telephone de-regulation, tariffs and rate cases.
Equipment modifications	Implementation of link-up between microwave and state operated telephone system - Phase 1 - Front Range.
Maintenance	Ongoing
*Network & System Management	

*Currently have 3 FTE using all available time.

Telephone Network Plan (COLONET)

Year 4

Program	Action
Microwave	Phase II
De-regulation contingency planning	Continue monitoring of telephone de-regulation.
Equipment modifications	Phase II
Maintenance	Ongoing
*Network & System Management	

*Currently have 3 FTE using all available time.

Telephone Network Plan (COLONET)

Year 5

Program	Action
Microwave	Phase III
De-regulation contingency planning	Continue monitoring of telephone de-regulation.
Equipment modifications	Phase III
Maintenance	Ongoing
*Network & System Management	

*Currently have 3 FTE using all available time.

GLOSSARY

GLOSSARY

This glossary defines those standard terms used by the Division of Communications. Not all of these terms are used in this document.

ANALOG -- A nominally continuous electrical signal that varies in some direct correlation to an impressed signal.

BANDWIDTH -- The width of a ban of frequencies used for a particular purpose.

CARRIER -- A wave suitable for modulation to be transmitted over a communication system.

CHANNEL -- A path for electrical transmission between two or more points.

CIRCUIT -- See "Channel"

COMMON CARRIER -- A government regulated private company that furnishes the general public with communication service facilities.

COMMUNICATION (TELECOMMUNICATION) -- In electrical practice, the transmission of information from one point to another.

CUSTOMER PROVIDED EQUIPMENT -- Telephonic equipment which is owned by the user and connected to the operating telephone company network.

DATA CIRCUIT -- A channel allocated for the transmission and reception of data.

DATA COMMUNICATIONS -- Dealing with the communicating of data between a computer and its' remotely located devices.

DATA TRANSMISSION -- See "Data Communications".

DEDICATED CIRCUIT -- Channels or circuits leased and dedicated for private use.

DEDICATED LOGIC SWITCH -- The first family of electronic telephone switches wherein solid state logic technology is used to perform the functions. These switches are not programmable and provide a few more features than electromechanical switches.

DIGITAL -- A nominally discontinuous electric signal that varies from one state to another in discrete steps. Analog signals may be converted to digital by quantizing.

DISTRIBUTED -- Spread out over an electrically significant length of area.

DUPLEX -- A method of operation in which communications take place in two directions simultaneously.

EARTH STATION -- Stations which are used as transmit and receive links in communicating with satellites.

ELECTROMECHANICAL SWITCH -- The orginal automatic telephone switching system which uses the technology of mechanical switching by command of electronic dial pulses. Limited basic features are available.

FACILITY -- Anything used for or available for use in the furnishing of communication service.

FIBER OPTIC -- A method of information transfer using light as the transfer carrier and glass fibers as the transfer medium.

FREQUENCY -- The number of complete cycles per unit of time. When the unit of time is one second, the measurement is Hertz.

INTERFACE -- A concept involving the inter-connection between two or more equipments or systems.

INTERFERENCE (Radio) -- Undesired disturbance of radio reception.

LAND MOBILE RADIO -- Radio service between a radio station at a fixed location and mobile units, or between mobile units.

MICROWAVE -- A term applied to radio waves in the frequency range of 1,000 megahertz (MHz) and above (see frequency).

MODEM -- A device used for modulation and/or demodulation of signals transmitted over communication facilities.

MODULATION -- The process of varying some characteristics of a carrier in accordance with the instantaneous value of samples of the intelligence to be transmitted.

MULTIPLEX -- The combining of two or more signals into a single wave from which the signals can be individually recovered.

MULTIPOINT -- The act of interconnecting several stations via one circuit.

NODE -- The representation of a state or an event by means of a point or tie on a diagram or data system.

POINT-TO-POINT -- Transmission of data between two fixed points.

PROPAGATION -- The travel of waves through or along a medium.

RADIO -- The transmission and reception of signals by means of electromagnetic waves without a connecting wire.

SIGNAL -- The form or variation of a wave with time, serving to convey information.

SIMPLEX -- A method of operation in which communications take place one direction at a time.

SPECTRUM -- The entire range of electro-magnetic radiation extending from the longest known radio waves to the shortest known cosmic rays.

STORED PROGRAM COMPUTER CONTROLLED SWITCH -- The current family of telephone switching technology which is programmable by a computer terminal. These switches provide in excess of 100 different features.

WAVE -- The radiated portion of electro-magnetic signals.