

MINUTES OF THE SENATE COMMITTEE ON WAYS AND MEANSThe meeting was called to order by Senator Paul Hess at  
Chairperson11:00 a.m./p.m. on February 9, 1983, 19\_\_ in room 123-S of the Capitol.

All members were present except:

Senators Bogina, Doyen, Harder and Warren

Committee staff present:

Research Department: Marlin Rein, Sherry Brown, Mary Galligan

Revisor's Office: Norman Furse

Committee: Mark Skinner, Doris Fager

Conferees appearing before the committee:

Patrick Hurley, Secretary of Administration

Lawrence Kunkel, Director, Telecommunications

Art Griggs, Attorney, Department of Administration

The Chairman explained that Senator Karr had requested the committee to introduce a bill placing community colleges and area vocational technical schools connected with those colleges under the State Board of Regents. It would also allow the Legislature to review the budgets of these institutions.

Following a brief discussion, motion was made by Senator Werts and seconded by Senator McCray to introduce the bill requested by Senator Karr. The motion carried by voice vote.

State Telecommunications

Secretary Hurley distributed a background paper concerning Deregulation and Divestiture and its Impact on Kansas State Government as a Telecommunication User (See Attachment A). Secretary Hurley stated that there had been the following agreement made with Southwestern Bell: (1) That there would be no action during the 1982 session of the Legislature regarding telecommunications; (2) (a) That the state would develop a plan; (b) That SW Bell would be given the opportunity to evaluate the plan; (3) That the State would analyze SW Bell's evaluation; (4) That SW Bell would have an opportunity to develop any proposal for a new system.

Secretary Hurley said that SW Bell has developed a proposal, but because of the intervening effects of de-regulation, etc., SW Bell cannot now offer Bell's best and least costly plan. Only American Bell can do that, and they will do it. All SW Bell has offered to the State is an enhanced Centrex system which has three major shortcomings: (1) it is not cost effective; (2) it is not state-of-the-art technically; (3) it is not the best plan for the state. Secretary Hurley stressed that the Department of Administration is more convinced than ever of the merit of its plan, and virtually "the whole world" of telecommunications agrees.

Following a brief discussion and questions from committee members, Secretary Hurley asked Mr. Kunkel to make his presentation.

Mr. Kunkel distributed Volume I of the Telecommunications System Plan-- Executive Summary (Attachment B) and Volume II--Implementation Plan (Attachment C). He used charts to clarify his presentation, and noted that detailed information can be found in the attachments distributed. During his presentation, committee members asked questions about various aspects, including the constitutional authority for the kind of improvement being discussed by the Department of Administration. Mr. Griggs stated that, in his opinion, the authority is given in the constitution, but he and Mr. Hurley agreed to explore the question further. In answer to further questions, Mr. Griggs said the state does have authority to issue revenue bonds for telecommunications.

State Telecommunications (Continued)

There was a discussion concerning the lease-purchase option for state telecommunications, and it was noted that there is a problem with ad valorem taxes where this option is concerned.

Mr. Kunkel concluded by stating that the recommendation of the Department of Administration is that they be allowed to proceed, and that the requested appropriation of \$450,000 be granted for FY 1984.

Secretary Hurley assured the Committee that his department is not an adversary to the Bell System. He noted that the true Bell System is not now Southwestern Bell. American Bell now has what the Department of Administration wants and will show specific examples of where money can be saved at the present time.

Senator Hess said that he would set aside some time for the various entities to testify, since the decision concerning telecommunications is very important.

Following a lengthy discussion concerning various aspects of the telecommunications system, the meeting was adjourned by the Chairman.

Deregulation and Divestiture: Impact on Kansas State  
Government as a Telecommunications User

This paper will present the Department of Administration's current understanding of: (1) the deregulation of Customer Premise Equipment and the divestiture of the A.T.&T. corporation; and (2) the impact of these actions upon Kansas state government as a major user of telecommunications services.

I. Overview

Federal regulatory and judicial actions taken during the last year will cause profound changes in the delivery and regulation of telecommunications services and equipment during the next 1-5 years. Until resolution of several remaining issues, the telecommunications industry will continue to be a volatile area. However, the general outline of the restructured telecommunications industry is emerging. It is evident that these changes will have considerable impact on large users such as Kansas state government. It will be to the benefit of such users to take positive action in anticipation of these effects.

II. Divestiture and Deregulation

The restructuring of the telecommunications industry is a result of the combined effects of two independent proceedings and orders:

(A) The order of the Federal Communications Commission (hereinafter referred to as "FCC") deregulating the acquisition and use of certain portions of basic telephone equipment and services; and

(B) The decision rendered by the United States District Court in the A.T.&T. antitrust suit.

A. The F.C.C. Order

The FCC ruled that customer premises equipment, or C.P.E., should be deregulated or detariffed. C.P.E. is telephone and data communications equipment used on a customer's premises, including telephone sets and those on-site switches commonly known as PBX systems. The effect of the order is that all new C.P.E. acquired after January 1, 1983 will have to be provided under "free market conditions". Competition between producers of C.P.E. will determine C.P.E. costs rather than regulatory

actions. "Existing C.P.E." will continue to be regulated by state regulatory agencies (the Kansas Corporation Commission in Kansas) until the FCC and state regulators make final decisions about continued regulation of existing C.P.E. A.T.&T. has requested deregulation of existing C.P.E. as soon as January 1, 1984. "Existing C.P.E." is defined as that equipment that was in place on a user's premises or in telephone company inventories on December 31, 1982.

### B. The Divestiture Decision

For several years, the United States government has been pursuing an antitrust settlement against American Telephone & Telegraph (A.T.&T.). In January, 1982, a settlement was reached and, with some modifications, was approved by the court. Under the court's order, A.T.&T. is to separate from its operations its 22 operating companies, including Southwestern Bell, in an action known as divestiture. Divestiture is to occur on January 1, 1984. The operating companies will become totally independent of each other and the remainder of A.T.&T.

As of January 1, 1984, A.T.&T. will consist of corporate headquarters, Bell Laboratories, Western Electric, and the Long Lines Division. A new subsidiary of A.T.&T., "American Bell Incorporated", came into existence on January 1, 1983. It was formed to sell primarily C.P.E. on an unregulated competitive basis. Most other types of telecommunications equipment, and maintenance and servicing of telecommunications equipment, will also be available from American Bell.

To summarize pertinent aspects of these actions, two charts are attached.

Attachment I, entitled "Providers of Telecommunications Services", outlines the shifting relationships between A.T.&T., its operating companies (the chart refers only to Southwestern Bell) and independent competitors.

Attachment II, entitled "Regulatory Authority," shows the known and possible effects of divestiture and deregulation on federal and state regulatory agencies.

### III. Impact on the State as a User

There are still several unsettled issues arising from divestiture and deregulation causing some uncertainty about the impact of these actions on all users, including the state. For example, we do not yet know how long existing C.P.E. will remain regulated, how intrastate long distance services will be provided or regulated, or the degree to which the restructuring of local and long distance tariffs, and the introduction of access charges, will affect costs for local and long distance services. However, we do know some of the general effects of divestiture

and deregulation upon Kansas consumers. We can determine with some specificity the impact upon the three major types of services--(a) Customer Premises Equipment, (b) local exchange services, and (c) long distance services. A summary of the expected effects on the state for each type of service follows.

#### Customer Premises Equipment

1. Telecommunications users, including the state, will have to acquire C.P.E. equipment, including PBX systems. The replacement value of C.P.E. currently in use by the State of Kansas is about \$33 million. The State could agree to acquire equipment already in place; however, that equipment is rapidly becoming outdated and A.T.&T. appears anxious to introduce newer product lines. Services for the older C.P.E. could be difficult to obtain in the future.

2. Any new, deregulated C.P.E. acquired by the State of Kansas, and service contracts for that equipment, must be bid competitively. Southwestern Bell is prohibited from selling new C.P.E. until January 1, 1984; their re-entry into the C.P.E. market is uncertain. Southwestern Bell inventories of existing C.P.E., which are regulated and therefore not subject to competitive bidding, are expected to be depleted in a few months. Any state agency that requires additional equipment during FY 1984, and possibly the latter portion of FY 1983, will not be able to lease that equipment from Southwestern Bell. Such equipment will have to be acquired, under competitive bid, from American Bell or a competitor. Thus, the State can anticipate that acquisition of C.P.E. will begin in FY 1984.

#### Local Exchange Services

1. Following divestiture on January 1, 1984, Southwestern Bell will continue to be a regulated utility providing only those basic services connected with local calls, access to long distance services provided by A.T.&T. and others, and possibly intra-LATA long distance services.

2. Significant increases in charges for basic local services are expected, as existing A.T.&T. subsidies of local service by long distance revenues will be eliminated.

In a study by the National Telecommunications Information Administration cited in an October, 1982 U. S. House Committee on Government Operations report, it is estimated that local rates will increase an average of 12% per year over the next five years, or a total of 76.4% by 1986. However, the same study concluded that those states with largely rural populations, such as Kansas, may experience rate increases of 13-16% per year.

## Long Distance Services

1. Considerable uncertainty remains about who will provide long distance services. A.T.&T. will have all interstate calls and will pick up some or all intrastate calls. Introduction of "Local Access Transport Areas" ("LATA's"), which define long distance service areas, will not simplify the matter. Kansas will be divided into three LATA's, roughly corresponding to existing area codes. A.T.&T. will be responsible for inter-LATA calls. Thus, Southwestern Bell will be the operating company for most of the state and yet will be prevented from providing inter-LATA calls within Kansas (e.g., Topeka to Wichita or Kansas City).

2. There are similar questions about who will regulate long distance calls within Kansas. Congressional action could place responsibility for inter-LATA service with the FCC. If so, the FCC will assume responsibility over some intrastate services which are now regulated by the Kansas Corporation Commission. Any such shift of regulatory authority could be quite controversial.

3. Standard direct dial long distance rates could be lowered, or the rate of increase could be slowed, with the introduction of greater competition and as long distance subsidies for local operations are removed. However, private line long distance rates used for KANS-A-N will be affected differently.

TELPAK is a private line, long distance bulk rate; TELPAK and WATS rates form the basis for the KANS-A-N network. TELPAK will be withdrawn after 1985, if not before, and A.T.&T. has not proposed an alternative that would be as advantageous to the state.

Of the roughly \$5 million spent on long distance services in FY 1982 by state agencies, traditional direct dial long distance costs amounted to only \$300,000. The remaining \$4.7 million consisted of KANS-A-N expenses, with \$2.7 million attributable to TELPAK rates. Thus, a general decline in long distance rates probably cannot be translated into significant reductions in long distance expenses for the state.

4. Divestiture is intended to increase competition; theoretically, the state could obtain lower long distance rates from another vendor. But, as experienced during deregulation of the airline industry, competition does not universally benefit all users. Lower traffic areas are not as attractive to competitors, and therefore users in these areas may not realize lower rates. Currently there are no viable competitors in Kansas that could provide intrastate long distance services of the magnitude required by Kansas state government.

5. The addition of an access charge for long distance service is expected. This fee would be in addition to basic monthly charges for local service and long distance costs. As Southwestern Bell loses long distance subsidies from A.T.&T., they will pass this cost to the consumer. Four dollars per line, per month, has been proposed as the initial charge to commercial users for connection to long distance lines with regular increases in the charge over a period of seven years. Other types of planned charges not applied previously to private line services, such as KANS-A-N, may be instituted.

In summary, the State of Kansas can anticipate effects as outlined in the table below. As a frame of reference, the total FY 1982 telecommunications budget and percentages devoted to each type of service also appear on the table.

FY 1982 Telecommunications Expenditures

<u>Type of Service</u>	<u>Telecommunications (Total Budget \$14,000,000)</u>	<u>Effect of Dives. &amp; Dereg.</u>
<u>C.P.E.</u>	\$3.6 million (or 26%)	A large investment in C.P.E. equipment will become necessary, beginning FY 1984.
<u>Local Services</u>	\$5.4 million (or 39%)	Sizable increases in rates are likely, as SW Bell is cut off from long distance subsidies
<u>Long Dis-tance</u>	\$5 million (or 36%) (\$300,000 - direct dial calls; \$4.7 million - KANS-A-N)	Long distance rates may moderate in some areas. The potential for increases in private line rates available to the state will probably offset those gains.

IV. The Kansas State Telecommunications System Plan

Divestiture and deregulation will result in overall increases in telecommunications costs for the State, although it is currently impossible to predict accurately the degree of increase. Clearly, it will become more difficult to anticipate and control telecommunications costs in the future. For this reason, many large commercial users are beginning to reduce their reliance on regulated telecommunications providers through

development of private telecommunications systems. Such private systems, made possible through technological advances, have proven to be simple, yet flexible and cost-effective means to provide both basic services and enhanced services that at this time are not readily available through A.T.&T./Southwestern Bell at acceptable costs.

Within the last three years, several Kansas companies, including Kansas Gas & Electric Co., Cessna Aircraft, and Fourth National Bank of Wichita, have replaced significant portions of Bell system services with their own systems. State governments in New Mexico, North Carolina, Kentucky, and Washington have some type of a telecommunications system in place and five other states are currently planning systems based on the Kansas telecommunications plan.

The Telecommunications System Implementation Plan, described below, provides a comprehensive package that meets the challenges inherent in the current telecommunications environment--controlling costs through a private telecommunications network; taking advantage of increased competition; and establishing the basis for meeting future telecommunications needs.

In 1980, \$150,000 was appropriated by the legislature to develop a comprehensive plan for the creation of a state-owned telecommunications network. The initial concept was developed by the Telecommunications Office of the Department of Administration. The firm of Booz, Allen and Hamilton reviewed and completed development of the plan.

The proposed state system would minimize reliance on regulated providers for two of the three types of services, Customer Premises Equipment and long distance services.

1. Customer Premises Equipment utilizing digital switching and transmission would be used throughout the state. Digital technology simplifies transmission; permits economies of transmission; and provides greater capabilities in voice, data, and video transmission.

The state plan includes three main switching centers in the high use areas of Topeka, Wichita, and Kansas City. These switching systems would replace KANS-A-N switching and Centrex. Centrex is a switching system for interoffice service in a localized area, such as the Capitol Complex. Unlike traditional PBX switches on the customer's premises, Centrex is located on telephone company premises.

2. Most long distance transmission via A.T.&T. within the State of Kansas would be largely replaced by fiber optic cables servicing major population and state activity centers. The fiber optic transmission system could carry video signals in addition



to voice and high speed data communications signals. These capabilities are currently available only on a special order basis and at a very high cost from A.T.&T./Southwestern Bell.

3. With regard to local service, Southwestern Bell would continue to provide local, nontoll calls, and access to long distance services not provided by the state telecommunications network. Local service is the only major portion of the state plan that can be provided by Southwestern Bell after divestiture and deregulation.

A companion report provides further information about the proposed state system and an evaluation of its cost effectiveness.

#### V. Conclusions

Two issues arising from divestiture and deregulations require legislative consideration and action this year: (1) the acquisition of C.P.E. and (2) the need to achieve maximum control of future telecommunications costs. These two factors, in combination with the anticipated growth of demands for advanced telecommunications services not currently available from A.T.&T./Southwestern Bell, make serious consideration of the telecommunications plan both appropriate and necessary at this time.

In reviewing the impact of divestiture and deregulation upon each of the three major components of telecommunications services, the advantages of the proposed telecommunications plan, as compared with the current methods of service delivery, become apparent. Cost advantages are particularly apparent in C.P.E. and long distance services.

#### (1) Local Services (40% - \$6 million)

Costs to the state for basic local services currently comprise 40% of total state telecommunications expenditures, or approximately \$6 million. As noted previously, with or without implementation of the state plan, the state will continue obtaining local services from Southwestern Bell and other independent local phone companies operating in Kansas. Rates for local services will be rising rapidly as a result of divestiture and loss of A.T.&T. subsidies. Control of rising costs for the largest segment of the telecommunications budget cannot be readily achieved as rates are set by the Kansas Corporation Commission for all users. Therefore, any significant savings must be realized in C.P.E. and long distance services.

(2) Customer Premises Equipment (26% - \$4 million)

C.P.E. costs are 26% of state telecommunications expenditures, or about \$4 million. Although the state has begun purchasing some C.P.E. in recent years, most C.P.E. used by the state is leased from Southwestern Bell.

Due to divestiture and deregulation, the state must acquire its C.P.E. over the next one to five years, and must do so under competitive bidding statutes, beginning in FY 1984. The acquisition of C.P.E. has the potential for producing significant savings in future telecommunications costs due to the economic advantages of owning over continuous lease. When compared to the costs of continued leasing, the purchase of eight PBX systems since 1981 is expected to result in a net savings to the state of \$1,237,455 over the first five years of ownership. (See Attachment 3.)

The need to acquire C.P.E. is imminent and independent of the decision to implement the state plan. However, systematic, planned acquisition of C.P.E. is necessary to assure: (1) an integrated C.P.E. system designed to meet long-term needs; (2) lower overall acquisition costs through use of quantity prices; and (3) the avoidance of multiple service and vendor contracts. The C.P.E. and switching component of the state plan constitutes such a coherent, thoughtfully designed plan. It can serve as a framework for acquisition of C.P.E. following divestiture and deregulation. The Department of Administration recommends that the acquisition of C.P.E. and switches proceed according to the state plan. As the acquisition of C.P.E. proceeds, the state will be able to realize substantial savings in this area.

(3) Long Distance (36% - \$5.5 million)

Long distance services total 36% of state telecommunications expenditures, or about \$5.5 million. If the current methods of delivering long distance services to Kansas state government are maintained, A.T.&T., rather than Southwestern Bell, will provide most long distance services. While traditional direct dial rates may decline, TELPAK, a private line bulk rate that forms the basis of KANS-A-N, will be discontinued. For this reason, the costs to the state for long distance rates can be expected to rise in the future. Currently, there are no viable competitors to A.T.&T. in Kansas that could provide long distance services of the magnitude required by the state. Therefore, the only way for the state to significantly reduce future long distance costs is to install its own transmission system between the major points in the state system, as described in the state plan.

The acquisition and installation of C.P.E., now made necessary by divestiture and deregulation, represents the largest segment of costs associated with implementation of the proposed state plan. C.P.E. currently in use by the State of Kansas has a

present replacement value of approximately \$33 million. The purchase and installation of the transmission segment of the system would cost a little under \$12 million. These portions of the state plan offers the greatest potential for reduced reliance upon regulated telecommunications providers and thus greater control of state telecommunications costs. In addition, the design of the system would allow the provision of enhanced services as needed in the future, particularly in the transmission of data and video signals.

The Department of Administration believes that the state telecommunications plan is the only prudent means to minimize future costs for telecommunications services while providing for the growing telecommunications needs of Kansas state government. All cost-benefits studies of the plan have concluded that it would be the most cost-effective means to provide present and future telecommunications services for the state.

In order to begin implementation of the plan, the Department of Administration proposes to:

1. Proceed with preparation of final design and specifications in FY 1984. For this purpose, an appropriation of \$450,000 is requested;

2. Purchase and install C.P.E., and switches and fiber optic links, for the major-use areas of Topeka, Wichita, and Kansas City during FY 1985 and 1986. Projected capital outlay for this phase of the plan is \$18.8 million; and

3. In two succeeding phases, bid and install the remainder of the system from FY 1986 to FY 1989. Projected capital outlay for the final two phases is \$7.5 million.

Other than the initial \$450,000 required to complete design of the system, the entire telecommunications system will be financed through user service charges. The Department of Administration anticipates that those user charges will be at least comparable to, and probably lower than, the projected costs of continuing to rely on regulated providers.

With a firm legislative commitment to carry out the entire state telecommunications plan, the purchase of C.P.E. can be effectively coordinated with the transmission component of the plan. Approval of the plan as a whole will provide a framework for decisions about the purchase of C.P.E., a means to establish greater control over future telecommunications costs, and a cost-effective method to take advantage of technological advances in the telecommunications industry.

PROVIDERS OF TELECOMMUNICATIONS SERVICES

Prior to Deregulation/  
Divestiture

After Deregulation/Divestiture

C.P.E. (includes PBX or on-site switches)

--SWB & emerging competitors provide CPE.

--Existing CPE: SWB may sell or lease through 1983, or until depletion of existing inventories. SWB expects to run out of CPE in a few months. Existing CPE will be transferred to AT&T books for phase-out. If FCC approves earlier deregulation, AT&T would "flash-cut" existing CPE in early 1984.

New CPE: Provided by AT&T's American Bell and competitors.

--SWB required by AT&T to purchase CPE from Western Electric.

--SWB cannot enter new CPE field until after 1/1/84. SWB cannot manufacture CPE or purchase from AT&T.

--CPE generally leased, although purchase has been possible in last few years.

--User acquisition of CPE at some point appears inevitable.

Local Exchange/Basic Services

--SWB, as an AT&T subsidiary, & scattered independent companies provide local service.

--SWB as an independent, fully regulated utility, and scattered independent companies continue to provide local service.

Prior to Deregulation/  
Divestiture

After Deregulation/Divestiture

Long Distance Services

--AT&T (Long Lines Div.) & emerging competitors provide interstate services.

--AT&T (Long Lines Div.) & emerging competitors provide interstate services.

--Long lines & competitors provide some intra-state services; bulk of intra-state services provided by SWB.

--Provision of intra-state services unsettled. Development of "Local Access & Transport Areas" or "LATA's" proposed. Kansas would have 3 LATA's roughly corresponding to current area codes. SWB may provide intra-LATA service; AT&T could provide inter-LATA service. Competitors unaffected by LATA's.

--SWB receives subsidies from AT&T Long-Lines. These subsidies have been used to help support local operations & keep local service charges down.

--SWB will lose subsidies from AT&T. Institution of "access to long distance" charges to compensate. Proposed rate: \$4/month/line with regular increases over 7-year period.

Enhanced Services

--AT&T/SWB prohibited from participating in certain unregulated areas such as data processing services.

--AT&T free to enter previously restricted areas with other competitors. May now manufacture & sell computers. SWB still barred from these areas.

<u>Type of Service</u>	<u>Regulatory Authority</u>	
	<u>Prior to Divestiture and Deregulation</u>	<u>After Divestiture and Deregulation</u>
C.P.E.	KCC	<u>New C.P.E.</u> Deregulated <u>Existing C.P.E.</u> KCC regulates as long as existing C.P.E. remains on AT&T books AT&T has requested FCC approval of ear- lier deregulation of existing C.P.E.
Local Exchange/ Basic Service	KCC	KCC
Long Distance Services	FCC regulates inter- state toll services  KCC regulates intra- state toll services	FCC regulates inter- state toll services  KCC may continue to regulate some or all intra-state or intra- LATA toll calls; FCC may pick up some or all intra-state or intra-LATA services.

NEW STATE OWNED TELEPHONE SYSTEMS AS OF JANUARY, 1983

Attachment III

DATE PLACED IN SERVICE	AGENCY	CAPITOL COST	PROJECTED STATE OWNED 5 YEAR COSTS (Inclds capital payback)	PROJECTED TELCO LEASED 5 YEAR COSTS	5 YEAR SAVINGS
8-21-81	Human Resources 1430 S. Topeka Topeka, Kansas PBX	\$ 85,168.00	\$223,241.00	\$448,343.00	\$225,102.00
0-01-81	SRS Office Key Pratt, Kansas System	\$ 18,576.00	\$ 31,115.00	\$ 60,799.00	\$ 29,684.00
8-02-82	KPERs Key Topeka, Kansas System	\$ 23,950.00	\$ 53,333.00	\$127,000.00	\$ 73,667.00
8-02-82	SRS Office Key Emporia, Kansas System	\$ 19,950.00	\$ 52,661.00	\$104,927.00	\$ 52,266.00
2-01-82	SRS Office Lawrence, Kansas PBX	\$ 53,476.00	\$ 91,144.00	\$195,325.00	\$104,181.00
0-16-81	KSIR Hutchinson, Kansas PBX	\$ 88,107.00	\$153,937.00 (Large upgrade in service)	\$408,869.00	\$254,932.00
1-27-82	OSH Osawatomie, Kansas PBX	\$246,612.00	\$325,637.00 (Large upgrade in service)	United Telephone Co. (No telco bid to compare)	
2-10-82	KSP Lansing, Kansas PBX	\$311,228.00	\$415,256.00 (Large upgrade in service)	\$912,879.00	\$497,623.00
	TOTALS	\$847,067.00	\$1,346,324.00	\$2,258,142.00	<u>\$1,237,455.00</u>

VOLUME I  
THE STATE OF KANSAS  
TELECOMMUNICATIONS SYSTEM  
PLAN

EXECUTIVE SUMMARY



VOLUME I

THE STATE OF KANSAS  
TELECOMMUNICATIONS SYSTEM  
PLAN  
(Updated January 1983)

EXECUTIVE SUMMARY

BACKGROUND.

Starting in FY 80, and every year thereafter, the state has been subjected to ever increasing telephone company service rate increases. Concurrently, Federal Communications Commission (F.C.C.) directed deregulation of Customer Premises Equipment (CPE), along with the Federal Court directed divestiture of AT&T are causing fundamental changes in the way telephone service has been traditionally provided with further cost increase impacts. Additionally, technological advances and increasingly powerful and user friendly telecommunications systems are catapulting our society into the "Information Age" by permitting us to take maximum advantage of computers and video services at all levels of government operations and administration.

The administration, perceiving the impacts of the preceding circumstances initiated action to determine the best approach to take to the situation and to proceed on the basis of the conclusions reached. It was concluded that the best course of action was for state government to become as independent as possible from regulated telephone companies and to acquire, own, and manage its own private statewide telecommunications system.

The Telecommunications Office was directed to develop a concept for a system and perform a feasibility study. This was then submitted to a nationally known communications consulting firm, Booz-Allen & Hamilton, for evaluation. Their conclusion was that the system proposed was technically and operationally sound and was the best system to meet the known and stated requirements. Subsequently, Booz-Allen was selected to prepare an implementation plan and this was presented to the legislature in the

FY 82 session.

This document is an update of that plan performed by the Telecommunications Office staff. It makes certain minor configuration changes resulting from technological advances and movements of state agencies, results in lower overall costs due to development of better cost data and recommends implementation of the first increment of the system now, with the remainder to be constructed as soon thereafter as possible.

#### SYSTEM DESCRIPTION.

The state telecommunications system will employ the most advanced, proven and in use digital technology in conjunction with lightwave technology (fiber optic cable). This system will provide services not currently technologically feasible or otherwise immediately available using leased facilities. It will provide a capability for addition, at very nominal cost, of enhanced services which are possible and available now, as well as any that are foreseen or under development, either as to type, variety, or quantity. It will provide all the telecommunications services needed by the state well past the year 2000.

The initial system consists of a transmission facility serving the major population centers in the state and three switches. The Central Control switch is to be located in Topeka and will provide all the switching system and control facilities necessary for intercity service, as well as serving most state agencies located in Topeka. Nodal switches are to be located at Kansas University Medical Center in Kansas City and Wichita State University in Wichita to serve similar purposes as the Topeka switch.

For maximum economy, reliability, and efficiency, the system is to be digital throughout, including the switches. Other switches at major population centers, such as Kansas University at Lawrence, Kansas State University at Manhattan, Fort Hays State University at Hays, and others

will be planned for later addition to the system and these will be digital also. The switches are to feature integrated voice/data service and employ the single line per instrument concept for optimum communications capability, simplicity, and economy of maintenance.

Services to be provided through the transmission system are, standard voice, data of any speed up to 56 Kb (Kilobits) on a dedicated or on a digitally switched basis when feasible, or up to 45, 90, or 135 Mb (megabits) on a point to point computer to computer dedicated circuit basis using the total capacity of one strand under current technology. Other services, such as facsimile, telemetry, electronic mail, "Picturephone", or any specialized service based on voice or data in quantities up to the 135 Mb rate can be accommodated. Television, either public, instructional, or for teleconferencing, can be provided on a dedicated basis.

Deregulation will require that the state acquire its own CPE in the next year or so. Consequently, those capital costs are included in this updated plan wherever appropriate.

Enclosure 1 to this summary is a map showing the configuration of the system. The initial increment recommended for implementation is highlighted.

#### CAPITAL COSTS.

The capital outlay required in FY 86 dollars is \$19,000,000 for the initial recommended increment and \$7,300,000 for the remainder. This total capital cost of \$26,300,000 FY 86 dollars for the total system compares to the \$31,900,000 FY 84 dollars estimated in the Booz-Allen version of this plan. Enclosure 2 is a summary of capital costs.

Acquisition may be financed by a bond issue or through lease/purchase. A bond issue is the least costly but requires legislative action. A bond interest rate of 8 to 9% is possible. Several leasing companies specializing in government leases are willing to finance the project on a lease/purchase basis at 1½ to 2% above the bond rate.

All capital costs will be recovered from agency budgeted annual operating funds through charges for the telecommunications services used. Because these services will be less costly than the telephone company charges, budgets will be smaller.

#### COST COMPARISONS.

Cost comparisons between the proposed state system and continuing to use telephone company service indefinitely were made. Several scenarios were used, along with both lease/purchase and a bond issue. Both "Cost Avoidance" and "Present Value" analysis techniques were used. Cost analyses cover the period FY 84 thru FY 96 or the period of implementation, plus 10 years of operations until all capital costs were recovered from annually budgeted agency operating funds.

The results of all cost analyses performed are favorable to state ownership and management of the state system.

Under both methods of financing and any combination of interest rates or inflation rates, and under any circumstances that might exist as to whether the K.C.C. will regulate all intrastate rates, whether the F.C.C. will assume jurisdiction, or whether some combination of regulatory authority pertains, the state system is less costly while providing a greater variety and quantity of services at equal or better quality than if no state system were built and all presently provided services (only voice and limited data) were secured from the telephone company indefinitely.

Examples of the results are as follows:

For the initial increment of the system (K.C. - Topeka - Wich. only)

CASE #	Annual Cost Avoidance (000)			Cum Cost Avoidance (000)
	FY 87	FY 90	FY 96	FY 96
1. (Worst) <sup>a</sup>	\$ 873	\$1,911	\$ 3,913	\$ 20,112
2. (Best)	5,346	8,757	20,449	113,542
3. (Probable)	3,652	5,507	10,066	62,600
4. (Probable) <sup>b</sup>	5,280	5,135	9,254	66,826

a. Cases 1, 2, and 3 use lease/purchase; paid off in FY 95.

b. Case 4 uses bond issue; paid off in FY 95.

For the full system - Booz-Allen configuration

CASE #	Annual Cost Avoidance (000)			Cum Cost Avoidance (000)
	FY 87	FY 90	FY 96	FY 96
5. <sup>c</sup>	\$5,318	\$5,508	\$18,340	\$ 78,704
6. <sup>d</sup>	3,388	5,578	12,579	72,120

c. Case 5, probable situation; with bond issue  
paid off in FY 95.

d. Case 6, probable situation; with lease/purchase  
paid off in FY 95.

Discounted Cash Flow Present Value - analyses show similar results.

#### IMPLEMENTATION.

Implementation will require an appropriation of \$450,000 for FY 84 in order to hire a consulting engineering firm to perform detail engineering, specifications preparation, writing of RFQ's, and other pre-procurement tasks. Contracts can be let in late FY 84; and awarded in early FY 85. Cutover can occur in late FY 86 or FY 87.

RECOMMENDATION.

It is recommended that the initial phases of this plan be approved for acquisition by lease/purchase. (Case #3 above). This is the most convenient and flexible procurement methodology and requires no further legislative action. It is further recommended that \$450,000 be made available in FY 84 to permit performance of detail engineering and other pre-procurement tasks required.

# THE NEW KANSAS DIGITAL TELECOMMUNICATIONS SYSTEM

## SERVICES TO BE PROVIDED

### Voice/Data Services

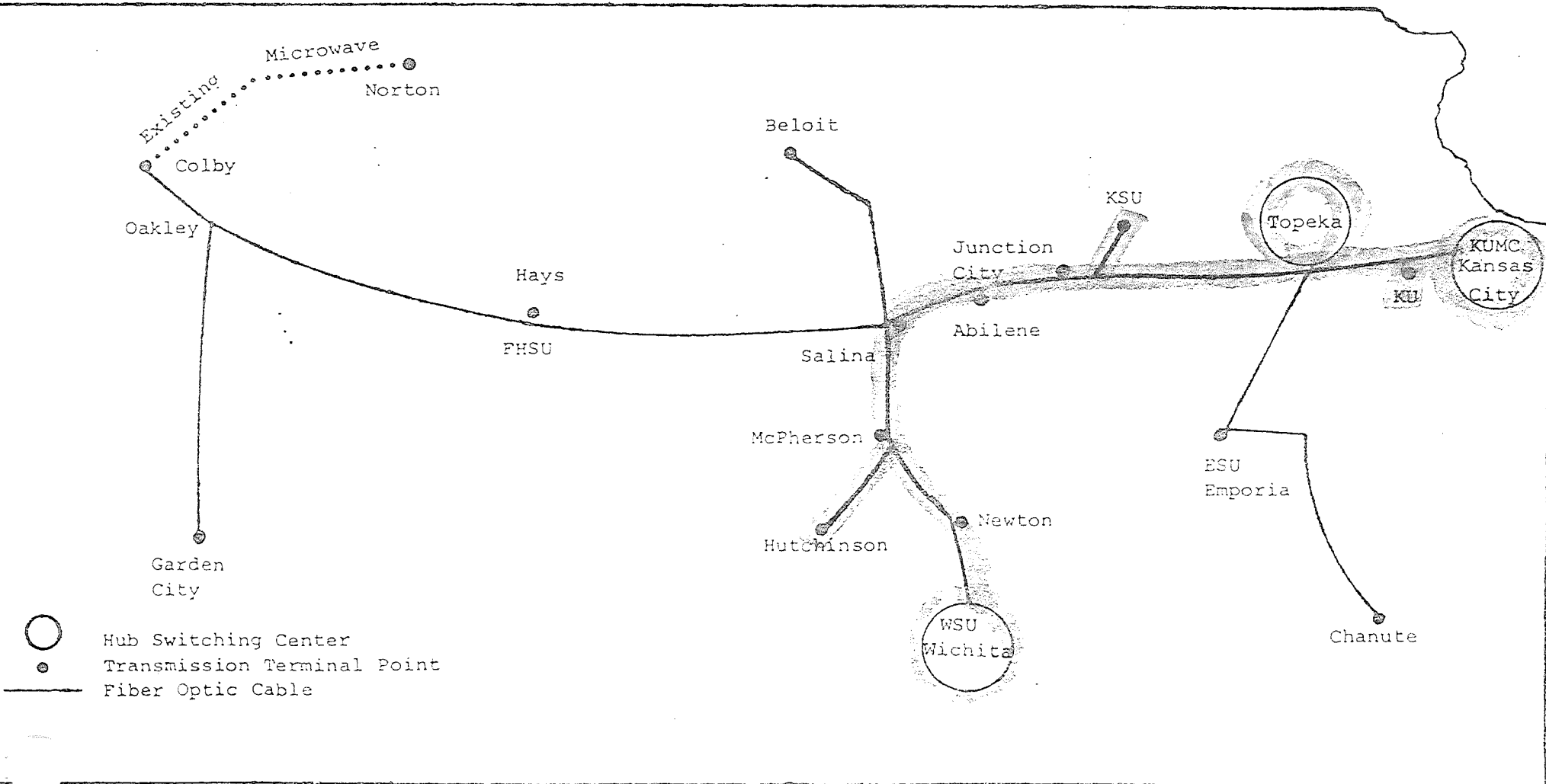
Integrated Switched Voice/Data  
 Dedicated Voice of Data  
 Highspeed Data Transfer

### Video

Instructional Television  
 Teleconferencing  
 Public Television

### Special Services

Telemetry  
 Highspeed Facsimile  
 Electronic Mail  
 Civil Defense  
 Others



SUMMARY OF CAPITAL OUTLAY  
 FOT THE KANSAS TELECOMMUNICATIONS SYSTEM

<u>SEGMENT</u>	<u>COST (\$000s)</u>	
	Booz-Allen FY 84	Update FY 87
A. NODAL AREA SWITCHING AND LOCAL AREA NET (LAN) FACILITIES		
1. Topeka	\$ 8,732	\$ 7,100
2. Kansas City	5,350	4,000
3. Wichita	3,763	2,700
B. INTERCITY TRANSMISSION FACILITIES		
4. Kansas City - Topeka - Wichita Transmission Link	6,031	5,000
5. Topeka - Emporia - Chanute	2,171	2,020
6. Salina - Hays	1,502	1,397
7. Hays - Colby	1,595	1,516
8. Oakley - Garden City	1,346	1,282
9. Salina - Beloit	1,101	1,052
C. COMPUTERIZED NETWORK CONTROL AND SURVEILLANCE CENTER	<u>275</u>	<u>200</u>
TOTAL CAPITAL OUTLAY	\$31,866	\$26,267



STATE OF KANSAS  
TELECOMMUNICATIONS SYSTEM PLAN  
(Updated January 1983)

FOREWORD

Rapidly increasing and seemingly uncontrollable costs for telephone service, the uncertainties of industry deregulation, the divestiture of AT&T which is sure to cause further costs increases, and the maturing of new technologies and applications favorable to private ownership and operation of telecommunications systems, prompted state operating officials to seriously consider and adopt a policy of self-reliance while minimizing dependence on regulated telephone companies. In furtherance of this policy, the Secretary of Administration authorized development of a plan that would provide a cost effective state telecommunications system using the latest proven technologies and which would be capable of accommodating foreseeable state government telecommunications service requirements well past the year 2000. The result was the "State of Kansas Telecommunications System Implementation Plan" which was developed by a telecommunications consulting firm, Booz-Allen and Hamilton, based on a feasibility study and preliminary plan prepared by the State Telecommunications Office.

This document updates the Booz-Allen plan with minor configuration changes and more current cost data and cost considerations. It presents and emphasizes an initial phased or partial approach to implementing the total plan which is still desired and recommended. Also included is a section on the cost of replacing, with state-owned facilities, all or most of the Customer Premises Equipment (CPE) currently provided by telephone companies.

The preceding two items will provide the administration and the legislature with data on the scope of the state's telecommunications service involvement and permit more informed planning and decision making as the state enters a new era and environment known as the "information age". Telecommunications in the coming era and decade will be influenced by technological advances, user friendly equipment and facilities, burgeoning combined computer and telecommunications applications, and the increasingly competitive "free market" environment resulting from telecommunications industry deregulation and the divestiture of AT&T.

This updated plan has been prepared and is presented by the staff of the Telecommunications Office.

Att C

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## VOLUME II

### STATE OF KANSAS TELECOMMUNICATIONS SYSTEM PLAN (Updated January 1983)

#### OVERVIEW

The future telecommunications environment may be characterized as an era of great technical advances and applications, as the "Information Age" in which telecommunications facilities will permit computers to be used to maximum advantage in all levels of government operations and administration, and as an era of increasing costs to the state due to F.C.C. directed deregulation, AT&T divestiture, and possible legislative actions at the Federal level.

The penalty for not taking defensive action now is to incur ever increasing annual budget appropriations for telecommunications services. Based on the FY 82 actual total cost of \$14 million dollars and assuming a modest 10% annual rate of increase to account for growth, inflation, and rate increases, even if no significant service improvements are made over current leased voice and limited data services, annual telecommunications budgets will approach \$23 million dollars in FY 87, \$30 million in FY 90, and \$50 million in FY 95. However, we can say at this time that because of divestiture, costs for our current level of leased service will approach \$20 million dollars in FY 84, \$26 million in FY 87, \$35 million in FY 90, and \$60 million in FY 95.

A state owned and operated telecommunications system employing the most advanced, proven, and in use digital technology in conjunction with lightwave technology (fiber optic cable) is proposed. This system will provide services not currently technologically feasible or otherwise immediately available using leased facilities. It will provide a capability for addition, at very nominal cost, of enhanced services which are possible and available now, as well as any that are foreseen or

under development, either as to type, variety, or quantity. It will provide all the telecommunications services needed by the state past the year 2000.

The capital outlay required in FY 87 dollars is \$19,000,000 for the initial increment emphasized in this presentation and \$7,300,000 for the remainder. This total capital cost of \$26,300,000 FY 86 dollars compares to the \$31,900,000 FY 84 dollars estimated in the Booz-Allen version of this plan.

Leasing companies will fund an undertaking of this nature at 1½ to 2% above the bond rate (estimated at between 8 and 9% at this time) for the state. Cost analyses were made, for lease/purchase and bond issue for acquisition and operation of the initial increment of the proposed state owned system vs. continuing to use telephone company services indefinitely. A number of scenarios were used, each with differing assumptions and cost data that could logically result from divestiture primarily, but also from deregulation. Based on analyses over the period of planning and implementation plus a 10 year operating period, in addition to more efficient government, the initial increment of the state owned system under worst case circumstances will result in cost avoidance of \$20,112,000 as a net amount, considering that some telephone company tax revenues will be lost as a result of this system, under the most probable case conditions, cost avoidance of \$66,826,000 as a net are forecast. The cost of recovering the capital investment at 15% interest for finance charges under lease/purchase is included in the worst case conditions while 12% is used in the most probable case. 9% is used for bond issue studies and this method of financing is the least costly overall.

STATE OF KANSAS  
TELECOMMUNICATIONS SYSTEM PLAN  
(Revised January 1983)

THE PROBLEM.

Costs for telecommunications services and facilities used for state government operations and administration were \$5,000,000 in 1975. Costs for 1982 were \$14,000,000. Based on 1983 usage and system reconfigurations to achieve lower costs, divestiture and F.C.C. tariffs will force costs approaching \$20,000,000 for FY 84. A way must be found to provide adequate telecommunications for state government operations and administration, while curtailing and minimizing cost growth.

THE SOLUTION.

The state should reduce to a minimum dependence on regulated telephone companies for provision of required services. Technological advances now permit construction of private telecommunications systems which are extremely user friendly and can provide necessary services, equal to and in most cases better than those of existing telecommunications providers, at costs below current annual expenditure levels for such services. The State of Kansas should build its own private system.

ADVANTAGES AND DISADVANTAGES OF OWNERSHIP.

ADVANTAGES:

1. Lease or rental charges for regulated telephone service consists of a capital recovery component, a return on investment or profit element, and operating, maintenance and other overhead costs. These variable recurring charges are further subject to regulatory body policies. With ownership,

capital costs are fixed over the period of payback and are eliminated entirely after payout. Recurring cash outlays need only be made for operations, maintenance, and overhead costs which will vary from year to year.

2. With ownership, lower annual cost budgets result. In almost all cases, operating costs for a private system, to include amortization of capital, are lower than leasing or renting, and the cash flow crossover point, depending on method of financing, is usually five years or less.
3. Private systems permit a high degree of independence from outside influences for costs, expansions, changes, and priorities.

DISADVANTAGES:

1. Either a large one time initial capital outlay is required, or as an alternative, a lease/buy arrangement can be used which increases acquisition costs substantially because of interest charges.
2. Either contract maintenance must be secured and paid for or personnel must be added to the state payroll for maintenance and support purposes.
3. A system management and administrative element must be provided or an existing capability expanded.
4. Qualified personnel for 2. and 3. above may be hard to find, be expensive, and be hard to retain.

5. Some telephone services, such as WATS service, trunk accesses to telephone exchanges, intercity accesses, and foreign exchange distant terminal circuitry must still be acquired from the telephone company if only on a minimal basis. Additionally, not all locations can be economically served by a private system and these must continue to be served by connecting commercial facilities. (Under this total plan about 50% of currently used telephone company services will be retained.)
6. Restoration of service in the event of natural or man-made disaster is the responsibility of the private system operator. Contingencies must be provided for.

#### SYSTEM CONCEPT AND PHILOSOPHY.

A telecommunications system for state operations and administration consists of the following elements.

1. Hardware.
  - a. An intercity transmission system with control and test facilities,
  - b. Switches (CPE),
  - c. User terminal equipment (CPE).
2. An operating, maintenance, and general support organization.
3. A management and administrative organization.

All leased telecommunications facilities currently connected directly to the existing KANS-A-N system will be considered for replacement by any state system to be developed and those retained under lease will be treated as part of the state system.

An end to end integrated systems approach will be taken in the design and operation of the system. No state agency facility will be viewed in isolation but all must be considered as part of the whole system.

Agency offices/installations will be served directly by the transmission system under the following criteria:

1. Directed requirements;
2. Operational necessity; or,
3. When economically feasible and advantageous.

Agency offices/installations not meeting the above criteria will be served directly as part of the system but through use of connecting commercial facilities when economically advantageous.

The Secretary of Administration or his designated representative will be in operational control of all state agency telecommunications facilities.

Centralized control will be exercised through an overall organization consisting of elements for management, administration, operation, maintenance, and general support.

Financing will be as for KANS-A-N. State agencies will pay for services on a pro-rata or approved schedule or tariff basis to the State Telecommunications Services Funds from which operating expenses will be paid.

Capital recovery and capital improvements costs will be paid as part of the service fees above into a special fund established for that purpose.

## SYSTEM DESCRIPTION.

The hardware portion of the initial system consists of a transmission facility serving the major population centers in the state through three nodal switches. User terminal equipment, now also identified as "Customer Premises Equipment" (CPE), will be provided in conjunction with the switches. For maximum economy, reliability, and efficiency, the system is to employ digital technology throughout for both transmission and switching purposes.

The transmission system is primarily a fiber optic cable system in combination with short links of microwave for city entry purposes. It is planned to bury a 6 strand tape armored fiber optic cable in the center median strip or along the shoulder of the right of way of state highways. This will make use of an existing state asset and avoid the high costs of acquiring right of way. Figure 1 is a map showing the configuration and composition of the total system. Leased facilities would still be used on links from the transmission terminal points to locations not on the fiber optic route which are not economically feasible at this time. At a later date, when economically feasible, satellite service to remote areas can be added.

Figure 2 is similar to Figure 1 except that that portion of the system (Kansas City through Topeka and Salina to Wichita) recommended for immediate implementation is high-lighted.

The mode of transmission throughout will be digital in the basic T1 Pulse Code Modulation (PCM) Time Division Multiplex (TDM) format which is standard in the Bell system and recognized internationally as an approved CCIT American standard, using 1.544 megabits as a basic transmission rate. This equates to



# THE NEW KANSAS DIGITAL TELECOMMUNICATIONS SYSTEM

## SERVICES TO BE PROVIDED

### Voice/Data Services

Integrated Switched Voice/Data  
 Dedicated Voice of Data  
 Highspeed Data Transfer

### Video

Instructional Television  
 Teleconferencing  
 Public Television

### Special Services

Telemetry  
 Highspeed Facsimile  
 Electronic Mail  
 Civil Defense  
 Others

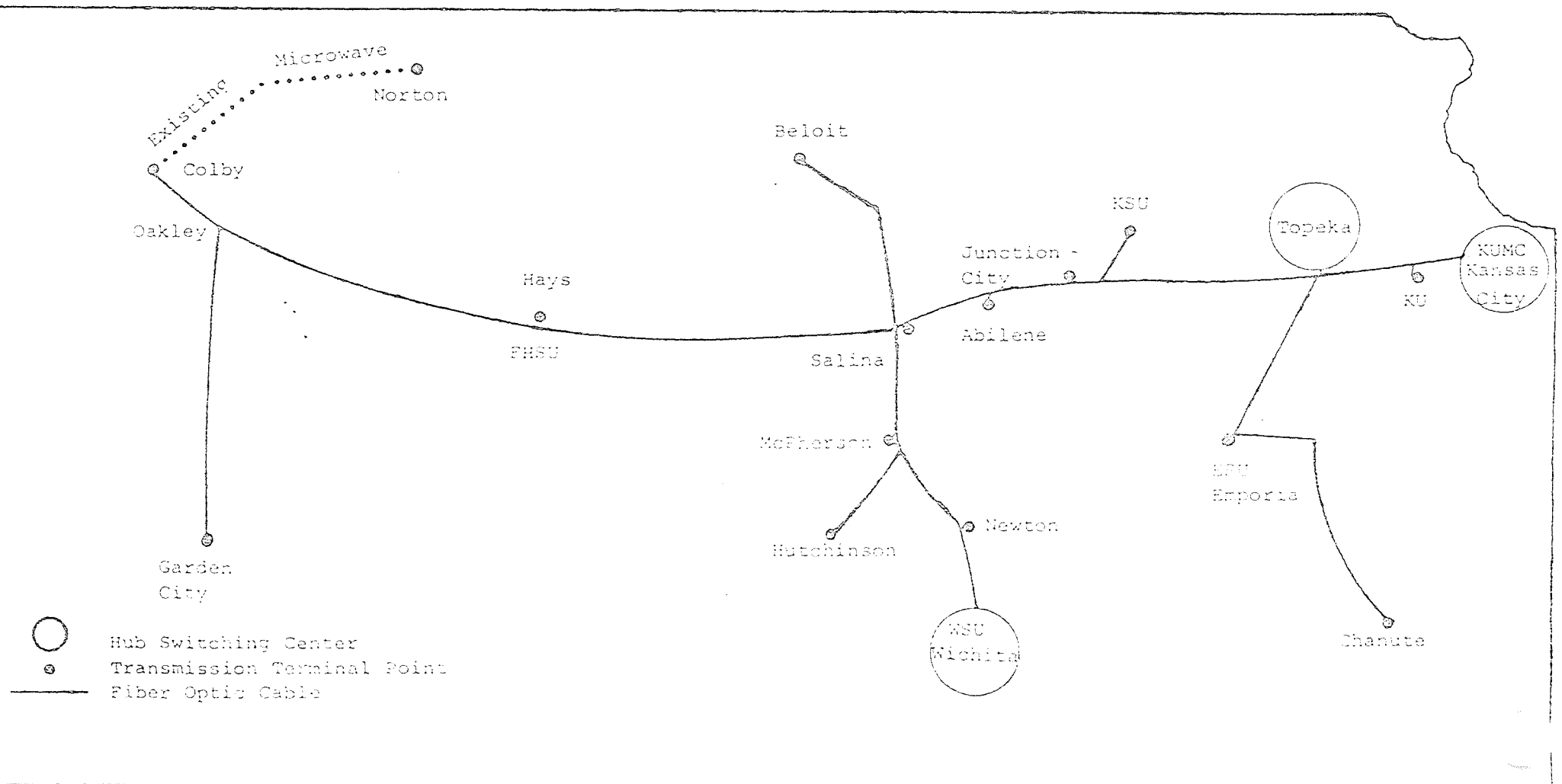


Figure 1

# THE NEW KANSAS DIGITAL TELECOMMUNICATIONS SYSTEM

## SERVICES TO BE PROVIDED

### Voice/Data Services

- Integrated Switched Voice/Data
- Dedicated Voice of Data
- Highspeed Data Transfer

### Video

- Instructional Television
- Teleconferencing
- Public Television

### Special Services

- Telemetry
- Highspeed Facsimile
- Electronic Mail
- Civil Defense
- Others

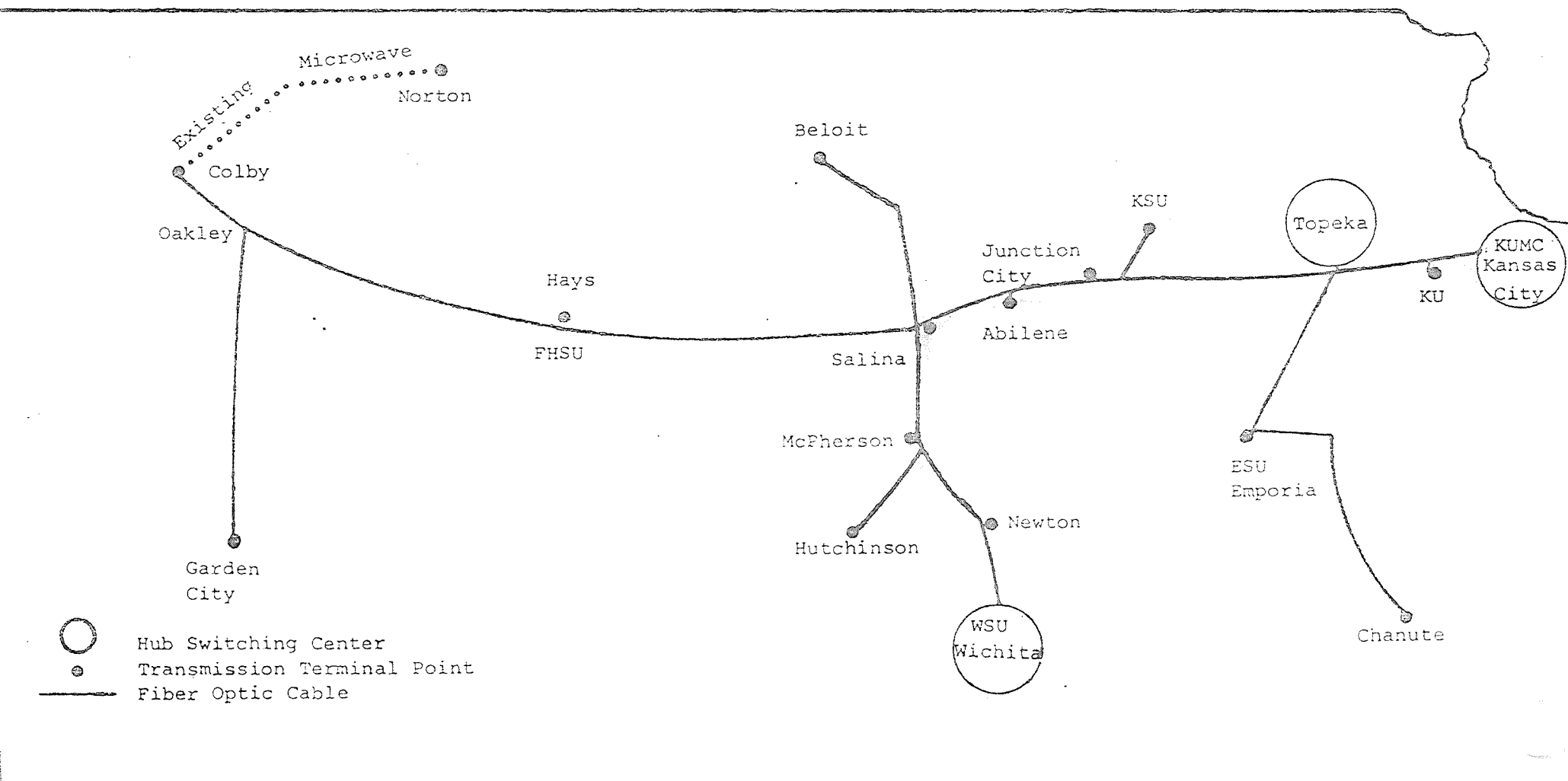


Figure 2

a basic grouping of 24 standard voice channels and permits user installations to be fed an appropriate capacity signal in multiples of 24 voice circuits or up to 24 channels for small installations. Line capacities are achieved by raising the T1 rate to the T2, T3, T3C, and T3D rate to provide line capacities of 96, 672, 1344, or 2016 standard voice channels. This is also equivalent to transmitting 3 commercial grade full color television signals through one fiber.

Services to be provided through the transmission system are, standard voice, data of any speed up to 56 Kb (Kilobits) on a dedicated or on a digitally switched basis when feasible, or up to 45, 90, or 135 Mb (Megabits) on a point to point computer to computer dedicated circuit basis using the total capacity of one strand under current technology. Other services, such as facsimile, telemetry, electronic mail, "Picturephone", or any specialized service based on voice or data in quantities up to the 135 Mb rate can be accommodated. Television, either public, instructional, or for teleconferencing, can be provided on a dedicated basis.

Initially, it is intended to provide 672 voice circuits capacity throughout the system using two of the strands. Video for instructional TV, teleconferencing, or public television on either a one or two way basis can be provided between designated locations on two other strands as needed. The remaining two strands can be used for back up and system protection or for state emergency or disaster purposes. Within a few years the capacities indicated can be increased five to ten fold with technological advances such as the use of wavelength division multiplexing.

This facility will provide all necessary telecommunications services to the points shown on the map past the year 2000. The life of the cable itself is estimated conservatively at 40 years. It is impervious and insensitive to electromagnetic induction, lightning, water infiltration, and electromagnetic pulse (EMP) from nuclear blasts, weather, and when buried, vandalism as well.

A "tutorial" on the technology used is contained in Volume III, Appendix A.

Engineering and cost data are contained in Volume III, Appendix B.

Switches. While a transmission facility as a stand alone system is possible, it is of limited use, and major economic and service benefits are lost if companion switches are not also provided as part of the system. The described system permits optimum service, efficiency, and economy through the addition of digital switches which are directly compatible with and transparent to the transmitted digital signal.

Digital switches are planned initially for the central control switch to be located in Topeka serving the Capital Area Complex through a Local Area Net (LAN) and similarly for the Nodal Area Service Centers in Kansas City and Wichita. Approximately 50% of the state agency telephone populations directly on the route of the digital system, as initially configured, will be served by these three switches. Later as existing switches require replacement, digital switches are planned for major installations, such as the University of Kansas at Lawrence, Kansas State University at Manhattan, Emporia State University, Fort Hays State University, and other large installations to be served directly by the digital transmission system. All switches

are to feature integrated voice/data or equivalent service and employ the single line per instrument concept for optimum communications capability, simplicity, and economy of maintenance. See Figure 2.

Direct compatibility and transparency between the transmission and switching systems are achieved by using digital switches employing the same T1 (PCM)(TDM) internal signal processing principles and format as the transmission system. This permits interfacing the two without the necessity for intervening multiplexing and demultiplexing equipment. Analog to digital and digital to analog conversion equipment, as well as multiplexing and demultiplexing equipment, need only be provided at the entry and exit points of the digital portion of the system.

Use of digital switches will permit switching of data up to 56 Kbs using a special line card and eliminating the need for complex modems at terminal locations. Some modem functions on a simplified basis may still be required at terminals to perform protocol functions.

These factors permit a simplified system which eliminates trouble spots, reduces equipment density, variety, and acquisition costs. They will reduce maintenance requirements and costs as well. A less costly and relatively simple system results overall.

Wherever possible the digital transmission system will be terminated at a state facility, whether or not it is served by a digital switch. This will place terminal control at a state facility and permit serving that facility directly,

without going through the telephone company central office. Circuits terminating at that point for other local purposes, such as for Off Net Access Lines or to serve other state agency offices in the area, will be turned over to the telephone company for local distribution. Where there is not a state agency convenient to the system, circuits serving local area agencies will be terminated at a convenient repeater (amplifier) location and turned over to the telephone company for local distribution.

The central control switch located at Topeka will perform the following system and local area service functions:

- a. Stored program control of all necessary operating instructions, system telephone numbers, circuit routing, switching, and supervision, and special features.
- b. Termination and control of off-net access lines (ONALs).
- c. Access to the telephone company exchange for local, long distance, WATS access, and commercial services as needed.
- d. Message detail accounting and recording, along with traffic and other operational data collection.
- e. All necessary switching and control functions for the local area which it serves.
- f. Transmission system monitoring, alarm, and overall system control functions will be provided at this location by a companion computerized control center.

Nodal area service center switches will perform many of the above functions as needed for the users in the areas served.

Large central or nodal switches permit most, if not all, agencies in metropolitan areas to be served from one switch at significant economies. Services and equipment are standardized, direct access to the transmission system without incurring costs for telephone company facilities, in particular the high cost of off-premise extensions in the Topeka area, is achieved. Shared use of telephone central office trunks permits reduction in the quantity required, in contrast to providing them to each agency separately. Similarly, space for equipment and the number of telephone operators is reduced. Maintenance is simplified and centralized administration and management can be applied to achieve efficiency and economy overall. These centers will serve the major area of population and state agency activity. Separate subsystem plans for each of these areas are provided in Volume III, Appendix C. Served agencies are to be connected to the nodal service centers thru 18 or 24 Ghz microwave as appropriate.

User terminal equipment consists of all telephone equipment on the customer's premises from the drop-wire, cable entry termination, or terminal block location to the telephone or other terminating facility. It also includes all private systems, such as PBX's, located on the customers' premises. Under a Federal Communications Commission directive, all these facilities are designated as Customer Premises Equipment (CPE) and became deregulated (detariffed) on 1 January 1983 for all new equipment added, and at some later date yet to be determined, for all existing in-place CPE. This means that

such equipment will cease to be controlled for rate or cost purposes by the Kansas Corporation Commission and thrown open to telephone equipment vendor competition. All required CPE in this plan will be provided as part of the switch installations.

#### OPERATIONS AND MANAGEMENT OF THE SYSTEM.

Operations, management, and other support activities necessary for the system will be provided by an augmented Telecommunications Office staff in conjunction with contract maintenance.

The Telecommunications Office staff now consists of 9 professionals and two clerical personnel. Five additional personnel, four professionals and one typist/word processor should be added during the detailed engineering, specification, and Request for Quotation phase which precedes contract award and commencement of installation.

At cutover, 16 additional professionals, technicians, and clerical personnel must be added to provide for supervision of contract maintenance personnel and management and provision of local telephone service. These personnel would be distributed between and located at Kansas City, Topeka, and Wichita.

The above augmentations are applicable primarily to the initial increment of the total system recommended at this time. A few additional personnel would be required for the same purpose as the system is expanded to its final configuration.

All the above costs are included in cost data to be discussed later.

An organization chart showing the full configuration of the Telecommunications Office as contemplated is enclosed as Figure 3. See Volume III, Appendix E for detailed discussions (unrevised) relevant to the overall system.



# REQUIRED SYSTEM MANAGEMENT/ORGANIZATIONAL FUNCTIONS

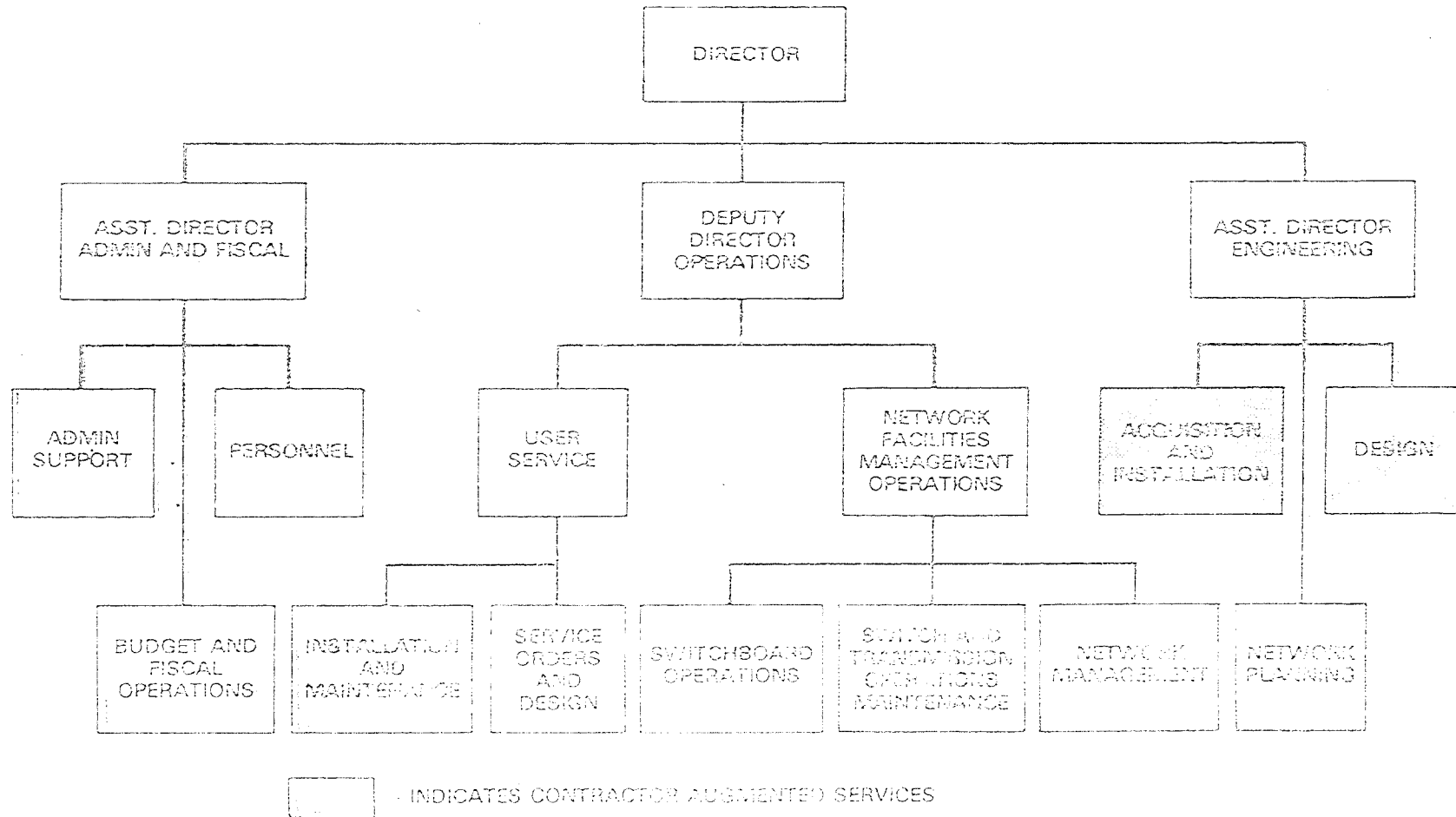


Figure 3

SYSTEM SERVICE CAPABILITIES.

1. Standard voice and data up to 56 kilobits per second on an integrated switched basis.
2. Data up to 135 megabits on a dedicated circuit basis.
3. Television.
  - a. Full wideband color for public TV, instructional TV, or video teleconferencing at 45 Mbs.
  - b. Video for regular voice telephone service, video teleconferencing, or instructional TV at 1.544 Mbs, or slow scan TV at 56 Mbs.
4. Facsimile/telecopying, telemetry, electronic mail, word processing, and others.
5. Integration of all the foregoing for "Office of the Future" applications.

SPECIAL PURPOSE OR DEDICATED SEPARATE SUBSYSTEMS WITHIN THE TRANSMISSION FACILITY.

- a. Data Communications Network
- b. Law Enforcement Nets
- c. Highway Maintenance Nets
- d. Regents Network
- e. Other Instructional TV or Voice Networks
- f. Public TV
- g. NOAA Weather Warning Nets
- h. Geodetic Survey Seismology Nets
- i. Satellite Communications Subsystems
- j. Radio Paging and others.

## INTANGIBLE BENEFITS

Over and above cost avoidance to the taxpayer, this system provides intangible or unquantifiable benefits through provision of larger quantities of service as well as more varieties of service than are presently physically or technologically possible under current commercial systems. Some of these intangible and unquantifiable benefits are:

- a. Increased personnel productivity.
- b. Improved information generation, retrieval, and transfer.
- c. Savings in personnel travel and visitation time by increased use of telecommunications services.
- d. Savings in energy consumption through substituting telecommunications for travel - "Telecommunications is the energy of the future".
- e. Increasing educational and cultural enhancement opportunities and exchanges for the general public through establishment and operation of public TV and "Instructional Television" programs.
- f. Improved efficiency in state agency operations overall.

## SYSTEM EVALUATION AND ALTERNATIVES

Booz-Allen, and Hamilton, a communications consulting firm of national stature, was asked to evaluate the original system concept and feasibility study completed by the Telecommunications Office and submitted to the Legislature in February 1981 and to investigate alternatives.

Their comments and conclusions at that time are as follows:

"Our analysis of the plan considered digital switching and transmission alternatives that were consistent with Kansas requirements. The digital switching configuration proposed in the plan appeared technically correct and cost effective. As a result, no viable alternatives to the digital switching system were identified. Several basic transmission alternatives were reviewed, including microwave, satellite, and coaxial cable transmission in addition to fiber optics cable.'

"The plan concept is technically and operationally sound.'

"There appears to be no other least costly transmission alternatives than the use of fiber optics for the planned applications."

Booz-Allen was subsequently engaged to develop the "State of Kansas Telecommunications System Implementation Plan" which was presented to the legislature in February 1982 and which has been updated and expanded by the Telecommunications Office for presentation to the 1983 legislature.

#### CAPITAL COSTS

Capital outlay for the full system, to include switches (CPE) and the transmission facility as revised and updated to FY 86 costs, totals \$26,267,000. These costs are tabulated on Figure 4 and detailed in Appendices "B" and "C" of Volume III.

Capital outlay for the first increment of the system recommended for immediate implementation is \$19,000,000 for switches (including CPE), at Kansas City, Topeka, and Wichita and for the fiber optic transmission facility between Kansas City, Topeka, and Wichita. See items A1, 2, and 3, B4, and C on Figure 4.

SUMMARY OF CAPITAL OUTLAY  
 FOT THE KANSAS TELECOMMUNICATIONS SYSTEM

<u>SEGMENT</u>	<u>COST (\$000s)</u>	
	Booz-Allen FY 84	Update FY 87
A. NODAL AREA SWITCHING AND LOCAL AREA NET (LAN) FACILITIES		
1. Topeka	\$ 8,732	\$ 7,100
2. Kansas City	5,350	4,000
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B. INTERCITY TRANSMISSION FACILITIES		
4. Kansas City - Topeka - Wichita Transmission Link	6,031	5,000
5. Topeka - Emporia - Chanute	2,171	2,020
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7. Hays - Colby	1,595	1,516
8. Oakley - Garden City	1,346	1,282
9. Salina - Beloit	1,101	1,052
C. COMPUTERIZED NETWORK CONTROL AND SURVEILLANCE CENTER	<u>275</u>	<u>200</u>
TOTAL CAPITAL OUTLAY	\$31,866	\$26,267

Figure 4

Capital outlay for the remainder of the transmission system, items B5, 6, 7, 8, and 9, Figure 4 is \$7,267,000.

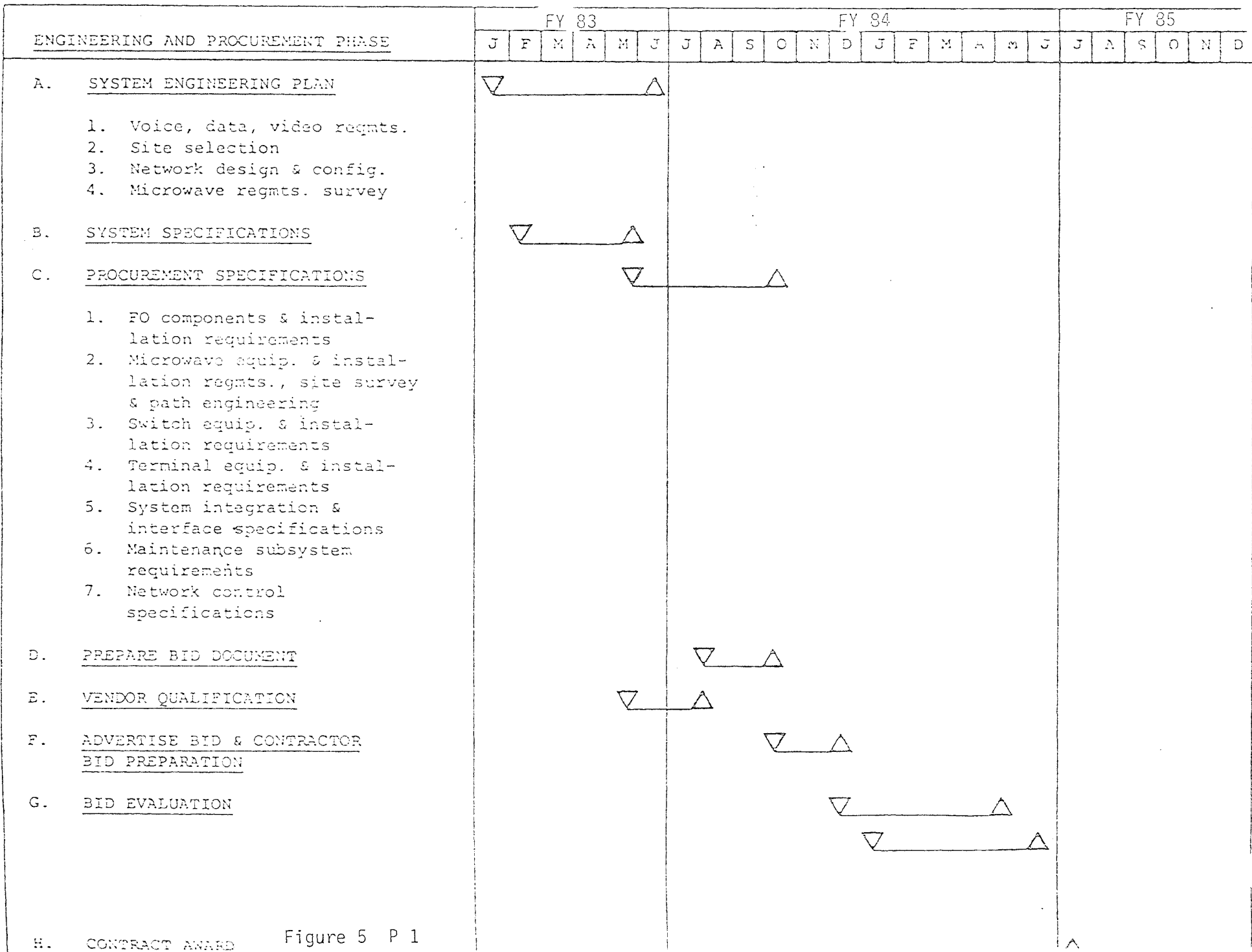
#### IMPLEMENTATION.

Figure 5 shows the total plan implementation schedule. It is the same as for the original Booz-Allen plan, but the fiscal years have been advanced one year. The years FY 84 thru FY 86 are the implementation years with cutover in late FY 86 or early FY 87.

It assumes legislative approval of funds in FY 83 for hiring a consulting engineer firm in FY 84 to perform certain preliminary work such as, detail engineering, specification preparation, and related pre-contract award tasks, which are beyond the physical capacity of the Telecommunications Office staff. The FY 84 budget contains the amount of \$450,000 to do these tasks for the initial increment of the total plan. These tasks are:

- a. Develop final system design in coordination with Telecommunications staff.
- b. Prepare detailed engineering layout of all elements.
- c. Prepare technical specifications and Request for Quotations (RFQs) in form suitable for procurements.
- d. Develop contractor qualification requirements and evaluate candidate contractors.
- e. Prepare bid evaluation criteria.
- f. Participate in evaluation of bids and contract award recommendations.

The time frames and intervals on Figure 5 are applicable to both the initial increment and total system construction. The \$450,000 in final planning and specification preparation applies only to the initial increment. Additional funds for the Beloit, Colby, Garden City, Emporia, and Chanute fiber optic links would be required in the amount of \$250,000. This latter figure is not included in costs in this updated version of the plan.



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Figure 5 P 1

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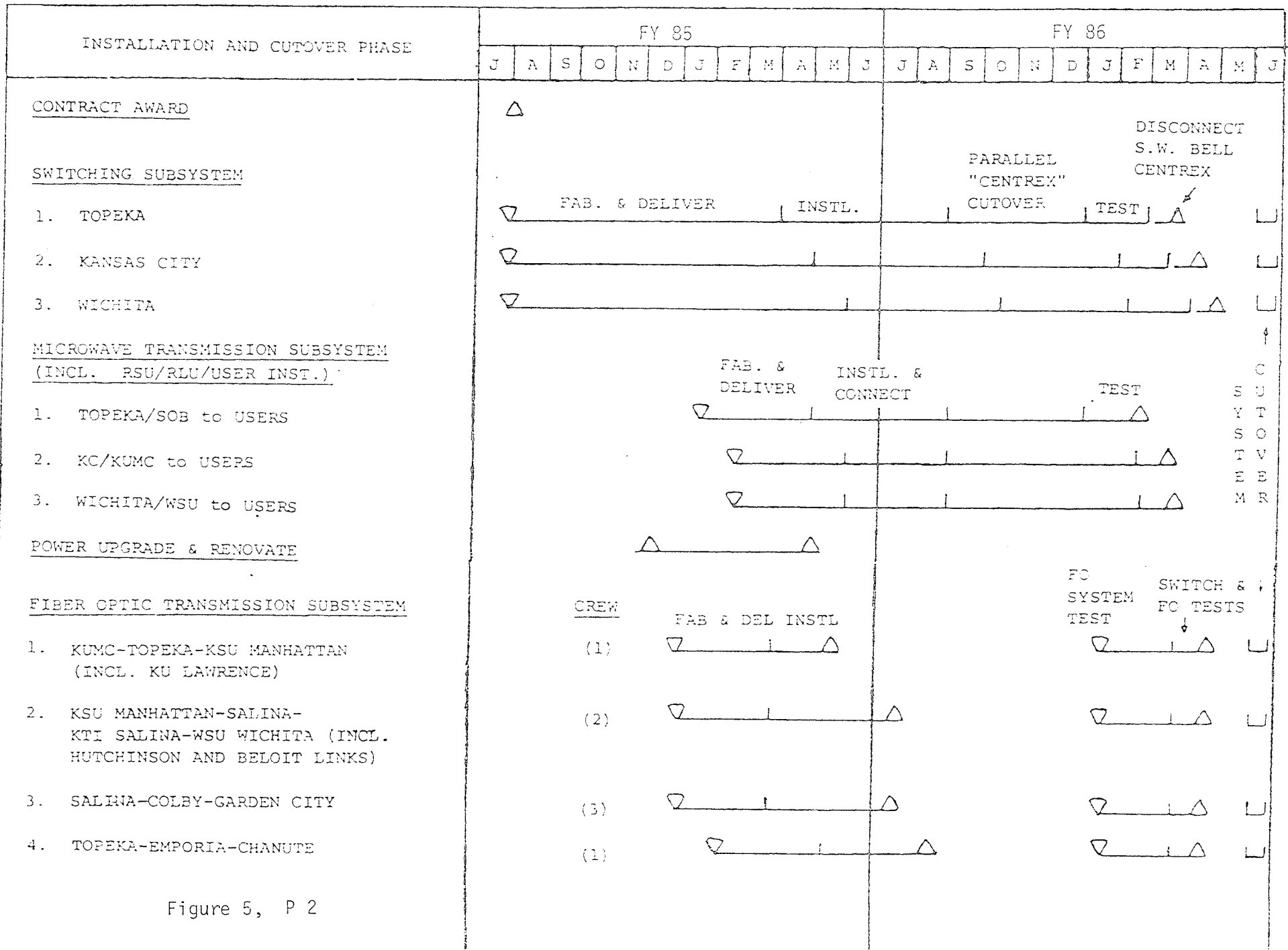


Figure 5, P 2

CT-13



## FINANCING THE SYSTEM.

Acquisition of the system may be financed through direct general fund appropriation, by a bond issue, or on a lease/purchase basis. Least costly is the direct appropriation method, followed by the bond issue. The most convenient, but also most expensive, is the lease/purchase of the system components.

Although cost avoidance is maximized through the direct general fund appropriation method, it may not be feasible to use that method of financing at this time.

The bond issue method is less expensive overall because a lower interest rate can be secured and because funds to repay principal can be accumulated in annual increments and placed at interest to help reduce payback costs overall. A bond interest rate between 8 and 9% is possible at this time. 9% has been used for cost comparison purposes in this study. A bond issue would require legislative action.

Lease/purchase is most expensive because a higher interest rate, 1½ to 2% above the bond rate, must be paid and because principal and interest would be paid back each month and not accumulated and invested as with a bond issue. Monthly payments are less expensive than semi-annual or annual payments. Legislative action specifically for this purpose would not be required.

Several leasing companies have been canvassed and have indicated their willingness to undertake financing a project of this nature and magnitude. They have indicated a finance charge rate at 1½ to 2% above the bond rating for the state. The State of Kansas can secure a bond rate on the order of 8 to 9% according to the latest information available. This means a lease/purchase carrying charge of approximately 10 or 11%. Cost effectiveness and cost comparison calculations in this plan apply rates of 10, 12, and 15% with 12% at most, considered as a

conservative possibility. A 10 year capital payback period which permits a comfortable approach to budgeting is also used.

#### COST COMPARISON METHODOLOGY.

Several scenarios were used, each with different assumptions regarding methods of financing, interest rates, growth and inflation rates, and various effects on costs that could result from divestiture or deregulation. Additionally, items of state costs and telephone company charges that were compared are those relevant only to the switches and local area networks (LANS) at Kansas City, Topeka, and Wichita and the interconnecting fiber optic transmission system for the initial recommended increment. In some cases, total state system costs and total state telecommunications service (telephone company charges) are also compared and so identified in other cases.

As previously stated, both a bond issue and lease/purchase of the system were studied as the methods of acquisition. A bond interest rate of 9% was used in some cases and lease carrying charges of 10, 12, and 15% were used in others.

A capital payback period of 10 years was assumed for the planned state system, and a 5 year payback period was used for the acquisition of CPE replaced in comparing telephone company service costs to the state system over the period studied since the dollar amounts are smaller and there is no point in extending the repayment period which increases costs.

While annual cost increases due to growth, inflation, and rate increases have been in excess of 15% as an average over the last 8 years, the FY 82 increase was only 10%. Since it appears that inflation may abate, some scenarios use 10% over the period studied.

Similarly, state overhead costs are primarily for personnel and these costs are controlled by budgetary and legislative action at below 10% on the average. 10% was used to escalate state system operation, management, and overhead costs.

The effects of deregulation on telephone company provided service are reasonably discernible but the effects of divestiture are still uncertain. With divestiture and the division of the state into three Local Access and Transport Areas (LATAs), the integrity of intercity private line systems like KANS-A-N could be disrupted. AT&T will take over inter-LATA service as a minimum, and could possibly take over all intrastate intercity service. Since AT&T is regulated by the F.C.C., inter-LATA intercity service will become subject to AT&T/F.C.C. tariffs. There are strong indications that the KANS-A-N system in its entirety will come under the control of AT&T. Since AT&T no longer offers discounted bulk intercity Telpak transmission circuit service, it will not be available from AT&T and Multi-schedule Private Line (MPL) service will be substituted by AT&T at twice the cost. Additionally, all of the channel derivation (multiplexing) and associated circuit termination facilities will be subject to AT&T tariffs which are higher than SWB rates. Because we do not know for certain whether the K.C.C. will retain either full or partial jurisdiction over KANS-A-N, we have assumed three situations as follows:

- a. K.C.C. will retain full jurisdiction and the "status quo" will continue indefinitely;
- b. the F.C.C. will assume full jurisdiction and AT&T rates will prevail;
- c. a combination of K.C.C./SWB rates in the 913 LATA and F.C.C./AT&T rates in the 316 and 816 LATA's will be applicable.

Additionally, SWB will charge AT&T a variety of access charges which will be passed on to the user. These access charges could be very considerable but are not known at this time and are not estimated or included in costs used in this study.

All CPE will be transferred to American Bell (ABI) (AT&T's independent subsidiary) on 1 January 1984. ABI will rent it to users for a time but it is believed they will try to phase it out of their inventory over a period of 18 to 24 months by withdrawing support. Since it is not economical to buy the old CPE because of the high cost of maintenance, moves, and changes, acquisition of less expensive CPE is contemplated. Acquisition is calculated on a one for one replacement basis. This CPE will be acquired in either a 5 year or 10 year lease/purchase arrangement, depending on the size of the dollar amount. Maintenance, moves, and changes will be accomplished under contract maintenance.

Southwestern Bell (SWB) will continue to offer "Centrex" service but only on a line and switch basis without CPE. The components of this service are now categorized as switch access (line) charges, intercommunication (inter and intra agency office) service charges, and exchange area access charges. SWB will propose a stabilized rate tariff for Centrex service. The tariff will stabilize for a three year period, the charges for switch access and intercommunication service, but the local exchange area access charge will vary from year to year at the initiative of the company. A study of the stabilized tariff planned for Texas reveals that these three charges are roughly equal or 1/3 each per Centrex main line. The 1983 cost for Texas is about \$25.00 per line, per month. In Kansas for FY 84 this would be about \$30 per line, or \$20 for the stabilized elements and \$10 for the variable elements. An escalation rate of 25% for each three year stabilized period and rates of 10 and 15% on the variable element were used. An assumed annual rate cost increase of 7½ to 8% per year for these stabilized elements is conservative. The 10 and 15% applied to the variable elements conforms to previously stated rationale for escalating telephone service

charges. Additionally, the telephone company will use this means of making up any shortfall resulting from the stabilized rates in interim years.

As stated above, maintenance, moves, and changes of CPE are provided by contract maintenance and are escalated at 10% per year.

State O&M costs are apportioned in accordance with the percent that the elements replaced bear to the total state telecommunications service annual cost.

#### FINANCIAL ANALYSIS METHODS.

Two methods of examining the comparative costs for the two competing systems are used. They are "Cost Avoidance" and "Discounted Cash Flow Present Value".

"Cost Avoidance" compares the annual cash flow budgeted costs for both systems. The amounts are stated in dollars valued at the year in which budgeted. In other words, they are the inflated dollars that would appear in annual budgets, five, ten, or fifteen years from now.

"Discounted Cash Flow Present Value" analysis states the comparative costs in present day dollars. In this case, FY 84 dollars. This method embodies the principle that a dollar today is worth more than a dollar 10 years from now.

In actuality, there is no difference between these two methodologies under the circumstances encountered in this cost comparison. The reason is that both systems require comparable cash outlays for the same or similar services on a uniform cash flow expenditure basis. The difference is that with the "Present Value" method the dollar amounts are condensed and differences between the two are minimized. This methodology makes no difference in the final outcome but it does satisfy critics and financial purists who use this method for determining the best rates of return in conjunction with benefits of competing investment opportunities.

Discount rates used represent the cost of money under various conditions of risk. This study uses a 7% to 15% risk range. Risk includes cost overruns, underruns, scheduling delays, technological changes and similar type difficulties. Financial analysts equate the "Cost of Money" with "Risk". We believe the most probable risk to be in the range of 7 to 12%, with our bond rate being in the middle or about 9%.

#### COST COMPARISONS RESULTS.

Cost comparisons are provided as Figures 6 thru 11 following. Each comparison consists of three parts, a covering recapitulation in numerical and graphical format, a tabulation of annual cost elements and assumptions relevant to the proposed state system, and a tabulation and assumptions with respect to costs relevant to continuing full service as presently provided by the telephone company.

The results of all cost analyses performed are favorable to state ownership and management of the state system.

Under both methods of financing and any combination of interest rates or inflation rates, and under any circumstances that might exist as to whether the K.C.C. will regulate all intrastate rates, whether the F.C.C. will assume jurisdiction, or whether some combination of regulatory authority pertains, the state system is less costly while providing a greater variety and quantity of services at equal or better quality than if no state system were build and all presently provided services (only voice and limited data) were secured from the telephone company indefinitely.

RECAPITULATION--PROJECTED ANNUAL COSTS (\$ Millions)  
 COMBINED STATE AND TELCO SERVICE SYSTEM VS CONTINUED TELCO SERVICE ONLY, INDEFINITELY  
 CASE NO. 1 (Best Case for Telco--Worst Case for State)

FISCAL YEARS	94	95	96	97	98	99	90	91	92	93	94	95	96	97	98	99
Annual Budget Telco System	\$10,695	\$11,305	\$12,564	\$13,812	\$14,863	\$15,964	\$17,851	\$19,249	\$19,725	\$22,119	\$23,978	\$26,025	\$29,156	\$31,631	\$34,354	\$38,459
Annual Budget State System	\$10,659	\$11,320	\$12,272	\$12,939	\$13,830	\$14,810	\$15,940	\$17,128	\$18,434	\$19,933	\$21,514	\$23,252	\$25,243	\$23,529	\$28,844	\$28,486
Cost Avoidance due State System	\$ (164)	\$ 265	\$ 292	\$ 873	\$ 1,033	\$ 1,154	\$ 1,911	\$ 2,121	\$ 1,291	\$ 2,186	\$ 2,464	\$ 2,773	\$ 3,913	\$ 8,102	\$ 8,510	\$ 9,964
Cost Avoidance, Cumulative	\$ (164)	\$ 101	\$ 393	\$ 1,266	\$ 2,299	\$ 3,453	\$ 5,364	\$ 7,485	\$ 8,776	\$10,962	\$13,426	\$16,199	\$20,112	\$28,214	\$36,724	\$46,688

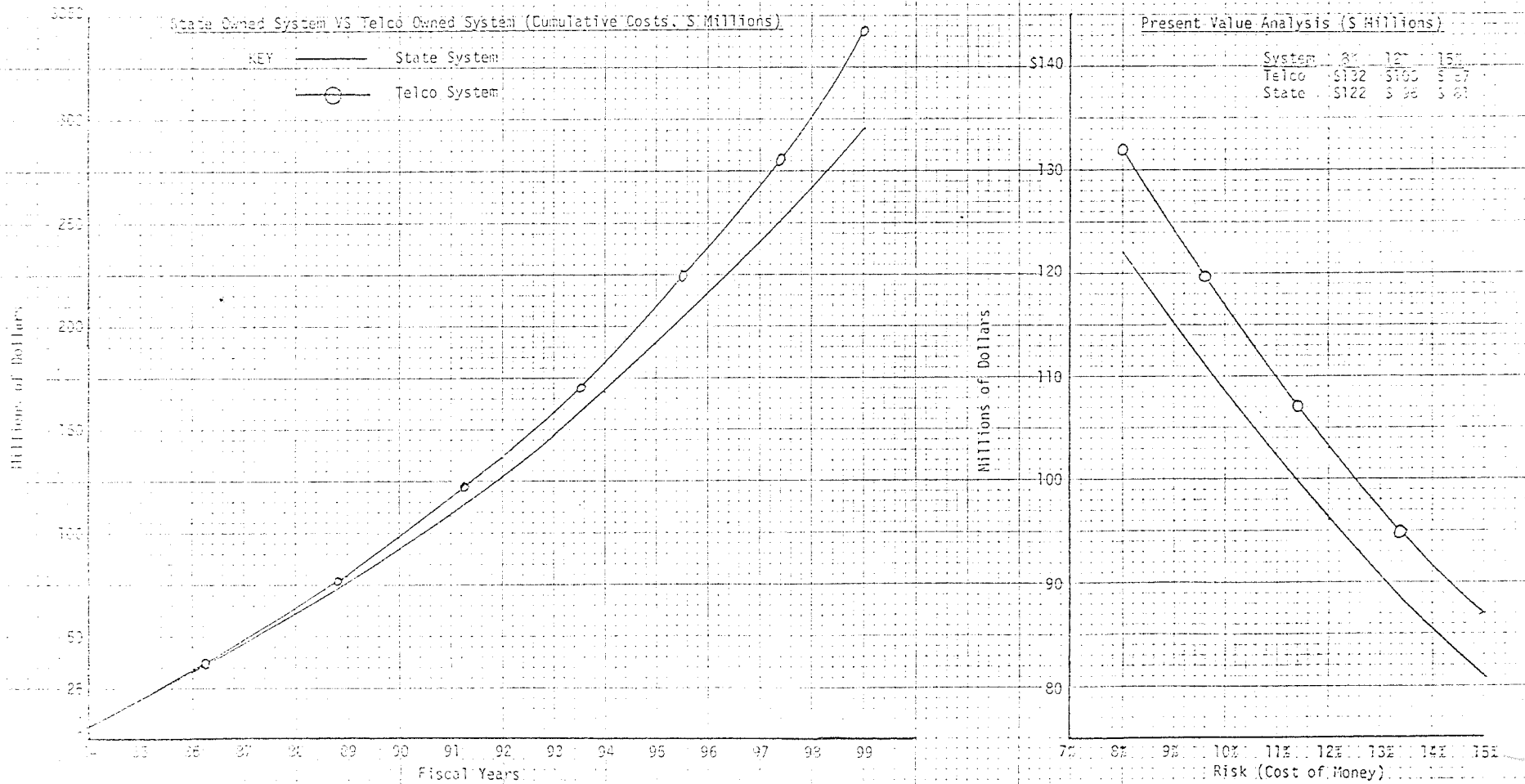


Figure 6a

PROJECTED ANNUAL COSTS (000's)  
 COMBINED STATE AND TELCO SERVICE SYSTEM  
 CASE NO. 1 (Best Case for Telco--Worst Case for State)

STATE SYSTEM COST ELEMENTS	Fiscal years	84	85	86	87	88	89	90	91	92	93	94	95	96	97
Capital Cost Payback (Lease/Purchase, 15% for 10 yrs.) <sup>1</sup>					\$ 3,816	\$ 3,816	\$ 3,816	\$ 3,816	\$ 3,816	\$ 3,816	\$ 3,816	\$ 3,816	\$ 3,816	\$ 3,816	\$ 3,816
System Engineer, Plan & Implement <sup>2</sup>	\$	450													
<u>Recurring Costs</u>															
<u>Telco Service</u>															
Intercity (KANS-A-N) incr. 10%/yr. <sup>3</sup>	\$	5,646	\$ 6,211	\$ 6,832	\$ 5,959	\$ 6,555	\$ 7,210	\$ 7,931	\$ 8,724	\$ 9,597	\$10,557	\$11,612	\$12,774	\$14,051	\$15,455
Local <sup>4</sup>															
Switch Access & I/C (stabl. 3 yrs.)	\$	1,800	\$ 1,800	\$ 1,800											
Exchange Access (incr. 10%/yr.)	\$	900	\$ 990	\$ 1,089											
Misc. (incr. 10%/yr.)	\$	424	\$ 466	\$ 513	\$ 1,051	\$ 1,156	\$ 1,272	\$ 1,399	\$ 1,539	\$ 1,693	\$ 1,862	\$ 2,049	\$ 2,253	\$ 2,478	\$ 2,726
CPE & PBXs (incr. 10%/yr.)	\$	1,547	\$ 1,702	\$ 1,872											
<u>Total Telco Service Costs</u>	\$	10,317	\$11,169	\$12,106	\$ 7,010	\$ 7,711	\$ 8,482	\$ 9,330	\$10,263	\$11,290	\$12,419	\$13,661	\$15,027	\$16,529	\$18,182
<u>State Costs</u>															
Support and Overhead <sup>5</sup>	\$	92	\$ 151	\$ 166	\$ 893	\$ 982	\$ 1,030	\$ 1,088	\$ 1,307	\$ 1,437	\$ 1,581	\$ 1,739	\$ 1,913	\$ 2,105	\$ 2,315
Contract O & M <sup>6</sup>					\$ 813	\$ 894	\$ 933	\$ 1,081	\$ 1,190	\$ 1,309	\$ 1,439	\$ 1,584	\$ 1,742	\$ 1,915	\$ 2,107
<u>Total State Costs</u>	\$	92	\$ 151	\$ 166	\$ 1,706	\$ 1,876	\$ 2,063	\$ 2,269	\$ 2,497	\$ 2,746	\$ 3,020	\$ 3,323	\$ 3,655	\$ 4,021	\$ 4,422
Telco Tax Revenue Lost					\$ 407	\$ 427	\$ 449	\$ 525	\$ 552	\$ 582	\$ 678	\$ 714	\$ 754	\$ 877	\$ 923
<u>Total Proposed State System Costs</u>	\$	10,859	\$11,320	\$12,272	\$12,939	\$13,830	\$14,810	\$15,940	\$17,128	\$18,434	\$19,933	\$21,514	\$23,252	\$25,243	\$28,529

1. \$10,000,000 for capital cost payback, lease purchase, 15%, 10 yrs.
2. General fund appropriation.
3. Telpak service continues indefinitely at increasing cost 10%/yr.
4. FY84 thru FY85 switch access/intercomm charges are stable, but exchange access, miscellaneous, and CPE and PBX charges increase 10%/yr. FY87 state system implemented; thereafter, only residual local service charges apply, increasing 10%/yr.
5. FY84 thru FY86 costs are proportional to telcomm office budget in the same way that replaced segment costs relate to those for entire system. FY87 and later same proportion, but augmented staff (16 total) applies.
6. Includes contract maintenance and spare parts support.

Figure 6b



PROJECTED ANNUAL COSTS (000's)  
 TELCO SERVICE CONTINUED INDEFINITELY  
 CASE NO. 1 (Best Case for Telco--Worst Case for State)

TELECOM SYSTEM COST ELEMENTS	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97
<u>Capital Cost Payback (Lease/Purchase, CPE, 15% for 5 yrs.)<sup>7</sup></u>					\$ 1,062	\$ 1,062	\$ 1,062	\$ 1,062	\$ 1,062						
<u>Recurring Costs</u>															
<u>Telco Service</u>															
Intercom (TANS-A-N) incr. 10%/yr. <sup>8</sup>	\$	5,646	\$ 6,211	\$ 6,832	\$ 7,515	\$ 8,267	\$ 9,094	\$10,003	\$11,003	\$12,104	\$13,314	\$14,645	\$16,110	\$17,721	\$19,493
Losses															
Switch Access & I/C (stbl. 3 yrs.)	\$	1,800	\$ 1,800	\$ 1,800	\$ 2,250	\$ 2,250	\$ 2,250	\$ 2,813	\$ 2,813	\$ 2,813	\$ 3,516	\$ 3,516	\$ 3,516	\$ 4,395	\$ 4,395
Exchange Access (incr. 10%/yr.)	\$	900	\$ 990	\$ 1,089	\$ 1,198	\$ 1,318	\$ 1,449	\$ 1,594	\$ 1,754	\$ 1,929	\$ 2,122	\$ 2,334	\$ 2,563	\$ 2,825	\$ 3,107
Misc. (incr. 10%/yr.)	\$	424	\$ 466	\$ 513	\$ 564	\$ 621	\$ 683	\$ 751	\$ 826	\$ 909	\$ 1,000	\$ 1,100	\$ 1,210	\$ 1,331	\$ 1,464
CPE & PBXs (incr. 10%/yr.)	\$	1,547	\$ 1,702	\$ 1,872											
<u>Total Telco Service Costs</u>	\$	10,317	\$11,169	\$12,106	\$13,527	\$15,456	\$17,476	\$19,761	\$22,396	\$25,755	\$29,952	\$35,595	\$42,404	\$50,272	\$59,455
<u>State Costs</u>															
Contract & Overhead (incr. 10%/yr.) <sup>10</sup>	\$	378	\$ 416	\$ 458	\$ 503	\$ 553	\$ 609	\$ 670	\$ 737	\$ 810	\$ 891	\$ 980	\$ 1,079	\$ 1,185	\$ 1,300
Contract O & M (incr. 10%/yr.) <sup>11</sup>	\$				\$ 720	\$ 792	\$ 877	\$ 958	\$ 1,054	\$ 1,160	\$ 1,276	\$ 1,403	\$ 1,543	\$ 1,698	\$ 1,867
<u>Total State Costs</u>	\$	378	\$ 416	\$ 458	\$ 1,223	\$ 1,345	\$ 1,426	\$ 1,628	\$ 1,791	\$ 1,970	\$ 2,167	\$ 2,383	\$ 2,622	\$ 2,884	\$ 3,172
<u>Total Annual Costs Telco System</u>	\$	10,695	\$11,585	\$12,564	\$14,750	\$16,801	\$18,902	\$21,389	\$24,187	\$27,725	\$32,119	\$37,978	\$45,026	\$53,156	\$62,627

7. \$3,720,000 for CPE, lease purchase, 15%, 5 yrs.
8. Telpak continues indefinitely at increasing cost 10%/yr.
9. Switch access and intercomm charges remain stable until beginning of each successive three year period; then they increase 25%. Exchange access and miscellaneous charges increase 10%/yr. FY84 thru FY86 CPE and PBX charges increase 10%/yr, but are discontinued in FY87 when state purchases its own CPE.
10. Costs based on telcomm office staff of 11 people and increase 10%/yr.
11. Includes contract maintenance and spare parts support.

Figure 6c

RECAPITULATION--PROJECTED ANNUAL COSTS (\$ MILLION)  
 COMBINED STATE AND TELCO SERVICE SYSTEMS VS CONTINUED TELCO SERVICE ONLY, INDEFINITELY  
 CASE NO. 2 (Best Case for State)

FISCAL YEAR	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
Annual Budget Telco-System		\$14,074	\$15,865	\$17,904	\$20,032	\$22,481	\$25,292	\$29,103	\$32,804	\$36,104	\$41,716	\$47,312	\$53,759	\$62,037	\$70,509	\$80,208	\$92,157
Annual Budget State System		\$14,235	\$15,611	\$17,666	\$14,696	\$16,310	\$18,167	\$20,346	\$22,784	\$25,574	\$28,836	\$32,409	\$36,898	\$41,588	\$44,013	\$50,033	\$57,697
Cost Avoidance due State System		\$ (161)	\$ 271	\$ 298	\$ 5,346	\$ 6,171	\$ 7,125	\$ 8,757	\$10,020	\$10,530	\$12,880	\$14,813	\$17,643	\$20,449	\$26,498	\$29,905	\$34,373
Cost Avoidance, Cumulative		\$ (161)	\$ 110	\$ 408	\$ 5,754	\$11,925	\$19,050	\$27,807	\$37,827	\$48,357	\$61,237	\$76,050	\$93,093	\$113,642	\$140,038	\$169,943	\$204,921

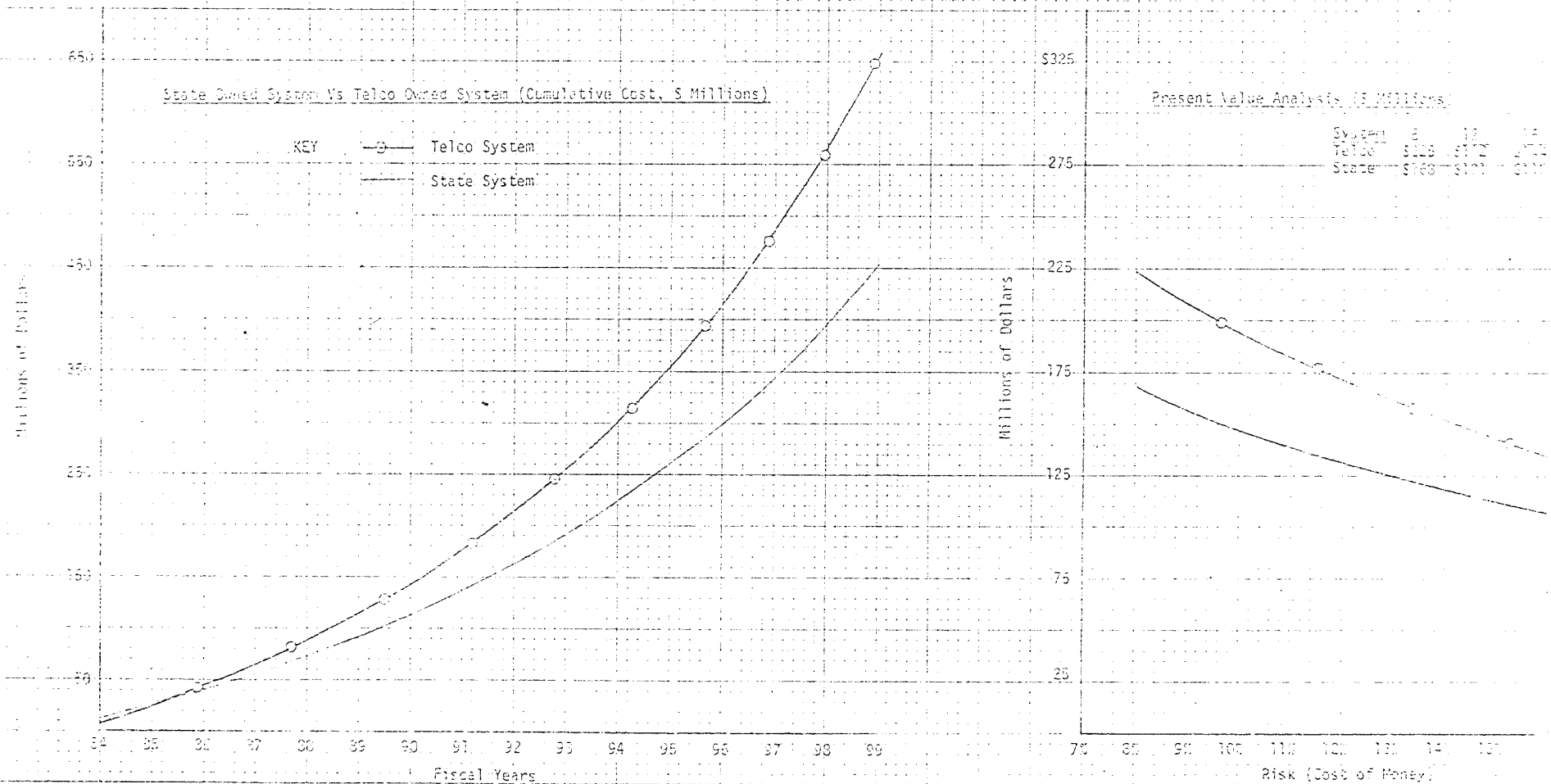


Figure 7a

PROJECTED ANNUAL COSTS (000's)  
 COMBINED STATE AND TELCO SYSTEMS  
 CASE NO. 2 (Best Case for State)

STATE SYSTEM COST ELEMENTS	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97
Capital Cost Payback (Lease/Purchase, 10% for 10 yrs.) <sup>1</sup>					\$ 3,088	\$ 3,088	\$ 3,088	\$ 3,088	\$ 3,088	\$ 3,088	\$ 3,088	\$ 3,088	\$ 3,088	\$ 3,088	
System Engineer, Plan & Implement <sup>2</sup>	\$ . 450														
<u>Recurring Costs</u>															
<u>Telco Service</u>															
Intercity (KANS-A-N) incr. 15%/yr. <sup>3</sup>	\$ 8,813	\$10,135	\$11,656	\$ 8,062	\$ 9,272	\$10,663	\$12,262	\$14,102	\$16,216	\$18,649	\$21,446	\$24,663	\$28,363	\$32,616	
Local <sup>4</sup>															
Switch Access & I/C (stbl. 3 yrs.)	\$ 1,882	\$ 1,882	\$ 1,882												
Exchange Access (incr. 15%/yr.)	\$ 941	\$ 1,082	\$ 1,244												
Misc. (incr. 15%/yr.)	\$ 443	\$ 510	\$ 586	\$ 1,051	\$ 1,209	\$ 1,390	\$ 1,598	\$ 1,838	\$ 2,114	\$ 2,431	\$ 2,796	\$ 3,215	\$ 3,697	\$ 4,252	
CPE & PBXs (incr. 15%/yr.)	\$ 1,618	\$ 1,860	\$ 2,139												
<u>Total Telco Service Costs</u>	<u>\$13,697</u>	<u>\$15,469</u>	<u>\$17,507</u>	<u>\$ 9,113</u>	<u>\$10,481</u>	<u>\$12,053</u>	<u>\$13,860</u>	<u>\$15,940</u>	<u>\$18,330</u>	<u>\$21,080</u>	<u>\$24,242</u>	<u>\$27,876</u>	<u>\$32,060</u>	<u>\$36,870</u>	
<u>State Costs</u>															
Support and Overhead <sup>5</sup>	\$ 88	\$ 145	\$ 159	\$ 885	\$ 973	\$ 1,070	\$ 1,177	\$ 1,295	\$ 1,425	\$ 1,567	\$ 1,724	\$ 1,896	\$ 2,086	\$ 2,294	
Contract O & M <sup>6</sup>				\$ 813	\$ 894	\$ 983	\$ 1,081	\$ 1,190	\$ 1,309	\$ 1,439	\$ 1,583	\$ 1,742	\$ 1,916	\$ 2,107	
<u>Total State Costs</u>	<u>\$ 88</u>	<u>\$ 145</u>	<u>\$ 159</u>	<u>\$ 1,698</u>	<u>\$ 1,867</u>	<u>\$ 2,053</u>	<u>\$ 2,258</u>	<u>\$ 2,485</u>	<u>\$ 2,734</u>	<u>\$ 3,006</u>	<u>\$ 3,307</u>	<u>\$ 3,638</u>	<u>\$ 4,002</u>	<u>\$ 4,401</u>	
<u>Telco Tax Revenue Lost</u>				\$ 787	\$ 874	\$ 973	\$ 1,140	\$ 1,271	\$ 1,422	\$ 1,662	\$ 1,862	\$ 2,092	\$ 2,438	\$ 2,742	
<u>Total Proposed State System Costs</u>	<u>\$14,235</u>	<u>\$15,614</u>	<u>\$17,666</u>	<u>\$14,686</u>	<u>\$ 16,310</u>	<u>\$18,167</u>	<u>\$20,346</u>	<u>\$22,784</u>	<u>\$25,574</u>	<u>\$28,636</u>	<u>\$32,499</u>	<u>\$36,696</u>	<u>\$41,588</u>	<u>\$44,013</u>	

1. \$19,000,000 plus interest for capital cost payback, Lease/Purchase, 10%, 10 yrs. Capital cost payback included in annual budget figures FY87 thru FY96.
2. General fund appropriation.
3. FY81 Telpak service discontinued. Mix of SWB/IXC and AT&T/MPL tariffs apply. FY87 state system operational. Residual telco charges increase 15%/yr.
4. FY84 thru FY86 switch access/intercomm charges are stable, but exchange access, miscellaneous, and CPE and PBX increase 15%/yr. FY87 state system implemented; thereafter, only residual local service charges apply increasing 15%/yr.
5. FY84 thru FY86 these costs are proportional to telcomm office budget in same way that replaced segment costs relate to those of the entire system. FY87 and later, same proportion, but augmented staff (16 total) applies.
6. Includes contract maintenance and spare parts support.

Figure 7b

PROJECTED ANNUAL COSTS (000's)  
 CONTINUED TELCO SERVICE  
 CASE NO. 2 (Best Case for State)

TELCO SYSTEM COST ELEMENTS	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97
<u>Capital Cost Payback (CPE, Lease/Purchase, 10% for 5 yrs.)<sup>7</sup></u>					\$ 948	\$ 948	\$ 948	\$ 948	\$ 948						
<u>Recurring Costs</u>															
<u>Telco Service</u>															
Intercom (KANS-A-II) incr. 15%/yr. <sup>8</sup>	\$ 8,813	\$10,735	\$11,656	\$13,404	\$15,414	\$17,727	\$20,386	\$23,443	\$26,960	\$31,004	\$35,654	\$41,003	\$47,153	\$54,226	\$64,226
Local <sup>9</sup>															
Switch Access & I/O (stabl. 3 yrs.)	\$ 1,882	\$ 1,882	\$ 1,882	\$ 2,352	\$ 2,352	\$ 2,352	\$ 2,940	\$ 2,940	\$ 2,940	\$ 3,675	\$ 3,675	\$ 3,675	\$ 4,594	\$ 4,594	\$ 5,789
Exchange Access (incr. 15%/yr.)	\$ 941	\$ 1,082	\$ 1,244	\$ 1,431	\$ 1,646	\$ 1,893	\$ 2,176	\$ 2,503	\$ 2,878	\$ 3,310	\$ 3,807	\$ 4,377	\$ 5,034	\$ 5,789	\$ 6,728
Misc. (incr. 15%/yr.)	\$ 443	\$ 510	\$ 586	\$ 674	\$ 776	\$ 892	\$ 1,025	\$ 1,179	\$ 1,356	\$ 1,560	\$ 1,793	\$ 2,063	\$ 2,372	\$ 2,728	\$ 3,172
CPE & PBXs (incr. 15%/yr.)	\$ 1,617	\$ 1,860	\$ 2,139												
<u>Total Telco Service Costs</u>	<u>\$13,696</u>	<u>\$15,469</u>	<u>\$17,507</u>	<u>\$17,861</u>	<u>\$20,188</u>	<u>\$22,864</u>	<u>\$26,527</u>	<u>\$30,065</u>	<u>\$34,134</u>	<u>\$39,549</u>	<u>\$44,929</u>	<u>\$51,118</u>	<u>\$59,153</u>	<u>\$67,337</u>	<u>\$77,337</u>
<u>State Costs</u>															
Support & Overhead (incr. 10%/yr.) <sup>10</sup>	\$ 378	\$ 416	\$ 457	\$ 503	\$ 553	\$ 609	\$ 670	\$ 737	\$ 810	\$ 891	\$ 980	\$ 1,078	\$ 1,186	\$ 1,305	\$ 1,435
Contract O & M (incr. 10%/yr.) <sup>11</sup>				\$ 720	\$ 792	\$ 871	\$ 958	\$ 1,054	\$ 1,160	\$ 1,276	\$ 1,403	\$ 1,543	\$ 1,698	\$ 1,867	\$ 2,052
<u>Total State Costs</u>	<u>\$ 378</u>	<u>\$ 416</u>	<u>\$ 457</u>	<u>\$ 1,223</u>	<u>\$ 1,345</u>	<u>\$ 1,480</u>	<u>\$ 1,628</u>	<u>\$ 1,791</u>	<u>\$ 1,970</u>	<u>\$ 2,167</u>	<u>\$ 2,383</u>	<u>\$ 2,621</u>	<u>\$ 2,884</u>	<u>\$ 3,172</u>	<u>\$ 3,507</u>
<u>Total Annual Costs Telco System</u>	<u>\$14,074</u>	<u>\$15,885</u>	<u>\$17,964</u>	<u>\$20,032</u>	<u>\$22,481</u>	<u>\$25,292</u>	<u>\$29,103</u>	<u>\$32,804</u>	<u>\$36,104</u>	<u>\$41,716</u>	<u>\$47,312</u>	<u>\$53,739</u>	<u>\$62,037</u>	<u>\$70,509</u>	<u>\$80,509</u>

7. \$3,720,000 for CPE, Lease/Purchase, 10% for 5 yrs.
8. FY84 Telpak service discontinued. Mix of SWS/IXC and AT&T/MPL tariffs apply. Telco charges increase 15%/yr.
9. Switch access and intercomm charges remain stable until beginning of each successive three year period; then they increase 25%. Exchange access and miscellaneous charges increase 15%/yr. FY84 thru FY86 CPE and PBX charges increase 15%/yr, but are discontinued in FY87 when state purchases its own CPE.
10. Costs based on telecomm office staff of 11 people and increase 10%/yr.
11. Includes contract maintenance and spare parts support.

Figure 7c

RECAPITULATION--PROJECTED ANNUAL COSTS (\$ Millions)  
 COMBINED STATE AND TELCO SERVICE SYSTEMS VS CONTINUED TELCO SERVICE ONLY, INDEFINITELY  
 CASE NO. 3 (Most Likely Cash)

SUMMARY	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
Annual Budget Telco System		\$13,650	\$14,335	\$16,138	\$17,657	\$19,111	\$20,632	\$22,016	\$24,937	\$26,057	\$27,009	\$28,611	\$34,454	\$38,428	\$41,833	\$45,673	\$50,733
Annual Budget State System		\$10,814	\$14,570	\$15,347	\$14,005	\$15,049	\$16,196	\$17,509	\$18,899	\$20,425	\$22,167	\$24,814	\$26,047	\$28,362	\$27,447	\$30,153	\$33,627
Cost Avoidance due State System		\$ (164)	\$ 265	\$ 126	\$ 3,652	\$ 4,070	\$ 4,456	\$ 5,507	\$ 6,028	\$ 5,632	\$ 6,913	\$ 7,627	\$ 8,407	\$10,066	\$14,333	\$15,420	\$17,663
Cost Avoidance, Cumulative		\$ (164)	\$ 101	\$ 227	\$ 3,679	\$ 7,949	\$12,405	\$17,912	\$23,950	\$29,582	\$36,500	\$44,127	\$52,534	\$62,600	\$76,333	\$92,403	\$109,766

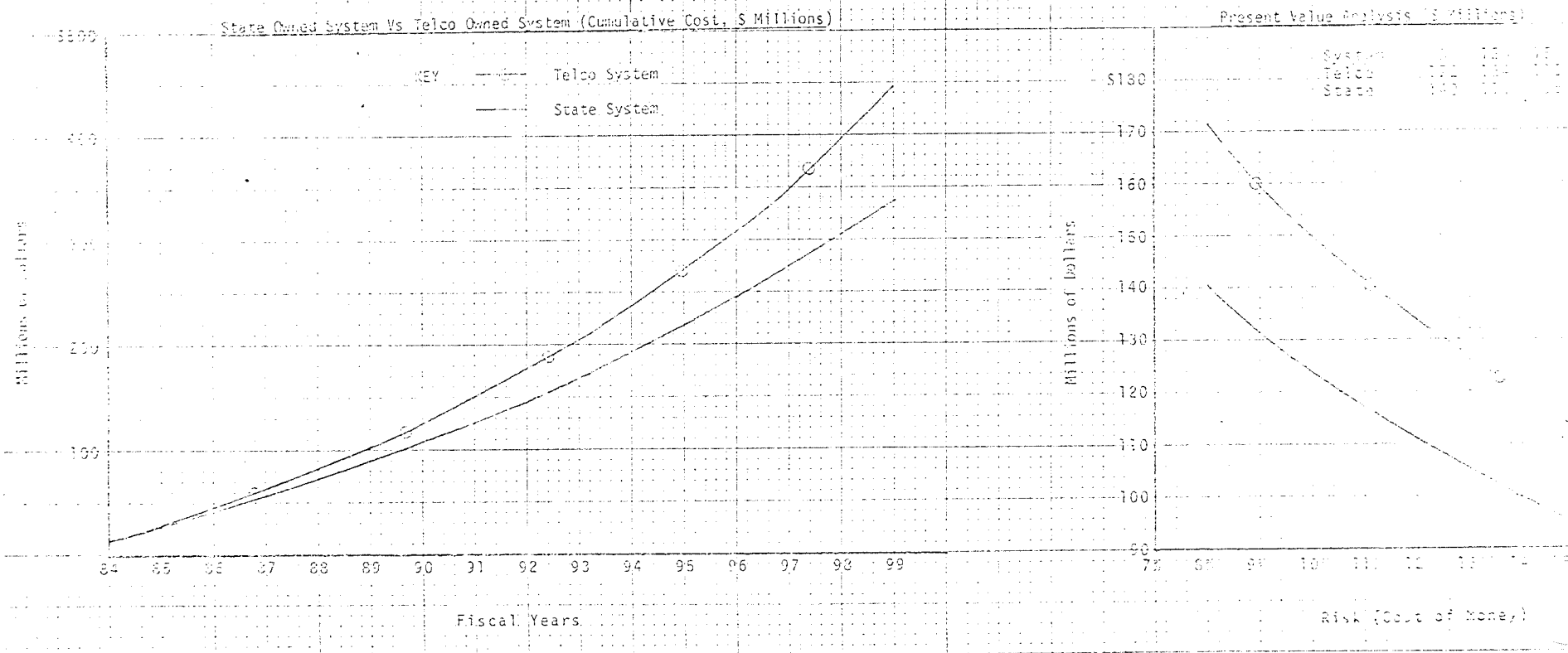


Figure 8a

PROJECTED ANNUAL COSTS (000's)  
 COMBINED STATE AND TELCO SYSTEMS  
 CASE NO. 3 (Most Likely Case)

STATE SYSTEM COST ELEMENTS	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97
<u>Capital Cost Payback</u> (Lease/Purchase, 12% for 10 yrs.) <sup>1</sup>					\$ 3,374	\$ 3,374	\$ 3,374	\$ 3,374	\$ 3,374	\$ 3,374	\$ 3,374	\$ 3,374	\$ 3,374	\$ 3,374	\$ 3,374
<u>System Engineer. Plan &amp; Implement</u> <sup>2</sup>	\$	450													
<u>Recurring Costs</u>															
<u>Telco Service</u>															
Intercity (RANS-A-N) incr. 10%/yr. <sup>3</sup>	\$	8,601	\$ 9,461	\$10,407	\$ 7,230	\$ 7,953	\$ 8,748	\$ 9,623	\$10,586	\$11,644	\$12,809	\$14,089	\$15,498	\$17,048	\$18,753
Local <sup>4</sup>															
Switch Access & I/C (stbl. 3 yrs.)	\$	1,800	\$ 1,800	\$ 1,800											
Exchange Access (incr. 10%/yr.)	\$	900	\$ 990	\$ 1,089											
Misc. (incr. 10%/yr.)	\$	424	\$ 466	\$ 513	\$ 1,051	\$ 1,156	\$ 1,272	\$ 1,399	\$ 1,539	\$ 1,693	\$ 1,862	\$ 2,048	\$ 2,253	\$ 2,478	\$ 2,726
CPE & PBXs (incr. 10%/yr.)	\$	1,547	\$ 1,702	\$ 1,872											
<u>Total Telco Service</u>		\$13,272	\$14,419	\$15,681	\$ 8,281	\$ 9,109	\$10,020	\$11,022	\$12,125	\$13,337	\$14,671	\$16,137	\$17,751	\$19,526	\$21,479
<u>State Costs</u>															
Support and Overhead <sup>5</sup>	\$	92	\$ 151	\$ 166	\$ 693	\$ 982	\$ 1,080	\$ 1,188	\$ 1,307	\$ 1,437	\$ 1,581	\$ 1,739	\$ 1,913	\$ 2,105	\$ 2,316
Contract O & M <sup>6</sup>					\$ 813	\$ 894	\$ 983	\$ 1,081	\$ 1,190	\$ 1,309	\$ 1,439	\$ 1,583	\$ 1,742	\$ 1,916	\$ 2,107
<u>Total State Costs</u>	\$	92	\$ 151	\$ 166	\$ 1,706	\$ 1,876	\$ 2,063	\$ 2,269	\$ 2,497	\$ 2,746	\$ 3,020	\$ 3,322	\$ 3,655	\$ 4,021	\$ 4,423
<u>Telco Tax Revenue Lost</u>					\$ 644	\$ 690	\$ 739	\$ 844	\$ 903	\$ 968	\$ 1,102	\$ 1,181	\$ 1,267	\$ 1,441	\$ 1,546
<u>Total Proposed State System Costs</u>		\$13,814	\$14,570	\$15,847	\$14,005	\$15,049	\$16,196	\$17,509	\$18,899	\$20,425	\$22,167	\$24,014	\$26,047	\$28,362	\$30,447

1. \$19,000,000 plus interest for capital cost payback, Lease/Purchase, 12% for 10 yrs.
2. General fund appropriation.
3. FY84 Telpak service discontinued. FCC tariff applies. FY87 state system operational. Residual telco charges increase 10%/yr.
4. FY84 thru FY86 switch access/intercomm charges are stable, but exchange access, miscellaneous, and CPE and PBX charges increase 10%/yr. FY87 state system implemented; thereafter, only residual local service charges apply increasing 10%/yr.
5. FY84 thru FY86 these costs are proportional to telcomm office budget in the same way that replaced segment costs relate to those for entire system. FY87 and later, same proportion, but augmented staff (16 total) applies.
6. Includes contract maintenance and spare parts support.

Figure 8b

PROJECTED ANNUAL COSTS (000's)  
 CONTINUED TELCO SERVICE  
 CASE NO. 3 (Most Likely Case)

TELCO SYSTEM COST ELEMENTS	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97
<u>Capital Cost Payback (CPE, Lease/Purchase, 12%, 5 yrs.)<sup>7</sup></u>					\$ 993	\$ 993	\$ 993	\$ 993	\$ 993						
<u>Recurring Costs</u>															
<u>Telco Service</u>															
Intercity (TRANS-A-N) incr. 10%/yr. <sup>8</sup>	\$	8,601	9,461	10,407	11,447	12,592	13,851	15,237	16,760	18,436	20,280	22,308	24,539	26,993	29,692
Local <sup>9</sup>															
Switch Access & I/C (stbl. 3 yrs.)	\$	1,800	1,800	1,800	2,250	2,250	2,250	2,813	2,913	2,813	3,516	3,516	3,516	4,395	4,395
Exchange Access (incr. 10%/yr.)	\$	900	990	1,089	1,198	1,318	1,449	1,594	1,754	1,929	2,122	2,334	2,568	2,825	3,107
Misc. (incr. 10%/yr.)	\$	424	466	513	546	621	683	751	826	909	1,000	1,100	1,210	1,331	1,464
CPE & PBXs (incr. 10%/yr.)	\$	1,547	1,702	1,872											
<u>Total Telco Service Costs</u>	\$	13,272	14,419	15,681	15,441	16,781	18,233	20,395	22,153	24,087	26,918	29,258	31,833	34,544	37,665
<u>State Costs</u>															
Support & Overhead (incr. 10%/yr.) <sup>10</sup>	\$	378	416	457	503	553	609	670	737	810	891	980	1,078	1,186	1,305
Contract O & M (incr. 10%/yr.) <sup>11</sup>	\$	378	416	457	720	792	817	958	1,054	1,160	1,276	1,403	1,543	1,699	1,867
<u>Total State Costs</u>	\$	378	416	457	1,223	1,345	1,426	1,628	1,791	1,970	2,167	2,383	2,621	2,884	3,172
<u>Total Annual Costs Telco System</u>	\$	13,650	14,835	16,138	17,667	19,119	20,652	23,016	24,937	26,057	29,085	31,641	34,454	37,428	41,235

7. \$3,720,000 for CPE, Lease/Purchase, 12% for 5 yrs.  
 8. FY84 Telpak service discontinued. FCC tariff applies. Telco charges increase 10%/yr.  
 9. Switch access and intercomm charges remain stable until beginning of each successive three year period; then they increase 25%. Exchange access and miscellaneous charges increase 10%/yr. FY84 thru FY86 CPE and PBX charges increase 10%/yr., but are discontinued in FY87 when state purchases its own CPE.  
 10. Costs based on telcomm office staff of 11 people and increase 10%/yr.  
 11. Includes contract maintenance and spare parts support.

Figure 8c

RECAPITULATION--PROJECTED ANNUAL COSTS (\$ Millions)  
 COMBINED STATE AND TELCO SERVICE SYSTEMS VS CONTINUED TELCO SERVICE ONLY, INDEFINITELY  
 CASE NO. 4 (Most Likely Case, but Using Bonds for Capital)

SUMMARY	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
Annual Budget Telco System		\$13,650	\$14,835	\$16,138	\$17,657	\$19,117	\$20,652	\$23,016	\$24,937	\$26,057	\$29,085	\$31,641	\$34,454	\$38,428	\$41,850	\$46,574	\$50,697
Annual Budget State System		\$13,914	\$15,007	\$17,593	\$12,377	\$13,421	\$15,568	\$17,881	\$19,271	\$20,797	\$22,539	\$24,336	\$25,200	\$24,988	\$27,447	\$30,159	\$33,229
Cost Avoidance due State System		\$ (164)	\$ (172)	\$ (1,455)	\$ 5,280	\$ 5,698	\$ 5,084	\$ 5,135	\$ 5,666	\$ 5,260	\$ 6,545	\$ 7,255	\$ 9,254	\$13,440	\$14,388	\$15,421	\$17,462
Cost Avoidance, cumulative		\$ (164)	\$ (336)	\$ (1,791)	\$ (3,489)	\$ (9,187)	\$ (14,271)	\$ (19,406)	\$ (25,072)	\$ (30,332)	\$ (36,878)	\$ (44,133)	\$ (53,387)	\$ (66,826)	\$ (81,210)	\$ (98,831)	\$ (114,093)

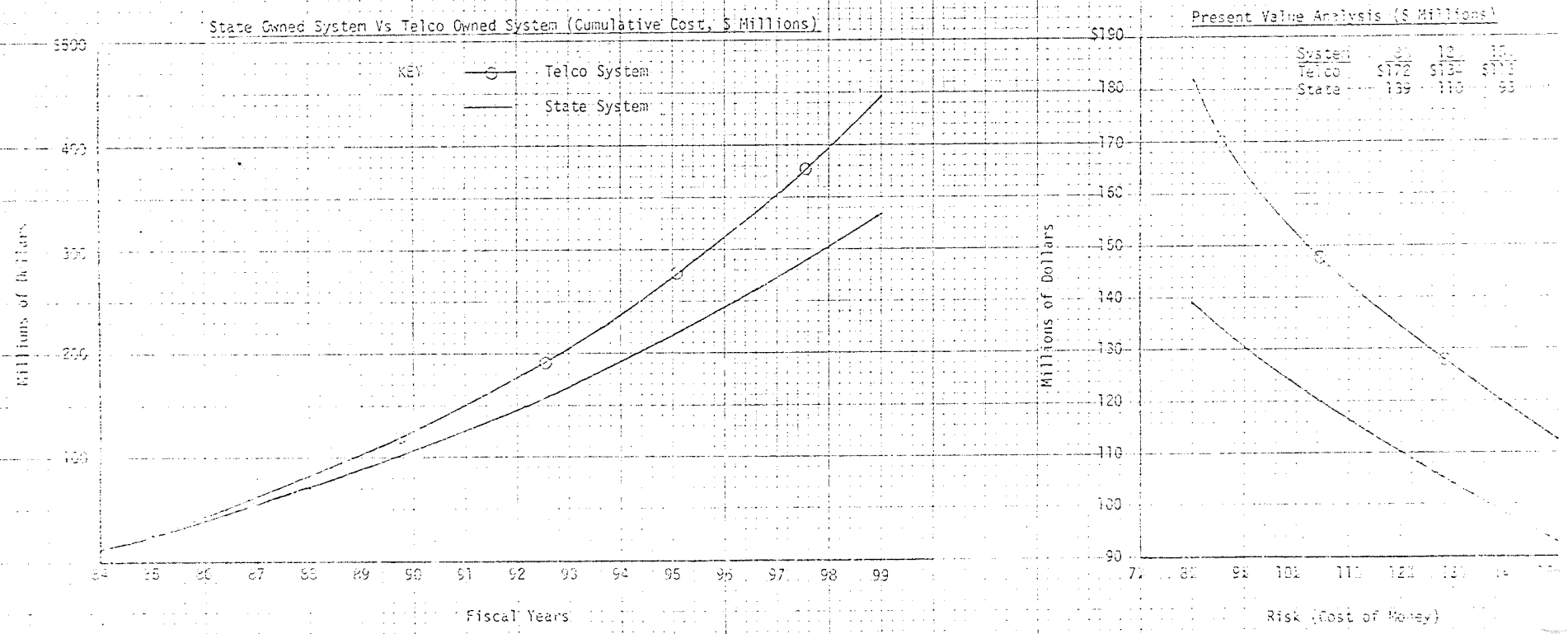


Figure 9a



CASE NO. 4  
 PROJECTED ANNUAL COSTS (000's)  
 COMBINED STATE AND TELCO SYSTEMS  
 (Most Likely Case, but Using Bonds for Capital)

STATE SYSTEM COST ELEMENTS	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97
Capital Cost Payback (Bonds at 9% for 10 yrs.) <sup>1</sup>	\$	437	\$ 1,746	\$ 1,746	\$ 1,746	\$ 2,746	\$ 3,746	\$ 3,746	\$ 3,746	\$ 3,746	\$ 3,746	\$ 3,746	\$ 2,527		
System Engineer, Plan & Implement <sup>2</sup>	\$	450													
<u>Recurring Costs</u>															
<u>Telco Service</u>															
Intercity (KANS-A-N) incr. 10%/yr. <sup>3</sup>	\$	8,601	\$ 9,461	\$10,407	\$ 7,230	\$ 7,953	\$ 8,748	\$ 9,623	\$10,586	\$11,644	\$12,809	\$14,089	\$15,498	\$17,048	\$18,753
Local <sup>4</sup>															
Switch Access & I/C (stbl. 3 yrs.)	\$	1,800	\$ 1,800	\$ 1,800											
Exchange Access (incr. 10%/yr.)	\$	900	\$ 990	\$ 1,089											
Misc. (incr. 10%/yr.)	\$	424	\$ 466	\$ 513	\$ 1,051	\$ 1,156	\$ 1,272	\$ 1,399	\$ 1,539	\$ 1,693	\$ 1,862	\$ 2,048	\$ 2,253	\$ 2,478	\$ 2,726
CPE & PBXs (incr. 10%/yr.)	\$	1,547	\$ 1,702	\$ 1,872											
<u>Total Telco Service</u>		\$13,272	\$14,419	\$15,681	\$ 8,281	\$ 9,109	\$10,020	\$11,022	\$12,125	\$13,337	\$14,671	\$16,137	\$17,751	\$19,526	\$21,479
<u>State Costs</u>															
Support and Overhead <sup>5</sup>	\$	92	\$ 151	\$ 166	\$ 893	\$ 982	\$ 1,080	\$ 1,188	\$ 1,307	\$ 1,437	\$ 1,581	\$ 1,739	\$ 1,913	\$ 2,105	\$ 2,315
Contract O & M <sup>6</sup>					\$ 813	\$ 894	\$ 983	\$ 1,081	\$ 1,190	\$ 1,309	\$ 1,439	\$ 1,583	\$ 1,742	\$ 1,916	\$ 2,107
<u>Total State Costs</u>	\$	92	\$ 151	\$ 166	\$ 1,706	\$ 1,876	\$ 2,063	\$ 2,269	\$ 2,497	\$ 2,746	\$ 3,020	\$ 3,322	\$ 3,655	\$ 4,021	\$ 4,422
<u>Telco Tax Revenue Lost</u>					\$ 644	\$ 690	\$ 739	\$ 844	\$ 903	\$ 968	\$ 1,102	\$ 1,181	\$ 1,267	\$ 1,441	\$ 1,546
<u>Total Proposed State System Costs</u>		\$13,814	\$15,007	\$17,593	\$12,377	\$13,421	\$15,568	\$17,831	\$19,271	\$20,797	\$22,539	\$24,386	\$25,200	\$24,988	\$27,447

- \$19,000,000 for capital cost payback plus \$400,000 investment banker's commission. Bonds issued at 9% for 10 years. Making 9% investments thru PMIB total capital payback is \$29,678. Capital costs included in annual budget figures FY87 thru FY96.
- General fund appropriation.
- FY84 Telpak service discontinued. FCC tariff applies. FY87 state system operational. Residual telco charges increase 10%/yr.
- FY84 thru FY85 switch access/intercomm charges are stable, but exchange access, miscellaneous, and CPE and PBX charges increase 10%/yr. FY87 state system implemented; thereafter, only residual local service charges apply increasing 10%/yr.
- FY84 thru FY86 these costs are proportional to telcomm office budget in the same way that replaced segment costs relate to those for entire system. FY87 and later, same proportion, but augmented staff (16 total) applies.
- Includes contract maintenance and spare parts support.

Figure 9b

CASE NO. 4  
 PROJECTED ANNUAL COSTS (000's)  
 TELCO SERVICE CONTINUED INDEFINITELY  
 (Most Likely Case, but Using Bonds for Capital)

TELCO SYSTEM COST ELEMENTS	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97
<u>Capital Cost Payback (CPE, lease purchase, 12% for 5 yrs.)<sup>7</sup></u>					\$ 993	\$ 993	\$ 993	\$ 993	\$ 993						
<u>Recurring Costs</u>															
<u>Telco Service</u>															
Intercity (RANS-A-N) incr. 10%/yr. <sup>8</sup>	\$	8,601	\$ 9,461	\$10,407	\$11,447	\$12,592	\$13,851	\$15,237	\$16,760	\$18,436	\$20,280	\$22,308	\$24,539	\$26,993	\$29,692
Local <sup>9</sup>															
Switch Access & I/C (stabl. 3 yrs.)	\$	1,800	\$ 1,800	\$ 1,800	\$ 2,250	\$ 2,250	\$ 2,250	\$ 2,813	\$ 2,813	\$ 2,813	\$ 3,516	\$ 3,516	\$ 3,516	\$ 4,395	\$ 4,395
Exchange Access (incr. 10%/yr.)	\$	900	\$ 990	\$ 1,089	\$ 1,198	\$ 1,318	\$ 1,449	\$ 1,594	\$ 1,754	\$ 1,929	\$ 2,122	\$ 2,334	\$ 2,568	\$ 2,825	\$ 3,107
Misc. (incr. 10%/yr.)	\$	424	\$ 466	\$ 513	\$ 546	\$ 621	\$ 683	\$ 751	\$ 826	\$ 909	\$ 1,000	\$ 1,100	\$ 1,210	\$ 1,331	\$ 1,464
CPE & PBXs (incr. 10%/yr.)	\$	1,547	\$ 1,702	\$ 1,872											
<u>Total Telco Service Costs</u>	\$	13,272	\$14,419	\$15,681	\$16,441	\$18,781	\$18,235	\$20,595	\$22,155	\$22,097	\$26,918	\$29,258	\$31,833	\$35,544	\$38,688
<u>State Costs</u>															
Support & Overhead (incr. 10%/yr.) <sup>10</sup>	\$	378	\$ 416	\$ 457	\$ 503	\$ 553	\$ 609	\$ 670	\$ 737	\$ 810	\$ 891	\$ 980	\$ 1,078	\$ 1,186	\$ 1,305
Contract O & M (incr. 10%/yr.) <sup>11</sup>					\$ 720	\$ 792	\$ 877	\$ 958	\$ 1,054	\$ 1,160	\$ 1,276	\$ 1,403	\$ 1,543	\$ 1,698	\$ 1,867
<u>Total State Costs</u>	\$	378	\$ 416	\$ 457	\$ 1,223	\$ 1,345	\$ 1,426	\$ 1,628	\$ 1,791	\$ 1,970	\$ 2,167	\$ 2,383	\$ 2,621	\$ 2,884	\$ 3,172
<u>Total Annual Costs Telco System</u>	\$	13,650	\$14,835	\$16,138	\$17,667	\$19,119	\$20,662	\$23,016	\$24,937	\$26,067	\$29,085	\$31,641	\$34,454	\$38,428	\$41,860

7. \$9,720,000 for CPE, lease purchase, 12% for 5 yrs.

8. FY84 Telpac service discontinued. FCC tariff applies. Telco charges increase 10%/yr.

9. Switch access and intercomm charges remain stable until beginning of each successive three year period; then they increase 25%. Exchange access and miscellaneous charges increase 10%/yr. FY84 thru FY85 CPE and PBX charges increase 10%/yr., but are discontinued in FY87 when state purchases its own CPE.

10. Costs based on telcom office staff of 11 people and increase 10%/yr.

11. Includes contract maintenance and spare parts support.

		RECAPITULATION--PROJECTED ANNUAL COSTS (\$ Millions)															
		COMBINED STATE AND TELCO SERVICE SYSTEMS VS CONTINUED TELCO SERVICE ONLY, INDEFINITELY															
SUMMARY		CASE NO. 5 (Booz-Allen Configuration Update, Bonds)															
Fiscal Years		84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
Annual Budget Telco System		\$20,823	\$22,664	\$24,664	\$25,618	\$27,695	\$30,960	\$34,392	\$37,156	\$40,195	\$44,664	\$49,342	\$53,389	\$57,741	\$60,836	\$65,271	\$70,953
Annual Budget State System		\$21,583	\$23,706	\$28,406	\$20,300	\$23,841	\$26,538	\$28,884	\$30,847	\$33,106	\$36,076	\$38,808	\$40,203	\$39,401	\$43,038	\$47,033	\$52,192
Cost Avoidance due State System		\$ (700)	\$ (1,022)	\$ (3,742)	\$ (5,318)	\$ (3,854)	\$ (4,442)	\$ (5,508)	\$ (6,309)	\$ (7,080)	\$ (8,588)	\$ (10,534)	\$ (13,186)	\$ (18,340)	\$ (17,848)	\$ (19,233)	\$ (21,761)
Cost avoidance, cumulative		\$ (700)	\$ (1,722)	\$ (5,464)	\$ (1,146)	\$ (3,708)	\$ (8,150)	\$ (13,658)	\$ (19,967)	\$ (27,059)	\$ (35,644)	\$ (46,178)	\$ (59,364)	\$ (78,704)	\$ (102,552)	\$ (135,552)	\$ (178,313)

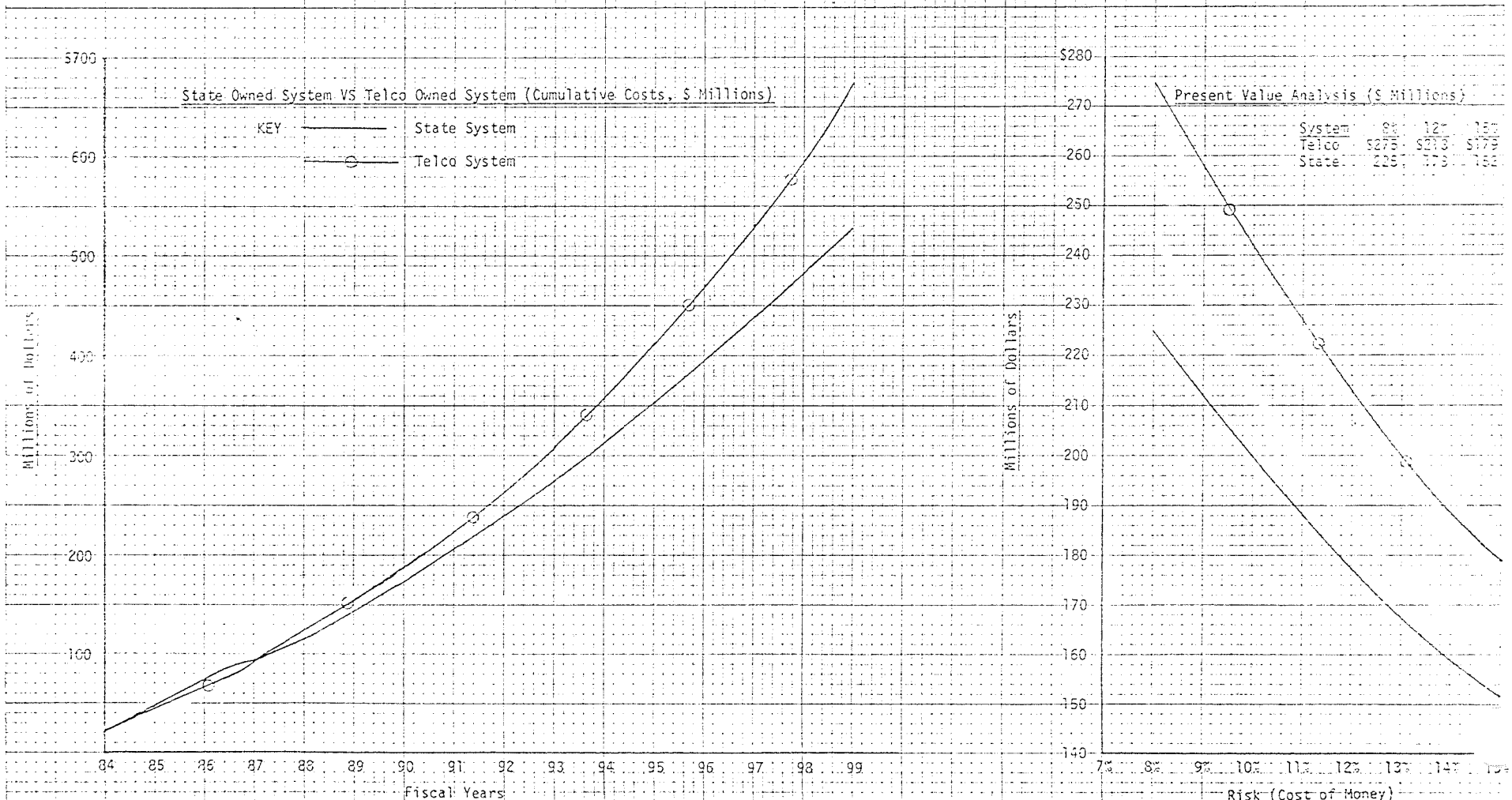


Figure 10a

PROJECTED ANNUAL COSTS (\$ Millions)  
 OMMINED STATE AND TELCO SYSTEMS  
 CASE NO. 5 (Booz-Allen Configuration Update, Bonds)

STATE SYSTEM COST ELEMENTS	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97
<u>Capital Cost Payback (Bonds at 9% for 10 yrs.)<sup>1</sup></u>		\$ 603	\$ 2,412	\$ 2,412	\$ 2,412	\$ 2,412	\$ 2,412	\$ 2,412	\$ 2,412	\$ 2,412	\$ 2,412	\$ 2,412	\$ 2,412	\$ 2,412	\$ 2,412
Residual CPE		\$ 229	\$ 914	\$ 914	\$ 914	\$ 914	\$ 914	\$ 914	\$ 914	\$ 914	\$ 914	\$ 914	\$ 914	\$ 914	\$ 914
<u>Total Capital</u>		\$ 832	\$ 3,326	\$ 3,326	\$ 3,326	\$ 3,326	\$ 3,326	\$ 3,326	\$ 3,326	\$ 3,326	\$ 3,326	\$ 3,326	\$ 3,326	\$ 3,326	\$ 3,326
<u>System Engineer, Plan &amp; Implement<sup>2</sup></u>	\$	700													
<u>Recurring Costs</u>															
<u>Telco Service</u>															
Intercity (TRANS-A-N) incr. 10%/yr. <sup>3</sup>	\$	8,800	\$ 9,461	\$10,407	\$ 6,434	\$ 7,077	\$ 7,726	\$ 8,564	\$ 9,420	\$10,362	\$11,390	\$12,638	\$13,792	\$15,171	\$16,689
Local <sup>4</sup>															
Switch Access & I/C (stbl. 3 yrs.)	\$	2,880	\$ 2,880	\$ 2,880	\$ 1,350	\$ 1,350	\$ 1,350	\$ 1,638	\$ 1,638	\$ 1,638	\$ 2,110	\$ 2,110	\$ 2,110	\$ 2,638	\$ 2,638
Exchange Access (incr. 10%/yr.)	\$	1,440	\$ 1,584	\$ 1,742	\$ 719	\$ 790	\$ 869	\$ 956	\$ 1,052	\$ 1,157	\$ 1,273	\$ 1,400	\$ 1,540	\$ 1,694	\$ 1,863
Misc. (incr. 10%/yr.)	\$	3,229	\$ 3,552	\$ 3,907	\$ 4,709	\$ 5,180	\$ 5,655	\$ 6,268	\$ 6,895	\$ 7,565	\$ 8,294	\$ 9,178	\$10,098	\$11,108	\$12,217
CPE & P&A (incr. 10%/yr.)	\$	4,356	\$ 4,792	\$ 5,271											
<u>Total Telco Service</u>	\$29,505	\$22,269	\$24,207	\$15,211	\$14,397	\$15,702	\$17,476	\$19,155	\$20,792	\$23,125	\$25,226	\$27,558	\$30,319	\$33,407	
<u>State Costs</u>															
Support and Overhead <sup>5</sup>	\$	378	\$ 605	\$ 873	\$ 1,824	\$ 2,006	\$ 2,207	\$ 2,428	\$ 2,671	\$ 2,938	\$ 3,232	\$ 3,555	\$ 3,911	\$ 4,302	\$ 4,732
Contract O & M <sup>6</sup>					\$ 1,214	\$ 1,335	\$ 1,469	\$ 1,616	\$ 1,773	\$ 1,956	\$ 2,162	\$ 2,397	\$ 2,664	\$ 2,964	\$ 3,150
<u>Total State Costs</u>	\$	378	\$ 605	\$ 873	\$ 3,038	\$ 3,341	\$ 3,676	\$ 4,044	\$ 4,444	\$ 4,894	\$ 5,394	\$ 5,922	\$ 6,515	\$ 7,166	\$ 7,882
<u>Telco Tax Revenue Lost</u>				\$ 725	\$ 777	\$ 834	\$ 898	\$ 1,017	\$ 1,094	\$ 1,241	\$ 1,384	\$ 1,485	\$ 1,625	\$ 1,749	
<u>Total Proposed State System Costs</u>	\$21,503	\$23,766	\$25,476	\$20,300	\$23,541	\$26,536	\$29,834	\$33,647	\$37,706	\$42,076	\$46,803	\$51,203	\$56,203	\$61,407	\$67,038

1. Includes, \$26,267,009 for Booz-Allen Configuration, \$9,955,000 for residual CPE not included in original Booz-Allen plan, and investment banker's commission. Bond issue 9% for 10 yrs. Accumulated funds invested with PMIS @ 9%. Total capital payback is \$58,461,000. Capital recovery costs in state agency budgets FY85 thru FY95.
2. General fund appropriation.
3. Telpak service discontinued. FCC tariff applies. FY87 state system operational. Residual telco charges increase 10%/yr.
4. FY84 thru FY86 switch access/intercomm charges are stable, but exchange access, miscellaneous, and CPE and P&A charges increase 10%/yr. FY87 state system implemented; thereafter, only residual local charges apply.
5. Costs include rent, support services, salaries for 11 people in FY84 increasing for 38 people in FY87.
6. Includes contract maintenance and spare parts.

Figure 10b

PROJECTED ANNUAL COSTS (in Millions)  
 TELCO OPER. FOR CONTINUED INDEFINITELY  
 CASE NO. 5 (Good-Allen Configuration update, Bonds)

TELCO SYSTEM COST ELEMENTS	84	85	86	87	88	89	90	91	92	93	94	95	96	97
Capital Costs Payback (CPE, Bonds at 9% for 10 yrs.) <sup>7</sup>				\$ 1,256	\$ 1,256	\$ 2,256	\$ 2,256	\$ 2,256	\$ 2,256	\$ 2,256	\$ 3,256	\$ 3,256	\$ 1,751	
<u>Recurring Costs</u>														
<u>Telco Service</u>														
Intercity (KANS-A-R) incr. 10%/yr. <sup>8</sup>	\$ 8,600	\$ 9,460	\$10,407	\$11,447	\$12,592	\$13,851	\$15,236	\$16,760	\$18,436	\$20,280	\$22,308	\$24,539	\$26,993	\$29,692
Local <sup>9</sup>														
Switch Access & I/O (stabl. 3 yrs.)	\$ 2,880	\$ 2,880	\$ 2,880	\$ 3,800	\$ 3,600	\$ 3,600	\$ 4,500	\$ 4,500	\$ 4,500	\$ 5,825	\$ 5,825	\$ 5,825	\$ 7,031	\$ 7,031
Exchange Access (incr. 10%/yr.)	\$ 1,440	\$ 1,584	\$ 1,742	\$ 1,916	\$ 2,108	\$ 2,319	\$ 2,551	\$ 2,806	\$ 3,087	\$ 3,396	\$ 3,736	\$ 4,110	\$ 4,523	\$ 4,973
Misc. (incr. 10%/yr.)	\$ 3,229	\$ 3,552	\$ 3,907	\$ 4,298	\$ 4,728	\$ 5,201	\$ 5,721	\$ 6,293	\$ 6,922	\$ 7,614	\$ 8,375	\$ 9,213	\$10,134	\$11,147
CPE & PBXs (incr. 10%/yr.)	\$ 4,856	\$ 4,722	\$ 5,271											
<u>Total Telco Service Costs</u>	\$20,905	\$22,268	\$24,207	\$27,261	\$28,028	\$30,171	\$328,908	\$30,959	\$32,945	\$36,915	\$40,044	\$43,187	\$46,879	\$50,043
<u>State Costs</u>														
Support & Overhead (incr. 10%/yr.) <sup>10</sup>	\$ 378	\$ 416	\$ 457	\$ 503	\$ 553	\$ 609	\$ 670	\$ 737	\$ 810	\$ 891	\$ 980	\$ 1,078	\$ 1,186	\$ 1,300
Contract S & M (incr. 10%/yr.) <sup>11</sup>				\$ 2,598	\$ 2,858	\$ 3,141	\$ 3,458	\$ 3,804	\$ 4,184	\$ 4,602	\$ 5,062	\$ 5,568	\$ 6,123	\$ 6,733
<u>Total State Costs</u>	\$ 378	\$ 416	\$ 457	\$ 2,601	\$ 3,411	\$ 3,750	\$ 4,128	\$ 4,591	\$ 4,994	\$ 5,493	\$ 6,042	\$ 6,648	\$ 7,311	\$ 8,033
<u>Total Annual Costs Telco System</u>	\$20,883	\$22,684	\$24,664	\$29,862	\$27,665	\$30,980	\$34,392	\$37,156	\$40,195	\$44,664	\$49,342	\$53,889	\$57,791	\$60,883

7. \$13,675,000 for capital cost payback plus \$279,000 investment bankers' commission to purchase CPE. Bonds issued at 9% for 10 years. Making 9% investment thru PMIB total capital payback is \$22,055,000. Capital costs included in budgeted figures FY87 thru FY96.
8. FY84 Telco service discontinued. FOD tariff applies. Telco charges increase 10%/yr.
9. Switch access and intercomm charges remain stable until beginning of each successive three year period; then they increase 25%. Exchange access and miscellaneous charges increase 10%/yr. FY84 thru FY86 CPE and PBX charges increase 10%/yr., but are discontinued in FY87 when state purchases its own CPE.
10. Costs based on current budget.
11. Includes contract maintenance and spare parts.

RECAPITULATION--PROJECTED ANNUAL COSTS (\$ Millions)  
 COMBINED STATE AND TELCO SERVICE SYSTEMS VS CONTINUED TELCO SERVICE O.U.I.Y. INDEFINITELY  
 CASE NO. 6 (Boos-Allen Configuration Update, Lease/Purchase)

SUMMARY	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
Annual Budget Telco System		\$20,883	\$22,584	\$24,664	\$26,716	\$28,793	\$31,078	\$34,490	\$37,254	\$40,293	\$44,762	\$48,440	\$52,487	\$58,384	\$60,006	\$66,271	\$73,983
Annual Budget State System		\$21,583	\$22,874	\$25,080	\$21,632	\$23,173	\$24,870	\$27,216	\$29,179	\$31,430	\$34,408	\$37,140	\$40,146	\$44,059	\$43,038	\$47,038	\$52,162
Cost Avoidance due State System		\$ (700)	\$ (190)	\$ (416)	\$ (5,084)	\$ 5,620	\$ 6,208	\$ 7,274	\$ 8,075	\$ 8,855	\$10,354	\$11,300	\$12,341	\$14,285	\$17,349	\$19,230	\$21,761
Cost Avoidance, Cumulative		\$ (700)	\$ (890)	\$ (1,306)	\$ (3,778)	\$ 9,398	\$15,606	\$22,880	\$30,955	\$39,810	\$50,164	\$61,464	\$73,605	\$86,890	\$105,938	\$125,171	\$145,932

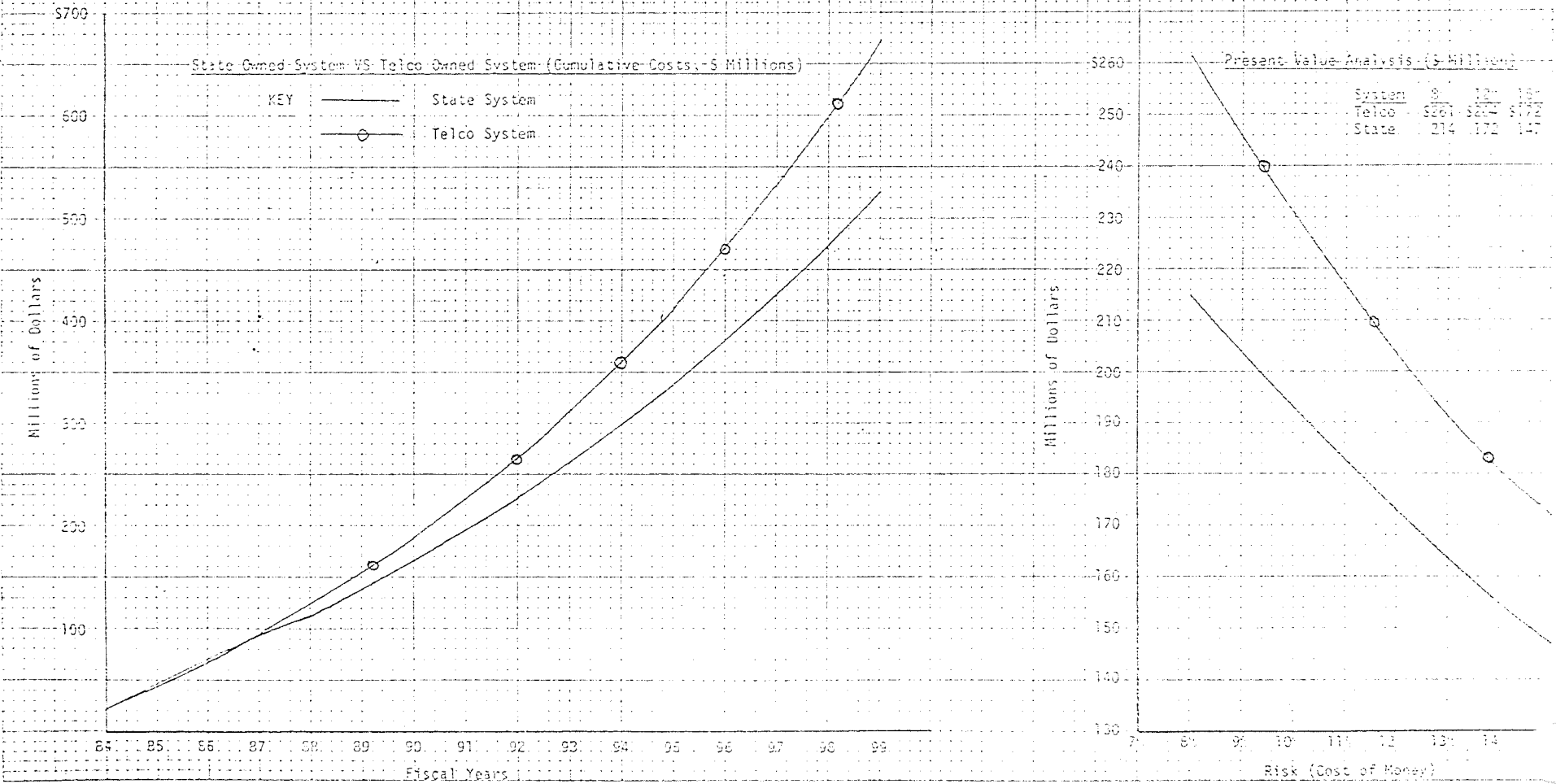


Figure 11a

PROJECTED ANNUAL COSTS (\$ Millions)  
 COMBINED STATE AND TELCO SYSTEMS  
 CASE NO. 6 (Booz-Allen Configuration Update, Lease/Purchase)

STATE SYSTEM COST ELEMENTS	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97
<u>Capital Cost Payback</u> (Lease/Purchase, 12% for 10 yrs.) <sup>1</sup>					\$ 4,658	\$ 4,658	\$ 4,658	\$ 4,658	\$ 4,658	\$ 4,658	\$ 4,658	\$ 4,658	\$ 4,658	\$ 4,658	\$ 4,658
Residual CPE					\$ 1,762	\$ 1,762	\$ 1,762	\$ 1,762	\$ 1,762	\$ 1,762	\$ 1,762	\$ 1,762	\$ 1,762	\$ 1,762	\$ 1,762
Total Capital					\$ 6,420	\$ 6,420	\$ 6,420	\$ 6,420	\$ 6,420	\$ 6,420	\$ 6,420	\$ 6,420	\$ 6,420	\$ 6,420	\$ 6,420
<u>System Engineer, Plan &amp; Implement</u> <sup>2</sup>	\$	700													
<u>Recurring Costs</u>															
<u>Telco Service</u>															
Intercity (KANS-A-N) incr. 10%/yr. <sup>3</sup>	\$	8,600	\$ 9,461	\$10,407	\$ 6,434	\$ 7,077	\$ 7,785	\$ 8,564	\$ 9,420	\$10,362	\$11,398	\$12,538	\$13,792	\$15,171	\$16,699
Switch Access & I/C (stbl. 3 yrs.) <sup>4</sup>	\$	2,880	\$ 2,880	\$ 2,880	\$ 1,350	\$ 1,350	\$ 1,350	\$ 1,658	\$ 1,658	\$ 1,658	\$ 2,110	\$ 2,110	\$ 2,110	\$ 2,638	\$ 2,638
Exchange Access (incr. 10%/yr.)	\$	1,440	\$ 1,584	\$ 1,742	\$ 718	\$ 790	\$ 869	\$ 956	\$ 1,052	\$ 1,157	\$ 1,273	\$ 1,400	\$ 1,540	\$ 1,694	\$ 1,863
Misc. (incr. 10%/yr.)	\$	3,229	\$ 3,552	\$ 3,907	\$ 4,709	\$ 5,180	\$ 5,698	\$ 6,268	\$ 6,898	\$ 7,595	\$ 8,344	\$ 9,178	\$10,096	\$11,106	\$12,217
CPE & PDs (incr. 10%/yr.)	\$	4,356	\$ 4,792	\$ 5,271											
Total Telco Service	\$20,505	\$22,269	\$24,307	\$13,271	\$14,397	\$15,702	\$17,478	\$19,088	\$20,792	\$23,728	\$26,728	\$29,938	\$33,788	\$38,407	\$43,407
<u>State Costs</u>															
Supports and Overhead <sup>5</sup>	\$	378	\$ 605	\$ 873	\$ 1,824	\$ 2,036	\$ 2,207	\$ 2,428	\$ 2,671	\$ 2,938	\$ 3,232	\$ 3,555	\$ 3,911	\$ 4,302	\$ 4,732
Contract O & M					\$ 1,214	\$ 1,335	\$ 1,469	\$ 1,616	\$ 1,778	\$ 1,955	\$ 2,152	\$ 2,387	\$ 2,654	\$ 2,951	\$ 3,280
Total State Costs	\$	378	\$ 605	\$ 873	\$ 3,038	\$ 3,371	\$ 3,676	\$ 4,044	\$ 4,449	\$ 4,893	\$ 5,384	\$ 5,942	\$ 6,565	\$ 7,253	\$ 8,012
<u>Telco Tax Revenue Lost</u>					\$ 725	\$ 777	\$ 834	\$ 898	\$ 1,017	\$ 1,094	\$ 1,241	\$ 1,394	\$ 1,485	\$ 1,628	\$ 1,749
<u>Total Proposed State System Costs</u>	\$21,563	\$22,874	\$25,080	\$23,309	\$24,768	\$26,382	\$28,522	\$30,997	\$33,706	\$38,170	\$43,602	\$49,908	\$57,527	\$66,086	\$75,086

1. Includes \$26,267,000 for Booz-Allen Configuration and \$9,955,000 for residual CPE not included in original Booz-Allen plan. Lease/purchase 12%, 10 yrs. Total capital payback costs included in agency annual budgets is \$64,200,000.
2. General fund appropriation.
3. Telpak service discontinued. FCC tariff applies. FY87 state system operational. Residual telco charges increase 10%/yr.
4. FY84 thru FY86 switch access/intercomm charges are stable, but exchange access, miscellaneous, and CPE and PDs charges increase 10%/yr. FY87 state system implemented; thereafter, only residual local charges apply.
5. Costs include rent, support services and salaries for 11 people in FY84 increasing for 33 people in FY87.
6. Includes contract maintenance and spare parts.

Figure 11b

PROJECTED ANNUAL COSTS (\$ Millions)  
 TELCO SERVICE CONTINUED INDEFINITELY  
 CASE NO.6 (Boos-Allen Configuration Update, Lease/Purchase)

TELCO SYSTEM COST ELEMENTS	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97
<u>Capital Cost Payback</u> (CPE, Lease/Purchase, 12% for 10 yrs.) <sup>7</sup>					\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420	
<u>Recurring Costs</u>															
<u>Telco Service</u>															
Intercity (KANS-A-N) incr. 10%/yr. <sup>8</sup>		\$ 8,600	\$ 9,460	\$10,407	\$11,447	\$12,592	\$13,851	\$15,236	\$16,760	\$18,436	\$20,280	\$22,308	\$24,539	\$26,993	\$29,692
Local <sup>9</sup>															
Switch Access & I/C (stbl. 3 yrs.)		\$ 2,880	\$ 2,880	\$ 2,880	\$ 3,600	\$ 3,600	\$ 3,600	\$ 4,500	\$ 4,500	\$ 4,500	\$ 5,625	\$ 5,625	\$ 5,625	\$ 7,031	\$ 7,031
Exchange Access (incr. 10%/yr.)		\$ 1,440	\$ 1,584	\$ 1,742	\$ 1,916	\$ 2,108	\$ 2,319	\$ 2,551	\$ 2,806	\$ 3,087	\$ 3,396	\$ 3,736	\$ 4,110	\$ 4,521	\$ 4,973
Misc. (incr. 10%/yr.)		\$ 3,229	\$ 3,552	\$ 3,907	\$ 4,298	\$ 4,728	\$ 5,201	\$ 5,721	\$ 6,293	\$ 6,922	\$ 7,614	\$ 8,375	\$ 9,213	\$10,134	\$11,147
CPE & PBXs (incr. 10%/yr.)		\$ 4,356	\$ 4,792	\$ 5,271											
<u>Total Telco Service Costs</u>		<u>\$20,505</u>	<u>\$22,268</u>	<u>\$24,207</u>	<u>\$21,261</u>	<u>\$23,028</u>	<u>\$24,971</u>	<u>\$28,008</u>	<u>\$30,359</u>	<u>\$32,945</u>	<u>\$36,915</u>	<u>\$40,044</u>	<u>\$43,487</u>	<u>\$48,679</u>	<u>\$52,843</u>
<u>State Costs</u>															
Support & Overhead (incr. 10%/yr.) <sup>10</sup>		\$ 378	\$ 416	\$ 457	\$ 503	\$ 553	\$ 609	\$ 670	\$ 737	\$ 810	\$ 891	\$ 980	\$ 1,078	\$ 1,186	\$ 1,305
Contract O & M (incr. 10%/yr.) <sup>11</sup>					\$ 2,598	\$ 2,858	\$ 3,144	\$ 3,458	\$ 3,804	\$ 4,184	\$ 4,602	\$ 5,062	\$ 5,568	\$ 6,125	\$ 6,738
<u>Total State Costs</u>		<u>\$ 378</u>	<u>\$ 416</u>	<u>\$ 457</u>	<u>\$ 3,101</u>	<u>\$ 3,411</u>	<u>\$ 3,753</u>	<u>\$ 4,128</u>	<u>\$ 4,541</u>	<u>\$ 4,994</u>	<u>\$ 5,493</u>	<u>\$ 6,042</u>	<u>\$ 6,646</u>	<u>\$ 7,311</u>	<u>\$ 8,043</u>
<u>Total Annual Costs Telco System</u>		<u>\$20,883</u>	<u>\$22,684</u>	<u>\$24,664</u>	<u>\$26,782</u>	<u>\$28,859</u>	<u>\$32,144</u>	<u>\$34,556</u>	<u>\$37,320</u>	<u>\$40,359</u>	<u>\$44,828</u>	<u>\$48,506</u>	<u>\$52,553</u>	<u>\$58,400</u>	<u>\$60,586</u>

7. \$13,675,000 capital payback, Lease/Purchase, plus interest at 12% for 10 yrs.
8. FY84 Telpak service discontinued. FCC tariff applies. Telco charges increase 10%/yr.
9. Switch access and intercomm charges remain stable until beginning of each successive three year period; then they increase 25%. Exchange access and miscellaneous charges increase 10%/yr. FY84 thru FY86 CPE and PBX charges increase 10%/yr., but are discontinued in FY87 when state purchases its own CPE.
10. Costs based on current budget.
11. Includes contract maintenance and spare parts.

Figure 11c



Examples of the results of "Cost Avoidance" analyses are as follows:

For the initial increment of the system (K.C. - Topeka - Wich. only)

CASE #	Annual Cost Avoidance (000)			Cum Cost Avoidance (000)
	FY 87	FY 90	FY 96	FY 96
1. (Worst) <sup>a</sup>	\$ 873	\$1,911	\$ 3,913	\$ 20,112
2. (Best)	5,346	8,757	20,449	113,542
3. (Probable)	3,652	5,507	10,066	62,600
4. (Probable) <sup>b</sup>	5,280	5,135	9,254	66,826

a. Cases 1, 2, and 3 use lease/purchase; paid off in FY 95.

b. Case 4 uses bond issue; paid off in FY 95.

For the full system - Booz-Allen configuration

CASE #	Annual Cost Avoidance (000)			Cum Cost Avoidance (000)
	FY 87	FY 90	FY 96	FY 96
5. <sup>c</sup>	\$5,318	\$5,508	\$18,340	\$ 78,704
6. <sup>d</sup>	3,388	5,578	12,579	72,120

c. Case 5, probable situation; with lease/purchase paid off in FY 95.

d. Case 6, probable situation; with lease/purchase paid off in FY 95.

Discounted Cash Flow Present Value analyses show similar favorable results.

#### IMPLEMENTATION.

Implementation will require an appropriation of \$450,000 for FY 84 in order to hire a consulting engineering firm to perform detail engineering, specifications preparation, writing of RFQ's, and other pre-procurement tasks. Contracts can be let in late FY 84, and awarded in early FY 85. Cutover can occur in late FY 86 or FY 87.

RECOMMENDATION.

It is recommended that the initial phases of this plan be approved for acquisition by lease/purchase. (Case #3 above). This is the most convenient and flexible procurement methodology and requires no further legislative action.

It is further recommended that \$450,000 be made available in the Department of Administration budget in FY 84 to permit performance of detail engineering and other pre-procurement tasks required.

ADDENDUM

VOLUME II

STATE OF KANSAS  
TELECOMMUNICATIONS SYSTEM PLAN  
(Updated January 1983)

This addendum incorporates all of the equipment and service facilities in the plans discussed in the preceding section and identifies specifically total state usage or all of the items which will need to be replaced in the near future due to deregulation and divestiture.

The annual charges for local telephone service which includes rental of all the above equipment was \$9,000,000 in FY 82.

The capital replacement cost of all the CPE, to include replacement of Centrex service with PBX's, replacement of existing obsolete or obsolescent PBX's, isolated individual multibutton key systems and individual telephones on business main lines is estimated at \$33,018,000. A list is appended as Figure 12.

Since a state system would be incomplete and great advantages would not be realized without an interconnecting transmission facility, that network is also included in Figure 12 at a cost of \$12,467,000.

Thus, the total involvement of the state in telecommunications equipment and facilities over the new few years will be on the order of \$45,500,000.

If all this equipment were to be replaced starting in FY 87, and this is feasible, the cost avoidance to the state over the succeeding 10 years of operations would be about \$70,000,000 as a conservative estimate. See Figures 13a, b, and c.

TOTAL STATE INVOLVEMENT  
IN TELECOMMUNICATIONS EQUIPMENT & FACILITIES

CPE REPLACEMENT COST

Large Centrex Systems (\$900/line installed)

1. Topeka 7,000 lines + Off Prem. Transmission	\$ 7,052,000
2. KUMC 4,000 lines + Off Prem. Transmission	4,000,000
3. Wichita 2,500 lines + Off Prem. Transmission	2,700,000
4. Kansas University 6,500 lines	5,850,000
5. Kansas State University 6,000 lines	5,400,000
6. Fort Hays State University 2,000 lines	1,800,000
	<u>\$26,802,000</u>

Small PBX's to be Replaced

24 Sys. 5,200 lines (\$900/line)	\$ 4,680,000
(3 Sys. 800 lines have been replaced 1-83)	

Key Systems to be Replaced

133 Sys. 2,660 Sta. (\$550/sta)	\$1,463,000
---------------------------------	-------------

<u>Stations on FB-1 lines</u> 1,100 sta (\$75.00/sta)	\$ 83,000
---	-----------

(Not associated with Key or PBX Sys.)	
	<u>\$33,028,000</u>

TRANSMISSION SYSTEM

Topeka - Emporia - Chanute	\$2,020,000	
Salina - Hays	1,397,000	
Hays - Colby	1,516,000	
Oakley - Garden City	1,282,000	
Salina - Beloit	1,052,000	
	<u>\$7,267,000</u>	
Kansas City - Wichita	<u>\$5,200,000</u>	<u>\$12,467,000</u>
TOTAL INVOLVEMENT		<u>\$45,495,000</u>

No additional funds need be appropriated since acquisition could be either by bond issue or lease purchase and paid for from the annual operating budgets of state agencies without any augmentation for this purpose.

RECAPITULATION--PROJECTED ANNUAL COSTS (\$ Millions)  
 COMBINED STATE AND TELCO SERVICE SYSTEMS VS CONTINUED TELCO SERVICE ONLY, INDEFINITELY  
 CASE NO. 7 (Complete Combined State and Telco System Implemented)

SUMMARY	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99
Annual Budget Telco System		\$20,683	\$22,684	\$24,664	\$26,782	\$28,059	\$32,144	\$34,555	\$37,320	\$40,359	\$44,828	\$48,506	\$52,553	\$58,409	\$60,286	\$66,771	\$73,953
Annual Budget State System		\$21,333	\$24,219	\$29,508	\$27,990	\$25,581	\$27,331	\$29,482	\$31,589	\$33,929	\$36,773	\$39,591	\$40,622	\$39,276	\$43,026	\$47,151	\$52,122
Cost Avoidance due State System		\$ (450)	\$ (1,535)	\$ (4,845)	\$ 2,792	\$ 3,278	\$ 4,813	\$ 5,074	\$ 5,721	\$ 6,430	\$ 8,055	\$ 8,915	\$11,931	\$19,124	\$17,669	\$19,623	\$21,821
Cost Avoidance, Cumulative		\$ (450)	\$ (1,985)	\$ (6,830)	\$ (4,038)	\$ (760)	\$ 4,053	\$ 9,127	\$14,848	\$21,278	\$29,333	\$38,248	\$50,179	\$69,303	\$87,163	\$108,728	\$128,621

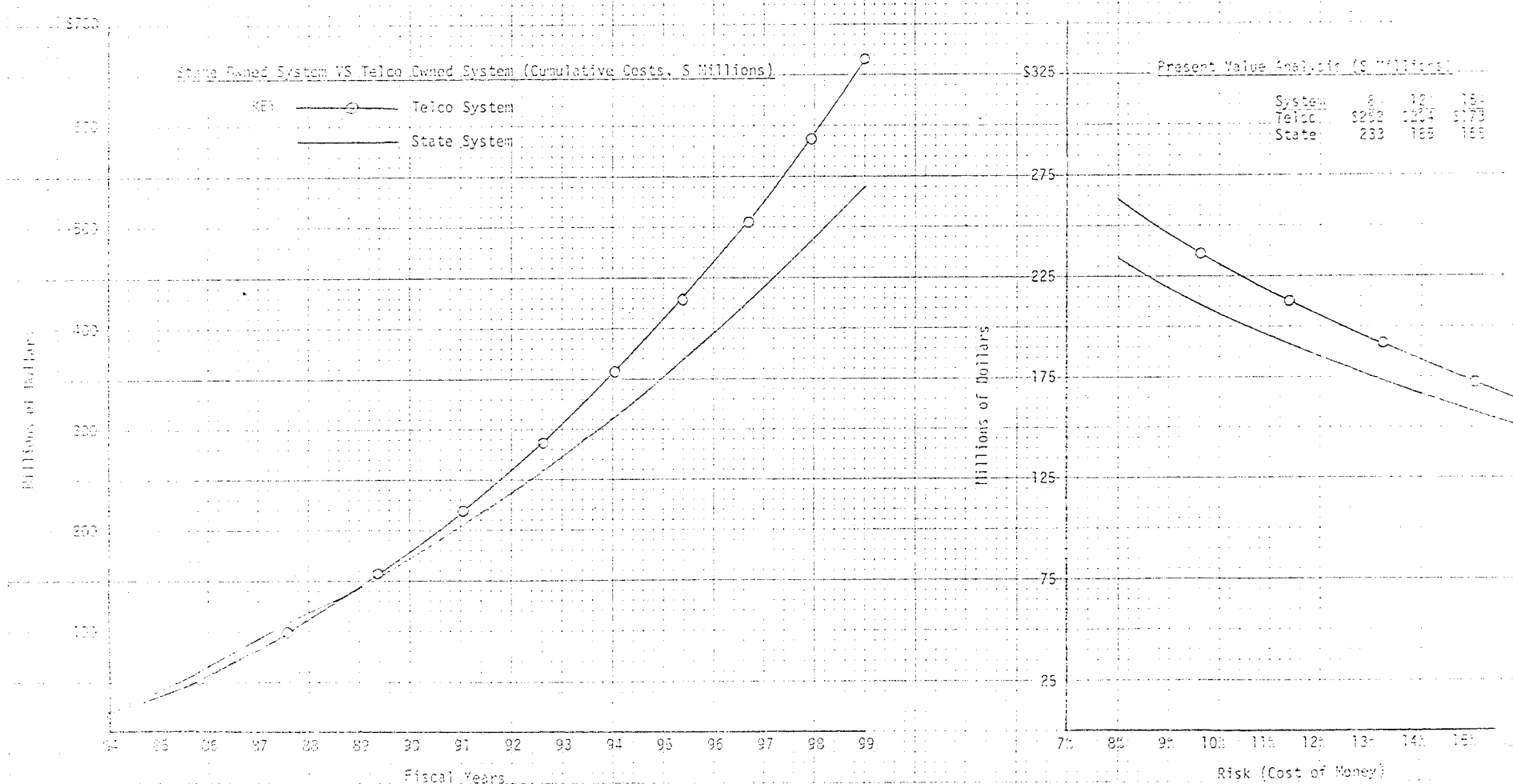


Figure 12a

PROJECTED ANNUAL COSTS (\$ Millions)  
 COMBINED STATE AND TELCO SYSTEMS  
 CASE NO. 7 (Complete Combined State and Telco System Implemented)

STATE SYSTEM COST ELEMENTS	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97
Capital Cost Payback (Bond, 9% for 10 yrs.) <sup>1</sup>															
Transmission System		\$ 282	\$ 1,410	\$ 1,938	\$ 1,938	\$ 1,938	\$ 1,938	\$ 1,938	\$ 1,938	\$ 1,938	\$ 1,938	\$ 1,938	\$ 1,938	\$ 1,380	
CPE		\$ 763	\$ 3,814	\$ 5,241	\$ 5,241	\$ 5,241	\$ 5,241	\$ 5,241	\$ 5,241	\$ 5,241	\$ 5,241	\$ 5,241	\$ 5,241	\$ 3,730	
Total Capital		\$ 1,045	\$ 4,179	\$ 7,179	\$ 7,179	\$ 7,179	\$ 7,179	\$ 7,179	\$ 7,179	\$ 7,179	\$ 7,179	\$ 7,179	\$ 7,179	\$ 5,110	
System Engineer, Plan & Implement <sup>2</sup>	\$	450	300	250											
<u>Recurring Costs</u>															
<u>Telco Service</u>															
Intercity (KANS-A-N) incr. 10%/yr. <sup>3</sup>	\$	8,600	9,461	10,407	6,434	7,077	7,785	8,564	9,420	10,362	11,398	12,538	13,792	15,171	16,689
Local <sup>4</sup>															
Switch Access & I/C (stbl. 3 yrs.)	\$	3,880	2,880	2,880	639	639	639	799	799	799	999	999	999	1,249	1,249
Exchange Access (incr. 10%/yr.)	\$	1,440	1,584	1,742	256	282	310	341	375	413	454	499	549	604	664
Misc. (incr. 10%/yr.)	\$	3,229	3,552	3,907	3,266	3,593	3,592	4,347	4,782	5,260	5,786	6,365	7,002	7,702	8,472
CPE & PBXs (incr. 10%/yr.)	\$	4,356	4,792	5,271											
Total Telco Service	\$	20,505	22,269	24,207	10,595	11,591	12,686	14,051	15,376	16,834	18,637	20,401	22,342	24,725	27,074
<u>State Costs</u>															
Support and Overhead <sup>5</sup>	\$	378	605	873	3,156	3,472	3,819	4,201	4,621	5,083	5,591	6,150	6,765	7,442	8,185
Contract O & M <sup>6</sup>					2,100	2,310	2,541	2,795	3,075	3,383	3,721	4,093	4,502	4,952	5,447
Total State Costs	\$	378	605	873	5,256	5,782	6,360	6,996	7,696	8,466	9,312	10,243	11,267	12,394	13,633
Telco Revenue Lost					960	1,029	1,106	1,256	1,348	1,450	1,645	1,768	1,903	2,156	2,319
Total Proposed State System Costs	\$	21,333	24,219	29,509	23,990	25,581	27,331	29,482	31,599	33,929	36,773	39,591	40,622	39,275	43,026

- Bond issue: \$46,429,000, including \$929,000 for investment banker's commission, at 9% for 10 yrs. Use PMIB investment at 9%/yr. \$33,215,000 for CPE; \$12,285,000 for transmission system. Total capital payback: \$67,766.
- General fund appropriation.
- Telpak service discontinued FY84. FCC tariff applies. FY87 combined State-Telco operational. Residual telco charges increase 10%/yr.
- FY84 thru FY86 switch access/intercomm charges are stable, but exchange access, miscellaneous and CPE & PBX charges increase 10%/yr. FY87 combined State-Telco system implemented; thereafter, only residual local charges apply.
- Costs include rent, support services and salaries for 11 people in FY84 increasing to 38 people in FY87.
- Includes contract maintenance and spare parts.

Figure 12b

PROJECTED ANNUAL COSTS (\$ Millions)  
 TELCO SERVICE CONTINUED INDEFINITELY  
 CASE NO. 7 (Complete Combined State and Telco System Implemented)

TELCO SYSTEM COST ELEMENTS	Fiscal Years	84	85	86	87	88	89	90	91	92	93	94	95	96	97
<u>Capital Cost Payback (CPE, Lease/Purchase, 12% for 10 yrs.)</u> <sup>7</sup>					\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420	\$ 2,420
<u>Recurring Costs</u>															
<u>Telco Service</u>															
Intercity (KANS-A-N) incr. 10%/yr. <sup>8</sup>	\$	8,600	\$ 9,460	\$ 10,407	\$ 11,447	\$ 12,592	\$ 13,851	\$ 15,236	\$ 16,760	\$ 18,436	\$ 20,280	\$ 22,308	\$ 24,539	\$ 26,993	\$ 29,692
Local <sup>9</sup>															
Switch Access & I/C (stbl. 3 yrs.)	\$	2,880	\$ 2,880	\$ 2,880	\$ 3,600	\$ 3,600	\$ 3,600	\$ 4,500	\$ 4,500	\$ 4,500	\$ 5,625	\$ 5,625	\$ 5,625	\$ 7,031	\$ 7,031
Exchange Access (incr. 10%/yr.)	\$	1,440	\$ 1,584	\$ 1,742	\$ 1,916	\$ 2,108	\$ 2,319	\$ 2,551	\$ 2,806	\$ 3,087	\$ 3,396	\$ 3,736	\$ 4,110	\$ 4,521	\$ 4,973
Misc. (incr. 10%/yr.)	\$	3,229	\$ 3,552	\$ 3,907	\$ 4,298	\$ 4,728	\$ 5,201	\$ 5,721	\$ 6,293	\$ 6,922	\$ 7,614	\$ 8,375	\$ 9,213	\$ 10,134	\$ 11,147
CPE & PBXs (incr. 10%/yr.)	\$	4,356	\$ 4,792	\$ 5,271											
<u>Total Telco Service Costs</u>		<u>\$20,505</u>	<u>\$22,268</u>	<u>\$24,207</u>	<u>\$21,261</u>	<u>\$23,028</u>	<u>\$24,971</u>	<u>\$28,008</u>	<u>\$30,359</u>	<u>\$32,945</u>	<u>\$36,915</u>	<u>\$40,044</u>	<u>\$43,487</u>	<u>\$48,679</u>	<u>\$52,643</u>
<u>State Costs</u>															
Support & Overhead (incr. 10%/yr.) <sup>10</sup>	\$	378	\$ 416	\$ 457	\$ 503	\$ 553	\$ 609	\$ 670	\$ 737	\$ 810	\$ 891	\$ 980	\$ 1,078	\$ 1,186	\$ 1,305
Contract O & M (incr. 10%/yr.) <sup>11</sup>					\$ 2,598	\$ 2,858	\$ 3,144	\$ 3,458	\$ 3,804	\$ 4,184	\$ 4,602	\$ 5,062	\$ 5,568	\$ 6,125	\$ 6,738
<u>Total State Costs</u>	\$	<u>378</u>	<u>\$ 416</u>	<u>\$ 457</u>	<u>\$ 3,101</u>	<u>\$ 3,411</u>	<u>\$ 3,753</u>	<u>\$ 4,128</u>	<u>\$ 4,541</u>	<u>\$ 4,994</u>	<u>\$ 5,493</u>	<u>\$ 6,042</u>	<u>\$ 6,646</u>	<u>\$ 7,311</u>	<u>\$ 8,043</u>
<u>Total Annual Costs Telco System</u>		<u>\$20,883</u>	<u>\$22,684</u>	<u>\$24,664</u>	<u>\$26,782</u>	<u>\$28,859</u>	<u>\$32,144</u>	<u>\$34,556</u>	<u>\$37,320</u>	<u>\$40,359</u>	<u>\$44,828</u>	<u>\$48,506</u>	<u>\$52,553</u>	<u>\$58,400</u>	<u>\$60,886</u>

7. \$13,675,000 capital payback, Lease/Purchase, plus interest at 12% for 10 yrs.
8. FY84 Telpak service discontinued. FCC tariff applies. Telco charges increase 10%/yr.
9. Switch access and intercomm charges remain stable until beginning of each successive three year period; then they increase 25%. Exchange access and miscellaneous charges increase 10%/yr. FY84 thru FY86 CPE and PBX charges increase 10%/yr., but are discontinued in FY87 when state purchases its own CPE.
10. Costs based on current budget.
11. Includes contract maintenance and spare parts.

Figure 12c