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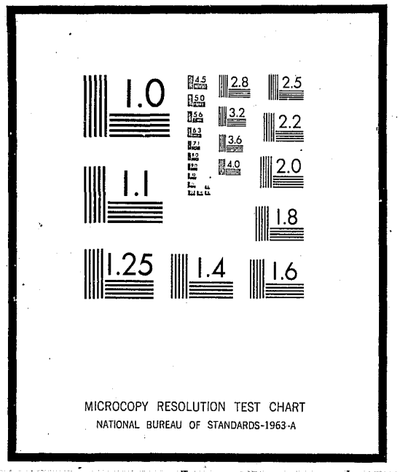
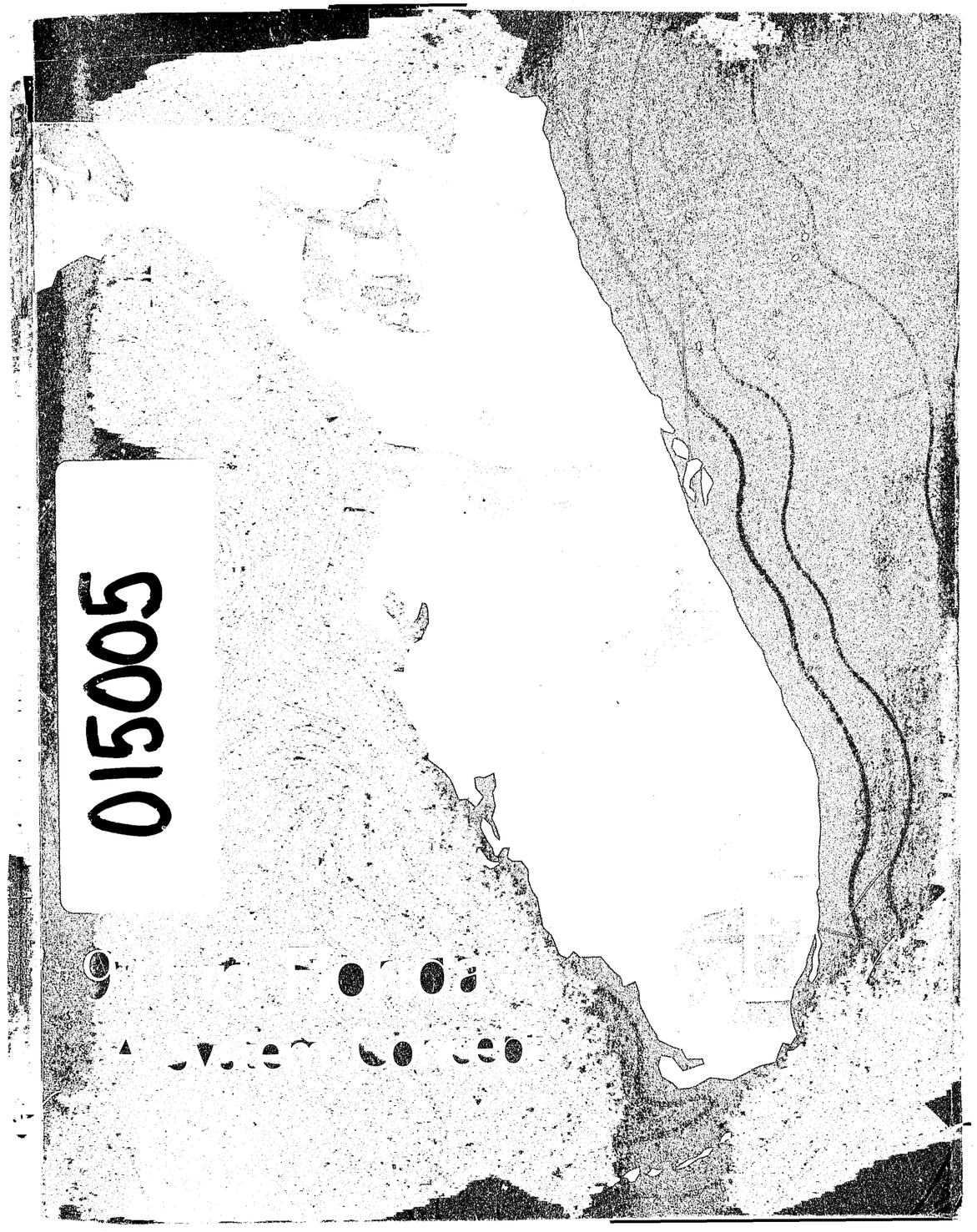


U.S. DEPARTMENT OF JUSTICE
LAW ENFORCEMENT ASSISTANCE ADMINISTRATION
NATIONAL CRIMINAL JUSTICE REFERENCE SERVICE
WASHINGTON, D.C. 20531

Date filmed 9/17/75



Final Report
Detachable Summary

August 1974

Nine-One-One

~~911~~ IN FLORIDA: A SYSTEM CONCEPT

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EXECUTIVE SUMMARY

The Universal Emergency Number, 911, is a simple and effective three-digit telephone number intended to increase the ease and speed of access by the public to emergency service agencies. Since 1968, 911 has been implemented in over 300 communities in the United States. It has been extensively endorsed by the federal government, local and state government associations, and professional emergency service organizations.

This study consists of an analysis of and recommendations for the Universal Emergency Number, 911, system for the entire state of Florida. The Florida Emergency Telephone Act of 1974 requires the development of a statewide plan for the Division of Communications, in cooperation with other state and local agencies. This study is not intended to be the plan; its objective is to provide the analytic and substantive considerations on which the Division of Communications will formulate the plan.

The recommendations include a conceptual design for statewide 911. We have configured our statewide conceptual design from examination, analysis, and comparison of local area 911 systems. The level of detail in the specification of these local systems was not intended to suffice as an engineering design, but rather to provide local decision makers with sufficient knowledge of the feasible configurations from which to select the alternatives that merit detailed engineering design.

We present an analysis of the probable effects of statewide 911 in Florida, a summary of national experience with 911 to date, the methodology and results of the conceptual design process, the recommended statewide 911 system concept and alternatives, recommendations for 911 finance and local organization, and a three-year implementation plan.

Analysis of the Effects of Statewide 911 in Florida

The purpose of 911 is to increase the ease and speed of access to emergency service agencies by the public.

The main benefit of 911 to the public will be the reduction in total response time--that time between the decision by an individual to call for emergency service and delivery to him of the proper service. This total response time has two components: the individual's response time, measured from the time he decides to call for help to the time he contacts the proper agency; and the agency's response time, measured from the time the agency receives the call to the time it delivers the requested service.

911 will not reduce agency response time; in fact, in some cases it may lengthen it slightly because of the need for call transfers. 911 will, however, provide a dramatic improvement in individual response times. Survey data obtained in Orange County, Florida, in connection with this Florida 911 effort, and previous data collected by SRI in Santa Clara County, California, indicate the reductions in individual response times of 1.5 to 4 minutes are possible if 911 is available rather than the present system of 7-digit agency numbers.

Reductions in total response time of this magnitude will help law enforcement agencies improve their arrest rates, clearance rates, and recoveries of stolen property. Emergency medical agencies will be able to save more lives than previously. Using conservative assumptions on 911-related response time reductions, we have made an analysis that shows, for Florida, that the savings in costs of fire losses due to 911 improvement in response time will be greater than the cost of 911. In other words, the dollars saved in reduced fire insurance premiums will more than pay for the costs of 911. The economic benefits from 911 in law enforcement and emergency medical services, although no doubt considerable, do not have to be evaluated quantitatively to prove the desirability of 911.

The costs of 911 will be borne by the public in two ways. As ratepayers, the public will eventually pay increased telephone rates to provide the additional $6.7 million we estimate that Florida telephone companies will require to make central office modifications; as taxpayers, they will pay for the increased personnel and telephone facilities that will be required by emergency service agencies for both initial and recurring costs (the latter will be between $4 million and $6 million annually). On the basis of our analysis, the public benefits will greatly exceed the public costs.

Local Agency 911 Problems in Florida

The fragmentation of both telephone companies and emergency service agencies in Florida makes local planning and cooperative efforts for 911 an intricate process. Twenty telephone companies, with 404 central offices, serve the state. The operating areas of these companies and the territory served by each central office do not usually coincide with county or municipal boundaries. About 900 law enforcement and fire protection agencies are generally responsive to the particular public they serve. These agencies, and emergency medical services as well, have response boundaries that are often not coincident with each other, and furthermore, are not oriented in most cases to the particular intra- and intergovernmental problems of 911 implementation.

State of Florida 911 Policy

To offset this fragmentation and to create a cooperative climate for statewide 911 in Florida, we believe that the state must carefully balance the public needs for 911 and the financial and organizational limitations of local governments. The major instruments of the state in this role seem to us to be: technical assistance, consensus building

among emergency service agencies, telephone companies, and local governments; and financial incentives in the form of state subvention of 911 recurring costs to encourage cooperation among agencies.

National Experience with 911

The applicability of national experience with 911 is limited by the particular way in which 911 has been implemented over the last six years. We have found that most 911 systems in operation (or being planned) are (or will be) the result of what we characterize as "pocket" implementation. Lacking any clear mandates or requirements from states or the federal government, 911 has been implemented in "pockets" where cooperative efforts among emergency service agencies in the same local government (or, less frequently, among local governments) have been achieved. The major impetus to 911 in these communities has usually been the courage and persistence of elected officials.

In most communities that have implemented 911, we have found that the call volume from the public has not increased enough to require increased operating personnel. Increased telephone and personnel costs are usually small, but in any case they bear little relationship to 911 system size or population served. 911 is often coupled with other improvements in public safety communications so that it is difficult to attribute the costs of 911 as such.

We found that emergency service agency officials who have implemented 911 identify more with the citizen's needs than with the agency's needs. We believe that this pattern will be repeated in Florida and that a result of 911 will be closer identification with the citizen's problems by emergency service officials.

We found that there is a positive correlation between implementation time and population size. The average implementation time for 911, measured from the beginning of local planning to operational status, is about

21 months; past national experience shows that the minimum time is about 3 months and the maximum time is about 4 years.

State policy guidance and direct technical assistance to local governments for 911 have been minimal to date, although many states are now considering 911-related legislation. Besides Florida, which has the strongest law to date, California is the only state to mandate 911 service. New York State, through its Public Service Commission, has established some specific 911 policies for telephone companies.

Selective Routing

Nationwide, the most important ongoing research on 911 is a pilot project in Alameda County, California, on selective routing. Selective routing is a telephone company-provided service that automatically routes the 911 call from the citizen to the proper jurisdiction, thereby eliminating the problem of overlap between telephone and law enforcement boundaries. However, selective routing does not eliminate the need for operational cooperation between law enforcement, fire, and emergency medical agencies within the same jurisdiction.

Applicability of selective routing for Florida is limited by its relatively high recurring costs compared with those of basic 911. Selective routing costs currently range between $0.74 and $0.90 per telephone subscriber annually, although we would expect some decrease in the future.

Considering both the particular advantages and the regulatory problems associated with selective routing, we recommend that the State of Florida should not structure its statewide 911 plan around selective routing. We further recommend that the following policy on selective routing be taken by the state:

(1) Through its Division of Communications, make information on the costs and benefits of selective routing available to local governments and telephone companies as national experience with selective routing is acquired.

(2) Through the Florida Public Service Commission, encourage telephone companies to set proposed selective routing tariffs for the guidance of state and local governments in Florida.

(3) Through the Public Service Commission, require that the telephone companies be fully compensated for the cost of selective routing. (In other words, selective routing should not be cross-subsidized by the general public.)

(4) Permit subvented funds for basic 911 to local governments to be used, if desired, for selective routing. However, under no conditions should extra funds be made available in particular areas of the state for selective routing in excess of the fixed schedule adopted for basic 911.

(5) Request the Attorney General to conduct further study to determine the accountability of the telephone companies for misdirected calls and the issue of privacy of unlisted telephone numbers in selective routing applications.

Conceptual Design of Local 911 Systems

To create our conceptual designs of local area 911 systems (which in turn form the design basis of statewide system alternatives), first we considered the various operational methods of 911; then we formulated a 911 system design and cost model; next we established 911 performance requirements; and, last, we configured local 911 systems.

Recommended Operational Methods of 911

Four basic 911 operational methods are shown in Figure S-1. In practice, most 911 systems are designed to use more than one of these methods. Table S-1 shows a comparison of the typical applicability, advantages, and disadvantages of each method.

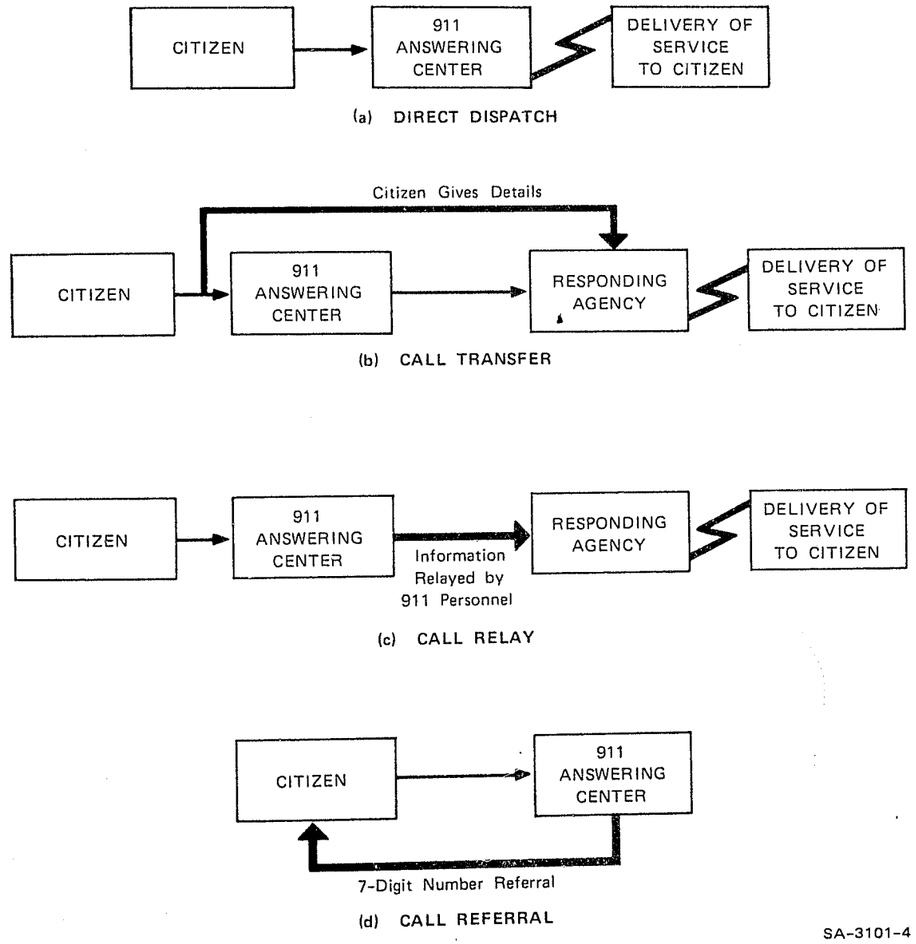


FIGURE S-1 911 OPERATIONAL METHODS

Table S-1

COMPARISON OF 911 OPERATIONAL METHODS

Method	Typical Applicability	Advantages	Disadvantages
Direct dispatch	Core-city law enforcement	Fast response time	Requires closest interagency cooperation to implement
Call transfer	Core-city fire; small-city and sheriff law enforcement and fire	Minimum need for interagency cooperation	Increases response time to some agencies; more frustrating to citizen
Call relay	Cooperative public safety communications systems	Fast response time while preserving dispatch autonomy	Requires explicit call-answering policies to be established
Call referral	Discouragement of nonemergency calls to 911	Prevention of 911 overload by nonemergency calls	Requires citizen to redial 7-digit number

We have designated direct dispatch and call referral for each local area 911 system, and have specified that the 911 answering center location be in the sheriff's dispatch location or in the law enforcement agency receiving the largest number of calls. This is consistent with the State Law Enforcement Communications Plan.

Each local 911 answering center has call transfer or call relay capability to emergency service agencies not dispatched at the 911 center location. For urban areas of the state, we recommend call relay when computer-assisted dispatch is implemented to take advantage of scale economies in planning and implementing new computer-assisted dispatch

centers. Where computer-assisted dispatch is not planned (or until it is implemented), we recommend call transfer.

911 System Design and Cost Model

Traffic Estimates

Figure S-2 shows the 911 system design and cost model inputs and outputs. We used a daily law enforcement call volume of 1.5 calls per 1000 population, based on both national experience and the State Law Enforcement Communications Plan, except in designated high crime areas where we used 2 calls per 1000 population. On the basis of national experience, we assumed that law enforcement agencies would receive 85 percent of all calls, that emergency medical services would receive 1 call per 10,000 population per day, and that fire departments would receive the remainder of 911 calls. Emergency service experience, both nationally and in Florida, provided us with an assumed average call length of 1 minute.

Performance Requirements

The performance requirements we specified for the model were an operator grade of service such that 90 percent of the callers would not have to wait more than 10 seconds (about 2 rings) during the busiest hour, and a telephone grade of service such that a caller will encounter a busy signal no more than 1 percent of the time during the busiest hour (a blocking probability of P01).

Since there are no comprehensive data on fire dispatch locations in Florida, we estimated these from the results of a survey made in 17 counties to determine telephone mileage between dispatch and answering centers.

The system design model provided the number of busy-hour operators required. From this number we computed the total number of operators and

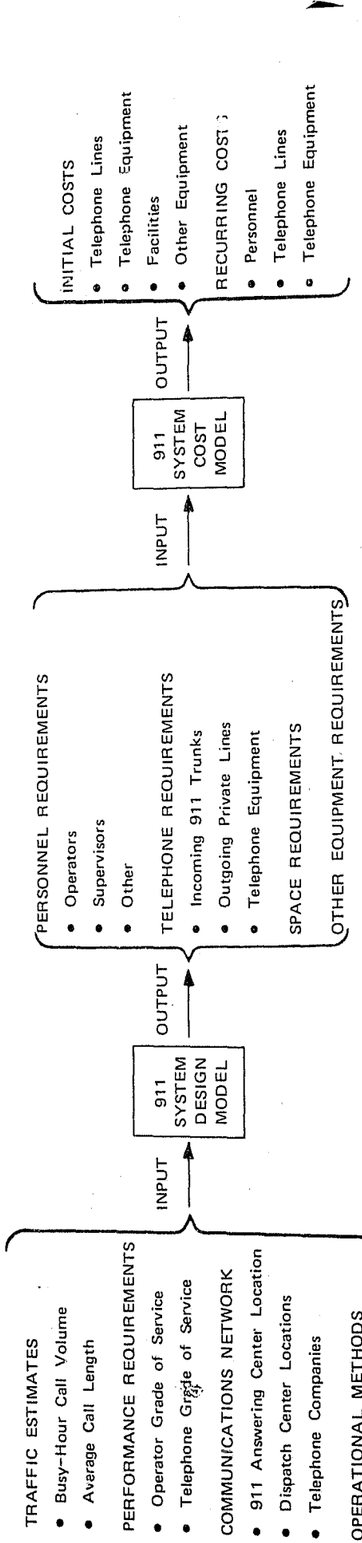


FIGURE S-2 INPUTS AND OUTPUTS FOR 911 SYSTEM DESIGN AND COST MODELS

supervisors. From the call volume, we determined the number of incoming 911 trunks from telephone company central offices to 911 answering centers and the number of outgoing lines from 911 answering centers to dispatch locations based on the direct dispatch-call transfer method of operation. For each 911 center we specified telephone requirements (based on the estimated call volume), space requirements, and equipment requirements.

Given the personnel, telephone, space, and equipment requirements, we calculated itemized initial and recurring costs for each local area 911 system. Initial costs include costs charged as one-time items by the telephone companies, the additional facilities required for 911, and other capital expenditures. Recurring costs include personnel and monthly telephone line and equipment rental charges. For personnel costs (which constitute typically 85 percent of recurring costs), we based the salaries on average wages currently paid in Florida, taking into consideration that sworn law enforcement and fire personnel and civilian clerks are often used for the same work in a given department. Our estimate of salaries is a good statewide total average but may be more or less than the true cost for some 911 systems. We present these data in a form that allows local officials to substitute their actual personnel salaries.

Local Area 911 System Configuration

Our rationale for the selection of local area 911 systems was based on two requirements: that each local area 911 configuration should function as part of the total statewide system, and that each local area 911 configuration should function individually as a total system.

For local area 911 systems we considered geographic, topographic, and telephone exchange boundaries, as well as population and the State

Law Enforcement Communications Plan. Where feasible, we configured alternatives that included more than one county. In some counties where the Law Enforcement Communications plan specified more than one dispatch center, we configured corresponding partial-county 911 systems. We used 109 local system area configurations in various combinations to provide statewide 911 coverage: 67 single-county, 10 two-county, 4 three-county, 4 four-county, 1 five-county, and 23 partial-county component configurations. Forty-five counties are included in one or more of the multicounty configurations, 7 counties are included in partial-county systems, and for 15 counties only one alternative was configured, that of a single-county system.

Statewide Alternative 911 System Concepts

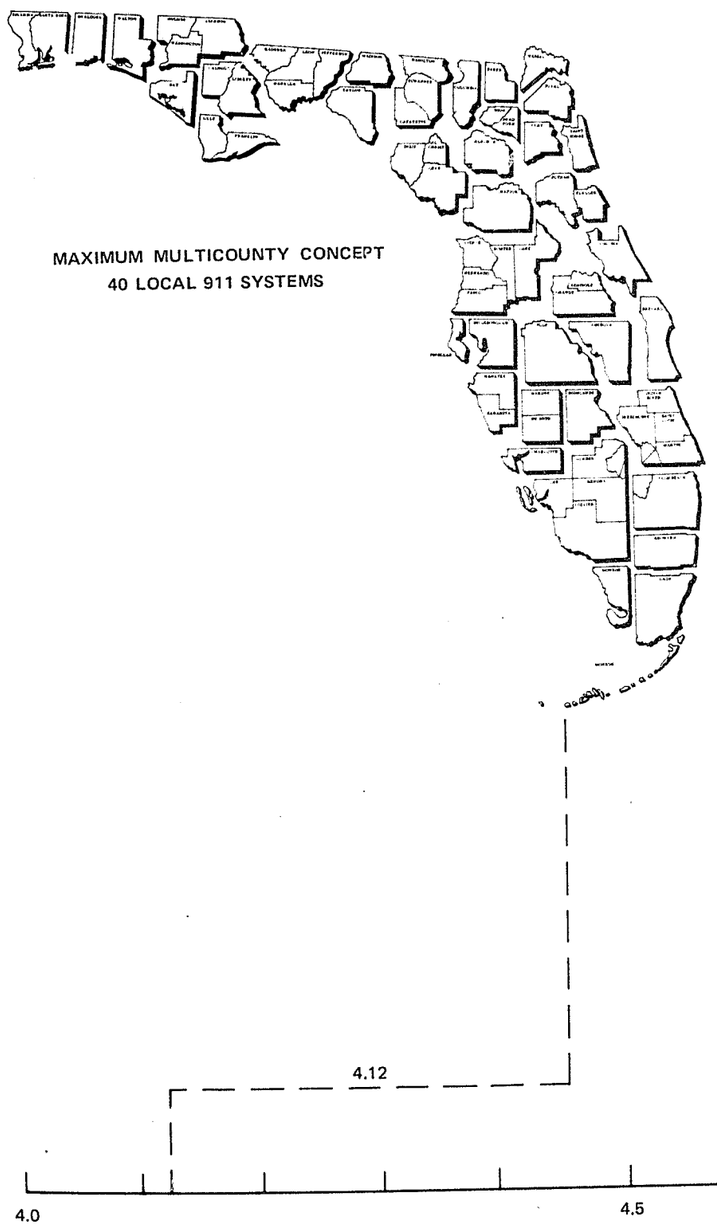
Using the 109 local system area configurations, we selected the four statewide 911 alternatives shown in Table S-2 and Figure S-3. The major differences among the four are the degree of consolidations. The single-county alternative would comprise 67 local area systems, one for each county of Florida; the maximum multicounty alternative would comprise 15 multicounty and 25 partial-county systems; the maximum partial-county alternative would comprise 20 partial- and 60 single-county systems.

The recommended alternative is a balance between achieving scale economy by multicounty systems and providing a 911 system uniquely suited to local needs in higher population areas. Figure S-4 shows, for 109 local system area 911 configuration, the cost per call as a function of call volume. Where the call volume is small (as in the rural counties), much scale economy can be gained by multicounty systems; where the call volume is large (typically in the more urban areas of the state), there is little direct economic benefit to be gained by consolidation. It is more expedient to encourage communities to plan 911 in accordance with their unique requirements. Our recommended alternative incorporates the best of both

Table S-2

COMPARISON OF STATEWIDE 911 ALTERNATIVE COSTS

Statewide Alternative	Number of Local 911 Systems	Telephone System		Operators and Supervisors (monthly)	Recording Equipment (initial)	Overall Total	
		Initial	Monthly			Initial	Monthly
Maximum multicounty	40	$76,254	$68,838	$274,900	$601,000	$677,254	$343,738
Single county	67	78,938	64,739	364,100	749,000	827,938	428,839
Maximum partial county	80	85,991	69,363	413,700	829,000	914,991	483,063
Recommended	51	82,223	70,360	321,100	677,000	759,223	391,460


MAXIMUM MULTICOUNTY CONCEPT
40 LOCAL 911 SYSTEMS
SIN
67
RECOMMENDED CONCEPT
51 LOCAL 911 SYSTEMS
4.12
4.7
4.0
4.5

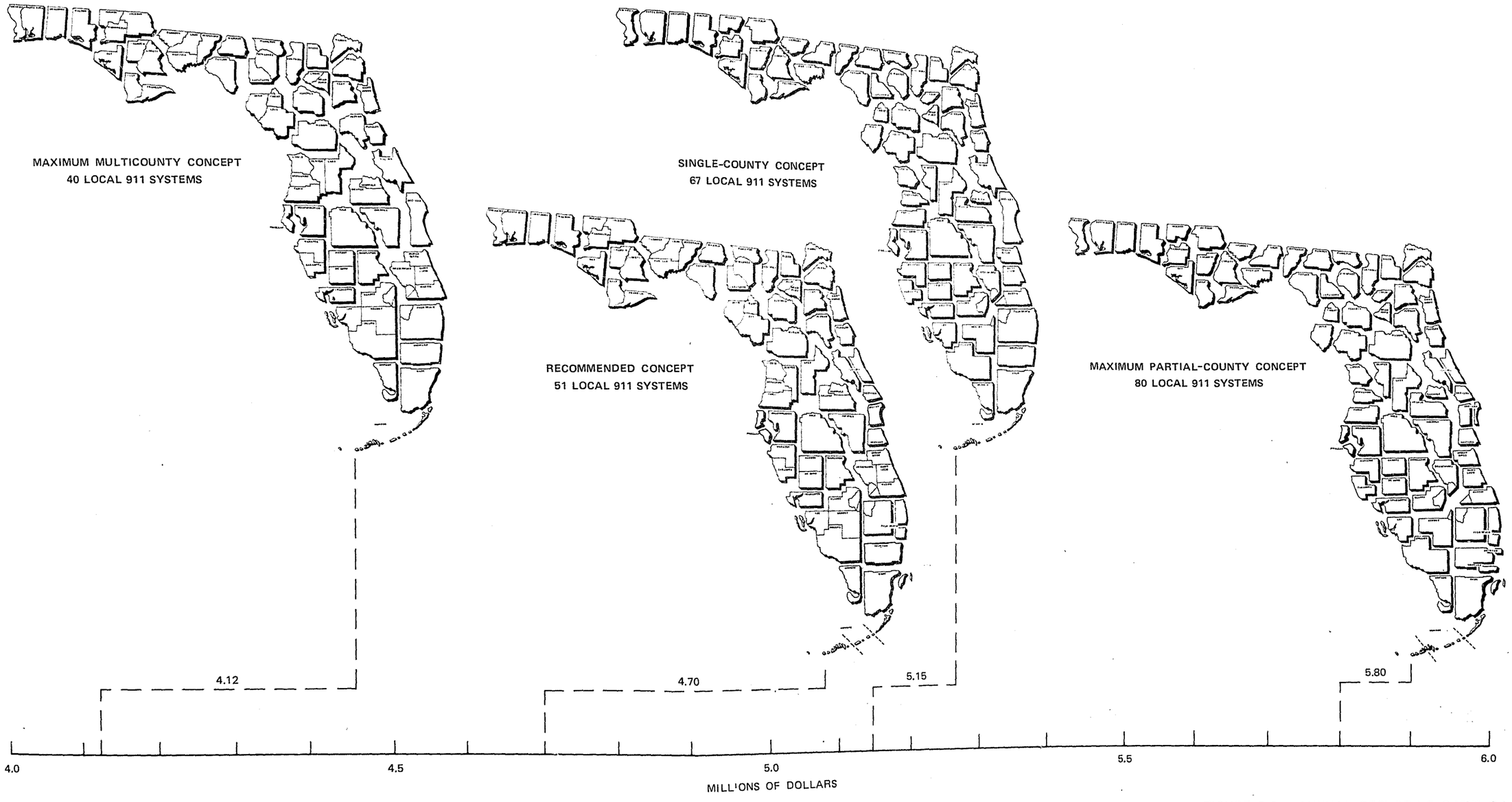


FIGURE S-3 ANNUAL RECURRING COSTS OF STATEWIDE ALTERNATIVE 911 SYSTEM CONCEPTS

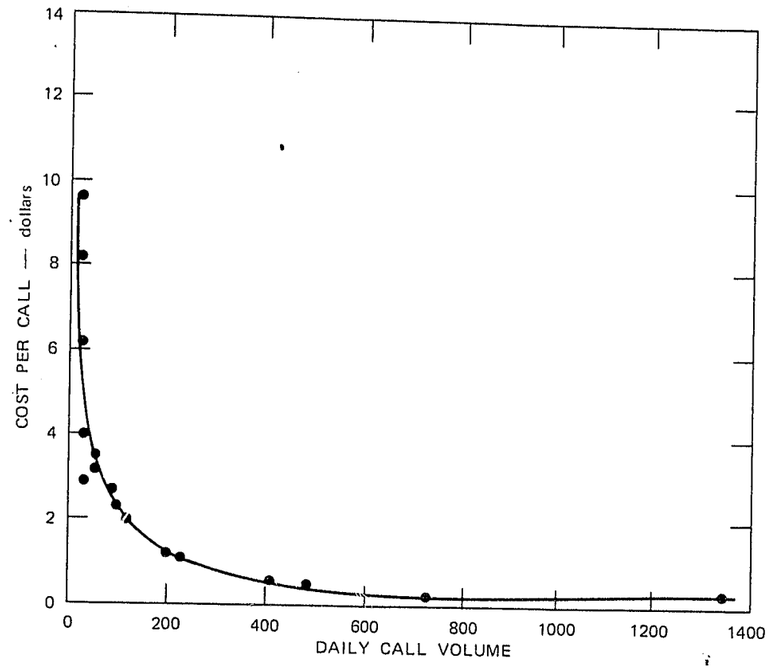
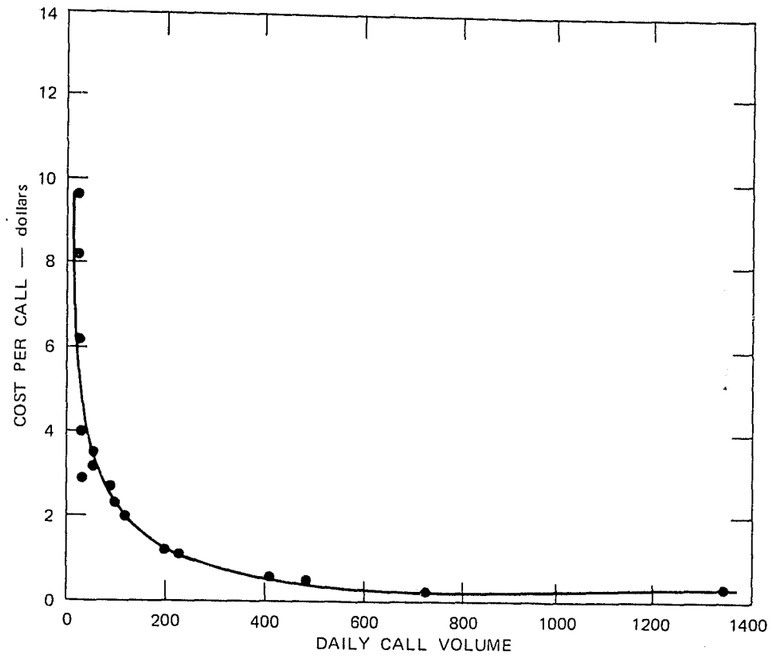


FIGURE S-4 COST PER CALL AS A FUNCTION OF DAILY CALL VOLUME

scale economy and local control, where appropriate, in each area of the state. We explain on a local area basis our specific reasoning for the recommended alternatives.

Finance of 911

We examined the burden for the various local jurisdictions if they were required to finance 911 solely by local means. We determined that such a requirement would create inequities, when considering 911 costs as a fraction of total budget, of public safety expenditures, and of taxable property assessment, plus per capita recurring cost of 911. Such substantial inequities among jurisdictions caused us to recommend state subvention of most of the implementation and recurring costs.



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We recommend a formula type of subvention that would meet three basic objectives:

(1) Compensation for the unequal fiscal positions of the local governments participating in a 911 system by aiding support of 911 recurring costs in proportion to the difficulty of the participating governments to finance their share of 911 with their own revenues.

(2) Encouragement of efficient and economical design and management of a 911 system by always requiring some local participation in financing recurring costs.

(3) Encouragement of regionalization of 911, where appropriate, to provide economies in operation along with better emergency services for the public.

Based on these objectives, we develop a subvention formula that considers population (as a measure of scale size) and assessed valuation per capita (as a measure of ability to pay), and that finances each local area system by rewarding both high population and low assessed valuation per capita.

Table S-3 is an application of this formula subvention. For each county area it shows the yearly 911 cost, the state share of that cost, the local share, and the property tax increase in dollars per $100 of assessed valuation to finance the local share.

We compare various sources of funds to finance the recurrent and initial costs of 911: direct user charge, county property tax, state general revenue, and a telephone excise tax. We recommend that a telephone excise tax be levied at a 1-percent rate on all intrastate Florida telephone service. This levy would replace the equivalent amount of the currently decreasing federal tax. We feel that the excise tax would offer the greatest coincidence between the benefactors and beneficiaries of 911, would be no more regressive than alternative sources, and would not be excessively difficult or expensive to administer.

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Table S-3

SUBVENTION SCHEDULE: STATEWIDE 911 BY COUNTY AREA ALTERNATIVE

911 System Area	Population (1971-72)	Annual 911 Cost	Annual State Share	Annual Local Share	
				Amount	Property Tax Rate, Dollars per $100 Assessed Valuation
Alachua	113,381	$ 86,520	$ 79,494	$ 7,026	$0.002
Baker	8,702	43,518	30,493	13,055	0.036
Bay	80,697	75,612	65,525	10,087	0.003
Bradford	13,600	44,220	34,677	9,543	0.018
Brevard	240,481	105,618	95,432	10,216	0.001
Broward	720,047	254,444	207,853	46,591	0.001
Calhoun	7,712	46,892	31,559	15,333	0.048
Charlotte	34,063	68,568	51,298	17,270	0.007
Citrus	25,476	70,524	52,749	17,775	0.010
Clay	31,993	73,728	64,254	9,474	0.008
Collier	44,402	73,056	44,603	28,453	0.005
Columbia	26,222	71,940	61,815	10,125	0.011
Dade	1,341,526	372,900	301,832	71,068	0.001
Desoto	12,297	41,208	29,484	11,724	0.017
Dixie	5,608	43,272	24,607	18,665	0.064
Duval	572,665	213,336	197,830	15,506	0.001
Escambia	214,017	84,792	76,909	7,883	0.001
Flagler	4,938	41,412	18,227	23,185	0.048
Franklin	7,269	41,340	25,922	18,418	0.035
Gadsden	33,857	71,256	65,585	5,671	0.007
Gilchrist	3,518	46,032	18,967	27,065	0.139
Glades	3,796	46,056	12,092	33,964	0.053
Gulf	10,129	45,864	32,253	13,611	0.026
Hamilton	7,800	44,256	28,986	15,270	0.039
Hardee	16,100	44,076	31,873	12,203	0.011
Hendry	13,538	47,340	30,964	16,376	0.014
Hernando	21,409	68,976	54,971	14,005	0.013
Highlands	34,810	68,028	51,739	16,289	0.006
Hillsborough	531,110	208,320	190,073	18,247	0.001
Holmes	11,600	46,860	37,356	9,504	0.032
Indian River	39,108	67,992	50,403	17,589	0.006
Jackson	34,259	73,518	65,563	7,985	0.007
Jefferson	8,801	45,216	32,166	13,050	0.039
Lafayette	2,924	43,800	12,769	31,031	0.118
Lake	73,462	78,648	64,853	13,795	0.003
Lee	122,751	83,364	69,836	13,528	0.002
Leon	113,725	74,940	65,630	9,310	0.002
Levy	13,570	49,272	35,587	13,685	0.017
Liberty	3,495	45,336	18,974	16,362	0.159
Madison	13,924	44,580	33,898	10,682	0.016
Manatee	106,215	75,108	66,160	8,948	0.002
Marion	75,734	78,864	65,198	13,666	0.003
Martin	32,375	69,372	49,471	19,898	0.007
Monroe	55,031	78,300	60,418	17,882	0.004
Nassau	21,734	72,621	56,891	15,733	0.013
Okaloosa	91,109	74,121	68,996	5,428	0.002
Okeechobee	12,538	46,221	32,970	13,254	0.018
Orange	384,031	185,460	162,947	22,513	0.001
Osceola	31,329	69,636	47,988	21,648	0.007
Palm Beach	389,375	173,448	130,977	42,471	0.001
Pasco	96,821	90,528	83,560	6,968	0.002
Pinellas	590,291	233,196	219,284	13,912	0.001
Polk	218,986	102,864	87,480	15,384	0.001
Putnam	37,746	74,640	63,770	10,870	0.006
St. Johns	34,037	71,604	57,541	14,063	0.007
St. Lucie	54,488	67,296	54,364	12,932	0.004
Santa Rosa	39,472	71,100	59,233	11,867	0.006
Sarasota	134,293	78,288	64,494	13,794	0.002
Seminole	109,689	82,152	74,429	7,723	0.002
Sumpter	16,264	41,412	32,546	8,866	0.012
Suwannee	15,894	45,876	35,955	9,921	0.014
Taylor	13,899	46,980	34,018	12,962	0.016
Union	6,385	45,312	29,943	15,369	0.087
Volusia	184,055	91,068	83,362	10,706	0.001
Wakulla	6,541	46,452	30,064	16,388	0.070
Walton	16,446	51,600	42,616	8,984	0.017
Washington	12,165	46,524	36,677	9,847	0.026

Based on: Population weight = 0.01
Assessed valuation per capita weight = 0.100
Statewide share of total 911 costs = 80%

We recommend that federal law enforcement funds be used to supplement finance of the initial costs of 911, provided these funds are used as part of the ongoing program responsive to the State Law Enforcement Communications Plan. We do not recommend law enforcement funds for 911 recurring costs.

Organizational and Management Techniques

The three basic organizational requirements for 911 are: effectiveness of resource management; maintenance of a high level of service to the public; and accountability to the state, the public safety agencies served, and the public. In Table S-4 we compare four organizational alternatives for the administration of 911: (1) the largest law enforcement agency; (2) a separate communications agency under city or county government; (3) an independent single-purpose special district; and (4) a special district formed under an existing governmental structure. Independent single-purpose special districts are not recommended, and the other alternatives are best applied on the basis of the particular conditions in the areas served.

Suggested management structures are presented for rural single- or multi-county 911 systems, urban multijuristictional 911 systems, and urbanizing county 911 systems.

We recommend that the Division of Communications formulate a program of training for 911 operators, and that it be administered either directly by the Division or by existing public safety organizations under contractual supervision of the Division. We believe that the content and organizational form of training requires further study by the Division of Communications.

Table S-4

COMPARISON OF 911 ORGANIZATIONAL ALTERNATIVES

Organizational Alternative for 911	Responsiveness to Resource Management	Organizational High Service Level	Requirements Accountability	Best Application	Comments
Largest law enforcement agency	High	Yes	High for elected sheriff; variable for others	Rural areas, single or multicounty; urban areas where police are service oriented	Advisory User Board recommended where agency head is not elected
Communications Agency under city or county government	Variable; depends on agency head and organizational reputation	Yes	High	Urban or rapidly growing areas; as an alternative to largest law enforcement agency	Advisory Board recommended
Independent single-purpose special districts	Low	Variable	Low	Multicounty systems	Not recommended
Dependent social district	High	Variable	Variable	Multicounty systems	Could be governed by proposed multi-county planning and service district

Implementation Planning

Table S-5 and Figure S-5 show an implementation plan, based on existing state law and assuming that the legislatively mandated 911 plan will be published by January 1, 1976. The plan indicates which counties should convert to 911 in the years 1976, 1977, and 1978. We further recommend that existing 7-digit areawide emergency numbers be eliminated at the same time as 911 cutover in each area, and that intercept be provided by the telephone company.

We have scheduled implementation for 1976 in county areas that have 911 operational now, have plans underway for 911, or are required by law to have 911 in that year. The largest county areas remaining are scheduled for 1977 since only slight savings in telephone plant modification costs will be achieved by postponement and maximum benefit for the public will be achieved. We have scheduled implementation in the less populated counties for 1978 to ease the financial burden on the smaller telephone companies by providing them with as much time as possible to perform the necessary modifications.

We believe that between now and 1976 the issue of local 911 organization will be of greatest interest and importance to the Division of Communications in preparing the 911 plan required by statute. We urge the Division to meet frequently with local officials to build consensus as rapidly as possible, and we urge the legislature to provide a specific subvention schedule during the 1975 session to convey a sense of seriousness to local officials and to provide them with a clear sense of the financial impact on their intergovernmental agreements.

Table S-5

TENTATIVE PROPOSED IMPLEMENTATION DATES
FOR 911 BY COUNTY AREA IN FLORIDA

1976	1977	1978
Alachua	Dade	Calhoun
Broward	Duval	Citrus
Madison	Holmes	Clay
Okaloosa	Jackson	Escambia
Pinellas	Marion	Franklin
Taylor	Orange	Gulf
Walton	Osceola	Hernando
Gadsden	Seminole	Lake
Jefferson	Washington	Liberty
Leon	Volusia	Palm Beach
Wakulla	Brevard	Pasco
Hillsborough	Collier	Putnam
Indian River	Glades	Santa Rosa
Martin	Hendry	Sumter
Okeechobee	Lee	Bay
St. Lucie	De Soto	Charlotte
Bradford	Hardee	Manatee
Union	Polk	Sarasota
Hamilton	Highland	Monroe
Lafayette	Baker	Dixie
Suwanee	St. Johns	Gilchrist
	Nassau	Levy
	Columbia	
	Flagler	

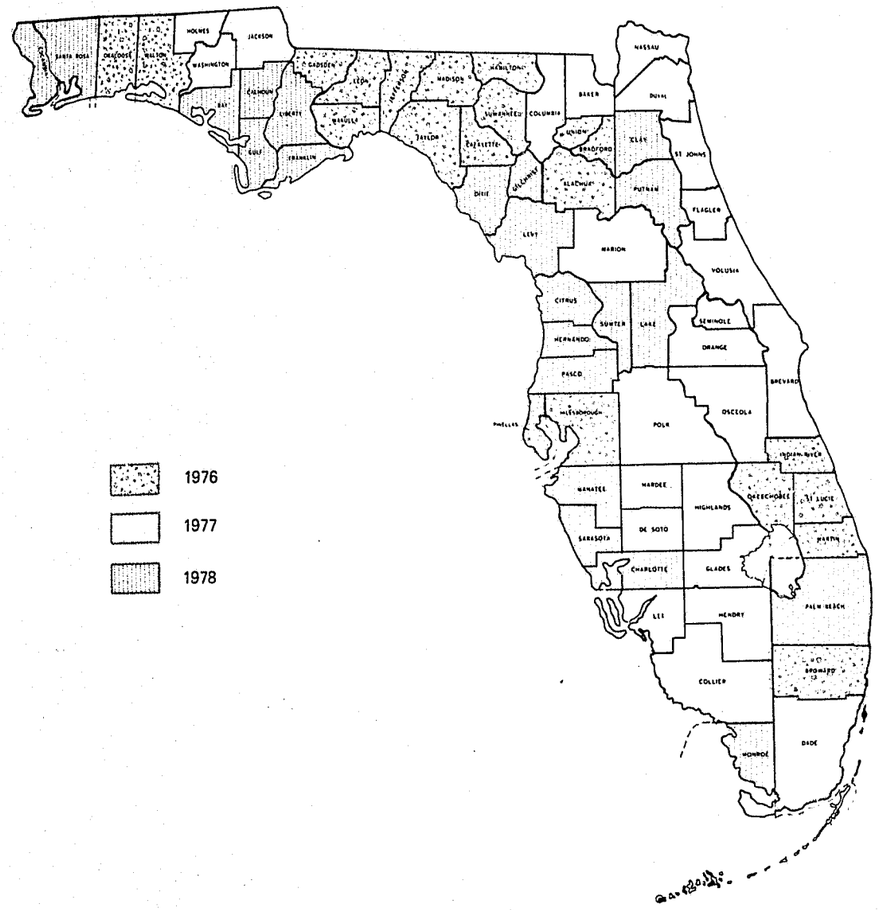

FIGURE S-5 COUNTY AREA 911 IMPLEMENTATION PLAN

Final Report

August 1974

911 IN FLORIDA: A SYSTEM CONCEPT

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ACKNOWLEDGMENTS

The State of Florida is now embarked on what may become the most ambitious and comprehensive effort nationwide in emergency service communications. During the last eight months, SRI project team members have witnessed a steady building of awareness of the meaning and implications of 911 among local and state officials throughout Florida. We were especially impressed by their enthusiasm and critical examination of the many issues that surround 911.

We feel that many officials--law enforcement, fire, and emergency medical administrators; city and county elected officials; city and county administrators; state officials in many departments and divisions; and telephone company representatives--have helped the success of this research beyond that usually encountered in studies of this type. The fact that these helpful people are too numerous to acknowledge individually validates, in our view, the great cooperation and enthusiasm that were manifest throughout the state.

We wish to thank the members of the State-County-Municipal 911 Task Force who gave much of their time and energy to making the study be responsive to the needs of Florida. The names and affiliations of this group are listed in Chapter I. We are grateful to the three subcommittee chairmen who made substantive contributions to our effort: Russ Marchner, who creatively and diligently guided the Finance Subcommittee in formulating the excellent set of recommendations given in Appendix B; Dr. Charles Hall, who contributed much of his time to planning and executing a survey of citizen response that is unique in its importance both to Florida and nationwide; Clayton H. Moore, Jr., who worked closely with telephone company

representatives to provide a comprehensive picture of the impact of 911 on the telephone companies of Florida.

Last, we extend our special thanks to Ronald N. Quiggins, Division of Communications 911 Project Director, for his patience and enthusiasm in guiding us throughout our effort. He and his colleagues at the Division of Communications kept us both objective and skeptical.

I INTRODUCTION

A. Background of the Study

Use of the Universal Emergency Telephone Number, 911, has as its objective increasing the ease and speed of public access to emergency service agencies. To date, 911 has been implemented or is being planned in over 300 communities in the United States. It is endorsed by the federal government and almost every public safety and local government professional organization.

On December 27, 1973, the Florida Division of Communications, Department of General Services, awarded a contract to SRI to perform a system concept study for implementing the Universal Emergency Telephone Number, 911, throughout the State of Florida. The contract called for the concept to be presented in the final report, to be delivered six months after contract award. Since the final report would not be delivered before the expected end of the state legislative session, the Division of Communications included in the contract a requirement for a preliminary report, to be delivered three months after contract award, which would assist state legislators and executive branch officials in formulating 911 policies. This preliminary report, published in March 1974, presented the most important 911 issues and was oriented to the needs of policy formulation at the state level. This final report presents to the Division of Communications firm recommendations for state action and alternative 911 plans for local governments in Florida, with local recommendations as appropriate.

B. State Planning Background

After publication of the preliminary report, the state legislature of Florida passed the Florida Emergency Telephone Act of 1974 (Florida Statutes, Chapter 74-357), a copy of which is given in Appendix A. The intent of this legislation is:

> "... to establish and implement a cohesive statewide emergency telephone number '911' plan which will provide citizens with rapid direct access to public safety agencies by dialing the telephone number '911' with the objecive of reducing the response time to situations requiring law enforcement, fire, medical, rescue and other emergency services."

The legislation directs the State Division of Communications, in cooperation with other state agencies, to be responsible for the implementation and coordination of a statewide 911 plan. After publication of the plan, local agencies will have six months to place a firm order to the telephone utilities and these utilities will have 24 months to install 911.

Two other actions of the state legislature should also be considered in the context of the plan required of the Division of Communications for 911. In 1972 the Florida legislature passed House Bill 3937 (Florida Statute Chapter 287.29), the Law Enforcement Communications Act. In passing this bill the legislature noted clearly that the limited number of radio channels had not been assigned by system engineering on a statewide basis and, further, that the existing radio communications systems operated by local governments in Florida failed to meet needs for rapid and complete interagency communications. The Law Enforcement Communications Act not only required that the Division of Communications formulate a statewide system of law enforcement communications, but further required the development of a telephone system provision for law enforcement agencies on a regional basis throughout the state.

In 1973 the Florida Legislature passed House Bill 205 (Florida Statute Chapter 73.254), which relates to emergency medical telecommunications. In so doing the legislature noted the increasing interest of both the general population and all levels of government in emergency medical services. It noted that the state's emergency medical telecommunications had been fragmented, slow to develop, and established on an arbitrary basis, without regard for system engineering on a statewide basis. The act specifically directed the Division of Communications to develop an integrated regional system of emergency medical telecommunications, and it mandated the coordinated efforts of local agencies with the Division.

On the basis of the recent 911 legislation and the previous legislation on law enforcement and emergency medical telecommunications, we believe that the development of the 911 plan should strive to accelerate the improved effectiveness of public safety communications in Florida through greater cooperative efforts among local governments. The system concept presented in this report attempts to meet this goal, not only through the conceptual designs presented but also through the policies on finance and organization for 911. In any case, the system concept presented in this report is entirely consistent with previous public safety communications plans of the Division of Communications.

The 911 program will thus bind together ongoing functionally related communications systems into a statewide system of public safety communications directly oriented to the public needs. Specifically, we believe that promulgation of 911 by the Division of Communications will accelerate implementation of the State Law Enforcement Communications Plan authorized by the 1972 legislation. By providing a publicly visible and tangible output for communications planning, local governments will be more willing to accept the guidance of the state in public safety communications implementation. At present, the penalty on local governments for not adopting the State Law Enforcement Communications Plan is denial of

federal law enforcement funds and additional radio spectrum. In many cases this penalty has not been sufficient to spur local governments to cooperative efforts. In our view, the visibility of 911 will create a much more favorable motivation to action by local governments.

Passage of the 1973 Emergency Medical Systems Act by Congress, authorizing expenditures of $185 million over the next three years, explicitly required the provision of plans for 911, except as waived by the Secretary of Health, Education, and Welfare (HEW). Unless 911 is planned on a statewide basis, the considerable amount of money that will be available to Florida under this act will be apportioned within the state only to the local communities that have provided 911 systems. This will further fragment the emergency medical communications within Florida. If 911 is not planned statewide, the provision of adequate modern emergency medical service by federal funds will show a pattern of great horizontal inequity, depending on the haphazardness of local institutional processes. Such horizontal inequity would clearly violate the legislative intent of the Florida emergency medical telecommunications act.

C. Objectives of the Study

The request for proposal issued by the Division of Communications in September 1973 required that the study include consideration of all conceivable 911 techniques and that it depict trade-offs and alternatives. The statewide plan to be derived from these alternatives would be based on considerations of cost, degree of sophistication, and response time. As agreed contractually between the Division of Communications and SRI, the study was to provide the following:

- Specification of the technical and operational features of a statewide 911 system based on both national experience with 911 and the unique problems and requirements of local governments and public safety agencies in Florida.

- Specific examination and recommendation of agencies and emergency services to be included in the plan; namely, all law enforcement, fire protection, and emergency medical organizations, as well as other entities such as Poison Control, Suicide Prevention, and the Coast Guard.
- Assessment of the technical and economic impact of 911 on public safety agencies, telephone companies, and local governments; and a timetable for 911 implementation, based on the technical, operational, and financial capabilities of public safety agencies and telephone companies.
- Specific recommendations for each part of the state, in sufficient detail for engineering design work to begin if the recommendations are adopted; estimation of telephone, personnel, facilities, and equipment requirements; derivation of both initial and recurring costs in sufficient detail to enable decisions on recommended alternatives to be made by the state and local governments.
- Specific recommendations for financing the recommended system, including federal funds and state subvention to local governments as found to be appropriate.

D. Process of the Study

In approaching the development of a system concept for statewide 911 for Florida, the SRI project team realized that the success of the effort would depend on a broad base of support from a large number of stakeholders. These stakeholders include various state agencies; law enforcement, fire, and emergency medical agencies, both state and local; and county and municipal elected and administrative officials. The project was structured to allow stakeholders to make contributions during the process of the study, rather than merely being presented with the results after the study was completed. As a vehicle for interchange, SRI proposed and the Division of Communications adopted the organization of a State-County-Municipal Task Force to include representatives of the various stakeholder groups. Affiliations and representations of the Task Force members are listed in Table 1. The Task Force met four times during the study and served as a valuable instrument for two-way interchange

Table 1

MEMBERSHIP OF STATE-COUNTY-MUNICIPAL TASK FORCE*

Name	Affiliation	Florida Representation
Karl R. Adams	House Criminal Justice Committee	House of Representatives
K. C. Alvarez	Ocala Police Department	Police Chiefs Association
Robert Burns	General Telephone Company	Telephone Association
Robert J. Chewning	Orlando Public Safety	Police Chiefs Association
James Nathan (Nat) Cole	Department of Administration	Law Enforcement Science Advisor Program
Rick Dunn	Senate Criminal Justice Committee	Senate
Charles C. Hall	Orange County Emergency Medical Service Council	Medical Association
Paula Hawkins	Florida Public Service Commission	Public Service Commission
W. R. Kaufman	Florida Highway Patrol	Highway Patrol
Thomas Kelly	Volusia County	State Association of County Commissioners
S. J. (Buddy) King	City of Jacksonville	State Fireman's Association
Tommy Knight	State Fire Marshal	State Fire Marshal
Russ Marchner	Dade County League of Cities	League of Cities
J. Rhett McMillan, Jr.	Associated Public Safety Communications Officers	Associated Public Safety Communication Officers
Clayton H. Moore	Florida Public Service Commission	Public Service Commission
Wallace A. Payne	City of Dunedin	League of Cities
Stewart Price	Department of Administration	Help Stop Crime Program
Lynwood Roberts	City of Jacksonville	State Association of County Commissioners
Chuck Robinette	Department of Agriculture and Consumer Services	State Division of Forestry
Jack Skeries	Department of Administration	Bureau of Criminal Justice Planning and Assistance
Luci Swanson	Department of Health and Rehabilitation	Health Planning Council
Jim Tait	Commission on Local Government	Commission on Local Government
Charles Walters	State Department of Community Affairs (Civil Defense)	Division of Emergency Government
Berwin Williams	Florida Sheriffs' Association	Sheriffs' Association
Gene Wright	Boynton Beach Fire Department	State Fire Chiefs Association

*Chairman: Ronald N. Quiggins, 911 Project Director, Florida Division of Communications.

on 911 issues. Additionally, three subcommittees were formed on the local alternatives, finance, and telephone areas of concern. The Advisory Subcommittee organization and objectives are given in Table 2. These subcommittees were quite productive in both achieving their goals to aid our substantive work and stimulating the process of consensus.

We advocate continued existence of the Task Force. During the formulation and implementation of the statewide 911 plan by the Division of Communications, the Task Force will serve as a vehicle for adjusting state and local policies to suit changing situations.

E. Organization of the Report

In organizing this report we have been conscious of two different audiences. On the one hand, we are informing various state officials--in both the legislative and the executive branches--and various elected and appointed governmental officials who are affiliated and directly concerned with the problems of local government. For this audience the issue of 911 is viewed as one of policy, state policy in general and state-local intergovernmental relationships in particular. On the other hand, we address a large audience of law enforcement, fire protection, emergency medical, and other public safety officials whose particular backgrounds and interests are technical and operational. In both general and specific terms they ask: "What does the state want us to do?" This group will be directly responsible for the implementation and operation of 911 throughout Florida. Their interest will be more local than statewide; it will be focused on the specific requirements that pertain to their particular local area.

To present our results to both groups, it is necessary to relate the concerns of one group to the particular orientation of the other. We have organized the report with this intent.

Table 2

ADVISORY SUBCOMMITTEE ORGANIZATION

Subject	Charter	Members
Local Alternatives	Concentrate on the alternatives listed in Chapter V of Preliminary Report with the objective of expanding the listed alternatives to include other viable ones and advising the Project Director as to the listed alternatives which are not worthy of study based upon members local level knowledge.	Charles C. Hall, Chairman K. C. Alvarez R. J. Chewning W. R. Kaufman S. J. King J. R. McMillan, Jr. C. Robinette C. Walters C. E. Wright
Finance	Concentrate on the subvention funding concept given in Chapter IV of the Preliminary Report to determine feasibility. Additionally, other means of funding the 911 implementation should be explored to the extent possible based upon the members experience and expertise. Members are reminded that recommendations given in this subcommittee will not reduce the contractual obligation that SRI has in this area.	Russ Marchner, Chairman T. Kelly W. A. Payne S. Price L. Roberts J. Skeries L. Swanson J. Tait B. Williams
Telephone	Determine where specific problems might occur for the telephone industry to implement 911 with emphasis on schedule and funding aspects. Information supplied by the subcommittee will be utilized to give a more realistic overall implementation schedule for 911.	Clayton H. Moore, Jr., Chairman R. Burns P. Hawkins

In Chapter II we examine the issues of 911 in Florida by exploring and comparing three distinctly different points of view--those of the public, the local officials, and the state policymakers. We consider the benefits of 911 to the public, particularly the reduction in response time that could be attributed to 911, and the corresponding costs to the public as both ratepayers and as taxpayers. As a basis for the issues of 911 from the view of local officials, we discuss, first, the boundary mismatch problem, illustrating it by the example of Dade County; and, next, the changes in the role and operation of public safety agencies that we believe will accompany implementation of statewide 911. Finally, we present 911 as a state policy issue.

In Chapter III we discuss the national experience with 911. We note that such experience is of somewhat-limited direct applicability because 911 has previously been implemented in a "pocket" or happenstance fashion, not statewide. We review and analyze the local experience with 911, derived from various sources of information. Next, we discuss experience in two states: California, where legislation requires local governments to establish 911 systems; and New York, where the state regulatory agency has created a policy that will have far-reaching consequences.

In Chapter IV we describe one design and analysis methodology. We discuss the basic 911 operational methods, describe the models used to design and cost 911 systems, and give the design parameters used in deriving 911 system requirements and total system costs. These parameters include: performance requirements; communications network information; operational methods; and personnel, telephone sizing and equipment, space, and other equipment requirements and costs. We also list the data sources.

In Chapter V we present the conceptual design of alternative local 911 systems. We provide our rationale for selection of the local area 911 configurations. For each local area system we discuss the requirements for telephone lines and equipments, personnel, recording equipment, and facilities. Initial and recurring costs are estimated for each local 911 system.

In Chapter VI we combine the various local area configurations into statewide 911 alternatives. We offer four alternatives: one 911 center for each of the 67 counties; a minimum cost alternative that emphasizes multicounty systems; a maximum cost alternative that emphasizes partial-county systems; and a recommended system that combines what we believe to be the best features of each, based both on the systems analysis and our knowledge of Florida public safety operations.

In Chapter VII we examine alternative methods of financing 911. Various local, state, and federal finance instruments are described. To achieve horizontal tax equity in the various county areas of Florida and best coincidence of benefactors with beneficiaries, we recommend finance of recurring and operational costs by a combination of federal funds and a 1-percent tax on intrastate telephone service to replace the currently repealed federal excise tax.

In Chapter VIII we describe organizational and management requirements and alternative solutions for local 911 systems. These are given as advisory rather than as specific local area recommendations.

In Chapter IX we make specific recommendations and present an implementation plan.

The appendices provide the following backup data:

Appendix A--Florida Emergency Telephone Act of 1974

Appendix B--Report of the Finance Subcommittee 911 Task Force

Appendix C--Effect of Response Time on Fire Losses

Appendix D--Florida Telephone Statistics

Appendix E--A Proposed State-Local Subvention Formula for 911 Costs.

II OVERVIEW OF 911

In this chapter we explore and compare different points of view on 911 to provide a context for the key issues that will be addressed in the report. For our purposes, we identify three distinctly different points of view--those of the public, the local officials, and the state policymakers. There are, of course, other points of view (e.g., those of the telephone industry in Florida and the federal government). Although these other views are of interest, they are tangential to the critical problem of ensuring the successful statewide implementation of 911 in Florida. For this reason we will touch on them only briefly.

The benefits of 911, unlike many controversial public policy issues, are unchallenged by most people. Few question the value of a system that will allow the public more rapid and comprehensive access to the proper emergency services than previous methods. But many people will question the means of achieving a statewide 911 system because the superimposition of 911 on existing emergency communications systems will result in changes and "spillouts." Indeed, structures and responsibilities that have been carefully planned, sustained, and protected within public safety agencies and local governments may have to be revised and redelegated in many cases to provide 911 service to the public.

To clarify some of these issues, we first discuss 911 in functional terms from the point of view of the public as the recipients of emergency services. In this report, then, we use the term "public" to mean the people who benefit directly from more rapid and comprehensive services during emergency situations. Although the changes, if any, in institutional arrangements necessary to provide 911 are clearly public issues--for

example, the degree of regionalization of telephone answering or whether the police, fire, or another agency should handle the calls--we treat these issues from the point of view of local officials who act as representatives of the public.

The second point of view, that of local officials, considers changes in the institutional forms of service delivery that will be necessary for statewide 911. We use the term "local officials" to mean all the individuals who have some policy role in emergency services communications and service delivery: local elected officials of cities and counties; city- and county-appointed managers; and agency heads, both elective and appointive, such as police chiefs, fire chiefs, sheriffs, and communications directors. In any case, local officials have a direct operational and financial responsibility for providing effective 911 service to the public.

The third viewpoint is that of state officials. For 911, this clearly means officials of the State Division of Communications, which has been given the major statutory responsibility for the development and implementation of a statewide 911 plan. It also includes officials in other state organizations such as the Florida Public Service Commission, which is responsible for regulation of the telephone industry of Florida; the Division of Forestry, which has a key functional role in fire protection; the Bureau of Criminal Justice Planning and Assistance and the Division of Health, which are responsible for effective planning and control of federal funds for law enforcement and emergency medical applications; the Office of the Attorney General, which would be responsible for enforcement of the Florida Emergency Telephone Act of 1974; the Office of the Governor, which has particular responsibility for the Help Stop Crime Program; and the legislature, which will appropriate any additional state funds for 911. In this chapter we synthesize the viewpoints of the public and of local and state officials by balancing the need for comprehensive emergency

services against the financial and organizational capabilities and limitations of local governments (and perhaps of telephone companies) to provide emergency services that best serve the public interest.

A. Public Benefits and Costs of 911

1. Benefits

The public will be the benefactor of 911 (the payer of its implementational and operational costs) and its beneficiary (the receiver of the benefits of 911). The chief benefit of 911 for the public is the reduction in response time in emergency situations. We will describe what this response time reduction means by comparing the 911 system with the present system of 7-digit numbers for each emergency service.

a. Response Time of Present Emergency Service Systems

Figure 1 shows, from the point of view of the public (the citizen), the current emergency service system. The citizen in need of emergency service who does not know the proper 7-digit number for the emergency service he thinks he needs must either dial "0" and ask the telephone company operator for that agency or look in the telephone directory and find the number. The emergency service agency dispatches service to the citizen only after it has screened the call to determine the type of problem and its priority with respect to agency policy and available resources.

Many emergency service agencies keep accurate records of their response time in order to manage their resources more effectively for the public benefit. These agencies estimate response time as shown in Figure 1: from the time of contact with them through delivery of service. This time from contact to delivery we call agency response time.

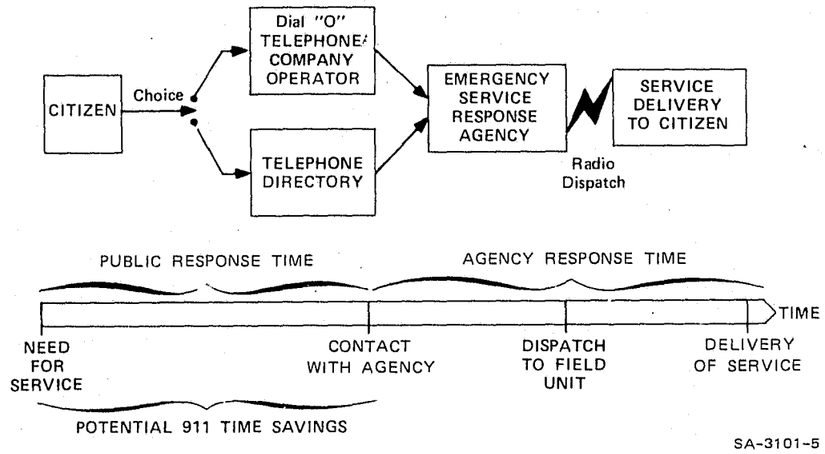


FIGURE 1 CURRENT EMERGENCY SERVICE SYSTEM

Public response time, which has never been measured, is the time from when the citizen in need decides to call to the time when he has contacted the proper agency. The total response time from subjective estimate of need to delivery of service is the sum of the public and agency response time.

The duration of public response time depends on the knowledge of both the citizen and others. If, for example, the citizen lives in a community where a municipal utility provides telephone stickers that give police, fire, and medical emergency numbers, and if these numbers have been posted on the telephone, the time is likely to be short. Or, if the telephone book is near the telephone and the proper emergency numbers for his community have been entered in the space provided on the back of the front cover, the time will also be short. Some citizens even memorize the proper numbers; for them the time will indeed be short.

For the others--those who have not recorded the emergency numbers or memorized them--two choices are available, as shown in Figure 1.

They can dial "0" and ask the telephone company operator for the agency, or they can use the telephone directory, if one is available.

Experience across the nation has shown that dialing the operator has certain disadvantages that will increase in the future. First, as telephone companies consolidate their operations and increasingly automate their equipment, there will be fewer operators and fewer local offices. The fewer operators will first take longer to reach, which increases the ringing and the response times. When finally contacted, the operators, who service people in more communities now than in the past, may not have full knowledge of the particular emergency service institutions in the citizen's area. The smaller number of operators covering a larger area will have less training for emergency situations; their main function will be handling toll calls. The net result is that dialing the operator will be increasingly time consuming and frustrating to the citizen in need of emergency service.

If the telephone directory is available, the citizen then faces the fact that he is not sure which agency provides the needed service. Not all citizens know, for example, that in a particular community the fire department performs rescue and emergency medical services; some think these are provided by the police. This is especially true for many visitors to Florida who base their choice of agencies on their knowledge of how emergencies are handled in their home communities. Even when the citizen feels confident he knows the correct agency, he must look up the number. In most metropolitan areas of Florida, there are literally tens of 7-digit emergency numbers. If the confident citizen has made a mistake and called the wrong agency, he must be directly transferred or, worse, be referred to the correct agency after he has explained the emergency problem to a sympathetic operator in the wrong public safety agency.

Summarizing then, the public response time is variable and may be lengthy. In any case it is not measured by the agency; some

agencies feel (at least implicitly) that it is the public's responsibility to take the necessary steps to make the public response time short.

To estimate the public response time reduction made possible by dialing 911, we have used data from two surveys. In connection with the State 911 Task Force discussed in Chapter I, Dr. Charles C. Hall, Chairman of the Local Alternatives Advisory Subcommittee, conducted a survey with the cooperation of Orange County, Florida, law enforcement, fire service, and ambulance agencies to obtain response time data from the citizens' point of view.

SRI made a similar survey under contract to the Santa Clara County, California, General Services Agency, in connection with a public safety communications project currently being performed. We discuss each of these surveys and compare their results.

1) The Orange County, Florida, Citizen Access Survey

The Orange County, Florida, Survey was administered by law enforcement, fire, and ambulance personnel at the scene, after the emergency situation had been resolved. A total of 665 survey forms were collected during June 1974. The results of the survey are given in Exhibit 1.

Question 1 answers show that 40 percent of the public had to talk to more than one agency, which lengthened the public response time considerably. In fact, 6 percent had to talk to three or more agencies.

Question 2 shows a significant difference in the handling of calls between law enforcement agencies and fire agencies: the number of people the citizen had to talk to after his call was received. Forty-nine percent of all law enforcement calls were handled by more than one person with only 17 percent of fire and ambulance calls. The cause for this difference may be that if the citizen is uncertain of the proper agency he will generally call the police. This conclusion is reinforced by the responses to Question 5, discussed below.

Exhibit 1

ORANGE COUNTY, FLORIDA, CITIZEN ACCESS SURVEY AND RESULTS

1. How many agencies did you have to talk to in order to have your report taken? Consider the telephone company operator as an agency.

	Number	Percent
One agency	247	60%
Two agencies	141	34
Three agencies	19	5
More than three agencies	7	1
Total	414	100%

2. After your call went through, how many people did you have to talk to before your complaint was handled?

	Law Enforcement		Fire and Medical		All Agencies	
	Number	Percent	Number	Percent	Number	Percent
One	168	51%	60	83%	228	56%
Two	109	33	12	17	121	30
Three	51	15	--	--	51	13
Four	3	1	--	--	3	1
Total	331	100%	72	100%	403	100%

3. How did you know how to call?

	Law Enforcement		Fire and Medical		All Agencies	
	Number	Percent	Number	Percent	Number	Percent
The number was posted	82	25%	98	30%	180	27%
Dialed the operator	97	30	70	21	167	25
Looked up the number in the phone book	101	31	81	24	182	27
Already knew the correct number	31	10	59	17	90	14
Other (please specify)	15	4	31	8	46	7
Total	326	100%	339	100%	665	100%

Exhibit 1 (Concluded)

4. What do you estimate was the elapsed time between the moment you decided to call for help and the time you felt your telephone report had been taken?

Average for law enforcement agencies	3.82 minutes
Average for fire agencies	1.60 minutes
(No data on ambulance)	

5. Which type of help was needed? (Check all that apply)

Police ____ Sheriff ____ Fire Department ____
Medical ____ Other (please specify) ____

(Results: 12 percent needed more than one agency.)

* * * * * * *

Number of Survey Responses

Law Enforcement Agencies	
Orlando Police Department	210
Orange County Sheriff	42
Winter Park Police	12
Maitland Police	3
Total	267
Fire Agencies	
Apopka Fire	50
Orlovista Fire	21
Lake Barton Fire	2
Zellwood Fire	23
Goldenrod Fire	7
Pinecastle Fire	1
Pinehills Fire	1
Orlando Fire	57
Killarney Fire	21
Taft Fire	12
Total	195
Ambulance	
Herndon Ambulance Service	101
West Orange Memorial Ambulance	12
Total	113

Question 3 answers indicate that more citizens know (or have posted) the telephone number of their fire department than know the telephone number of their law enforcement agency. There was no effort to stratify the sample by agency. That is, the number of responses was not weighted in proportion to the total number of calls received; they reflect the voluntary cooperation of the emergency service personnel in administering the questionnaire to citizens. We consider it significant that only 14 percent of the sample knew the correct number to call.

Question 4 answers show that the response time for fire and medical services was less than half that of law enforcement agencies. This significantly shorter time may also indicate that citizens react more quickly to a fire department or ambulance company emergency than to a law enforcement emergency. However, there was some suspicion that fire and ambulance personnel confused individual response time with agency response time in administering the survey to citizens.

Question 5 shows that 12 percent of the citizens interviewed needed help from more than one agency. Not shown in this tabulation is that over 80 percent of citizens who needed more than one agency reported their need to a law enforcement agency rather than a fire and medical service agency. As will be discussed later in this report, this finding verifies experience found elsewhere in the nation: that, in cases requiring multiple response to emergencies, the law enforcement agency is likely to receive the call. This finding provides added justification for placing 911 centers in law enforcement dispatch facilities where there is greater experience with multiple response problems.

2) Santa Clara County, California, Citizen Access Survey

The survey performed by SRI in December 1973 collected data by telephone from approximately 175 individuals who had used the

emergency services of eight law enforcement agencies in a county of about 1.2 million people.* The survey included a question not asked in the Orange County, Florida, survey: "From the time you felt your telephone complaint had been taken, how long do you estimate the police response to have taken?" This question was asked to provide a comparison of the citizen's estimate of public response time with a known time (agency response time). Since the agency response time could be checked, the citizen's estimate of their own response time could be adjusted to compensate for time distortions.

Although the Santa Clara County survey questioned citizens only on response time of law enforcement agencies, the results obtained were similar to those for Orange County, Florida. A somewhat smaller number (25 percent) of citizens in Santa Clara County had to talk to more than one agency before they reached the proper one, compared with 40 percent in Orange County. Similarly, after they had contacted the proper agency, a much smaller percentage of citizens talked to one person in the Santa Clara case than in the Orange County case. This reflects differences in methods of agency operations.

Over 55 percent of the citizens in Santa Clara County either had the police department telephone number posted or knew it from memory. Those who knew the number explained that in calling one police department they frequently encountered a busy signal, and they memorized the number from calling it so often!

On the question of public response time--from incidence or decision of need to call the law enforcement agency--a consistent report

*Dayharsh et al., "Joint City-County Coordinated Emergency Services Communication System Implementation Study," Interim Report Number 1, SRI, Menlo Park, California (May 1974).

of 1.5 minutes was obtained, except for the agency where a busy signal was encountered; for this agency the time averaged to 2.7 minutes.

On the basis of both the Santa Clara and the Orange County surveys, we can draw the following conclusions:

- Many citizens call the wrong agency and many calls are misdirected. Typically, between 25 and 40 percent of calls must be transferred at least to two agencies.
- Considerably less than half the citizens have recorded their emergency numbers for convenient use in emergencies.
- Considerably less than half of the citizens know their emergency 7-digit numbers.
- The maximum possible time that could be saved by 911 ranges from 1.5 to 4 minutes, depending on the particular agency: law enforcement, fire, or medical.

b. Economic Benefits of 911

If it were feasible to make a systematic and comprehensive cost benefit analysis of 911 for the State of Florida, the results would be quite useful. The economic benefits of 911, such as reduced public response time, would be estimated in terms of total response time savings and then translated into resulting cost savings. The time saved would greatly improve the effectiveness of all emergency service agencies. Law enforcement agencies would solve more crimes, apprehend more criminals, and recover more stolen property. Fire agencies would arrive at the scene faster, thus reducing fire losses and saving lives. The saving of the lives through improved fire and emergency medical effectiveness has an economic value in terms of retaining earning power (which is taxable) and reducing dependency of a family. Given the economic benefits, then, comparison with the costs of 911 given in this report would indicate the direct economic value of 911 in objective terms.

Such an analysis would be difficult, if not impossible, to perform. Estimating the economic impact would require a detailed citizen survey in each community. This would be quite time consuming and expensive; further, the value of the results would be perishable as the community changes, because of public orientation toward the emergency service institutions and of subsequent agency attempts to educate the public. It is the translation of response time reduction into economic savings that is difficult. The difficulty arises because of the diffuse and intricate consequences that are spillouts of a reduction in response time for the entire State of Florida.

Reduction in response time will have the effect of increasing the arrest rate. The Task Force report on Science and Technology of the President's Commission on Law Enforcement and the Administration of Justice in 1967 showed dramatic increases in arrest rate when response time is reduced below about 5 minutes. It is difficult, however, to translate increasing arrest rate to economic terms unless benefits and costs can be compared on a common measure. Will potential criminals of certain types by deterred from coming to Florida if there is statewide 911? Will fewer Floridians commit crimes? If 911 could be shown to reduce burglaries, then the benefits of 911--assuming more burglars are captured or deterred--would accrue to many citizens, not merely to those whose homes were burglarized.

In the emergency medical area, more rapid response time would probably save more lives. The common difficulty in analyses of this type is to place on the saving of a life an economic value that is substantial methodologically and unambiguous.

We can, however, examine the benefits of 911 by a different method. In Appendix C we have performed an analysis that estimates reduction in both insurance premiums and uninsured losses in Florida if

various reductions in response time are achieved. If, as indeed turns out to be true, the reduction in fire losses, from which fire insurance premiums are directly determined, is substantial enough to offset the costs of implementing and operating 911, then any other benefits--in such areas as law enforcement and emergency medical for example--are in essence free. This a fortiori analysis would in essence say that the difficulty in translating response time benefits to economic return for law enforcement and emergency medical services would not have to be faced. If 911 is paid for by reduced fire losses, then it is desirable a fortiori--all the more so, if we add the "intangible benefits" of law enforcement and emergency medical benefits.

To analyze the savings in fire losses, we use our estimates of response time reduction from the last section and translate this reduction to fire losses for Florida derived from Appendix C. We show that, for a 1-minute reduction in response time, an average residential building fire loss reduction of only 11 percent and an average nonresidential and nonbuilding loss reduction of only 2 percent, the annual savings to Florida would be $5.2 million, which is comparable to the annual recurring costs of 911 computed in Chapter VI. If we make the more pessimistic assumption of only 30 seconds reduction in response time, a reduction of 7 percent in residential losses, and no savings from other fire types, the minimum estimated savings would be $1.7 million. We show further that reductions as high as $16 million are not unrealistic. Again, these figures do not include any savings from the law enforcement function or emergency medical functions of 911, or saving of lives. We conclude that 911 would provide economic returns in excess of its costs, under the most conservative assumptions for fire service alone.

The high proportion of the public within Florida who are visitors, part-time residents, or new residents, makes 911 all the more important. First, such people will presumably have less knowledge of the proper agency to call than long-term or permanent residents. Second,

many of these visitors come from areas served by 911. As 911 coverage spreads nationwide, an increasingly large proportion of visitors will expect to have 911 service available during their stay in Florida. Third, visitors to Florida who have used 911 successfully will champion its implementation in their home communities. Florida thus has both a responsibility and an opportunity for leadership in national 911 implementation.

2. Costs to the Public

Because the public (the individual citizens) is the greatest beneficiary from 911, it is fitting that the public bear most of the costs. The public will pay in two roles: as taxpayers and as ratepayers. As taxpayers they will pay for the expenditures by the state or local governments that are necessary to implement and operate 911. As ratepayers they will pay for modifications to the telephone systems of the various telephone companies that 911 systems will require.

The distinction between taxpayers and ratepayers is critical for the section on the political economy of 911 in Chapter III that discusses selective routing. That is, in general, the same level of total expenditure will have very different political consequences depending on whether it is included as an increase in telephone rates or as an increase in taxes. (This is not to say that the total level of expenditure--in comparison with the benefits or even absolutely--is necessarily large.) It is rather to point out that the feasibility of statewide 911 may well be enhanced by the specific method of finance chosen. In considering the costs of statewide 911 to the telephone companies, the offsets against capital outlay must be determined to arrive at the real costs incurred by the telephone companies of Florida that will ultimately be paid for by the ratepayers of the various telephone companies. These costs will

be averaged over each telephone company rate base; there will be cross subsidy from inexpensive modification areas to expensive ones.

As taxpayers, the citizens of Florida will pay for the agency personnel, facilities, and equipment necessary to provide emergency services.

B. 911 As Viewed by Local Government Officals

In the previous section we described the points of view of the public on 911. We showed that, with even the most conservative assumptions on fire loss reduction, the savings in fire losses would substantially pay for the operation of 911. Given these findings, the questions that arise are: Why haven't local governments used such analyses previously? and Why isn't 911 implemented nationwide by this time?

Chapter III will provide some data to answer these questions. However, at this time definitive answers can be only speculative. We would speculate, however, that the answers to these questions are to be found by considering the problems of local governments with 911 from an institutional rather than technical standpoint. We believe that local governments have ample technical ability to deal with 911, but their institutional and organizational orientations make 911 seem less important than other programs.

Except in certain fortuitous situations, 911 requires interagency and intergovernmental solutions (the reasons for this will be given subsequently). 911 does not fit the organizational needs of one agency or one government in a way that enables other agencies or governments also to derive satisfaction for their organizational needs. With respect to emergency service agencies and local governments, local officials view 911 as a zero sum game--if the sheriff answers 911 calls, the city police believe they suffer; if one city answers 911 calls for another, the second

city views it as being given secondary status. Whether this zero-sum situation is true objectively is not the issue; the issue is how local officials who make the decision perceive the situation.

To clarify these institutional problems, we first explore the basic 911 implementation problem--the lack of congruence between jurisdiction and telephone exchange boundaries. Next we interpret this basic boundary problem by showing the changes 911 might make in the role and operation of public safety agencies.

1. The Boundary Mismatch Problem

Florida typifies the problems of 911 implementation. Twenty telephone companies operate within Florida's boundaries (see Table 3). Most of the 404 telephone exchanges overlap boundaries, not only the state boundaries (with Georgia and Alabama) but the local jurisdiction boundaries of the 67 counties and nearly 400 incorporated cities. Compounding this mismatch problem, the boundaries of the nearly 650 fire protection agencies and the informal service zones of the hospitals and ambulance companies* overlap, and they are not coincident with boundaries of telephone exchanges or law enforcement agencies. There is no semblance of order among the service boundaries of the agencies, public and private, that will be the principals of 911 implementation.

When we consider politics, we can assume that the public safety officials of the 67 counties and the approximately 900 law enforcement and fire protection agencies are responsive to their specific citizen-clients and that they act within the institutional restraints of their professions. It is to be expected, then, that interagency policy consensus is lacking and is difficult to achieve among public safety officials

*There are approximately 200 hospitals, 20 of which provide ambulance service. In addition, there are 190 other ambulance and rescue agencies.

Table 3

SUMMARY OF FLORIDA TELEPHONE COMPANY STATISTICS

Telephone Company	Number of Central Offices	Number of Prefixes	Number of Main Stations				Percent of Total Main Stations	Number of Florida Counties Served
			Residence	Business	Coin	Total		
Florala Telephone Co.	1	1	--	--	--	331	0.01 %	1
Florida Central Telephone Co.	6	6	2,971	158	15	3,144	0.10	4
Florida State Telephone Co.	13	13	8,290	1,152	100	9,542	0.30	6
Florida Telephone Corp.	34	41	89,572	17,592	1,509	108,673	3.47	9
General Telephone Co. of Florida	74	184	617,172	112,237	12,442	741,851	23.67	8
Gulf Telephone Co.	2	2	3,464	634	43	4,141	0.13	2
Indiantown Telephone System	1	1	--	--	--	829	0.03	1
Northeast Florida Telephone Co.	2	2	1,742	294	26	2,062	0.06	1
North Florida Telephone Co.	26	27	19,189	2,982	333	22,504	0.72	13
Orange City Telephone Co.	3	3	--	--	--	3,913	0.12	1
Quincy Telephone Co.	3	3	4,981	759	42	5,782	0.18	1
St. Joseph Telephone and Telegraph Co.	12	13	10,112	1,464	232	11,808	0.38	7
Southeastern Telephone Co.	18	25	67,781	19,685	1,252	88,718	2.83	8
Southern Bell Telephone and Telegraph Co.	163	403	1,605,214	287,963	36,963	1,928,388	61.54	38
South Georgia Telephone Co.	1	1	--	--	--	52	0.002	1
Southland Telephone Co.	3	3	1,525	79	14	1,618	0.05	1
United Telephone Co. of Florida	35	39	106,194	22,517	1,854	130,565	4.17	12
Vista-Florida Telephone System	1	2	(7,500)*	*	200	7,700	0.24	1
West Florida Telephone Co.	2	3	--	--	--	4,609	0.15	1
Winter Park Telephone Co.	4	13	46,479	10,159	959	57,597	1.84	2
Total	404	785	2,583,686+	476,923+	55,984+	3,133,827	100 %	

*Includes Residence and Business Stations.

who serve different masters. Officials of muncipal fire departments and rural fire districts in the state actively involved in political decisions within their areas may view 911 as a distinct threat to their time-honored and cherished positions. On the other hand, law enforcement officials, while possibly visualizing an expanded definition of their role, may fear that the provision of 911 will create a demand for service far in excess of the resources available. Consequently, distrust, manifested in diminished interagency and intergovernmental cooperation, may further hamper 911 planning and implementation.

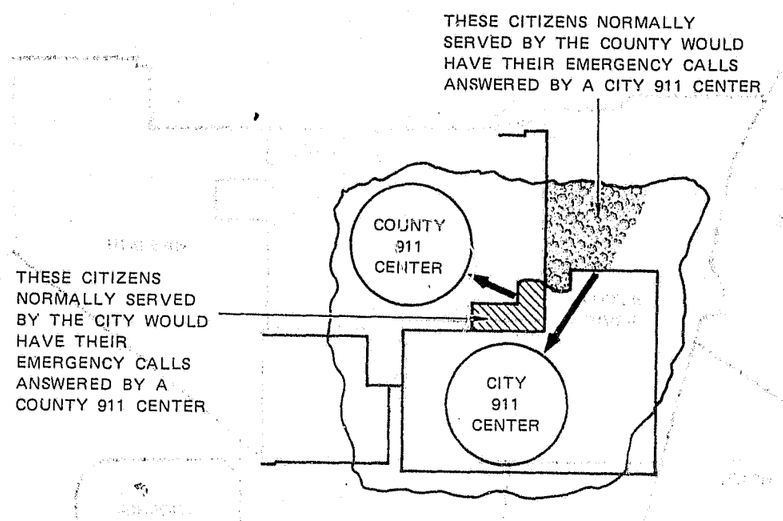
To summarize, Florida is beset with problems of fragmentation. The fragmentation of telephone service and of public safety delivery is, however, only the most visible problem of 911 implementation; the interpersonal problems--mistrust and misunderstanding of 911--are, in the final analysis, the most difficult to overcome.

2. Effects of the Boundary Mismatch Problem

We have selected Dade County for a graphic presentation of the boundary mismatch problem. This choice was made for three important reasons:

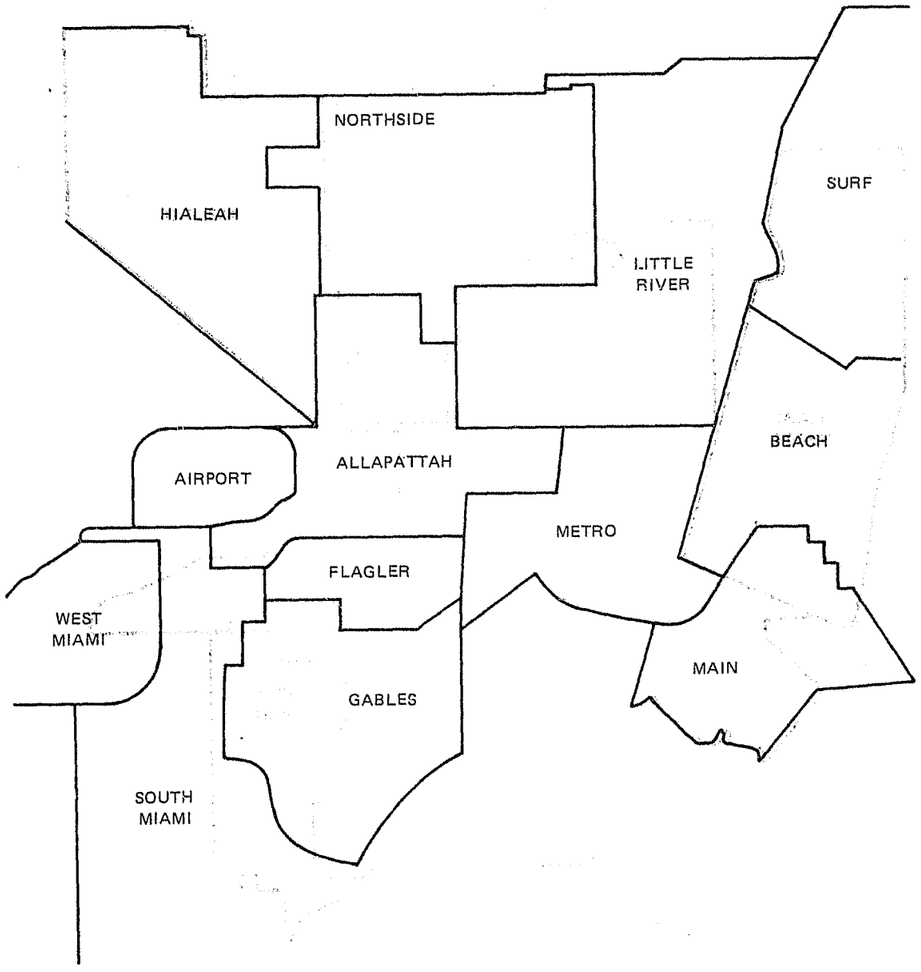
- Dade County is highly fragmented, particularly in terms of telephone exchanges.
- Dade County has a long history of both public and official desire for 911, coupled with much confusion and misunderstanding. Our example may help clarify the situation.
- Dade County does not have telephone exchange overlap with adjacent counties and can be considered by itself.

Figure 2 indicates by various overlaps the extent of the boundary mismatch in this particular county. Table 4 presents the problem in terms of the number of Dade County citizens affected by incongruent telephone exchange and city boundaries.



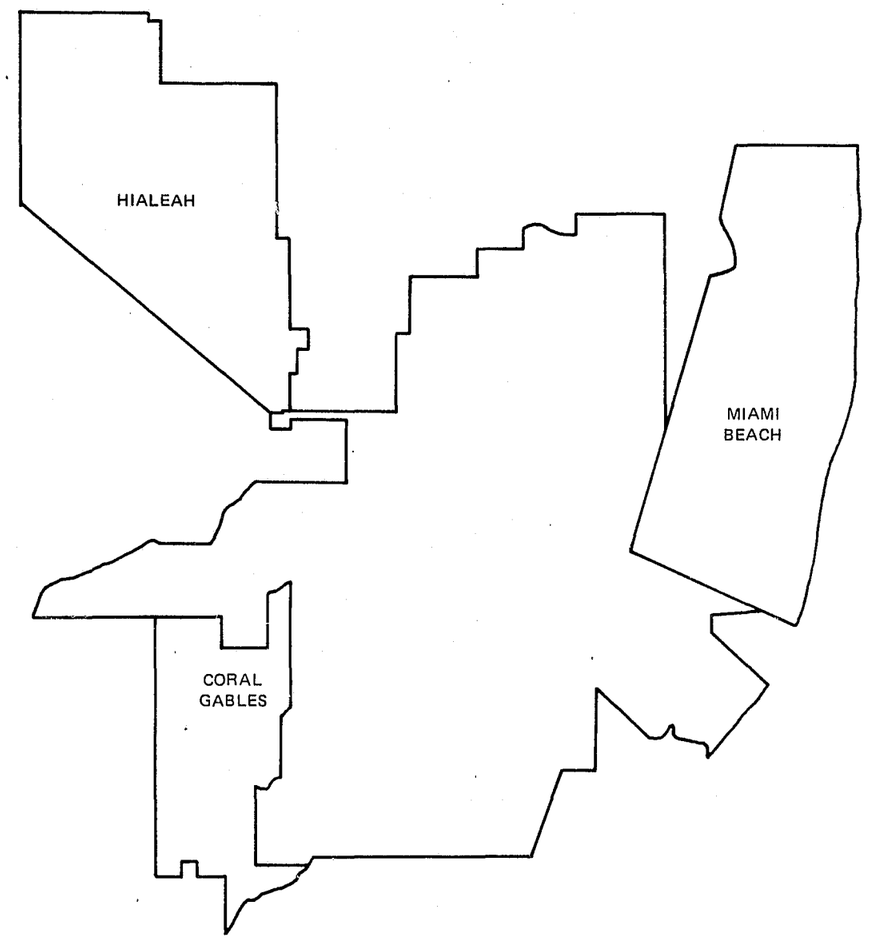
NOTE: This example of a city 911 center and a county 911 center is presented only to illustrate the problem. It is not a recommendation for Dade County.

FIGURE 2(c) CITIZENS WHO WOULD BE AFFECTED BY THE BOUNDARY MISMATCH PROBLEM



†Approximate boundaries

FIGURE 2(b) TELEPHONE EXCHANGES† OF GREATER MIAMI AREA



*Police dispatch for other cities and unincorporated areas of this area provided by Dade County Public Safety Department.
†Approximate boundaries.

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FIGURE 2(a) CITIES DISPATCHING POLICE SERVICES* IN GREATER MIAMI AREA†

Table 4

NUMBER OF CITIZENS* AFFECTED BY BOUNDARY MISMATCH PROBLEM

Exchanges of Greater Miami	Total in Exchange	Citizens in Exchange Residing in†				
		Miami	Miami Beach	Hialeah	Coral Gables	Areas Served by Dade County
South Miami	84,000	13,000	--	--	22,000	49,000
Gables	101,000	50,000	--	--	51,000	--
West Miami	17,000	5,000	--	--	--	12,000
Allapattah	76,000	43,000	--	3,000	--	30,000
Northside	74,000	8,000	--	3,000	--	63,000
Little River	88,000	52,000	--	--	--	28,000
Surf	40,000	--	30,000	--	--	10,000
Beach	54,000	13,000	41,000	--	--	--
Main	13,000	--	13,000	--	--	--
Flagler, Metro (Biscayne)	201,000	201,000	--	--	--	--

*Approximate numbers.

†In the four cities, law enforcement services are provided and dispatched by the appropriate city police department.

In this example area, five law enforcement agencies provide the emergency dispatch function. Figure 2(a) indicates the geographic areas served by four city police departments; emergency calls for the remaining area are serviced by the Dade County Public Safety Department. Figure 2(b) shows the approximate Southern Bell Telephone exchange boundaries and indicates the boundary mismatch. Figure 2(c) focuses on a portion of the Greater Miami area and indicates the areas of mismatch and how the mismatch produces a 911 problem (i.e., where citizens would, on dialing 911, be connected to a public safety agency other than their own). This mismatch problem is greatly simplified in our presentation. If we had added

the fire district boundaries and the informal emergency medical service zones to the maps, they would have been nearly unreadable.

The telephone exchange local jurisdiction mismatch problem is massive when viewed from a statewide perspective. One hundred telephone company central offices (approximately 25 percent of the total) have service area boundaries that extend over county lines (nearly all cross a city, fire district, or emergency medical boundary). Of these 100 central offices, 85 have a two-county overlap, 13 have a three-county overlap, and two have a four-county overlap.

Such boundary mismatch problems are common to 911 planning and are not unsolvable. They can be minimized, if not totally overcome, by:

- Provision of some degree of 911 to all citizens in the state.
- Various degrees of consolidation of 911 centers and emergency service dispatch centers.
- High levels of intergovernmental and interagency cooperation.

3. Changes in the Roles and Operation of Public Safety Agencies

Another policy area that should be considered is the change in the roles and operations of local public safety agencies. It is possible that 911 will result in a higher volume of calls, requiring more operators to provide the level of service previously given. As is shown later, in the local communities that have implemented 911, the increase has usually been only temporary and the call volume returns to its old level within several months after initial implementation. Particularly for law enforcement agencies, where--unlike fire and emergency medical services--there is no clear definition of what constitutes a "true" emergency, 911 may have potentially disruptive effects. What is clearly an

emergency to a citizen may not be an emergency to a particular law enforcement agency.

A second change in the public safety role is the need for more detailed and explicit cooperation among agencies in handling 911 calls. This increased cooperation must be effected in two areas: intraagency cooperation within the same jurisdiction and interagency cooperation between jurisdictions. Explicit interagency policies and operational procedures among law enforcement, fire, and emergency medical services, must be worked out to provide the most rapid and comprehensive emergency assistance to citizens; and explicit and sometimes detailed interagency mutual aid agreements on areas served, information to be obtained, call transfer procedures, and so on, must be worked out. Here again, a critical question is: To what extent should the state require the implementation of specific intraagency and interagency policies and procedures?

C. 911 Viewed As a State Policy Issue

As mentioned in the first section of this chapter, the role of the state in 911 implementation--specifically, in preparation of the plan required by the Emergency Telephone System Act of 1974--is to balance the need of the public for rapid and comprehensive emergency services against the financial and organizational capabilities and limitations of local governments.

Particularly in the urban/suburban areas, the state must be the catalyst in achieving what the various local governments, left to their own initiative would probably not achieve, at all, or at least in the near future. We have structured the report to help achieve this catalytic action, both in form and content. As a system concept study, we did not investigate the detailed organizational, operational, and political

situation in each area to the extent that our recommendations for local alternatives are exhaustive, thorough, and comprehensive. Rather, we performed a systems analysis in which the best use of our local alternatives is as a data base and made our recommendations on the basis of what seemed most feasible from the data available. If, after thorough study, alternative recommendations are considered more desirable, the data organization presented herein lends itself to modification.

We believe that the most potent tool available to the state to encourage cooperation is to provide subvention of the major share of both implementation and operating costs. To this end, the state should use the financial analysis presented in this report as a guide in giving local governments a clear idea of how much money is available for alternative local 911 implementation schemes.

III NATIONAL EXPERIENCE WITH THE 911 SYSTEM

A. Methodological Considerations

In this chapter we have drawn on national experience with the 911 system to provide specific policy guidance to Florida. Over 250 communities have operational 911 systems. On the face of this experience we might expect that all the problems that might be faced in Florida have been solved successfully somewhere, that the aggregate of national experience provides a pool from which specific solutions can be extracted to meet the situations to be found in Florida.

Unfortunately, this does not seem to be the real situation. Although much useful operational information on 911 is available from the experience of communities that have implemented it and much technical information is available from various users, telephone companies, and the federal government, this information reflects the limitations of the institutional form by which 911 has grown.

Specifically, since the announcement of 911 by AT&T on 12 January 1968, the decision for implementation of 911 by a community has been made within the community. In no case, to our knowledge, has 911 been imposed on a local government by a state government (or the federal government). This situation will change dramatically in the next few years as other states besides Florida--California, in particular--make statewide 911 mandatory.

The present status of 911 can be termed "pocket" implementation. Within a community, one or more elected officials believe that 911 services would be in the best interest of the community. These officials stimulate the interest of their colleagues--typically, other local

legislators or elected executives--and request information from the local telephone company. Their initial belief is that 911 is a service provided and packaged by the phone company. The telephone company makes a presentation in which three salient facts are made explicit:

- The community interested in 911 shares telephone exchanges with adjoining communities. Usually it is not possible to provide 911 without taking in outlying areas served by other public safety agencies.
- The community (and not the telephone company) must select the answering point for 911. This answering point gives the agency that controls it high visibility (at least in the opinion of the public safety agencies that do not control the answering point).
- Although most emergency calls are for police, some procedure of operational cooperation must be worked out with fire protection, emergency medical services, and other agencies.

It appears that these facts discourage many elective officials from further planning. Unfortunately, the public service posture of the telephone company representatives emphasizes the benefits of 911 to citizens but precludes solving the real institutional and intergovernmental problems of 911. Officials who are not discouraged proceed to solve these problems and provide 911 for their citizens.

Officials who have been deterred take the following positions:

- 911 must wait until the telephone company can solve by technical means the problem of telephone exchange jurisdiction overlap.
- 911 will be feasible only when certain local institutional or personnel changes have been made, for example, city-county consolidation; rural fire district consolidation; or retirement of the police chief, fire chief, or sheriff.
- 911 is not practical in any case. There should be a "universal" number for police, another for fire, another for medical emergency, and so on.
- Citizens should continue to dial "0."

Pocket implementation, then, means that the communities that have already achieved 911 are probably not typical communities in that one or more of the following situations was fortunate:

- The geographical situation was such as to give congruence between telephone and jurisdiction boundaries. This means that 911 planning could be done without including outlying jurisdictions and thus the decision to implement could be made entirely within the community.
- The public safety agency heads were favorably disposed to 911 to the extent that decisions by elective officials to implement 911 received their cooperation.
- One or more elected officials had sufficient belief in the benefits of 911, coupled with the appropriate courage to make decisions against the views of public safety agency heads.

These circumstances in communities that have implemented 911 should be considered in evaluating the national experience with 911.

B. Local 911 Experience

1. Sources of Data

Given the limitations of applicability of pocket implementation to statewide implementation, we believe that the experience of other 911 communities will be useful to Florida. To provide this experience, we rely on the following sources of data:

- Direct personal visits to communities that have 911. SRI staff have visited the cities of Alameda, California; Seattle, Washington; Omaha, Nebraska; Sunnyvale, California; Gainesville, Florida; Albuquerque, New Mexico; and New York City, New York. In these cities they have observed the 911 operation and discussed implementation with local officials.

- A survey of local experience with 911, initiated by Assemblyman Charles Warren of California in March 1972. Exhibit 2 gives the text of a letter sent to communities across the nation that had installed 911. Twenty-two replies to this letter were made available to SRI by Mr. Harold Eisenberg of the Assembly Judiciary Committee Staff.* Our visits (e.g., Washington, D.C.) and discussions have not shown any nonoperational systems with any significant differences or innovation in the past two years.

- The publication "911--The Emergency Telephone Number--A Handbook for Community Planning," published by the Office of Telecommunications Policy (OTP), Executive Office of the President, assisted by the Office of Telecommunications, U.S. Department of Commerce, under contract with the Franklin Institute Research Laboratories, Philadelphia, Pennsylvania.

- Various publications of the National Service to Regional Councils, Washington, D.C. (now the National Association of Regional Councils), including those from the 1970 Emergency Telephone Communications Workshops, held in January and December 1970. SRI representatives attended the latter workshop.

- Newspaper or magazine articles reporting the experience of a particular community. Magazine articles were generally the least useful since they were usually one-sided, presenting the desirable features of 911 without discussing the problems.

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*The replies made available to SRI came from the following communities:

Bradford, Pennsylvania
Worcester, Massachusetts
Nashville-Davidson, Tennessee†
Gustine, California
New Britain, Connecticut
Galveston, Texas
Evanston, Illinois
Camden, Maine
Macon, Georgia
Jackson, Mississippi
Seattle, Washington
Denver, Colorado
San Clemente, California
New York City, New York
Omaha, Nebraska
Baton Rouge, Louisiana
Boulder, Colorado
Vicksburg, Mississippi
Eau Claire, Wisconsin
Bloomington, Indiana
Rancho Santa Fe, California

†Not yet operational.

Exhibit 2

SURVEY LETTER SENT BY ASSEMBLYMAN CHARLES WARREN OF CALIFORNIA

Dear _____

I have introduced legislation this 1972 session to establish a single 911 emergency telephone number state wide. I am informed your city has established a 911 emergency phone system. In order to clarify my thinking and expedite implementation of a 911 system, would you be so kind as to answer the following questions.

(1) What type of 911 system do you have?
  (a) Direct Dispatch--call a specific unit and give it detail
  (b) Relay--take the information and give it to the agency responsible
  (c) Transfer--transfer the calling party directly to the responsible agency
  (d) Referral--refer the calling party to the responsible agency.

(2) What public safety agencies are served by your system? (City, County, State, Federal, etc.)

(3) How many emergency phone numbers were there in use in your 911 area prior to installing 911 system?

(4) Does your system serve more than one political area?

(5) How many phone exchanges are serviced by your system? Do these exchanges correspond or overlap political and public safety jurisdictional boundaries?

(6) What is the population figure served by your system?

(7) What is the volume of calls received approximately weekly, monthly, yearly?

(8) How have you worked out problems of handling emergencies beyond the geographic boundaries of agencies?

(9) What governmental level, and what agency within the area manages the facility or facilities?

(10) Has your local legal counsel rendered an opinion on the liability of the operating agency? If so, please forward copy of same.

(11) What was the time required to implement your system from the time conceived through planning and installation?

(12) What was the cost of implementation?

(13) Who paid for the costs of implementation? (i.e., source of funds)

(14) What is the on-going costs of the system?

(15) What difficulties existed or still exist with respect to training and staffing emergency center or centers?

(16) What has been the results of implementation of your system in regards to:
  (a) Operating costs and efficiency of public safety agencies
  (b) Services to the public
  (c) Response and acceptance of system of public?

(17) What recommendations or comments would you make to help implement 911 in California?

While I realize I have asked many questions, your early reply to these questions will be greatly appreciated. The early reply is necessitated due to legislative calendar. Please respond to Mr. Harold Eisenberg on the Judiciary Committee staff in my office.

Sincerely,

CHARLES WARREN

- The report, "Narrative Summary--National Survey of Statewide 911 Activity," published by the Franklin Institute Research Laboratories in May 1974.

In evaluating the 911 systems in use by local governments, we specifically consider the following features:

- The operational methods used--In making this evaluation, we try to consider explicitly how the community solved the problems of jurisdiction, telephone boundary, lack of coincidence, and interagency cooperation in order to meet the needs of its citizens.
- Call volume--Here we are interested in comparing the call volume on a per capita basis between communities of similar size that have 911 and also between 911 and non-911 communities of the same size. We further want to determine whether there has been any dramatic increase in calls from 911.
- Costs of 911--The best documented costs available are direct installation or monthly charges by the telephone company to the community. Additional personnel costs are often available. Unfortunately, costs for new buildings and equipment are often associated with other improvements to public safety communications that are coupled with, but not attributable directly to, the implementation of 911.
- Feelings of agency officials--We compare the feelings of agency officials in communities with a central emergency 7-digit number with officials from communities not having such a number. This comparison is based on the Franklin Institute survey performed in 1970. In addition, we give the opinions derived from the Warren Questionnaire of officials in communities that have 911.
- Time to implement--To provide some benchmarks for implementation in Florida, we compare the implementation times of various communities.

2. Operational Methods Used

Table 5 shows the four basic 911 operational methods used by local governments across the nation: direct dispatch, call transfer,

Table 5

OPERATIONAL 911 METHODS IN USE BY LOCAL GOVERNMENTS

Governmental Entity or Entities Served	Direct Dispatch	Call Transfer	Call Relay	Call Referral
Alameda, California	Police	Fire	No	Yes
City of Baton Rouge, Louisiana; Parish of East Baton Rouge; Parish of West Baton Rouge	Police	Fire Sheriff (two parishes) State police Ambulance	Yes	n.a.*
Bloomington, Illinois	Police	Fire	No	No
New Britain, Connecticut; Town of Berlin (part of)	Fire	Police	Yes	n.a.
Worcester, Massachusetts	Police	Police	To other police and fire agencies for emergencies	Other police and fire for routine calls
Boulder, Colorado	No	City Police City fire County sheriff Ambulance	County fire districts Ambulance	n.a.
Vicksburg, Mississippi	City police	No	Other city agencies	n.a.
Macon, Georgia Bibb County	No	No	City police City fire Sheriff Medical center Civil defense State police State forestry	n.a.
Eau Claire, Wisconsin Eau Claire County	Eau Claire police Eau Claire fire department County sheriff Altoona city police	No	Private ambulance	
Galveston, Texas	City police City fire	Sheriff West Isle fire	None	n.a.
Jackson, Mississippi	City police	City fire	Hinds County sheriff Ambulance	n.a.
Denver, Colorado	No	City police City fire City ambulance	To outside agencies	n.a.
Bradford, Pennsylvania	City police	No	Others	n.a.
Evanston, Illinois	City police City fire	No	No	No
San Clemente, California	City police	No	City fire	No
New York City, New York	City police Police ambulance	City fire	No	Other agencies
Seattle, Washington	City police	City fire Fire department rescue County sheriff Washington State Patrol	No	Has primary and secondary
Omaha, Nebraska	City police City fire	Regional Police agencies Other emergency services	No	Yes
Rancho Santa Fe, California (Association)	No	Fire district County sheriff California Highway Patrol	No	No
Camden, Maine	Police Fire Medical	No	No	No

*n.a. = not available.

call relay, and call referral.* The data were obtained from the Warren Questionnaire. Examination of Table 5 shows that we can construct, for methodological purposes, three 911 system concepts: the police-direct-dispatch, the switchboard, and the consolidated.

The police-direct-dispatch 911 system concept consists of the 911 answering being collocated with, and organizationally under the control of, the police department in the major city; call transfer to the fire department and perhaps to the sheriff of the county; and minimum call relay and call referral. Systems based on the police-direct-dispatch concept include those in Alameda, California; Baton Rouge, Louisiana; Bloomington, Illinois; Worcester, Massachusetts; Vicksburg, Mississippi; Jackson, Mississippi; Bradford, Pennsylvania; San Clemente, California; New York City, New York; and Seattle, Washington. Washington, D.C., not included in this survey, is also in this category.

The second 911 system concept we call "switchboard 911." Here the 911 system functions as a central switchboard, transferring or relaying emergency calls to the proper agency. Examples of switchboard 911 systems include those in Boulder, Colorado; Macon, Georgia; Denver, Colorado; and Rancho Santa Fe, California. Prince George County, Maryland, is another example of a switchboard 911 system.

The third 911 system concept we call "consolidated 911." In such a system direct dispatch is performed either for more than one agency within a community--most often police and fire--or, alternatively or in addition, for more than one community. Examples of consolidated 911 systems are those of Eau Claire, Wisconsin; Evanston, Illinois; Galveston, Texas; Camden, Maine; and Omaha, Nebraska.†

*Chapter IV contains a detailed description of these operational methods.

†This leaves the 911 system in New Britain, Connecticut, as the only one in Table 5 not included. In New Britain, the 911 system terminates in the fire department, where direct dispatch is performed. Florida's 911 system in Gainesville is also of this form.

In making this system concept distinction, we do not claim that the numerous 911 systems nationwide that might be classified according to each concept are represented by our small sample. We do claim, however, that each 911 system concept does correspond to a broadly defined type of community.

The police-direct-dispatch 911 system concept is oriented to large cities. In such cities, emergency problems tend to be defined as police problems. Fire departments recognize this and, although they are concerned with reducing response time, are also concerned with preserving their control. This situation leads directly to the call transfer capability for fire.

From our knowledge of several of the communities, the switchboard 911 system concept is used where response time is not a critical problem or where cooperation between police and fire departments cannot be achieved. It represents a form of consolidation of 911 answering but gives each agency or jurisdiction control over the dispatch of its own resources.

The consolidated 911 system concept represents the situation where interagency and/or interjurisdictional cooperation has been carried farthest; the dispatch function has been rationalized to the extent that it is a resource control rather than a supervisory or disciplinary function. Omaha, where the police and fire dispatch are consolidated and 34 cities in three counties cooperate on a call transfer basis, is perhaps the best known example of this system concept. Eau Claire, Wisconsin, where the city and county have cooperated in a joint dispatch and 911 system, is another excellent example. Eau Claire also includes an advisory board made up of users to maintain ongoing cooperation.

3. Call Volume

Table 6 shows the call volume, call increase, and telephone and personnel costs obtained from the Warren Questionnaire. Only two cities reported any increase in calls from 911: Jackson, Mississippi, and Seattle, Washington. After the questionnaire had been distributed, there was considerable local and national publicity on call increases for a third city, New York. Comments to SRI from various 911 communities continually stress that the call volume to law enforcement agencies is to a great extent controllable by the agencies. The majority of calls to law enforcement agencies are not defined by these agencies to be real emergencies. The action of the law enforcement agencies in dealing with these calls determines the volume to be expected. If law enforcement agencies discourage action from certain kinds of calls, citizens will be dissuaded from making them. If, on the other hand, law enforcement agencies take some kind of action on almost every call, the volume will increase as citizens perceive law enforcement as a universal emergency service agency.

In our view, the increase in call volume for Seattle reflects the unique feature of the Seattle system: its primary-secondary structure. Calls that, in the opinion of the primary operators, require the dispatch of a police unit are handled as such. If, on the other hand, the primary operator believes that the call is a valid police incident but does not require an immediate dispatch, then the call is immediately transferred to a secondary operator who obtains more information from the citizen and makes some arrangements for disposition. The advantage of this system--in which the number of primary and secondary operators is flexible up to a combined maximum of 14--is that it gives the citizen a high level of service while still making good use of police field resources.

The OTP handbook on 911 reports similar findings. Additionally, the OTP study found that the ease of access to emergency service agencies

Table 6

CALL VOLUME AND COST DATA FOR OPERATING 911 SYSTEMS

Governmental Entity	Governments Served		Population Served	Number of Calls per Month (approximate)	Call Increase (percent)	Telephone Costs per Month (approximate)	Telephone Cost Increase	Personnel Cost Increase (thousands of dollars)
	Number	Catagories						
Alameda, California	1	City	71,000	550	%	$ 10		$
Baton Rouge (city and parish)	2	Parishes	310,000	300		292	$2,200/yr	
Bloomington, Illinois	1	City	43,000	375				
New Britain, Connecticut	1	City	85,000			72		
Worchester, Massachusetts	1	City	176,000			340		$50
Boulder, Colorado	1	City	110,000	3,400		450	$250/mo	
Nashville/Davidson Tennessee	1	City/ County	500,000	Not in operation when reported		200		
Vicksburg, Mississippi	1	City	45,000	866		14		
Macon, Georgia	2	City and county	148,000	3,000				12
Eau Claire, Wisconsin	2	City County	57,000	2,000		50		
Galveston, Texas	1	City	62,000	14,400		222		
Jackson, Mississippi	1	City	175,000	6,067	5%	150		
Denver, Colorado	1	City	530,000	42,500		658		22
Bradford, Pennsylvania	1	City	25,000	510				
Evanston, Illinois	1	City	80,000			313		
San Clemente, California	1	City	20,000	40		30		
New York City, New York	1	City	8,000,000	567,978		10		
Seattle Washington	1	City	585,000	40,000	12			
Omaha, Nebraska	13 2	Cities Counties	400,000	18,000		3,330		

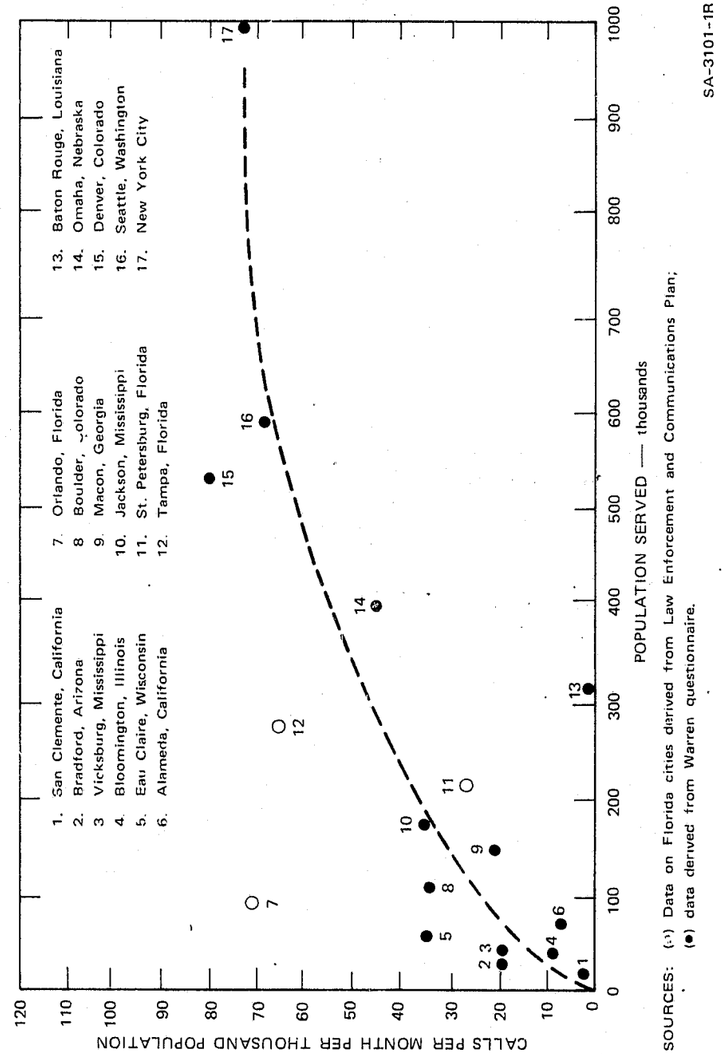
will often increase the number of calls on the same incident because citizens feel a greater familiarity with the established agencies.

Figure 3 shows the per capita call volume measured in calls per month per thousand population as a function of population. This figure, based on the Warren Questionnaire, shows that the per capita call volume increases almost monotonically with increasing population. This strongly suggests that 911 tends to reflect "real need" in that large cities tend to produce more emergency situations than small communities. We have plotted the estimated call volumes for several Florida cities, from the Law Enforcement Communications Plan performed under contract to the Division of Communications by the Atlantic Research Corporation. Actual 911 calls per capita are not necessarily higher than the estimates of law enforcement calls for 7-digit numbers. From this we tentatively conclude that 911 will not create a significant increase in call volume for Florida communities.

4. Costs to Local Agencies of 911

In the telephone costs in Table 6 two findings are evident: absolute as well as increased costs are small, and costs bear little relationship to the population served. Similar findings are given in the OTP report, which cites two communities that have actually saved money in telephone charges by consolidation when 911 was implemented. Suffolk County, New York, saved $1,900 per month from the consolidation of forty 7-digit numbers into one answering point; Springfield, Massachusetts, saved $300 per month when old telephone lines were removed.

Personnel costs showed increases in Worcester, Massachusetts; Macon, Georgia; and Denver, Colorado. In the latter two systems (classified by us as switchboard 911) these increases appear to us to be due to adding operators to an existing nonemergency switchboard in order to



SOURCES: (○) Data on Florida cities derived from Law Enforcement and Communications Plan;
(●) data derived from Warren questionnaire.

FIGURE 3 PER CAPITA 911 CALL VOLUME

handle emergency calls for the first time. We would expect corresponding reflections in call answering by the separate agencies if the switchboards were able to screen nonemergency calls effectively.

Not given in any of our data are the savings from consolidated 911 systems. We would expect considerable economy of scale to result from consolidation of communications as such, over and above the implementation of 911.

To estimate the telephone costs, both installation and recurring, we supplemented the data given in Table 6 with additional data made available by the California Division of Communications* from across the nation. Histograms showing the costs are given in Figure 4, with installation costs being given in Figure 4(a) and recurring costs in Figure 4(b).

5. Feelings of Agency Officials

Under contract to the National Science Foundation, Franklin Institute Research Laboratories published in March 1970 the results of a survey of heads of public safety agencies on the feasibility of a single nationwide emergency number. A total of 546 responses were received from large and small city police and fire chiefs, sheriffs, and poison control centers. About 19.4 percent of the respondents were from jurisdictions having a single emergency number, not necessarily 911. From these jurisdictions the benefit most often specified was coordination of activities that required more than one agency. The greatest objection was fear of "petty jealousies" and "empire builders." From jurisdictions not having a single emergency number, only 28.6 percent felt there would be any benefit. Of those who favored a single number, 88.7 percent felt

*Personal correspondence, from Mr. William Brandenberg, California Division of Communications.

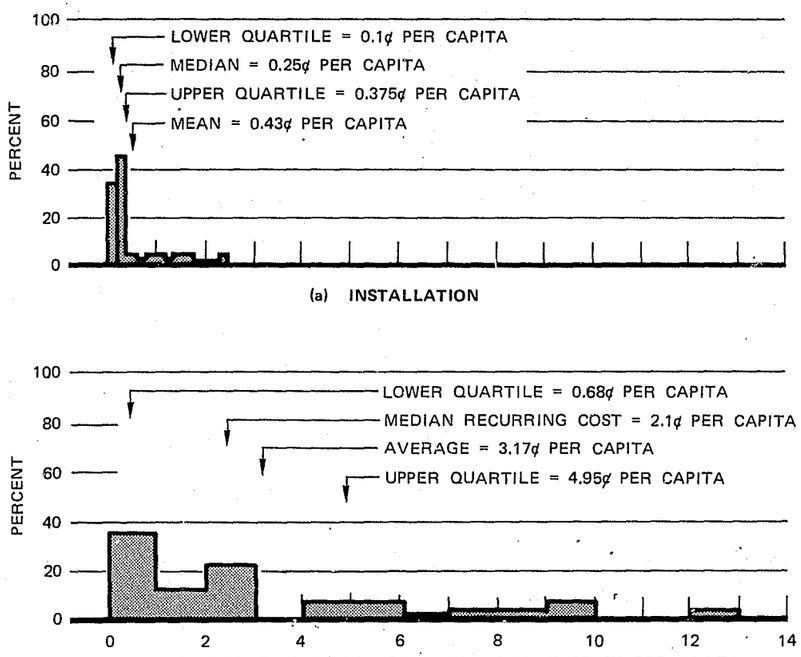


FIGURE 4 HISTOGRAMS OF 911 COSTS TO LOCAL AGENCIES

that improved response time would be the major benefit, along with increase in area coverage for the emergency resource.

The Franklin Institute concluded that those who had experience with a single emergency number favored having a single number and those who lacked experience with a single emergency number opposed having a single number. Franklin Institute recommended public education and self-evaluation by public safety agencies of their own organizational structure.

An excellent journalistic survey of opinion in large cities was conducted by Donald Janson, in a New York Times feature story on March 31, 1970. In surveying large cities across the country, Janson found that

control over their own resources was the largest reason that public safety agency heads opposed 911. New York City, for example, operated 911 for many months without a direct transfer line to fire, because the New York Fire Department wanted control of their own resources.

The Warren Questionnaire received no negative comments on 911 from any respondent. The benefit most frequently cited was improved participation and acceptance by the public, followed by decreased overall response time.

Perhaps the most significant viewpoint, expressed consistently and unanimously by respondents to the Warren Questionnaire (mayors, city managers, police and fire chiefs) was the degree of personal identification of these officials with the problems of citizens as opposed to the problems of governments or public safety agencies. Both in giving comments on the success of 911 in their own communities and in making recommendations for California, the officials stressed such things as education of the public, regional 911 systems for better service, and decreased response time to the citizen. The most succinct statement of all was given in the response of Bob Belmont, Chief of Police of Gustine, California (population 6000), who replied to the question on recommendations: "Ask a citizen which he would like to call in a personal emergency, 911 or a 7-digit number."

6. Time to Implement

We compare in Figure 5 the responses from the Warren Questionnaire (Exhibit 1) of various cities to Question 11: "What was the time required to implement your system from the time conceived through planning and installation?" Note that time depicted includes both planning by the community and installation by the telephone company. It is therefore not a benchmark for telephone company performance. We presume

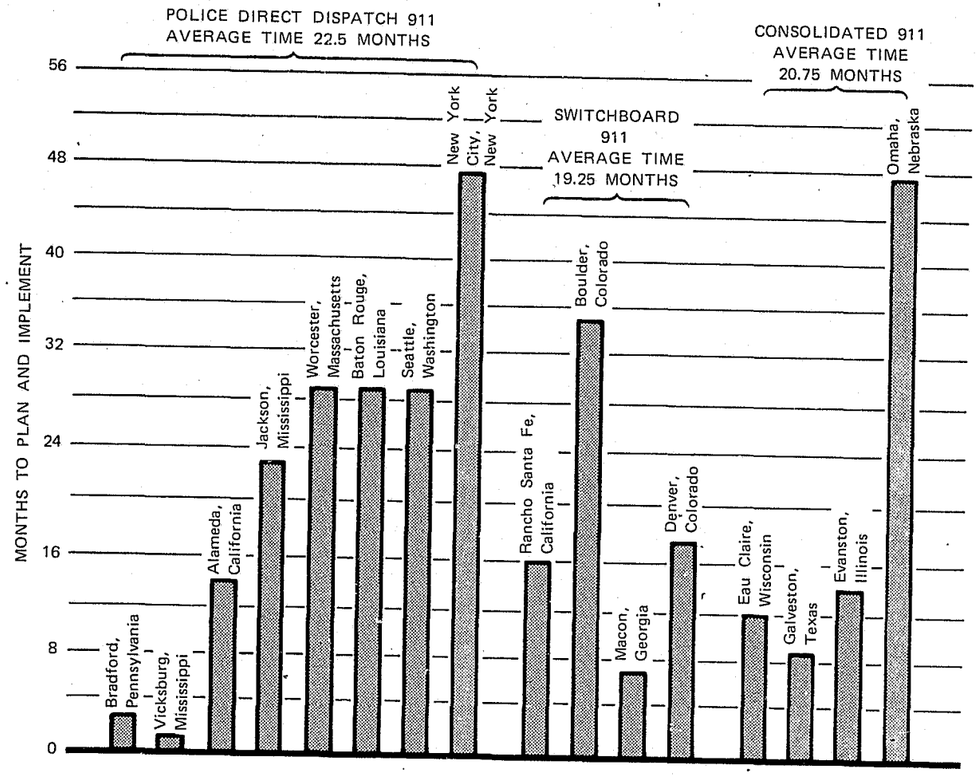


FIGURE 5 911 PLANNING AND IMPLEMENTATION TIME ORDERED BY TYPE AND POPULATION

that there was interaction between the community officials and the telephone company, with several iterations in most cases. That is, we believe it is overly simplistic to assume that the community developed explicit requirements without telephone company participation and then placed a "firm order" to the telephone company. The time given, then, is time for the overall process and is not a guide to either community planning time or telephone company installation time, considered separately or additively. For example, New York City installed 911 in July 1969, six months after announcement by AT&T of the service, yet officials gave four

years as the planning period. We speculate that much coordination and planning was performed between the city and the New York Telephone Company during this four-year period, and that the telephone company was aware of the city's plans before the January 12, 1968 announcement.

In Figure 5 the responses of planning and implementation time are categorized according to the concepts given earlier, with the responses within each category ordered by ascending population. This ordering was made to test the supposition that larger cities should take more time to plan and implement than smaller cities. Again, we stress that our sample is small and intended to be illustrative rather than representative.

For the police-direct-dispatch 911 concept, we see that our supposition is essentially validated--there is a more or less monotonic increase of implementation time with increasing population. For switchboard and consolidated 911, the implementation times are somewhat shorter and show no monotonic increase with increasing population. For consolidated 911, Eau Claire, Galveston, and Evanston are all within the 50,000 to 100,000 population range and have implementation times comparable to the police-direct-dispatch systems of cities with comparable population, such as Vicksburg, Alameda, and Jackson. Omaha, perhaps the most elaborate 911 system in operation when measured in terms of number of governmental entities participating, attributes its four years of implementation to planning of new radio dispatch along with 911 telephone answering. We speculate that most of this time was in planning by the city and surrounding jurisdictions and a comparatively small time was devoted to actual telephone company installations.

C. State 911 Policies and Action

The most comprehensive study of statewide 911 planning efforts available to us to date is a narrative summary entitled "National Survey

of Statewide 911 Activity," performed by Mr. Warren Suss of the Franklin Institute Research Laboratories, and published in May 1974. Each state, plus the District of Columbia, was contacted by mail, telephone, or both and asked the following questions:

(1) Has 911-related legislation been enacted on a statewide basis in your state?

(2) Is any such legislation under consideration or being proposed?

(3) Is there currently any statewide administrative activity in your state relating to 911?

The results of this survey showed that: (1) only five states had developed and passed comprehensive legislation: California, the District of Columbia (on order of the Mayor-Commissioner), Florida, Tennessee (as part of Tennessee Emergency Medical Services Act of 1972), and Massachusetts (authorization by legislature to conduct a study); and (2) 32 of the states sponsor some 911-related activities. In 13 other states legislation is being considered.

Franklin Institute believes that most states have only recently begun to see 911 as part of their responsibilities. It notes that "... though 911 systems exist in communities in virtually every state, few states have taken the initiative to ensure that any individual at any time, anywhere within the state, will have access to a single emergency telephone number."

Franklin Institute's conclusions are that it is reasonable to project that by the end of the decade most states will have become committed both legislatively and administratively to a statewide 911 system.

They feel further that the speed of implementation depends on federal legislation in health and law enforcement as well as federal funding. If neither legislation nor funding is implemented, Franklin Institute feels that "... 911 implementation will proceed somewhat more slowly but nonetheless certainly."

Another recent report, entitled "A Staff Regulatory Viewpoint of the Universal Emergency Telephone Number," by Louis A. Ceddia of the New York Public Service Commission staff, gives the status activity up to May 1973. Ceddia considers both legislative action and rulings of state regulatory agencies. Legislation had been enacted only in Massachusetts and California, with the California legislation being perhaps the most comprehensive. The main features of the California law, passed in 1972, are that:

- Every local public agency must have a basic or sophisticated 911 system in use by December 31, 1982.
- Maximum centralization of 911, to the extent feasible, should be implemented.
- At a minimum, police, fire fighting, and emergency medical and ambulance service are to be included.
- All pay telephones must be equipped to dial 911 without a coin by December 31, 1982.
- Mutual aid agreements are to be signed between jurisdictions to allow for completion of service of dispatched vehicles, regardless of the jurisdictional boundaries determined after dispatch.
- All the systems established are to use at least three of the four basic operational methods: direct dispatch, call relay, call transfer, or call referral.

The law gives the California Division of Communications the responsibility for the development of technical and operational standards for local governments, the approval of local government plans, and the development of plans for finance. Significantly, there will be no statewide plan except for the aggregate of local plans. The law specifies consideration of state subvention during the 1975 session of the legislature. The Attorney General is given authority, with the advice of the Division of Communications, to enforce the provisions of the act on local governments and public utilities within the state.

The most comprehensive regulatory agency policy and order on 911 to date was made by the New York State Public Service Commission on November 20, 1973. The Commission provided a Statement of Policy and an order on all telephone companies within the state. The specific order, given as Case 26443, specified that all telephone companies should provide, within two years from date of order for common control central offices and by January 1, 1978 for others, 911 service to existing emergency reporting centers. Where no such reporting centers exist, the telephone companies should provide the means of reaching a telephone company assistance operator.

We believe it is important to interpret this order in the light of two significant facts. First, the State of New York has passed no legislation that would mandate local governments to create emergency reporting centers. The State Public Service Commission noted that any further expansion of 911 is beyond its jurisdiction but stated that it would support legislation that would stimulate such expansion. Second, New York state already has 12 operating 911 systems, serving a total of 11.1 million people (over half the population of the state). Among these systems are five relatively large ones: New York City, Buffalo, Nassau County, Suffolk County, and Broome County. There is thus considerable statewide experience with 911. The specific order of the Commission on telephone companies, with respect to these companies providing operator intercept assistance, should serve to accelerate what is evidently a statewide trend to 911 by making the telephone companies advocates for local governmental 911 action that would relieve them of the intercept responsibility.

The New York State Public Service Commissions's Statement of Policy, based on the staff report referred to earlier, is quite far reaching.

Some of the most significant points of this statement, in terms of possible national precedent, are:

- The specification that 911 be a free number and, where coin-free operation of coin telephones is planned, the caller be able to dial 911 without the use of a coin. Significantly, the Commission did not order coin-free telephones statewide but did ensure that 911 would be a free call statewide.
- The specification that a one-busy-in-a-hundred-calls grade of service be a standard, subject to prior agency-company agreements.
- Discouragement of selective routing, by releasing the telephone companies from the obligation to provide such routing in central offices serving more than one jurisdiction. Further, and perhaps most important for the national future of 911, the Commission states its policy that selective routing or automatic location identification would be charged to agencies at a rate fully compensatory to the telephone company. Telephone companies thus cannot provide selective routing in areas of the state where public safety agencies want individual autonomy in controlling 911 and at the same time expect lower costs by passing the real costs to the state ratepayers. Autonomy, then, in controlling 911 is likely to be quite costly, and governments must pay for it explicitly. Although not endorsing nor even mentioning any local government institutional forms of 911, the Commission's policy, in our opinion, favors cooperative or regional 911 by ruling out ratepayer cross subsidy to selective routing.

D. Selective Routing as a 911 Policy Issue

We believe that, as the plan for statewide 911 in Florida is being formulated and subsequently implemented, selective routing will increasingly become a part of the joint consciousness of the State Division of Communications, the Public Service Commission, the telephone companies within Florida, and, most important of all, local government and public safety agency officials. We believe that this issue should be addressed

so that a consistent policy be formulated by the Division of Communications, the State Legislature, and the State Public Service Commission. Such a consistent policy will greatly increase the acceptance of the state plan with local governments and telephone companies.

We consider here first the benefits and costs of selective routing, discuss next the political economy of selective routing, and conclude by recommending a state policy on selective routing.

1. Costs and Benefits of Selective Routing

Selective routing is a feature by which the 911 call is automatically routed to an answering center that is predesignated on the basis of the location of the telephone. Selective routing thus solves the largest problem of jurisdictional boundary telephone exchange mismatch--eliminating the need for cooperation between law enforcement agencies. If, in addition, all emergency service agency dispatching can be consolidated within each jurisdiction, it makes possible direct-dispatch 911 for an entire metropolitan area. Selective routing thus makes possible a technical solution for what are essentially political, organizational, and intergovernmental problems. Selective routing does not solve the fire and law enforcement intragovernmental problems because it can determine only the jurisdiction and not the need for the 911 call.

At present, selective routing is not operational anywhere in the United States. A pilot study, financed by the Law Enforcement Assistance Administration with the cooperation of AT&T, is being performed in Alameda County, California, under a $150,000 grant.

AT&T, in its presentation to LEAA, estimated that for Alameda County the installation cost would be $620,000, with continuing annual costs of $305,000 for 20 years on a tariff basis. Of the installation

cost, the $545,000 development cost need not be repeated in other parts of the nation. Alameda County, with a population of 704,000 people, has 340,000 telephone subscribers. The estimated costs include automatic number and location identification, discussed below. Without automatic location identification, the costs might be reduced by 40 percent.

In a study performed for the Metropolitan Council of the Twin Cities Area (Minneapolis-St. Paul, Minnesota), the consulting organization of Michaud, Cooley, Hallberg, Erickson and Associates estimated, for one of their options, a total of $1.36 million in installation costs and $744,000 in annual recurring costs for a telephone company-provided 911 system using automatic number identification, forced disconnect, and selective routing for a 7-county 911 system, serving about 1.9 million people and 1 million telephone subscribers.

Considering only the recurring costs, selective routing is quite expensive. Per subscriber, the Alameda County estimates give an annual cost of about $0.90; the comparable Minnesota costs are $0.74. These do not include any recurring personnel costs that, as shown in Chapter V, are the larger costs of 911 in Florida.

We would, however, expect these costs to decrease somewhat in the future as electronic switching equipment is phased in to meet the demands of an expanding population, especially in Florida. The problem is that the costs will be very different for various parts of the state; and, unfortunately, there is absolutely no evidence that the costs would be lowest where selective routing might be "needed most."

Another problem of selective routing is associated with Automatic Number and Location Identification, called ANI and ALI, respectively. ANI or ALI provide the public safety agency with real-time information on the caller's telephone number, location, or both. These features raise important public policy issues of privacy that are being studied by the Alameda County Project.

2. The Political Economy of Selective Routing

From the point of view of public safety agency heads, selective routing is seen as the panacea that will eliminate the political problems created by 911 by allowing each jurisdiction to retain its own 911 answering. In particular, law enforcement officials, whose previous interaction with the telephone companies has been confined to operational issues, do not seem to appreciate that the large costs cannot simply be bypassed. In Florida and nationally, our conversations with law enforcement officials revealed that their attitude was: "They (the telephone company) could really do it cheaply if they wanted to."

What many law enforcement and local government officials seem to imply is that whatever the true costs, the local telephone company should provide them with selective routing at a nominal or low charge and make up the difference in distributing the cost to the subscribers. In terms of the political economy of 911 described in Chapter II, the public as taxpayers would be charged little for selective routing; the major costs for this feature would be passed on to the public ratepayers in the form of slightly higher rates for telephone service.

We believe both the telephone companies and most state regulatory agencies would oppose this method of paying for selective routing, as did the New York State Public Service Commission. From the point of view of the telephone companies, it would charge the public for selective routing on a cost of service basis rather than on the more traditional value of service basis. This would set a precedent for other areas of telephone service pricing and would erode the cross subsidy policy by which rates are averaged for the same service in different areas (for example, urban users subsidizing the higher costs of rural telephone service), as well as the ability to market new features by charging higher or lower rates than cost on the basis of the value of service to the user.

From the point of view of the public service commissions, adding the cost of selective routing to the rate base of a telephone company would be a means by which local governments could claim credit for "painless 911" without accepting the responsibility for the high recurring costs themselves. They would take credit for the benefits of 911 while placing the responsibility for the increased telephone rates onto the public service commission. We believe that most commissions will therefore adopt the stand of the New York PSC and require local legislative bodies to appropriate the full cost of selective routing, in a manner that is "fully compensatory to the telephone company."

3. A Recommended Policy on Selective Routing

Based on the costs, benefits, and political economy of selective routing, we believe that a statewide policy, uniformly agreed to by the Division of Communications, State Legislature, and Public Service Commission, should be as follows:

(1) Information available on selective routing should be freely disseminated to local officials as national research and experience is acquired with this technique. In particular, we believe the Division of Communications should actively collect and disseminate on request to local officials in Florida the best experience of local and state governments throughout the country in selective routing.

(2) The Florida Public Service Commission should encourage the telephone companies of Florida to set proposed tariffs on selective routing at the earliest possible time in order to provide local governments with a clear economic impact of this feature.

(3) The Florida Public Service Commission should adopt a policy of requiring the cost of selective routing--both initial and recurring--to be borne by local governments at a rate fully compensatory to the telephone companies, as was done in New York. We recommend there be no exceptions to this rule for any local governments.

(4) If the state legislature follows the recommendations made in Chapter VII and subvents funds to local governments for initial and recurring costs, local governments should be allowed to use these costs at their discretion to pay for selective routing. Under no conditions do we believe that extra funds (over and above those given in a regular 911 subvention schedule) should be made available by the state to cover selective routing costs. To do otherwise would be for the state legislature to reward financially areas of the state for noncooperation with each other at the direct expense of areas of the state where cooperative arrangements for 911 have been made.

(5) The Attorney General of Florida should conduct further study, in cooperation with the Division of Communications, of two additional issues: determination of the accountability of the telephone companies and public safety agencies for misdirected calls; and, if ALI or ANI is to be implemented, consideration of privacy, particularly for unlisted telephone numbers.

IV 911 SYSTEM OPERATING DESCRIPTION, REQUIREMENTS, AND COST ANALYSIS

The conceptual design of a 911 system includes specification of the area to be served by the 911 answering center, system sizing, performance requirements, and operational methods. Rationale for selecting the area to be served will be discussed in Chapter V. In this chapter we discuss the basic 911 operational methods, the basic methodology for costing a 911 system, and the design parameters that must be specified to determine total system costs. The actual values used for the various parameters are also discussed.

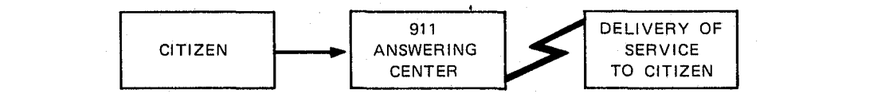
A. Description of Operational Methods

The objectives of a 911 emergency service communications system are to make it as easy as possible for a citizen to contact the proper emergency service agency and to minimize the response time required for a citizen to receive emergency service. The system does this by simplifying the role of the citizen (that is, by reducing the number of decisions he must make) and increasing the responsibility of the public safety communications system.

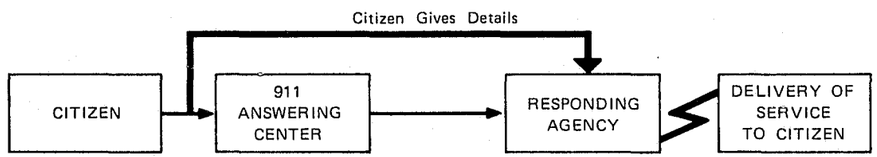
The primary function of the 911 emergency answering center is to facilitate the flow of information between the citizen and the responding agency. The center answers emergency calls and selects the proper agencies. The manner in which the information is routed to the agency varies with the jurisdictional, operational, and organizational requirements of the area being served. The four basic operational methods are direct dispatch, call transfer, call relay, and call referral. Most 911 systems comprise a combination of several of these methods to handle variations

in the levels of cooperation, centralization, and consolidation between and within the participating agencies in the system, as well as local boundary mismatch problems.

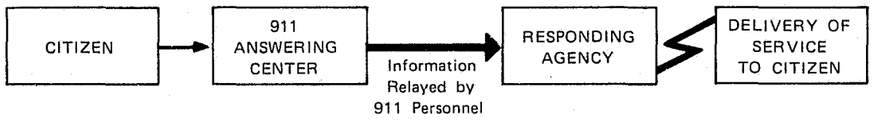
Figure 6 illustrates the information flow for each of the operational methods.



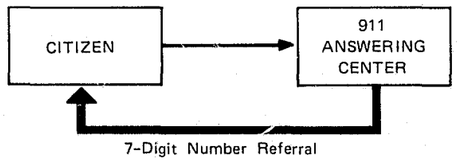
(a) DIRECT DISPATCH



(b) CALL TRANSFER



(c) CALL RELAY



(d) CALL REFERRAL

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FIGURE 6 911 OPERATIONAL METHODS

1. Direct Dispatch

In the direct dispatch method, two of the emergency communications system elements, emergency answering and responding agency, are collocated. For example, the answering center might be collocated with a centralized multiagency dispatch center handling emergency calls for police, fire, and emergency medical service, or it might be collocated with a single agency providing one type of emergency service. Transmission of information from the answering center to any of the agencies not collocated with the answering center can be effected by using one or a combination of the remaining three basic operational methods: call transfer, call relay, or call referral.

If there were no boundary mismatch between telephone exchanges and public safety agency jurisdictions and if all the emergency communications--police, fire, and emergency medical--could be dispatched from a single location, there would be no need for any other 911 operational method. Direct dispatch would be universal. For many reasons--operational, technical, and political--a single location for answering and dispatch is not feasible in most cases.

This is not to say that law enforcement agencies receive the highest fraction of emergency calls compared with other services such as fire, emergency medical, and so on. Many calls to law enforcement agencies do not require emergency response and are directly referred to other organizations, for example. However, with respect to 911, the relevant meaning of emergency is the citizen's perception rather than the agency's. Therefore, regardless of how emergency functions are apportioned by the local governments, the public seems to want to call the police over 85 percent of the time in most cases.

2. Call Transfer

As depicted in Figure 6, call transfer requires that the citizen first dial 911 to obtain the answering center. The answering center determines which public safety agency should respond to the citizen's problem. Determination of the proper agency by the 911 answerer essentially entails obtaining, as rapidly as possible, the location and the nature of the problem. The answerer then selects the appropriate agency and by direct line quickly connects the citizen with that agency, usually by the push of a button. The answering center thus performs the function of a switchboard, and the citizen gives the complete explanation of his problem to the proper agency.

The major advantage of call transfer is the lack of coordination required to implement it operationally. Its greatest application is in situations involving core-city fire agencies and public safety for outlying cities--situations where the particular emergency service agencies want to perform their own screening of calls and preserve their identity, organizationally, in the eyes of the public. Its major disadvantages are, first, that the response time is lengthened compared with direct dispatch and, second, that the need for repeating parts of the problem is often frustrating to a citizen under stress. The individual response time from our survey data in Chapter II is still in most cases considerably less than with the present 7-digit emergency system, but not as short as with direct dispatch. The training of the 911 answering center personnel makes them more familiar than telephone company operators with the responsibilities of local public safety agencies.

3. Call Relay

Call relay is similar to call transfer in the facilities required, but in call relay the information rather than the caller is

transferred to the proper agency. The necessary information can be relayed to the proper agency by the 911 operator either by voice or by means of digital data transmission using an electronic keyboard and a cathode ray tube (CRT) display. The citizen does not perceive any difference since he gives the information to the 911 center, which in turn relays the information to the proper agency. The citizen is thus spared the necessity of repeating the information.

The major advantage of call relay, then, is that, since the response time is essentially the same as that of direct dispatch, citizen frustration under stress is eliminated. Proper operation of call relay does require that explicit call-answering policies be established among the various agencies. Such policies are in some cases difficult to establish. Many law enforcement agencies would resist making policies on call answering and dispatch explicit, preferring that decisions be made on a short-term basis for essentially organizational and political reasons.

Call relay does have the advantage of leaving dispatch operations under the control of individual agencies, which view the dispatch function as a management and control function rather than as a more neutral "resource allocation" function.

4. Call Referral

The call referral method, in which the 911 answering center gives the citizen a 7-digit number to dial, is used for two purposes. First, certain agencies may not have the volume of calls to warrant call transfer or call relay, which requires the expense of dedicated or direct lines from the 911 center. Examples are, typically, the Coast Guard, poison control, and the FBI. Second, it may be necessary to discourage citizens from using 911 for nonemergency calls, in order to keep the

lines free for emergency calls. Call referral is therefore a means of informing the public that they should not use 911--in a polite and professional manner.

B. Examples of Operational Methods

As a first example, let us consider how these operational methods would be used in a case where a countywide 911 answering center is collocated with a sheriff's radio dispatch facility and where all 911 calls coming in that are not for the sheriff's office are handled by the call transfer method. This type of operation is called a call transfer/direct dispatch system.

Incoming emergency calls that are for the sheriff's office would be handled in the normal manner. If an incoming call is not for the sheriff's office but is for any fire protection agency, emergency medical agency, or other law enforcement agency within the service boundary of this 911 system, the 911 operator would obtain enough information from the caller to determine the type of emergency service required and the agency that should supply the service, and would connect the caller by private line directly to the correct dispatch center. The caller would then give the complete details of the emergency to the dispatch center that has the responsibility of providing the required assistance. The dispatch center would decide how to deploy its resources.

If the caller is too emotionally distressed to be transferred, the 911 operator would obtain as many details as possible about the emergency and call this information in to the appropriate radio dispatch center. This procedure uses the call relay method as a backup mode of operation. This same method would be used if the caller hung up before he could be transferred. In these two instances an individual operator position recorder can be of great benefit (see subsection D-4, below).

The agencies being served by each 911 center will have to determine among themselves what types of calls they are going to consider as emergency calls. If a call that is not considered an emergency comes into the 911 center, the caller is given the correct 7-digit number to call to make his report or complaint. This procedure uses the call referral method.

Let us assume that instead of the call transfer method the call relay method is used in conjunction with the direct dispatch method. Let us further assume that voice relay is used (rather than digital data relay). The only difference between this example and the previous example is, then, in how emergency calls not destined for the sheriff's office are handled.

When a 911 call comes in that is not for the sheriff's office, the 911 operator obtains the required information (determined by the participating public safety agencies) from the caller and, by private line connection to the correct dispatch agency, tells the dispatcher the details of the emergency. The local dispatching agency then decides how to respond to the caller's emergency.

This operational system also has the capability of transferring the caller to the dispatch agency, just as in the call transfer method. But in this case, call transfer would only be used in special cases (to be defined by the participating agencies), such as a police call concerning a felony in progress. Call referral would be used as described in the first example.

As a third example, let us assume the same situation as that in the second example except that the call relay method uses digital data transmission (rather than voice relay).

In this method of operation, as the 911 operator obtains the required details from the caller, she types the necessary information on

an electronic keyboard attached to a cathode ray tube (CRT). At the same time, a computer determines (on the basis of programming and data files) which dispatch center should receive the information (this will be the dispatch center responsible for responding to this particular request for service). The computer will have determined which is the proper agency before the caller has completed his call and will display on the CRT the code for that agency. When the operator has finished talking with the caller, she enters the agency code on the keyboard, pushes the "send" button, and the computer automatically routes and transmits the call information over a private line to the correct dispatch center. This method requires that the dispatch centers also have one or more CRTs (the number required depends on their busy-hour call volume) to receive the digital information. We recommend that in this type of operation, the radio dispatcher be the receiver of the emergency call information rather than some other individual, as is now done in many dispatch centers. Since the 911 center will have relayed all the available required information, routing it through a third individual would accomplish nothing but an increase in response time.

This type of operational system also has call transfer capability for special types of emergency calls or for use in the event of failure of digital or electronic equipment, and would use call referral as necessary.

In any one of the three examples presented above, if, because of telephone boundary/jurisdictional overlap, a call comes into the 911 center that should have gone to an adjoining area's 911 center, it can be handled in one of two basic ways. The caller or his information can be transferred or relayed by private line to the 911 center that handles the dispatch center responsible for providing the requested service, or contact can be made by private lines directly with the correct dispatch center. The latter case, because of increased telephone line cost, would

be used only if very few agencies were involved in the overlap. The decision of whether the correct dispatch center should be contacted directly would, of course, have to be made jointly by the agencies involved.

In all these examples we have assumed that a large number of the calls are being handled by the direct dispatch method of operation because of the 911 center's being collocated with (in these examples) a sheriff's office dispatch center. If the 911 center was not collocated with any public safety dispatch center, then all 911 calls would be handled by either the call transfer method or the call relay method, backed up by call referral.

C. 911 System Model Description

The methodology employed in the conceptual design and cost analysis of a 911 system can best be described in terms of two consecutive models. The first model is used to determine 911 system requirements, which in turn are input to the second model to obtain associated 911 system costs. These models are used after the geographical area to be served by a particular 911 system has been determined.

1. Inputs and Outputs

Figure 7 illustrates the flow of information between the design model and the cost model. Inputs to the design model fall into four categories: traffic estimates, performance requirements, communications network information, and operational methods.

Outputs from the design model are sizing requirements for each cost component of a 911 system. These components are personnel--total 911 operator and supervisor force; telephone--incoming 911 trunks, outgoing private lines to dispatch facilities, and telephone terminal

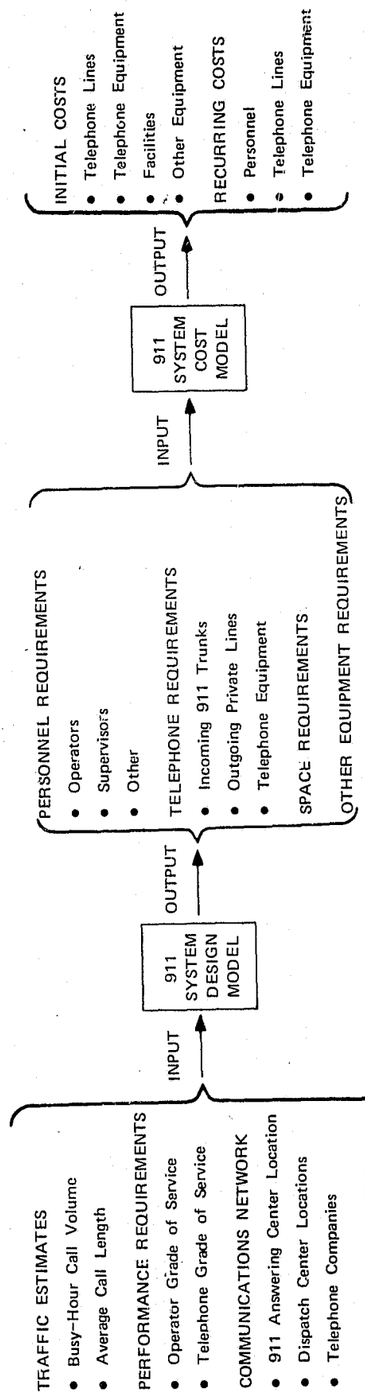

FIGURE 7 INPUTS AND OUTPUTS FOR 911 SYSTEM DESIGN AND COST MODELS

equipment; space--in terms of the minimum space requirements for each 911 operator position; and other 911 center equipment--such as recorders. Cost factors are applied to these component sizing requirements in the cost model to estimate both initial and recurring costs for a 911 system.

2. 911 System Design Model

The 911 system design model consists of a set of functional relationships between the design criteria and the sizing requirements, as indicated in Figure 8. Operator personnel requirements for a 911 center are a function of operator grade of service, call volume, and average call length. The number of incoming 911 trunks required is also a function of 911 call volume, expressed in terms of peak or busy-hour call volume and call length, plus telephone grade of service. Requirements for outgoing lines are computed like those for incoming trunks, substituting dispatch center call volume for total 911 call volume. And finally, the type of telephone terminal equipment required for the center is a function of the number of operator positions, number of incoming trunks, and number of outgoing private lines.

After calculating the number of 911 busy-hour operator positions required at the answering center, estimates for supervisor requirements and ratio of busy-hour operators to total force operators are input to arrive at total telephone personnel requirements. The number of 911 busy-hour operator and supervisor positions is also used to determine operator space requirements at the 911 center.

If the 911 system area is served by more than one telephone company, the number of interconnecting 911 trunks between telephone companies must also be calculated. The number of these lines required is a function of the call volume expected from the other telephone company's area, average call length, and telephone grade of service.

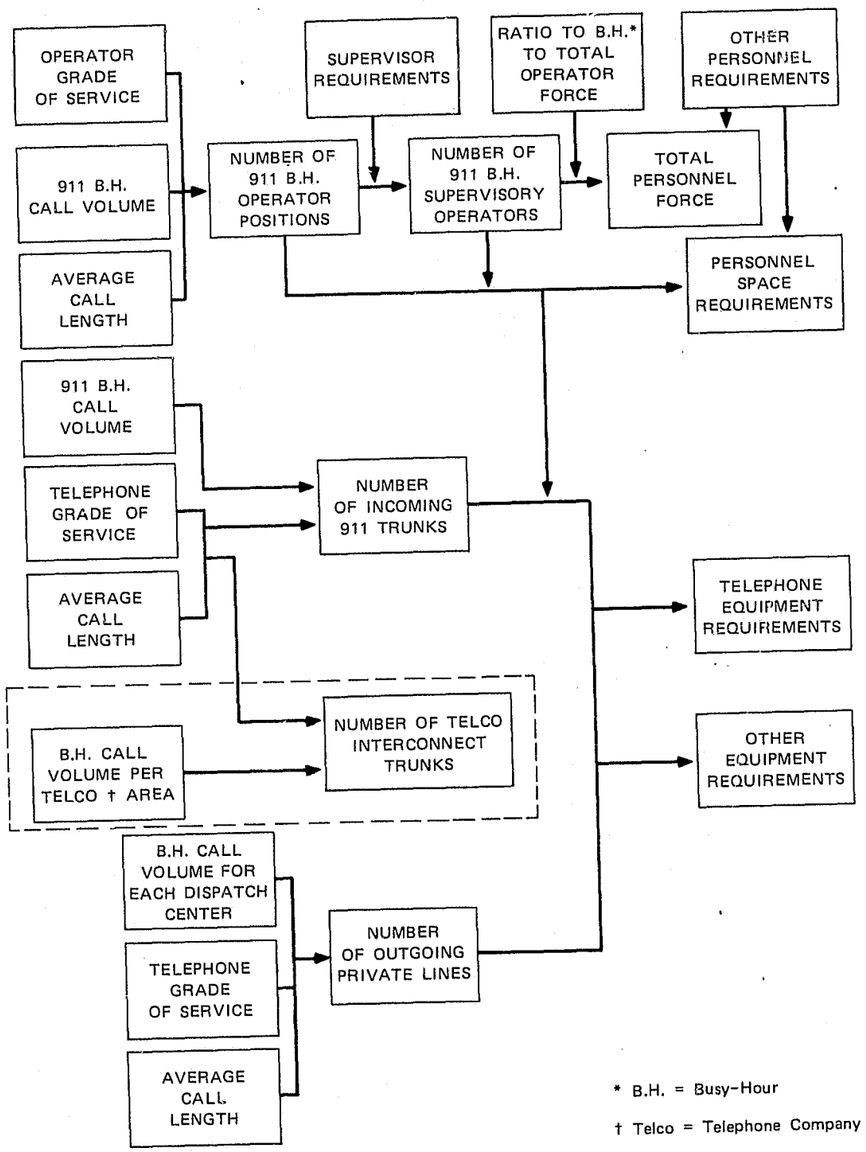

FIGURE 8 911 SYSTEM DESIGN MODEL

3. 911 System Cost Model

The information flow for the 911 system cost model is illustrated in Figure 9. Personnel costs, which are the major component of total recurring costs, are determined by simply multiplying the total personnel force by the personnel salary. Incoming and outgoing line costs and telephone equipment costs are computed using tariffs for the telephone company(ies) serving the 911 system area and varying combinations of sizing parameters. Both initial and monthly costs are computed for telephone lines and equipment.

D. Florida 911 Systems Design

In this section we discuss the parameters used in the design and cost analysis of the many local alternative 911 systems for Florida.

1. Performance and System Sizing Requirements

Four primary parameters are used in calculating the required number of telephone lines and the number of 911 operators needed during the busiest hour of the day. Following is a discussion of each parameter.

a. Grade of Service

The number of required telephone lines is computed on the basis of a particular grade of service. Grade of service, expressed in a technical sense, is the probability of a call being blocked by busy trunks, expressed as a decimal fraction and usually meaning the busy-hour probability. In designs of the systems presented in this report, we have used a busy-hour grade-of-service probability of a call being blocked of 0.01 (sometimes written as P01). This means that no more than one call out of a 100 during the busy hour should receive a busy signal. In its application to a citizen seeking help, this grade (or level) of service

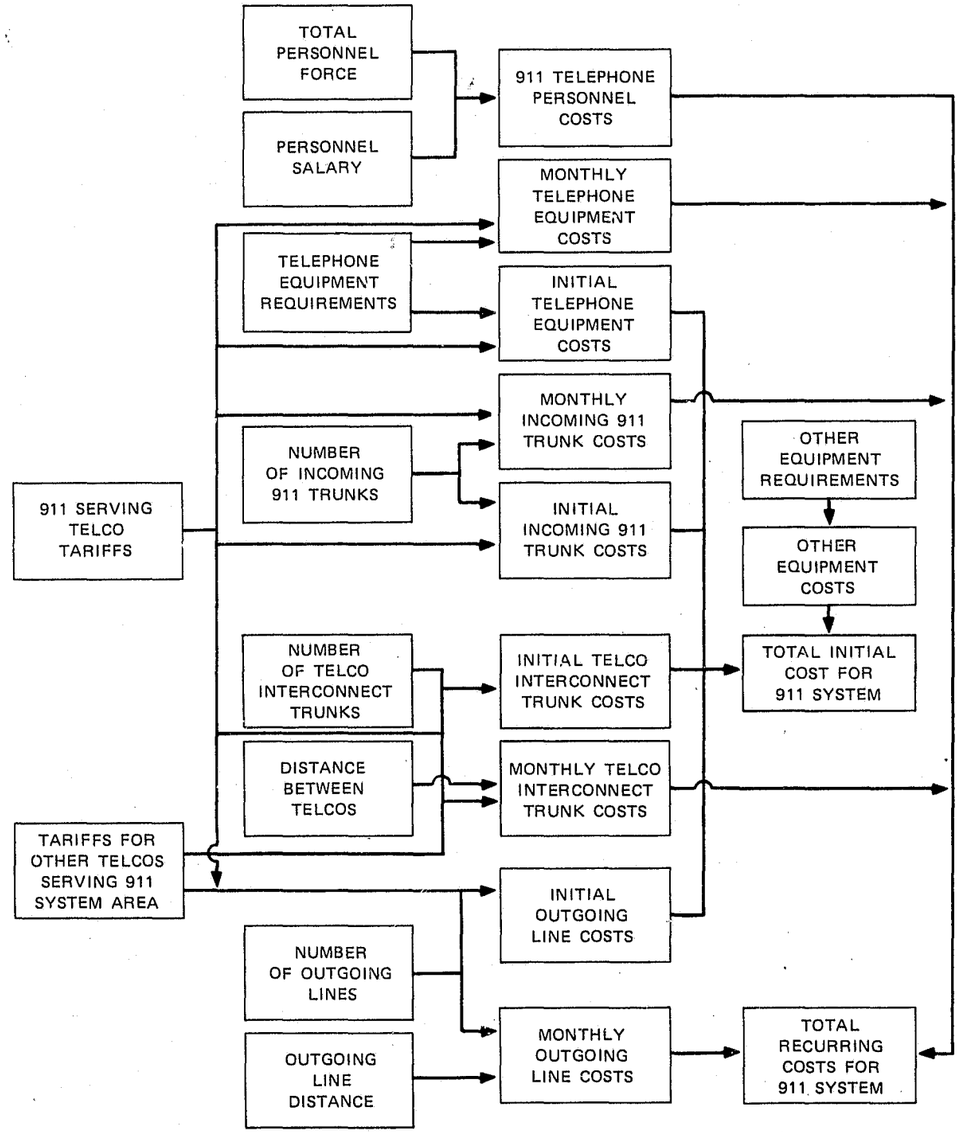

FIGURE 9 911 SYSTEM COST MODEL

means that it is highly unlikely that he will receive a busy signal when he dials 911.

b. Ringdown Time

The length of time that a phone rings before it is answered is called ringdown time. This factor affects both the number of telephone lines and the number of operators required, particularly the latter. We have based our telephone line and operator calculations on a ringdown time of 10 seconds. Given the normal telephone company standard that each ring is 2 seconds long followed by a 4-second pause, a 10-second ringdown time is equivalent to 2 rings.

c. Call Volume

At the beginning of this study, we planned to use the Florida County and Municipal Law Enforcement Communications Plan prepared by the Atlantic Research Corporation as the primary source of call volume data for each of the law enforcement dispatch centers, supplemented with additional call volume information obtained through personal visits and telephone interviews with public safety agency officials in more than 20 counties. However, in our analysis of these data we found inconsistencies between and within the data sources. We believe this inconsistency resulted primarily from the fact that most of the call volume data used in the communication plan and all the data derived in our interviews were obtained by asking the agency officials to estimate their call volumes. For those agencies that had no measured data to rely on, the estimate was reasonably difficult to make and was subject to large variances. Very few agencies acquire statistics on incoming emergency calls; they generally have not had a requirement for this information in the past.

Since the purpose of this study is to develop statewide requirements and costs, the assumptions for deriving call volumes, a key factor in sizing a 911 system, should be consistent throughout the state. For this reason we did not use the call volumes in the Communications Plan directly as given, but rather we used the data to establish a pattern of call volume versus population in Florida. Estimating call volume as a function of population provides the best consistency and has been established as a viable means of approximating public safety call volume in traffic studies throughout the country.

To derive call volume versus population ratios appropriate for Florida, we examined the data from the Communications Plan and compared them with data from other selected areas in the country. Busy-hour call volume per 1000 population for law enforcement agencies in 26 counties in Florida is given in Figure 10. The busy-hour call volume was assumed to be 15 percent of the daily call volume. Three ratio lines for daily call volume per 1000 population are shown: one call per 1000 population, 1.5 calls per 1000 population, and 2 calls per 1000 population.

The traffic analysis for most of the counties in the State Law Enforcement Communication Plan was performed by Atlantic Research Corporation; traffic analysis for Broward, Dade, Monroe, and Palm Beach counties was performed by Northrop Page Communications Engineers. Call volume data in Figure 10 are coded by source. Data are also shown for areas outside Florida for comparison with national experience. Most of the Atlantic Research data lie within the 1/1000 and 2/1000 population lines, but the Page data appear consistently high. This anomaly may result from a difference in survey methodology and definition of emergency call volumes. The Atlantic Research call volume data are more consistent with national experience.

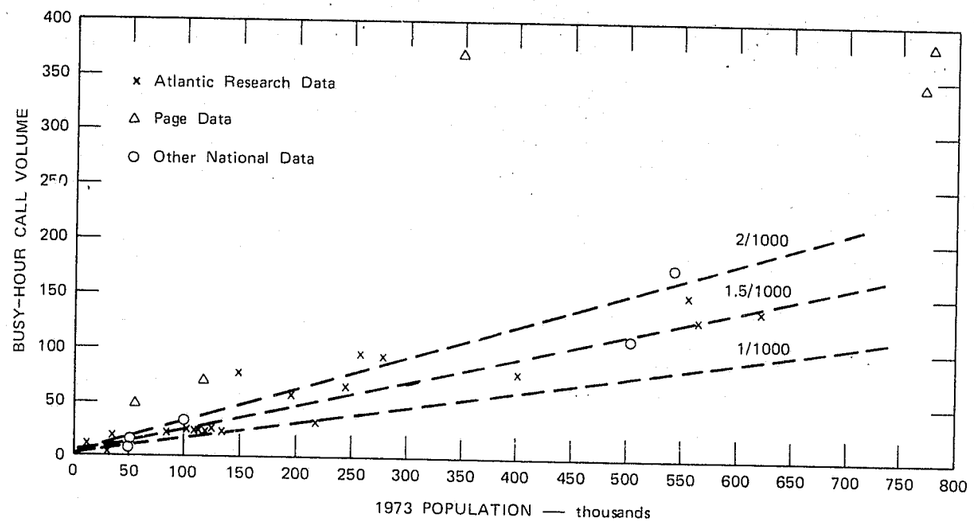

FIGURE 10 BUSY-HOUR CALL VOLUME VERSUS POPULATION FOR 26 FLORIDA CITIES AND OTHER SELECTED AREAS

For the conceptual design we therefore assumed a call volume to population ratio of 1.5/1000 for all counties except for the high crime areas identified in the Communication Plan, where we used the 2/1000 ratio.

For each 911 system area, the call volume for law enforcement agencies was computed using the appropriate ratio with 1975 population projections.* Next, the total daily call volume was computed, assuming that 85 percent of all emergency calls are for law enforcement agencies. From this total, 1 call per 10,000 population per day was designated for emergency medical (E.M.) and the remainder, minus law enforcement (L.E.), was designated for fire protection (F.P.) agencies. These steps can be summarized as follows:

*Population projections for each county in Florida were provided by the State Department of Administration.

$$\text{Call volume}_{L.E.} = 1.5 \times \frac{\text{population}}{1000}$$

$$\text{Call volume}_{Total} = \frac{\text{call volume}_{L.E.}}{0.85}$$

$$\text{Call volume}_{E.M.} = \frac{\text{population}}{10{,}000}$$

$$\text{Call volume}_{F.P.} = \text{call volume}_{total} - (\text{call volume}_{L.E.} + \text{call volume}_{E.M.})$$

Busy-hour call volume, which is the desired design parameter, was then computed to be 15 percent of the total daily volume. Next, 15 percent was added to the busy-hour call volume to allow for flexibility and growth of the system.

d. Call Length

Call length varies with many factors, such as the type of emergency, the service policies and techniques of the agency being contacted, and the individual characteristics of the calling party. Previous studies and our discussions with public safety personnel in Florida indicate that an average call length of one minute is a reasonable estimate for use in a conceptual design. This estimate was used in the 911 operator personnel and telephone line calculations.

2. Personnel Requirements and Costs

The number of 911 operators required to serve an estimated busy-hour call volume is computed using the following Poisson queuing theory equation:*

$$P(>t) = \frac{(\lambda/\mu)^c}{c!(1-\lambda/c\mu)} \cdot \frac{1}{\sum_{n=0}^{n=c-1} \frac{(\lambda/\mu)^n}{n!} + \frac{(\lambda/\mu)^c}{c!(1-\lambda/c\mu)}} \cdot e^{-t(c\mu-\lambda)},$$

where

$P(>t)$ = the probability of having to wait longer than time, t, with all operators busy

μ = reciprocal of average message length

c = number of operators

3600λ = number of calls in the busy hour

In working this equation we used the following values for the constant factors:

- Average message length = 60 seconds
- t = 10 seconds (ringdown time)
- $P(>t) = 0.1$.

The end result, then, indicates the number of operators required to service a given busy-hour call volume so that the probability of a caller having to wait longer than 10 seconds is 0.1 (10 percent). Another way of saying

*Thomas L. Saaty, "Elements of Queueing Theory," pp. 115-116 (McGraw-Hill Book Company, Inc., New York, New York, 1961).

this is that during the hour of the day having the highest volume of incoming 911 calls, the longest time that 90 percent of the callers will have to wait before their call is answered is 10 seconds (2 rings). Ten percent of the callers may have to wait longer than 2 rings. During the other hours of the day, however, the actual waiting time would be much less than 10 seconds.

The total number of operators required to man a 911 center 24 hours a day, 7 days a week, depends on the number and distribution of emergency calls throughout the entire 24-hour day. The nonbusy-hour call volume distribution is not available for Florida's public safety agencies and would have to be obtained during the actual engineering design. Based on the diurnal call volume variation experienced by public safety agencies throughout the country, the following set of factors was derived:

Number of Busy-Hour Operators	× Factor	= Total Operator Force
1	5	5
2	4	8
3	3	9
4 or more	2.5	10 or more

The above factors, when multiplied times the busy-hour operator force size, will give the total operator force required; they take into consideration that each operator position (in multiposition 911 centers) will not have to be manned 24 hours a day, and that the total operator force will have to be large enough to allow time off from work for sick leave, vacation, and regular days off.

We recommend that if the busy-hour operator force consists of five or more operators, there be an additional position manned by a supervisory operator. This operator's main duties will be to supervise the

911 operators on duty, train new operators, handle special problems, and act as a 911 operator in the event of an unexpected high volume of calls. The supervisory operator's work station will have the same equipment as a regular operator's station, plus whatever extra materials the operating agency may deem necessary.

Since the nonbusy-hour call demand is not available, we are assuming that the supervisory operator position will have to be filled during only one shift each day--the shift during which the busy hour occurs. Considering the necessity of time off for vacation, sick leave, and regular days off, three supervisors will be needed to man one supervisory position for one shift each day, seven days a week.

The 911 centers that do not require a supervisory operator or that have one or more shifts that do not require a supervisory operator can appoint one operator on each shift as the senior operator. The senior operator would then have the position of responsibility and authority.

In our survey of various public safety agencies in Florida, we obtained estimates of current monthly salaries for emergency telephone answering personnel. The purpose in obtaining this information was to develop a data base of salary range experience in Florida for use in estimating average emergency operator salaries for 911 system costing. In many of the agencies contacted, especially those with a relatively small daily call volume, personnel answering emergency calls are not actually classified as "operators," as they would be in a 911 system, but rather are police officers, firemen, clerks, and the like. For this reason, existing emergency operator salaries will not be directly comparable to future 911 operator salaries in all cases. However, the salary data obtained does provide a basis for making a reasonable estimate of average statewide emergency operator salaries for use in 911 system costing.

A comparison of these salary data indicates large salary variations among agencies. This spread in data reflects both the variation of base salaries among counties and the variation in types of telephone answering personnel among the agencies surveyed. In a public safety agency, the emergency call answering personnel may be all civilians, all sworn officers or firemen, or a combination. In general, salaries for civilians are lower than salaries for sworn law enforcement and fire personnel. Following is a summary of the salaries obtained in terms of three personnel categories:

Type of Personnel	Number of Samples	Average Salary	Range of Salaries
Police officer	14	$647	$400-$1025
Fireman	7	726	350-1000
Civilian	27	579	367-960

Average salary estimates for civilian and police officer answering personnel versus population size for the 19 counties surveyed are shown in Figure 11. The averages shown were derived from a sample survey of agencies in each of the 19 counties; and therefore are not absolute averages for these counties but rather are representative of the state as a whole.

We selected two average monthly salaries for 911 operators for use in estimating system costs: $600 for 911 system areas with a population below 400,000 and $700 for areas with a population above 400,000. The estimates selected are slightly inflated over average existing salaries to account for fringe benefits. The reason for using two salary estimates based on population is that 911 systems serving densely populated areas will experience larger call volumes and more complex operational procedures than sparsely populated areas and therefore will have more demanding requirements for training and qualifications of personnel.

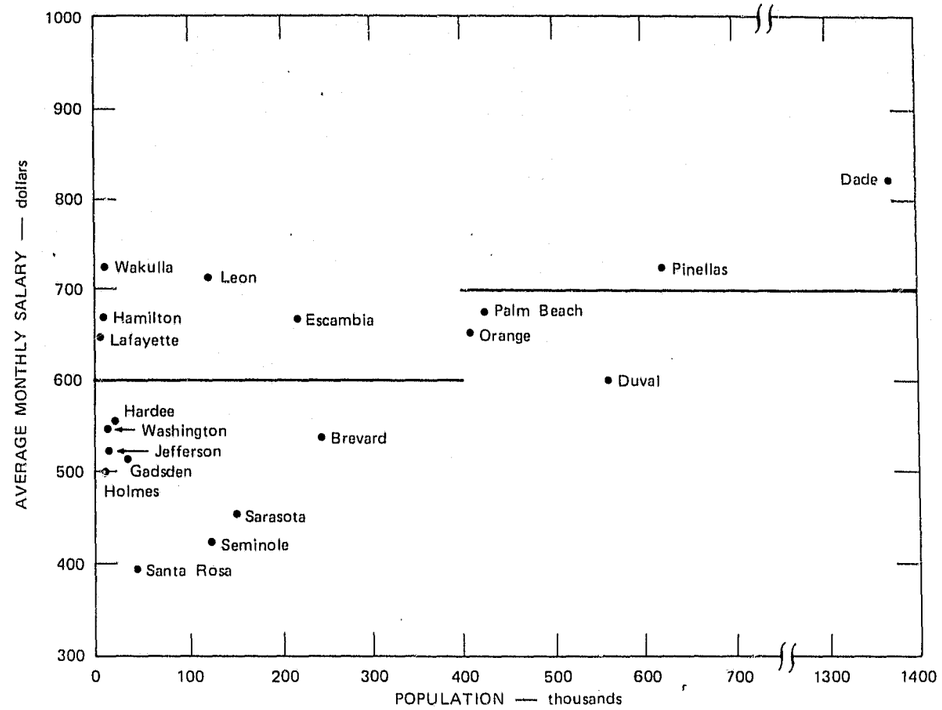

FIGURE 11 AVERAGE MONTHLY SALARY FOR EMERGENCY ANSWERING PERSONNEL VERSUS POPULATION FOR SAMPLED ANGENCIES IN 19 COUNTIES

An average monthly salary of $900 was used to estimate the cost of supervisory personnel.

The average monthly salary estimates that we have used are for costing purposes only and should not be taken as recommended salaries. Actual salaries for 911 operator personnel will vary and should be consistent with local system personnel requirements and local salary rates for comparable positions.

By using average statewide salaries in 911 system costing, personnel costs in some instances may differ from actual costs, but overall statewide costs will be reasonably accurate. To obtain costs that take

into account unique local area characteristics, officials can readily modify the cost data in Table 12 (shown later in subsection V-B-1) by substituting their own proposed personnel salaries in place of the averages given.

3. Telephone System Requirements and Costs

a. Telephone System Requirements

A 911 system has the following four primary telephone components:

- Incoming 911 trunks from the public to the 911 center.
- Outgoing private lines from the 911 center to dispatch agencies and to other 911 centers.
- Terminal equipment.
- Optional service features and equipment.

The incoming 911 trunks can be provided using either tandem or direct trunking. In tandem trunking all 911 calls are routed by the telephone company in whatever manner it chooses to the telephone central office (CO) providing service to the 911 center, and the 911 center then leases the required number of lines between this serving CO and the 911 center to handle the estimated busy-hour call volume. In direct trunking the 911 center leases a sufficient number of direct lines between each CO in the 911 service area and the 911 center. Direct trunking thus requires more lines than tandem trunking. We have designed the local alternative 911 systems and made cost estimates for them on the basis of tandem trunking.

Direct trunking is more expensive than tandem trunking because of the greater number of telephone lines required, but direct trunking is a prerequisite for certain optional features that will be discussed later in this chapter.

Outgoing private lines are necessary to transfer callers reporting an emergency or to relay the necessary information to the correct dispatch center. The number of lines required depends primarily on the estimated volume of calls that the dispatch center will receive in its busy hour.

Private lines will also be necessary in some cases to connect adjacent 911 centers with each other. The purpose of these lines is to provide the capability of transferring callers or their information when the caller is involved in a telephone boundary/jurisdictional overlap. These lines could also be used as coordination channels in the event of a common emergency affecting two adjacent 911 system areas. The exact number of these interconnecting lines will have to be determined during the actual systems engineering design phase.

A variety of terminal equipment is available from Florida's telephone companies for use in 911 centers. In the conceptual designs presented in this report, we have assumed the use of switchboards (PBXs or PABXs).

We have not used key telephones as alternative 911 center terminal equipment in our conceptual designs because a key telephone set generally does not have call transfer capability. It is technically possible to provide a key telephone set with the capability to transfer calls, but a special assembly request would have to be made to the telephone company, which would then engineer the necessary equipment and specify a rate. The use of key telephone equipment instead of switchboard equipment should be investigated further during the actual engineering design, especially by 911 centers that will require only one or two operator positions.

b. Telephone Line Calculations

To calculate the required number of telephone lines needed to handle traffic between two locations, values must be obtained for the following parameters:

- Busy-hour call volume
- Average call length
- Ringdown time
- Grade of service.

These parameters were discussed earlier in this chapter.

To compute the number of lines required to service a particular busy-hour call volume, the requirement was first converted into hundred call-seconds (CCS). The formula for this computation is:

$$\text{CCS} = [\text{No. of busy-hour calls} \times \text{average holding time (in s)}] ,$$

where

$$\text{Average holding time} = [\text{average call length (in s)}] + [\text{ringdown time (in s)}] .$$

When we had computed the CCS, this value was then looked up in standard telephone trunk capacity tables that list the required number of lines for a given CCS and grade of service.

The busy-hour call volumes we used in our calculations are dependent on several assumptions, the most sensitive of which is population. Some local 911 systems may require more incoming 911 lines than we have computed because the actual population in their area is greater than the official population estimates. During the actual engineering design if

any area is found to require more lines than we have calculated, the cost increase will be minor.

c. Telephone System Costs

The service and equipment charges presented in this section that have been used for estimating telephone system costs are neither exact nor have they been applied to all types of services and equipment available in Florida's regulated telephone industry. The information presented is sufficient, however, for arriving at the approximate costs.

(1) Incoming 911 Trunks

Where the 911 center's service area is served by only one telephone company, we have assumed that all 911 calls will be routed to the 911 center's serving CO at the telephone company's expense, and that the 911 center will pay only for the lines needed between the serving CO and the 911 center.

These lines were priced as exchange service (within the base rate area), one-party, business trunks. We have assumed in all cases that the 911 center is within the base rate area of its serving CO. Table 7 shows the rates used to cost these lines. The approximate rates that we have used are slightly on the high side, and therefore the actual costs of the 911 trunks may be slightly less than we have calculated. The number of main stations served can be determined from the tables given in Appendix D of this report.

Where the 911 center's service area is served by more than one telephone company, we have assumed that there will be an additional cost to route 911 calls from the other telephone company service area(s) to the 911 center's serving CO. We have estimated the number of busy-hour calls originating in each telephone company's service area for

Table 7

APPROXIMATE EXCHANGE, ONE-PARTY, BUSINESS TRUNK RATES

Telephone Company	Number of Main Stations Served	Per Trunk	
		Monthly Basic Rate*	Initial Service Connection Charge
Florala	--	$12.75	$20.00
Florida Central	--	16.00	30.00
Florida State	--	11.00	15.00
Florida Telephone Corp.	0-6000	16.00	30.00
	6000-20,000	18.00	
	Over 20,000	20.00	
General	0-5000	15.00	20.00
	5000-25,000	17.00	
	25,000-90,000	20.00	
	Over 90,000	23.00	
Gulf	--	16.50	25.00
Indiantown	--	8.00	20.00
Northeast Florida	--	10.00	30.00
North Florida	0-2000	17.00	30.00
	2000-5000	18.50	
	Over 5000	20.00	
Orange City	--	9.50	12.00
Quincy	--	17.25	30.00
St. Joseph	--	9.50	5.00
Southeastern	0-4000	17.00	30.00
	4000-20,000	20.00	
	Over 20,000	22.00	
Southern Bell	0-6000	15.00	41.00
	6000-29,000	17.00	
	29,000-110,000	20.00	
	Over 110,000	22.00	
Southland	--	8.00	4.00
United	0-3700	12.00	16.00
	3700-14,400	14.50	
	Over 14,400	16.30	
Vista-Florida	--	19.50	9.00
West Florida	--	10.00	25.00
Winter Park	--	16.50	22.50

*If lines terminate in a PBX, multiply these monthly rates by 2. (This is the case in our assumptions.) If lines terminate in a key system, multiply these monthly rates by 1.5.

each local 911 system area being served by more than one telephone company. For calculating monthly trunk costs we measured the distance between the serving CO and the CO of the other telephone company(s) nearest the serving CO. These interconnecting telephone company lines were priced at $3 per mile per trunk per month, plus an initial one-time charge of $20 per trunk.

When the 911 system engineering design work is done in the future, we suggest that the feasibility of using foreign exchange (FX) trunks for interconnecting the telephone companies to be investigated. This type of trunking would enable the 911 operator to know in which telephone company area (and thus in which geographical area) a 911 emergency call was originating.

(2) Outgoing Private Lines

When a dispatch center that is connected to the 911 center by private line and the 911 center are both served by the same CO, the distance was measured straight-line, point to point between the two agencies. The same type of measurement was used when the two agencies are served by different COs even though the exact procedure calls for measuring the sum of three different distances: the distance from the 911 center to its serving CO, the distance from the 911 center's serving CO to the dispatch center's serving CO, and the distance from the dispatch center's serving CO to the dispatch center. We feel that the slight error introduced by this simplified distance measuring procedure has only a very minor effect on monthly telephone costs and no effect on initial costs. The monthly cost of these lines was computed on the basis of $3 per mile per trunk per month.

The initial cost for these lines is applied to each end of each line. If each end of a given line terminates in a different

telephone company's territory, the initial charge may be different for each end of the line. Since there is a wide variation in the tariffs covering private line channel termination charges, we have assumed the following costs:

- Southern Bell--$50 for the first line and $25 for each additional line terminating at the same location.
- All other telephone companies--$10 for each line.

We recommended investigating the possible use of a bulk telephone service offering called "TELPAK" between agencies that have to be connected with a large number of private lines. This offering allows a telephone customer to take advantage of economies of scale when he requires a large number of lines between two locations.

(3) Terminal Equipment

Most telephone companies can supply a variety of terminal equipment configurations to meet an individual user's needs. For our conceptual design costing we have used PBXs.

Table 8 shows the information that we have used for estimating 911 center PBX costs. Again, we have assumed one set of information for Southern Bell and another set for all other Florida telephone companies because of tariff variations.

4. Recording Equipment Requirements and Costs

All calls into and out of 911 centers will have to be recorded on magnetic tape by master logging recorders, just as incoming emergency telephone calls are now recorded at dispatch centers. These audio recordings will provide a record that can be used in the event of any litigation or any dispute between the 911 center and one of the radio dispatch centers

Table 8

APPROXIMATE TERMINAL EQUIPMENT COSTS FOR A 911 CENTER

Telephone Company	No. of Busy-Hour Operator Positions	Cost per Position		Trunks*			Stations*		
		Initial	Monthly	Max No.	Cost per Trunk		Max No.	Cost per Station	
					Initial	Monthly		Initial	Monthly
Southern Bell	1	--	$ 80	8	None	None	80	None	None
	2 or more	$150	150	160	None	None	1600	None	None
Other telephone companies	1 or 2	20	32	10	$10	$12	39	$10	$5
	3 to 5†	100	40	60-225	10	12	600+	10	5
	6 or more	180	65	U‡	10	6	U	10	5

*"Trunk" refers to an incoming 911 line to the 911 answering center. "Station" refers to an outgoing private line from the 911 center.

†The following charges apply to these configurations:

Item	Cost Initially	Cost Monthly
Each group of 6 trunks	$ 10	$ 5
Visual busy-line indication	250	90

‡U = Unlimited

that it serves on how and when a call was handled. We realize the potential inconvenience of having to collect tape recordings from different locations (dispatch centers and the 911 center) if they are required for legal proceedings, but such recordings are absolutely necessary to document the handling of every emergency call.

For the purpose of costing recording equipment we estimate that a 10-channel (including a time channel) logging recorder costs about $4000 and a 20-channel (including a time channel) logging recorder costs about $6000.

In addition to the multichannel master logging recorders, we recommend that each 911 operator position be equipped with an endless loop or cassette-type recorder. This type of recorder automatically records both sides of every emergency call and provides the operator with an immediately accessible record of the call (without interrupting the master logging recorder) if the information must be repeated or reconfirmed but the citizen is no longer available to provide it. We estimate the cost of this type of recorder is $1000.

We have not included the cost of the reproducers that are needed to play back recordings made on the master logging recorders. We feel that enough reproducers are currently used by local agencies so that one could be easily accessed when necessary.

5. Facilities Requirements

If the 911 center is collocated with an existing radio dispatch center, some of the floor space will have to be dedicated to 911 but much of the facility can be shared between the 911 and the radio dispatch functions. Following are the types of floor space in a shared facility that the 911 system will affect:

- 911 operator positions
- Storage space for supplies
- Restrooms
- Telephone line logging recorder space
- Air-conditioning and heating equipment space
- Telephone company equipment room
- Miscellaneous space.

The degree to which the sharing of the above space is possible varies by locality for Florida's public safety agencies. Therefore, in making estimates of the space required, we will consider only the space needed for the 911 operators. National experience shows that a reasonable estimate of the space required by one 911 operator is 45 square feet.

Some agencies may wish to consider building a new facility or remodeling an existing structure to house 911. Table 9 gives floor space estimates for three sizes of 911 centers.

The estimated cost of constructing a new building is approximately $39 per square foot.* This estimate does not include the costs of telephone company connections and equipment, furniture, land, electronic equipment, or supplies.

The cost of renovating an existing building to house a 911 center can vary from 50 percent to 100 percent of the cost of a new building. The exact percentage would depend on the type of structure, demolition required, utilities available, offstreet parking available, and other factors.

During our visits to many of Florida's local public safety agencies, we observed that some of them have adequate space to house

*Based on Florida building costs for March 1974.

Table 9

APPROXIMATE 911 CENTER SPACE REQUIREMENTS
FOR SEVERAL OPERATOR FORCE SIZES

Type of Floor Space	Square Feet Required by Number of Operator Positions		
	2	6	10
911 operator positions	90	270	450
Supervisory operator position	--	50	50
Administrative office	300	400	400
Storage space	200	200	250
Two restrooms, each with storage area for personal belongings	200	400	500
Small kitchen and emergency foodstuffs supply storage area	100	400	400
Telephone trunk logging recorder	20	20	20
Emergency power generator	100	100	100
Air conditioning and heating equipment	100	200	200
Telephone company equipment room	150	200	250
Miscellaneous space for walkways and other needed materials (approximately 20% of the above space)	250	450	530
Total space required	1,510	2,690	3,150

the 911 function and will not have an additional facility expense to make room for 911.

6. Optional 911 Features

The applicability to 911 systems of a number of special telephone service options is often discussed. Definitions of some of these optional features are presented in Table 10.

Because of the many possible combinations of terminating equipment, types of trunking, types and capabilities of telephone company

Table 10

911 TELEPHONE SERVICE OPTIONS

Option	Description
Called-party hold	Enables the 911 center to hold a connection through the local central office by remaining in an off-hook position. The connection is held regardless of the status of the originating party's switchhook. This feature would permit manual trace of the call. Available only when direct trunks (not tandem routing) are employed.
Ringback or callback	Enables the 911 operator to hold and ring the calling party after the connection has been broken by the calling party. This feature is usually limited to calls from 1- and 2-party lines. It also requires direct trunking and called-party hold as necessary prerequisites.
Idle trunk tone application	Enables the 911 operator to determine whether the calling party hung up before his call was answered, or whether he is on the line but is unable to speak.
Forced disconnect	Enables automatic release of a 911 trunk on disconnect by the 911 center, independent of the calling party's switchhook. It is designed to enable the 911 center to avoid tieup or intentional jamming of the incoming 911 lines. The speed of disconnect depends on the type of central office switching equipment.
Visual originating exchange identification	The 911 operator's console has a separate lamp for each incoming 911 line. This would allow identification of the telephone exchange where the call originates. Not available when an automatic call distributor (ACD) or tandem trunking is used.
Audible originating exchange identification	The name of the central office from which the call originates automatically precedes each 911 call as a recorded announcement. This option can be employed where an ACD and tandem routing is used.
Recorded announcement capability	Enables the 911 center to have any incoming calls that encounter a busy signal answered by a recorded message identifying the center or saying whatever is desired. The content of the recording would be controlled and changed as necessary by the 911 center. This option can be employed when an ACD is used.
Automatic number identification (ANI)	Central office equipment automatically determines the telephone number of the calling party and transmits it to the 911 center. This service has not been implemented by any present 911 system.
Automatic location identification (ALI)	The address location from which a call is placed is identified electronically. This service has not been implemented by any present 911 system.
Selective call routing	911 calls would automatically be routed to the proper jurisdiction, regardless of telephone company central office boundaries. This service has not been implemented by any present 911 system.
Coin-free dialing or no-coin dial tone	Permits coin station dialing and connection to the 911 center without the deposit of a coin.

central office equipment, and the like, most (all for some companies) of the optional features cannot be priced until a specific detailed request is made to the telephone company for a special assembly. The resultant costs and implementation time will vary by telephone company and with the particular 911 system that would employ the option.

Called-party hold is a useful extra feature if the 911 center will have a large demand for holding a caller on the line while the call is traced to determine the caller's location. Called-party hold, although it might be a desirable optional feature for some 911 systems, can raise the telephone costs considerably because dedicated trunks (rather than tandem trunks) are required. Direct trunking can increase the costs of incoming 911 trunks by as much as a factor of four over the costs of tandem trunks. In some cases the 911 center terminal equipment costs would also be increased because of the additional number of lines that would have to be accommodated by the equipment. The difference between tandem and direct trunking was discussed above in subsection D-3-a.

For Florida, we recommend that the decision on called-party hold be made exclusively by local officials on the basis of their perception of its need and applicability, rather than by the state. Concomitantly, the cost of called-party hold should be borne entirely by local governments regardless of state subvention policies for the basic 911 system. We base this recommendation on called-party hold being a feature that is not essential on a statewide basis for the safety of life and property, but rather a feature for which need might be felt in particular communities.

Southern Bell offers called-party hold at no additional charge on 911 systems that have direct trunking; other companies require an individual special assembly request.

"Callback" or "ringback" would be used to call back the party who has just hung up, perhaps because the 911 answerer wants to obtain more information. Since this optional feature has only a limited application and also requires the added expense of direct trunking and called-party hold, the decision of whether to include this option in a local 911 system should be made solely by local officials. If implemented, the cost should be paid entirely by the local governments. The cost of this feature would have to be determined by submitting a special assembly request to the telephone company providing the service.

The primary benefit of idle trunk tone application would be to determine that a caller was still on the line but was unable to speak. This situation could occur when a caller loses consciousness because of some medical emergency. If this was determined to be the case, the 911 center could initiate a trace of the call to determine where emergency assistance should be sent.

This feature is offered by Southern Bell at no charge on 911 systems and should therefore be requested by all 911 centers that will be served by this company. Other telephone companies can provide this feature as a special assembly request, the cost of which is unknown. The requirement for this feature of 911 centers not served by Southern Bell should be determined by the local agencies involved on the basis of their perception of its need. Since this feature is not essential on a statewide basis, we recommend that its cost, if implemented, be borne entirely by the local governments being served by it.

As pointed out in Table 10, the forced disconnect feature would enable the 911 center to keep its incoming 911 lines from being maliciously jammed. Intentional jamming of these lines could effectively close down a 911 center. The potential threat of this possibility and the real need for this special feature must be determined by local officials. Since

this feature will not be required by every 911 system, its cost should be borne by the local agencies ordering its implementation.

Since Southern Bell offers this option at no charge on 911 systems, centers that will receive telephone service from this company should request this feature. The other companies can provide this feature as a special assembly request.

Visual originating exchange identification could be provided at a minor additional cost for a 911 system having direct trunking of incoming 911 lines. This feature would enable the 911 operator to determine from which telephone company exchange, and thus from which specific geographical area, the emergency call is originating. We recommend implementation of this feature where direct trunking is employed if an automatic call distributor (ACD) is not used as terminating equipment.

Audible originating exchange identification can be provided in a 911 system where tandem trunking is used, but only if an ACD is used as terminating equipment in the 911 center. This feature, like the visual originating exchange identification feature, would provide the 911 operator with the name of the telephone company central office from whose service area an emergency call is originating. The cost of this option, if implemented, should be borne solely by the local governments because it is not an essential component of a 911 system. A special assembly request would have to be submitted to the telephone company involved to determine the charge.

A recorded announcement capability would be a desirable option for 911 systems serving a large population and where unpredictable system overloads might occur frequently. An analysis of historical calling volume data will indicate candidate areas where this feature might be considered. If implemented, however, we recommend that the cost of this

special feature should be borne by the local governments involved because it is not a feature required by all 911 systems.

This feature is included when an ACD is used. Its cost for use without an ACD would have to be determined by submitting a special assembly request to the telephone company supplying the service.

We feel that ANI and ALI are desirable features in and of themselves but do not believe that either is critical to the feasibility or implementation of 911 in Florida. ANI and ALI would not be any less or more desirable if the present 7-digit system were retained; their benefit is primarily operational to public safety agencies and does not affect the institutional form of 911.

Selective call routing was discussed in Chapter III of this report.

We agree with the public safety community that coin-free dialing of 911 would be a valuable adjunct to 911 in Florida. It has the potential of allowing a large decrease in response time for emergency calls made from public pay stations. This is not, however, a feature that can be ordered from the telephone companies by local governments. The decision of whether to implement this feature can be made only by the Florida Public Service Commission (PSC). The Florida PSC is currently in the process of rule making that would make implementation of coin-free dialing of 911 mandatory by all Florida telephone companies.

7. Data Sources

We obtained the various data used in designing the alternative 911 systems for Florida from many sources. Our primary data sources were:

- State Division of Communications.
- State Division of Forestry.
- State-County-Municipal 911 Task Force.
- Florida's telephone companies.
- Florida Public Service Commission.
- Personal visits and telephone interviews with many local and state public safety officials.
- The Florida County and Municipal Law Enforcement Communications Plan prepared by Atlantic Research Corporation.
- Volume II of Phase II of the Florida Region VII Criminal Justice Communications Project prepared by Northrop Page Communications Engineers.
- Census data from the State of Florida and U.S. Bureau of the Census.
- National experience with 911.
- U.S. Government maps.
- Published reports, papers, and articles on 911.

As an aid to the conceptual design process we constructed composite maps, using the official General Highway map(s) of each county as the base, showing the following approximate boundaries and locations:

- Boundaries of telephone company exchanges and central office service areas.
- Locations of telephone company central offices.
- Boundaries of fire department service areas.
- Locations of fire department dispatch centers or headquarters stations.
- Locations of law enforcement dispatch centers.
- Jurisdictional city limit boundaries.

These maps were used primarily to measure distances for calculating monthly telephone line costs and to determine the extent and type of the boundary mismatch problems. Because the maps are quite bulky and

are subject to continuous modifications, they have not been included with this report but will be on file at the Division of Communications.

E. Connection with Public Safety Dispatch Facilities

The basic 911 system design for Florida includes the following public safety agencies: local law enforcement, local fire protection, ambulance services, Division of Forestry, and State Highway Patrol. Requirements for including additional agencies in local 911 systems will vary considerably with the area being served and should be revised and solidified on the basis of local requirements.

There are approximately 400 law enforcement agencies, more than 650 fire protection agencies, and approximately 200 ambulance services and rescue agencies in Florida. The total number of agencies that would be connected with 911 answering centers is smaller than this because some of the agencies participate in cooperative dispatch centers. In some cases a sheriff's office or police department performs dispatching for several fire protection agencies, as well as for other law enforcement agencies.

Florida's Communication Plan was used to identify and locate law enforcement dispatch centers. Although the Communication Plan has not yet been implemented throughout the state and may be modified, it provides a consistent and retractable data base.

Information on names and locations of fire protection agencies in Florida was obtained from the State Division for Forestry and augmented by discussions with local fire protection agency officials. However, there was no centralized information indicating which of these agencies dispatch for themselves or are dispatched by another agency. Contacting each of the agencies would have required an extensive effort that was incompatible with the scope and time frame of this study. Instead, we

developed a technique for estimating the number of fire dispatch centers based on a sample survey of 17 counties. The estimation technique assumes a functional relationship between the total number of fire departments and the number of fire dispatch centers in a county. The data from the counties surveyed are given in Figure 12. A correlation coefficient of 0.90 indicated a strong relationship in the measured data between the total number of fire departments and the number of fire dispatch points. From the measured data, a linear least-squares-curve fit was derived. The curve provides a better approximation of the number of dispatch centers

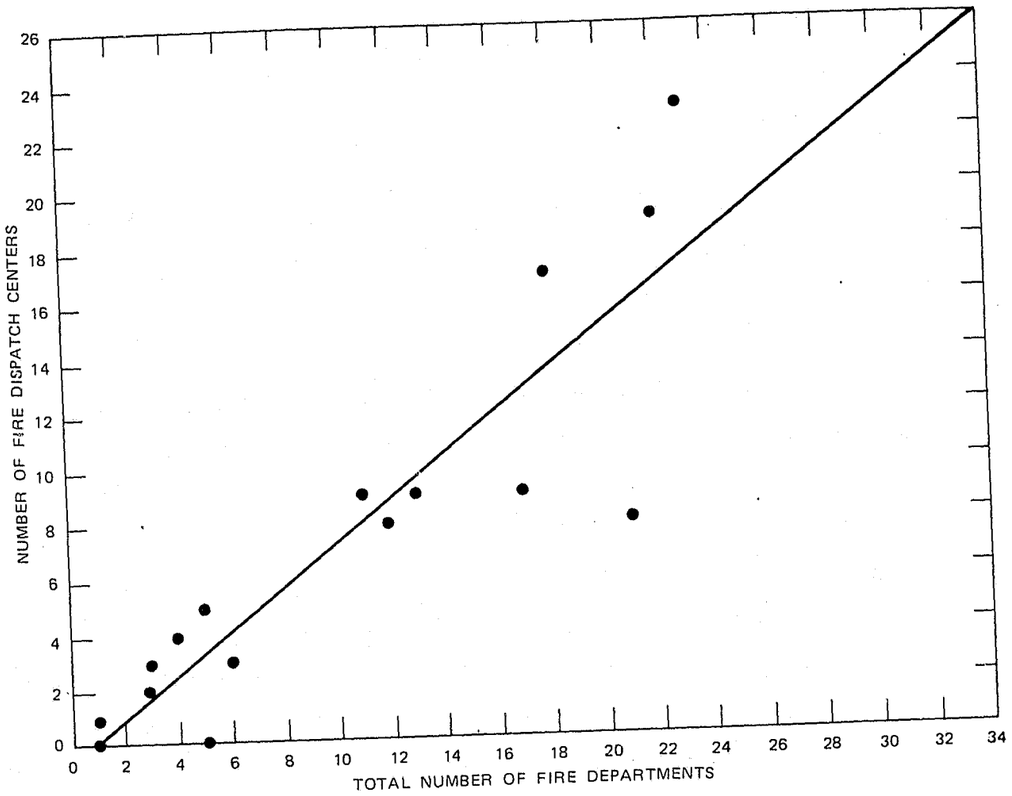

FIGURE 12 NUMBER OF FIRE DISPATCH CENTERS AS A FUNCTION OF THE TOTAL NUMBER OF FIRE DEPARTMENTS FOR 17 FLORIDA COUNTIES

for counties with ten or fewer fire departments than for those with more than ten where the spread of data points is greater. However, more than 65 percent of the counties have fewer than ten fire departments.

Total line mileage between the 911 centers and the fire dispatch centers was estimated by multiplying the average distance to fire departments in each 911 system by the predicted number of dispatch centers. This average distance was also used in estimating line mileage between the 911 centers and ambulance service centers since it represented a measure of distance specific to each county. Statewide 911 system costs are not significantly sensitive to the errors introduced by these approximations because line mileage charges are a small component of overall costs. Distances to all other agencies were determined by map measurement.

F. Volunteer Fire Department in a 911 System

Most of the volunteer fire departments (VFD) in Florida do not have specific individuals on duty at all times to answer incoming emergency telephone calls. This sometimes results in a long response time in providing fire fighting service. These VFDs should not be criticized for this situation, however, because without their services many citizens would have no fire protection at all; at the least, the response time for travel by other fire fighting agencies to cover areas now serviced by the VFDs would be much longer than that currently experienced.

Emergency telephone answering and/or notification of volunteer firemen of a fire call is accomplished by VFDs using one or more of several different methods. In some cases, when the VFD emergency number is dialed, special telephone equipment causes the call to ring at the home (or place of business) of each volunteer. The first fireman who answers the telephone obtains the required information and then remains on the line to inform the others as they check in. In other cases, several emergency

numbers are listed for a given VFD, and the caller just keeps trying numbers until he contacts someone who can provide assistance. Sometimes VFDs have an arrangement whereby some other emergency agency answers their emergency calls and then it notifies the volunteers. In addition to the above example procedures, a siren is usually also sounded at the VFD's fire station to alert all firemen of the fire emergency.

To improve VFD response time, especially in the more rural areas of Florida, we suggest that the feasibility of using one of the following two methods be investigated for 911 centers to notify certain VFDs of emergency calls:

- Answering of VFD emergency calls for some VFDs by State Division of Forestry (DOF) dispatch centers.
- A special telephone number for use by 911 operators that rings at the home and/or place of business of each volunteer fireman.

The DOF works closely with many of the VFDs, especially those in rural areas, and has an interest in seeing them improve their response capability. Where appropriate, the DOF and VFDs should enter into discussions to determine if the DOF dispatch center serving a local 911 system area should be designated as the location to which the 911 operators should route VFD emergency calls.

In addition to reducing the response time of those VFDs that adopt the preceding procedure, the telephone system costs of 911 would also be reduced because private lines would no longer be needed to connect the 911 center with these VFDs.

Some VFDs, especially those that now have more than one emergency number listed in the telephone directory, may wish to consider adopting the use of special telephone equipment whereby the 911 operator dials a private, unlisted telephone number that rings simultaneously at the home

and/or place of business of all or selected members of a VFD. This procedure would greatly improve response time in most cases.

The cost of this telephone service varies by telephone company and also depends on the number of firemen that would be connected to the system. The charge for this service can be determined by contacting the telephone company that would supply the service.

V CONCEPTUAL DESIGN OF ALTERNATIVE LOCAL 911 SYSTEMS

This chapter develops alternative 911 system concepts or configurations for specific areas throughout the state. As the groundwork for this development, a general discussion of alternative 911 system configurations is provided, together with an explanation of the rationale used in developing the local 911 solutions in Florida.

The local 911 system area configurations presented here are, except for a few modifications, essentially the same as those described in the preliminary report published in March 1974. Discussions with the local alternatives subcommittee of the 911 task force, various public safety officials throughout the state, and individuals in the State Division of Communications resulted in some modifications to the original set.

Sizing requirements for personnel, lines, telephone equipment, and facilities, together with resulting recurring and initial costs, are presented for each of the local 911 systems for the basic call transfer-direct dispatch method of operation. The call relay method of operation is discussed as it applies to high crime areas.

A. 911 System Configurations

We define a 911 system configuration in terms of the organizational and functional structure of the system between the answering center and the dispatch center of the participating public safety agencies. Variations in configuration result from varying levels of centralization of the answering center (i.e., the number of jurisdictions and public safety agencies included in one system) and from varying levels of centralization and consolidation of the dispatch centers. The range of configuration

alternatives, then, can be defined by one of two limits: completely fragmented and localized answering and dispatch, or extensive centralization of authority and of 911 answering and dispatch. Within this range, the alternatives chosen for a particular area are a function of the area's special requirements and characteristics.

There are, of course, advantages and disadvantages associated with each level of centralization and consolidation in a 911 system. With a single-jurisdictional or localized 911 system, the agencies retain the greatest degree of control over the level and quality of emergency service, and, providing there is little boundary mismatch, the associated cost and implementation time--from the local point of view--may be relatively small. However, in terms of a statewide 911 system, this fragmented implementation could potentially be the most expensive and may result in the poorest service to the citizen. This kind of system also depends on a great deal of local coordination to overcome boundary mismatch problems and to ensure at least a minimum level of service being uniformly provided to all citizens.

In contrast, the multijurisdictional approach, in which one 911 answering center and possibly one dispatch center as well replaces many small ones, can--from the state's point of view--save costs through consolidation and can--from the local point of view--increase the emergency services available to the citizen through coordination and effective utilization of the resources. However, as the number of jurisdictions in the system increases, the requirement for intergovernmental and interagency cooperation also increases. For this reason, the multijurisdictional approach is often perceived as a threat to local control.

1. Rationale for Selection

In the conceptual design of the 911 configurations we took into account two criteria: each local 911 configuration should function as

part of the total statewide system, and each local 911 configuration should function individually as a total system. This means that the configuration design should maintain consistency and uniformity among the local 911 systems but be flexible enough to take into account the local characteristics and requirements within each 911 system.

The boundaries of the alternative areas to be served by 911 systems were selected after considering several different contributing factors, primarily geographic, demographic, and telephone exchange boundary information, as well as the state's communication plan.

Topographical features (indicated in Figure 13) such as national forests, swamp areas, rivers, and lakes were considered in regard to whether they would favor or inhibit the cooperation of adjacent counties in a combined system; or whether, because of their presence, it would be more feasible to divide a county into two or more systems. The geographical size and shape of each county were also considered, especially in regard to how they would affect the potential cost of telephone lines.

Population statistics were evaluated to determine population size and distribution. Distribution is important because it indicates areas within each county where the population is concentrated or sparse. The map in Figure 14 illustrates the variations in population concentrations and densities throughout the state. Of special interest are the areas where adjacent counties have major population concentrations in such close proximities that they tend to behave economically and socially as a unit. Such units can often be better served if they are in a common 911 system.

The state's Communication Plan provided the input factor of how many law enforcement radio dispatch centers exist or are proposed for each county, their locations, and the areas served by each. This information

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FIGURE 13 MAP OF FLORIDA

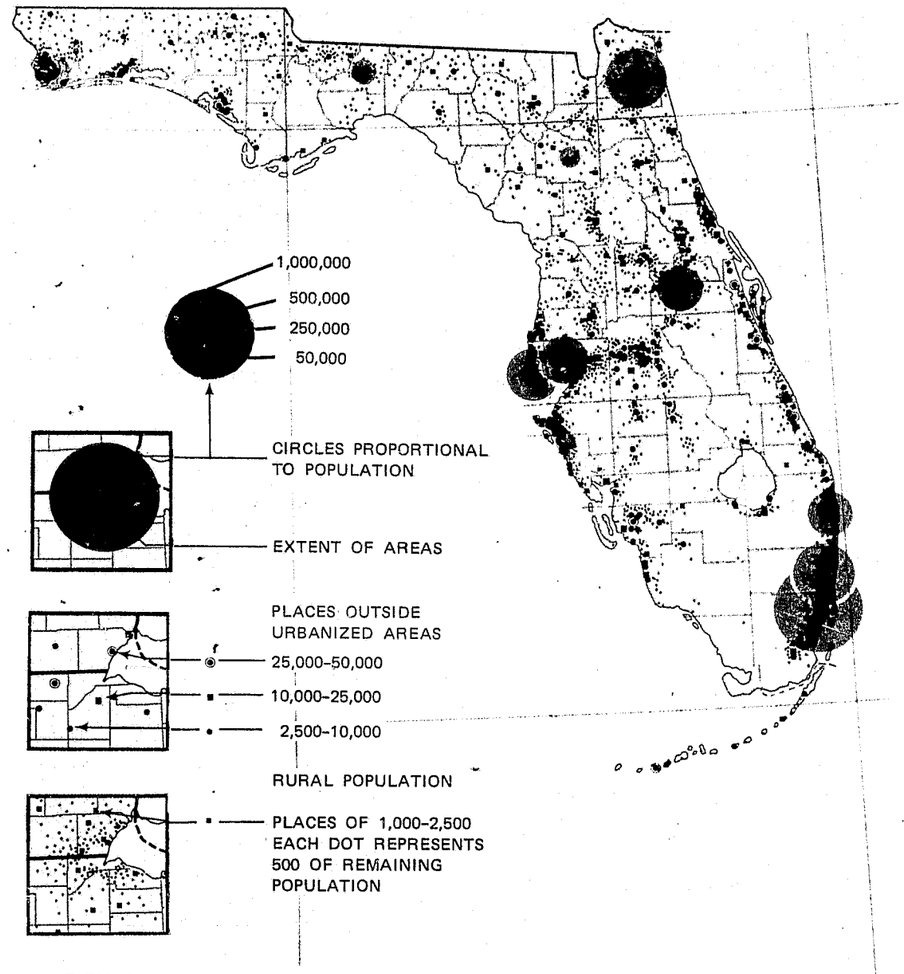


FIGURE 14 VARIATIONS IN POPULATION CONCENTRATIONS AND DENSITIES

is particularly important for cases where a county may be subdivided into two or more 911 systems because the number of emergency calls that must be transferred should be minimized.

Finally, the telephone exchange boundaries were examined to determine the extent to which a proposed configuration might either introduce or resolve boundary overlap problems. The intent was to minimize

telephone boundary overlap consistent with other design objectives. This factor impacts on the definition of 911 system areas comprised of either more than one county or part of a county.

2. Presentation of Local Alternatives

Of the 67 counties in Florida, 49 have a population of less than 100,000, and 42 counties have a population of less than 50,000. It is apparent from Figure 14 that in several of the counties the population is concentrated in one or two areas rather than being evenly distributed throughout the county. Because of these factors, our initial approach to the 911 configurations was at the county level. Closer inspection of local requirements and characteristics led us to additional variations. The 911 configurations that were developed can be grouped into three categories of 911 answering system alternatives:

- Single county
- Multicounty
- Partial county.

In the single-county alternative, there would be one 911 answering center for the whole county; in the multicounty alternative, one 911 answering center would serve two or more counties; and in the partial-county alternative, there would be two or more 911 answering centers within the county.

We have developed a total of 109 local system area configurations that can be used in various combinations to provide statewide coverage. One alternative for each county is a countywide system with a single 911 answering point. The remaining 42 alternatives include 19 multicounty configurations and 23 partial-county component configurations. These 109 configurations can be summarized as follows:

- 67 single county
- 19 multicounty
  - 10 two county
  - 4 three county
  - 4 four county
  - 1 five county
- 23 partial county.

Table 11 describes each of the 109 configurations in terms of the area served and location of the 911 answering center. Forty-five counties are included in one or more of the various multicounty alternatives; 7 counties have alternatives in which they are partitioned into two or more 911 systems; and for 15 counties only one alternative is postulated, a single-county system.

In each of the single-county alternative 911 systems, except Escambia County and one of Alachua County's alternatives, the sheriff's office dispatch center has been recommended as the location for 911 answering. The basic rational for this choice is that, to minimize the number of calls that have to be transferred or relayed, 911 answering should be collocated with a public safety dispatch center. Further, the agency with which the 911 center is collocated should generally be the one receiving the highest number of calls in the 911 system's coverage area.

Based on the state's Communication Plan and the call volume assumptions discussed in Chapter IV, the sheriff's dispatch center in each county either receives more calls than any other public safety agency in the county or it receives only a small percentage less than the agency receiving the highest number of calls. An additional advantage in locating the 911 center with the sheriff's office is that sheriff's office personnel are usually more familiar with all emergency service agencies throughout that county than is any other law enforcement agency.

Table 11

LOCAL 911 SYSTEM AREAS

Area No.	Area	Answering Center Location	
		Agency*	City
	SINGLE COUNTY SYSTEMS		
1a	Alachua	SO	Gainesville
1b	Alachua	Gainesville FD	Gainesville
2	Baker	SO	MacClenny
3	Bay	SO	Panama City
4	Bradford	SO	Starke
5	Brevard	SO	Titusville
6	Broward	SO	Ft. Lauderdale
7	Calhoun	SO	Blountstown
8	Charlotte	SO	Punta Gorda
9	Citrus	SO	Inverness
10	Clay	SO	Green Cove Springs
11	Collier	SO	Naples
12	Columbia	SO	Lake City
13	Dade	DPS	Miami
14	De Soto	SO	Arcadia
15	Dixie	SO	Cross City
16	Duval	SO	Jacksonville
17	Escambia	Dept. of Emergency Services	Pensacola
18	Flagler	SO	Bunnell
19	Franklin	SO	Apalachicola
20	Gadsden	SO	Quincy
21	Gilchrist	SO	Trenton
22	Glades	SO	Moore Haven
23	Gulf	SO	Port St. Joe
24	Hamilton	SO	Jasper
25	Hardee	SO	Wauchula
26	Hendry	SO	La Belle
27	Hernando	SO	Brooksville
28	Highlands	SO	Sebring
29	Hillsborough	SO	Tampa
30	Holmes	SO	Bonifay
31	Indian River	SO	Vero Beach
32	Jackson	SO	Marianna
33	Jefferson	SO	Monticello
34	Lafayette	SO	Mayo
35	Lake	SO	Tavares
36	Lee	SO	Fort Myers
37	Leon	SO	Tallahassee
38	Levy	SO	Bronson
39	Liberty	SO	Bristol

Table 11 (Continued)

Area No.	Area	Answering Center Location	
		Agency*	City
	SINGLE COUNTY SYSTEMS (Continued)		
40	Madison	SO	Madison
41	Manatee	SO	Bradenton
42	Marion	SO	Ocala
43	Martin	SO	Stuart
44	Monroe	SO	Key West
45	Nassau	SO	Fernandina Beach
46	Okaloosa	SO	Crestview
47	Okeechobee	SO	Okeechobee
48	Orange	SO	Orlando
49	Osceola	SO	Kissimmee
50	Palm Beach	SO	West Palm Beach
51	Pasco	SO	Dade City
52	Pinellas	SO	Clearwater
53	Polk	SO	Bartow
54	Putnam	SO	Palatka
55	St. Johns	SO	St. Augustine
56	St. Lucie	SO	Ft. Pierce
57	Santa Rosa	SO	Milton
58	Sarasota	SO	Sarasota
59	Seminole	SO	Sanford
60	Sumter	SO	Bushnell
61	Suwannee	SO	Live Oak
62	Taylor	SO	Perry
63	Union	SO	Lake Butler
64	Volusia	SO	Deland
65	Wakulla	SO	Crawfordville
66	Walton	SO	De Funiak Springs
67	Washington	SO	Chipley
	MULTICOUNTY SYSTEMS		
68	Bradford and Union	Union Co. SO	Lake Butler
69	Calhoun and Liberty	Calhoun Co. SO	Blountstown
70	Charlotte and Lee	Charlotte Co. SO	Punta Gorda
71	Citrus, Hernando, Lake, Pasco, and Sumter	Pasco Co. SO	Dade City
72	Citrus, Hernando, Pasco, and Sumter	Pasco Co. SO	Dade City
73	Collier, Glades, Hendry, and Lee	Lee Co. SO	Fort Myers
74	De Soto and Hardee	De Soto Co. SO	Arcadia
75	Dixie, Gilchrist, and Levy	Gilchrist Co. SO	Trenton
76	Escambia and Santa Rosa	Escambia Co. Dept. of Emergency Services	Pensacola
77	Flagler and Putnam	Putnam Co. SO	Palatka

Table 11 (Continued)

Area No.	Area	Answering Center Location	
		Agency*	City
	MULTICOUNTY SYSTEMS (Continued)		
78	Franklin and Gulf	Franklin Co. SO	Apalachicola
79	Gadsden, Jefferson, Leon, and Wakulla	Leon Co. SO	Tallahassee
80	Hamilton, Lafayette, and Suwannee	Suwannee Co. SO	Live Oak
81	Holmes, Jackson, and Washington	Washington Co. SO	Chipley
82	Indian River, Martin, Okeechobee, and St. Lucie	St. Lucie Co. SO	Ft. Pierce
83	Jefferson, Madison, and Taylor	Taylor Co. SO	Perry
84	Leon and Wakulla	Leon Co. SO	Tallahassee
85	Manatee and Sarasota	Sarasota Co. SO	Sarasota
86	Orange and Seminole	Orange Co. SO	Orlando
	PARTIAL COUNTY SYSTEMS		
	Brevard County:		
87	North area--City of Titusville and the surrounding unincorporated area in Brevard Co.	Brevard Co. SO	Titusville
88	Central area--Cities of Cape Canaveral, Cocoa, Cocoa Beach, and Rockledge; surrounding unincorporated area in Brevard Co.	Cocoa Beach PD	Cocoa Beach
89	South area--Cities of Indialantic, Indian Harbour Beach, Malabar, Melbourne, Melbourne Beach, Melbourne Village, Palm Bay, Satellite Beach, and West Melbourne; surrounding unincorporated area in Brevard Co.	Melbourne PD	Melbourne
90	East central area--Cities of Cape Canaveral and Cocoa Beach, surrounding unincorporated area in Brevard Co.	Cocoa Beach PD	Cocoa Beach
91	West central area--Cities of Cocoa and Rockledge; surrounding unincorporated area in Brevard Co.	Cocoa PD	Cocoa
	Broward County:		
92	Central area--Cities of Coconut Creek, Cooper City, Coral Springs, Davie, Ft. Lauderdale, Hacienda Village, Lauderdale-by-the-sea, Lauderdale Lakes, Lauderhill, Margate, North Lauderdale, Oakland Park, Plantation, Sunrise, Tamarac, and Wilton Manors; surrounding unincorporated area in Broward Co.	Broward Co. SO	Ft. Lauderdale

Table 11 (Continued)

Area No.	Area	Answering Center Location	
		Agency*	City
	PARTIAL COUNTY SYSTEMS (Continued)		
	Broward County (Continued):		
93	South area--Cities of Dania, Hallandale, Hollywood, Miramar, Pembroke Park, and Pembroke Pines; surrounding incorporated areas in Broward Co.	Hollywood PD	Hollywood
94	North area--Cities of Deerfield Beach, Hillsboro Beach, Lighthouse Point, Pompano Beach, and Sea Ranch Lakes; surrounding unincorporated area in Broward Co.	Pompano Beach PD	Pompano Beach
	Dade County:		
95	Dade Metro--All areas within Dade Co. except for the Cities of Coral Gables, Hialeah, Miami, and Miami Beach	Dade Co. DPS	Miami
96	Cities of Coral Gables, Hialeah, and Miami	Miami PD	Miami
97	City of Miami Beach	Miami Beach PD	Miami Beach
98	Cities of Coral Gables, Hialeah, Miami, and Miami Beach	Miami PD	Miami
	Monroe County:		
99	Area served by the sheriff's station at Key West	Monroe Co. SO	Key West
100	Area served by the sheriff's substation at Marathon	Monroe Co. SO Substation	Marathon
101	Area served by the sheriff's substation at Plantation	Monroe Co. SO Substation	Plantation Key
	Palm Beach County:		
102	Northeast area--Cities of Atlantis, Briny Breeze, Cloud Lake, Glen Ridge Golfview, Greenacres City, Haverhill, Hypoloxo, Juno Beach, Jupiter, Jupiter Inlet Colony, Lake Clarke Shores, Lake Park, Lake Worth, Lantana, Manalapan, Mangonia Park, North Palm Beach, Palm Beach, Palm Beach Gardens, Palm Beach Shores, Palm Springs, Riviera Beach, Royal Palm Beach, South Palm Beach, Tequesta Village, and West Palm Beach; surrounding unincorporated area in Palm Beach Co.	Palm Beach Co. SO	West Palm Beach

Table 11 (Concluded)

Area No.	Area	Answering Center Location	
		Agency*	City
	PARTIAL COUNTY SYSTEMS (Continued)		
	Palm Beach County (Continued):		
103	Southeast area--Cities of Boca Raton, Boynton Beach, Delray Beach, Gulf Stream, Highland Beach, and Ocean Ridge; surrounding unincorporated area in Palm Beach Co.	Boca Raton PD	Boca Raton
104	West area--Cities of Belle Glade, Pahokee, and South Bay; surrounding unincorporated area in Palm Beach Co.	Palm Beach Co. SO Substation	Belle Glade
105	East area--Combined areas listed for Area Nos. 102 and 103	Palm Beach Co. SO	West Palm Beach
	Pinellas County:		
106	North area--Cities of Belleair, Belleair Beach, Belleair Bluffs, Belleair Shores, Clearwater, Dunedin, Indian Rocks Beach, Indian Shores, Kenneth City, Largo, Oldsmar, Safety Harbor, and Tarpon Springs; surrounding unincorporated area in Pinellas Co.	Pinellas Co. SO	Clearwater
107	South area--Cities of Gulfport, Madeira Beach, North Redington Beach Pinellas Park, Redington Beach, Redington Shores, St. Petersburg, St. Petersburg Beach, Seminole, South Pasadena, and Treasure Island; surrounding unincorporated area in Pineallas Co.	St. Petersburg PD	St. Petersburg
	Volusia County:		
108	East area--Cities of Daytona Beach, Daytona Beach Shores, Edgewater, Holly Hill, New Smyrna Beach, Oak Hill, Ormond Beach, Ponce Inlet, Port Orange, and South Daytona; surrounding unincorporated area in Volusia Co.	Daytona Beach PD	Daytona Beach
109	West area--Cities of Deland, Lake Helen, Orange City, and Pierson; surrounding unincorporated area in Volusia Co.	Volusia Co. SO	Deland

*SO = Sheriff's Office
PD = Police Department
FD = Fire Department
Co. = County.

For Escambia County we recommend that the 911 center be located at the Escambia County Department of Emergency Services (DES). The Escambia County sheriff specifically stated to us that he does not want the 911 center to be located at his facility, but would like to see it located at the DES. The DES has adequate facility space and it currently performs emergency telephone answering and radio dispatching for ten of the county's volunteer fire departments and for both of the ambulance companies serving the county.

The Alachua County alternative of having 911 answering performed by the Gainesville Fire Department is included because a 911 system currently serves the city of Gainesville and some of the surrounding unincorporated area of Alachua County. The system is operated by the Gainesville Fire Department.

B. Presentation of Results

1. Call Transfer/Direct Dispatch Method

For each of the 109 local areas described in Table 11, we designed and costed a 911 system based on a combination of the direct dispatch and call transfer methods of operation. Table 12 presents the design parameters and associated costs for each of these local systems.

The local 911 system area number given in the first column of Table 12 provides an easy reference to the local system area and its recommended answering center location as given in Table 11.

Following the table, and in the same order as in the table, are the categories of information that are presented in Table 12:

Table 12

DESIGN PARAMETERS AND COSTS
FOR LOCAL 911 SYSTEMS

Local 911 System Areas		Incoming 911 Trunks			Outgoing Private Lines			911 Operators			Supervisory Operators			911 Center PBX Cost		Recording Equipment Cost	Minimum Space Needed (sq ft)	Overall Total Cost	
No.	Description	Number	Cost		Number	Cost		Number		Monthly Cost	Number		Monthly Cost						
			Initial	Monthly		Initial	Monthly	B.H.*	Total		B.H.*	Total		Initial	Monthly			Initial	Monthly
	SINGLE-COUNTY SYSTEMS																		
1a	Alachua	5	$245	$284	13	$ 760	$ 347	3	9	$ 5,400	--	--	$ --	$ 450	$ 450	$13,000	135	$14,455	$ 6,481
1b	Alachua	5	245	284	15	900	333	3	9	5,400	--	--	--	450	450	13,000	135	14,595	6,467
2	Baker	2	100	244	7	140	261	1	5	3,000	--	--	--	110	91	7,000	45	7,350	3,596
3	Bay	4	204	208	26	1,480	576	2	8	4,800	--	--	--	300	300	14,000	90	15,984	5,884
4	Bradford	2	110	200	7	180	81	1	5	3,000	--	--	--	110	91	7,000	45	7,400	3,372
5	Brevard	6	246	240	30	2,700	1,547	4	10	6,000	--	--	--	600	600	16,000	180	19,546	5,387
6	Broward	14	574	616	46	3,900	912	9	23	16,100	1	3	2,700	1,500	1,500	32,000	450	37,974	21,828
7	Calhoun	2	10	38	7	220	360	1	5	3,000	--	--	--	110	91	7,000	45	7,340	3,489
8	Charlotte	3	88	218	8	160	243	2	8	4,800	--	--	--	150	140	8,000	90	8,398	5,401
9	Citrus	3	130	240	10	320	270	2	8	4,800	--	--	--	170	150	8,000	90	3,620	5,460
10	Clay	3	163	222	13	940	509	2	8	4,800	--	--	--	300	300	8,000	90	9,403	5,831
11	Collier	3	48	98	10	200	831	2	8	4,800	--	--	--	170	150	8,000	90	8,418	5,879
12	Columbia	3	163	210	4	400	60	2	8	4,800	--	--	--	300	300	8,000	90	8,863	5,370
13	Dade	21	861	924	32	2,000	492	14	35	24,500	1	3	2,700	2,250	2,250	33,000	675	38,111	30,866
14	De Soto	2	32	58	6	120	81	1	5	3,000	--	--	--	100	86	7,000	45	7,252	3,225
15	Dixie	2	82	60	6	500	153	1	5	3,000	--	--	--	--	80	7,000	45	7,582	3,293
16	Duval	11	451	484	12	900	377	7	18	12,600	1	3	2,700	1,200	1,200	19,000	360	21,551	17,361
17	Escambia	6	286	396	21	1,130	715	3	9	5,400	--	--	--	450	450	15,000	135	16,866	6,961
18	Flagler	2	82	60	4	400	102	1	5	3,000	--	--	--	--	80	7,000	45	7,482	3,242
19	Franklin	2	10	38	8	160	352	1	5	3,000	--	--	--	120	96	7,000	45	7,290	3,486
20	Gadsden	3	210	380	11	300	291	2	8	4,800	--	--	--	180	155	8,000	90	8,690	5,626
21	Gilchrist	2	122	204	6	500	135	1	5	3,000	--	--	--	--	80	7,000	45	7,622	3,419
22	Glades	2	32	48	6	120	391	1	5	3,000	--	--	--	100	86	7,800	45	7,252	3,525
23	Gulf	2	10	38	7	180	276	1	5	3,000	--	--	--	110	91	7,000	45	7,300	3,405
24	Hamilton	2	60	68	5	140	226	1	5	3,000	--	--	--	90	81	7,000	45	7,290	3,375
25	Hardee	3	48	87	5	100	180	1	5	3,000	--	--	--	100	93	7,000	45	7,248	3,360
26	Hendry	2	32	58	6	120	384	1	5	3,000	--	--	--	100	86	7,000	45	7,252	3,528
27	Hernando	3	163	210	6	500	125	2	8	4,800	--	--	--	300	300	8,000	90	8,963	5,435
28	Highlands	3	48	87	8	160	225	2	8	4,800	--	--	--	150	140	8,000	90	8,358	5,252
29	Hillsborough	11	220	506	31	620	396	7	18	12,600	1	3	2,700	1,860	741	26,000	360	28,700	16,943
30	Holmes	2	110	284	7	180	217	1	5	3,000	--	--	--	110	91	7,000	45	7,400	3,592
31	Indian River	3	123	102	8	650	151	2	8	4,800	--	--	--	300	300	8,000	90	9,073	5,353
32	Jackson	3	195	336	13	380	411	2	8	4,800	--	--	--	200	165	12,000	90	12,775	5,712
33	Jefferson	2	60	80	4	80	195	1	5	3,000	--	--	--	80	76	7,000	45	7,220	3,351
34	Lafayette	2	60	68	3	140	198	1	5	3,000	--	--	--	70	71	7,000	45	7,270	3,337
35	Lake	4	120	160	25	500	732	2	8	4,800	--	--	--	330	237	14,000	90	14,950	5,929
36	Lee	5	80	163	24	480	676	3	9	5,400	--	--	--	850	395	9,000	135	10,410	6,634
37	Leon	5	150	220	9	180	102	3	9	5,400	--	--	--	700	210	9,000	135	10,030	5,932
38	Levy	2	122	132	10	610	477	1	5	3,000	--	--	--	--	80	7,000	45	7,732	3,689
39	Liberty	2	10	38	6	120	237	1	5	3,000	--	--	--	100	86	7,000	45	7,230	3,361
40	Madison	2	100	110	6	120	102	1	5	3,000	--	--	--	100	86	7,000	45	7,380	3,298

*B.H. = busy hour.

Table 12 (Continued)

DESIGN PARAMETERS AND COSTS
FOR LOCAL 911 SYSTEMS

Local 911 System Areas		Incoming 911 Trunks			Outgoing Private Lines			911 Operators			Supervisory Operators			911 Center PBX Cost		Recording Equipment Cost	Minimum Space Needed (sq ft)	Overall Total Cost	
No.	Description	Number	Cost		Number	Cost		Number		Monthly Cost	Number		Monthly Cost	Initial	Monthly			Initial	Monthly
			Initial	Monthly		Initial	Monthly	B.H.*	Total		B.H.*	Total							
	SINGLE-COUNTY SYSTEMS (Continued)																		
41	Manatee	4	$ 80	$160	16	$ 310	$ 147	3	9	$ 5,400	--	--	$ --	$ 860	$ 343	$13,000	135	$14,250	$ 6,050
42	Marion	4	200	388	19	460	552	2	8	4,800	--	--	--	270	207	14,000	90	14,930	5,947
43	Martin	3	163	156	10	510	362	2	8	4,800	--	--	--	170	150	8,000	90	8,843	5,468
44	Monroe	3	123	102	15	1,050	1,218	2	8	4,800	--	--	--	300	300	12,000	90	13,473	6,420
45	Nassau	3	203	426	9	570	421	2	8	4,800	--	--	--	300	300	8,000	90	9,073	5,947
46	Okaloosa	4	200	320	18	400	880	2	8	4,800	--	--	--	260	202	14,000	90	14,860	6,202
47	Okeechobee	3	48	87	4	120	156	1	5	3,000	--	--	--	90	88	7,000	45	7,258	3,331
48	Orange	9	549	630	32	1,900	508	5	13	9,100	1	3	2,700	2,100	2,100	24,000	270	28,549	15,038
49	Osceola	3	90	108	12	280	214	2	8	4,800	--	--	--	190	160	12,000	90	12,560	5,282
50	Palm Beach	8	328	352	34	3,200	1,089	5	13	9,100	1	3	2,700	900	900	24,000	270	28,428	14,141
51	Pasco	5	270	414	18	440	948	3	9	5,400	--	--	--	790	365	15,000	135	16,500	7,127
52	Pinellas	12	240	552	40	840	1,115	8	20	14,000	1	3	2,700	2,140	857	27,000	405	30,220	19,224
53	Polk	6	160	336	34	680	1,114	4	10	6,000	--	--	--	1,060	497	22,000	180	23,900	7,947
54	Putnam	3	163	186	20	1,090	621	2	8	4,800	--	--	--	300	300	14,000	90	15,553	5,907
55	St. Johns	3	163	210	11	810	344	2	8	4,800	--	--	--	300	300	8,000	90	9,273	5,654
56	St. Lucie	3	123	102	4	400	93	2	8	4,800	--	--	--	300	300	8,000	90	8,823	5,295
57	Santa Rosa	3	123	102	16	1,150	514	2	8	4,800	--	--	--	300	300	12,000	90	13,573	5,716
58	Sarasota	5	100	200	13	260	375	3	9	5,400	--	--	--	740	340	13,000	135	14,100	6,315
59	Seminole	5	265	278	15	1,030	405	3	9	5,400	--	--	--	450	450	13,000	135	14,745	6,533
60	Sumter	3	90	96	8	240	200	1	5	3,000	--	--	--	130	108	7,000	45	7,460	3,404
61	Suwannee	2	60	80	8	200	230	1	5	3,000	--	--	--	120	96	7,000	45	7,380	3,406
62	Taylor	2	90	258	5	100	159	1	5	3,000	--	--	--	90	81	7,000	45	7,280	3,498
63	Union	2	100	140	5	100	138	1	5	3,000	--	--	--	90	81	7,000	45	7,290	3,359
64	Volusia	5	245	236	28	1,720	1,277	3	9	5,400	--	--	--	450	450	15,000	135	17,415	7,363
65	Wakulla	2	60	68	6	120	300	1	5	3,000	--	--	--	100	86	7,000	45	7,280	3,454
66	Walton	2	140	288	9	180	494	1	5	3,000	--	--	--	130	101	7,000	45	7,450	3,883
67	Washington	2	82	60	6	420	320	1	5	3,000	--	--	--	--	80	7,000	45	7,502	3,460
	MULTICOUNTY SYSTEMS																		
68	Bradford and Union	3	170	204	12	240	471	2	8	4,800	--	--	--	190	160	8,000	90	8,600	5,635
69	Calhoun and Liberty	2	10	38	13	260	582	1	5	3,000	--	--	--	170	121	7,000	45	7,440	3,741
70	Charlotte and Lee	6	136	280	35	700	2,091	3	9	5,400	--	--	--	970	462	19,000	135	20,806	8,233
71	Citrus, Hernando, Lake, Pasco, and Sumter	6	300	690	70	1,675	4,614	4	10	6,000	--	--	--	1,420	677	28,000	180	31,395	11,981
72	Citrus, Hernando, Pasco, and Sumter	5	270	650	42	1,095	2,011	3	9	5,400	--	--	--	1,030	485	21,000	135	23,395	8,546

*B.H. = busy hour.

Table 12 (Continued)

DESIGN PARAMETERS AND COSTS
FOR LOCAL 911 SYSTEMS

Local 911 System Areas		Incoming 911 Trunks			Outgoing Private Lines			911 Operators			Supervisory Operators			911 Center PBX Cost		Recording Equipment Cost	Minimum Space Needed (sq ft)	Overall Total Cost	
No.	Description	Number	Cost		Number	Cost		Number		Monthly Cost	Number		Monthly Cost	Initial	Monthly			Initial	Monthly
			Initial	Monthly		Initial	Monthly	B.H.*	Total		B.H.*	Total							
	MULTICOUNTY SYSTEMS (Continued)																		
73	Collier, Glades, Hendry, and Lee	6	$ 96	$196	47	$ 960	$3,944	3	9	$ 5,400	--	--	$ --	$1,090	$ 522	$21,000	135	$23,146	$10,062
74	De Soto and Hardee	3	48	87	11	220	561	2	8	4,800	--	--	--	180	155	8,000	90	8,448	5,603
75	Dixie, Gilchrist, and Levy	3	183	324	25	2,140	1,454	2	8	4,800	--	--	--	300	300	14,000	90	16,623	6,878
76	Escambia and Santa Rosa	6	286	372	38	2,770	1,766	4	10	6,000	--	--	--	600	600	20,000	180	23,656	8,738
77	Flagler and Putnam	3	163	126	26	1,560	1,056	2	8	4,800	--	--	--	330	230	14,000	90	16,053	6,212
78	Franklin and Gulf	2	10	38	16	320	916	1	5	3,000	--	--	--	200	136	11,000	45	11,530	4,090
79	Gadsden, Jefferson, Leon, and Wakulla	5	270	688	30	640	1,554	3	9	5,400	--	--	--	910	425	15,000	135	16,820	8,067
80	Hamilton, Lafayette, and Suwannee	3	90	120	17	420	785	2	8	4,800	--	--	--	240	185	12,000	90	18,750	5,890
81	Holmes, Jackson, and Washington	4	264	346	26	1,705	1,334	2	8	4,800	--	--	--	300	300	14,000	90	16,269	6,780
82	Indian River, Martin, Okeechobee, and St. Lucie	5	285	560	28	2,305	1,816	3	9	5,400	--	--	--	450	450	15,000	135	18,040	8,226
83	Jefferson, Madison, and Taylor	3	175	513	17	340	1,470	2	8	4,800	--	--	--	240	185	12,000	90	12,755	6,968
84	Leon and Wakulla	5	150	220	16	320	759	3	9	5,400	--	--	--	770	355	13,000	135	14,240	6,734
85	Manatee and Sarasota	6	120	276	31	620	882	4	10	6,000	--	--	--	1,030	482	16,000	180	17,770	7,640
86	Orange and Seminole	9	509	552	51	3,280	1,387	6	15	10,500	1	3	2,700	1,050	1,050	29,000	315	33,839	16,139
	PARTIAL-COUNTY SYSTEMS																		
	Brevard County:																		
87	North Area	3	123	120	9	850	194	2	8	4,800	--	--	--	300	300	8,000	90	9,273	5,414
88	Central Area	4	164	136	11	1,000	344	2	8	4,800	--	--	--	300	300	8,000	90	9,464	5,580
89	South Area	4	164	136	17	1,550	675	3	9	5,400	--	--	--	450	450	13,000	135	15,164	6,661
90	East Central Area	3	123	102	7	650	311	2	8	4,800	--	--	--	300	300	8,000	90	9,073	5,513
91	West Central Area	3	123	120	8	750	270	2	8	4,800	--	--	--	300	300	8,000	90	9,173	5,490
	Broward County:																		
92	Central Area	10	410	440	24	2,150	317	6	15	10,500	1	3	2,700	1,050	1,050	19,000	315	22,610	15,007
93	South Area	7	287	308	11	1,000	206	4	10	6,000	--	--	--	600	600	14,000	180	15,093	7,114
94	North Area	5	205	200	9	850	167	3	9	5,400	--	--	--	450	450	9,000	135	10,505	6,217

*B.H. = busy hour.

Table 12 (Concluded)

DESIGN PARAMETERS AND COSTS
FOR LOCAL 911 SYSTEMS

Local 911 System Areas		Incoming 911 Trunks			Outgoing Private Lines			911 Operators			Supervisory Operators			911 Center PBX Cost		Recording Equipment Cost	Minimum Space Needed (sq ft)	Overall Total Cost	
No.	Description	Number	Cost		Number	Cost		Number		Monthly Cost	Number		Monthly Cost	Initial	Monthly			Initial	Monthly
			Initial	Monthly		Initial	Monthly	B.H.*	Total		B.H.*	Total							
	PARTIAL-COUNTY SYSTEMS (Continued)																		
	Dade County:																		
95	Dade Metro	14	$574	$616	11	$ 700	$ 318	9	23	$16,100	1	3	$2,700	$1,500	$1,500	$22,000	450	$24,774	$21,234
96	Coral Gables, Hialeah, and Miami	11	451	484	10	850	279	7	18	12,600	1	3	2,700	1,200	1,200	18,000	360	20,501	17,263
97	Miami Beach	5	205	200	6	600	78	3	9	5,400	--	--	--	450	450	9,000	135	10,255	6,128
98	Coral Gables, Hialeah, Miami, and Miami Beach	12	492	528	13	1,200	357	8	20	14,000	1	3	2,700	1,350	1,350	21,000	405	24,042	18,935
	Monroe County:																		
99	Key West	3	123	102	5	500	399	2	8	4,800	--	--	--	300	300	8,000	90	8,923	5,601
100	Marathon	2	82	68	6	600	372	1	5	3,000	--	--	--	--	80	7,000	45	7,682	3,520
101	Plantation	2	82	68	5	500	273	1	5	3,000	--	--	--	--	80	5,000	45	5,582	3,421
	Palm Beach County:																		
102	Northeast Area	6	246	240	22	2,200	615	4	10	6,000	--	--	--	600	600	16,000	180	19,046	7,525
103	Southeast Area	5	205	200	10	900	490	3	9	5,400	--	--	--	450	450	9,000	135	10,555	6,540
104	West Area	3	123	150	6	600	262	2	8	4,800	--	--	--	300	300	8,000	90	9,023	5,512
105	East Area	8	328	320	27	2,700	1,098	5	13	7,800	1	3	2,700	900	900	18,000	270	21,928	12,818
	Pinellas County:																		
106	North Area	7	140	322	18	360	489	4	10	6,000	--	--	--	920	434	16,000	180	17,420	7,245
107	South Area	10	200	460	17	340	474	6	15	10,500	1	3	2,700	1,530	600	19,000	315	21,070	14,734
	Volusia County:																		
108	East Area	5	245	366	20	1,900	645	3	9	5,400	--	--	--	450	450	15,000	135	17,145	6,861
109	West Area	3	153	162	9	900	261	2	8	4,800	--	--	--	300	300	8,000	90	9,353	5,523

*B.H. = busy hour.

- Incoming 911 trunks to the 911 center.
  - Number of trunks required.
  - Initial (one time) cost of these trunks.
  - Monthly (recurring) cost of these trunks.
- Outgoing private lines to the dispatch centers.
  - Number of lines required.
  - Initial cost of these lines.
  - Monthly cost of these lines.
- 911 Operators.
  - Number required during the busy hour.
  - Total number required for round-the-clock service.
  - Monthly cost of the total number.
- Supervisory operators.
  - Number required during the busy hour.
  - Total number required for one shift per day, seven days a week.
  - Monthly cost of the total number.
- 911 Center PBX (or PABX) terminal equipment cost.
  - Initial cost of this equipment.
  - Monthly cost of this equipment.
- Initial cost of the recording equipment.
- The minimum square footage required by the operators.
- Overall total cost.
  - Overall initial cost: the sum of the inital costs of incoming 911 trunks, outgoing private lines, PBX equipment, and the recording equipment.
  - Overall monthly cost: the sum of the monthly costs of incoming 911 trunks, outgoing private lines, PBX equipment, 911 operators, and supervisory operators.

The telephone lines and PBX equipment would be leased from a telephone company. The multichannel logging recorders and individual operator position recorders would be purchased by the 911 centers.

Even though the costs given in Table 12 are shown to the nearest dollar, they are not that accurate--they are estimates that were left in the form in which they were obtained. Bearing in mind the assumptions that were presented in Chapter IV of this report, the cost figures that we have derived could just have easily been rounded off to no more accuracy than two significant digits.

2. Call Relay Systems

In the five counties designated in the State Communications Plan as high crime areas (Broward, Dade, Duval, Hillsborough, and Pinellas), we recommend the eventual implementation of call relay operation using digital data transfer from the 911 answering center to the dispatch centers. Associated with these five counties we have presented 14 local area alternatives: 5 single-county (System Areas 6, 13, 16, 29, and 52) and 9 partial-county configurations (System Areas 92-98, 106, and 107).

We make this recommendation on the basis of the significant increase in effectiveness that will result from the decrease in response time with the use of call relay rather than call transfer. With the call relay method described in Chapter IV, the citizen need not repeat his problem to the dispatch center after being transferred by the 911 answering operator. With digital call relay, the answering operator obtains the complete information from the caller and formats it on a keyboard device where it is presented to the appropriate dispatcher by proper communications switching equipment. A more detailed operational description of this digital call relay technique is given in Chapter IV.

Certain design parameters will be different for call relay than for the call transfer alternatives given in the preceding section. For example:

(1) Fewer outgoing private lines between the 911 center and some high call volume dispatch centers will be required because digital data transfer will shorten transmitted messages.

(2) There will be increased cost for telephone termination equipment required for digital switching.

(3) Equipment will be required for automatic switching of outgoing information to the proper dispatch center and the optional function of address verification and proper assignment of dispatch center.

(4) More space may be required for this equipment.

In the five counties for which we have recommended call relay, there exist or are being planned computer-aided dispatch systems in the larger law enforcement agencies. The particular type of computer-aided dispatch system that is implemented will greatly influence the specific equipment necessary for 911 call relay. It is difficult for us, therefore, to specify exactly the additional costs for these five counties above those required for call transfer. For example, in counties where there are many duplicated street names, address verification using the telephone number prefix may be required. The additional equipment for call relay could be combined with the computer-aided dispatch equipment and placed at the dispatch center rather than at the 911 answering center.

In view of the need to coordinate requirements for computer-aided dispatch with 911 call relay, we have not made any cost estimates for call relay. Since we lack intimate knowledge of dispatch requirements, we cannot specify the form of computer-aided dispatch. We recommend that all computer-aided dispatch projects in the five counties be compatible with 911 call relay, and that functional requirements and equipment specifications be made for call relay at the same time that they are made for computer-aided dispatch. We further recommend that call transfer be implemented in the above five counties until such time as computer-aided dispatch is implemented.

VI CONCEPTUAL DESIGN OF ALTERNATIVE STATEWIDE 911 SYSTEMS

In Chapter V we described our rationale for selection of local area 911 configurations and the conceptual design, sizing requirements, and operating costs for the 109 local area systems. In this chapter we configure various combinations of these local area 911 alternatives into a statewide system concept for 911. The local area alternatives thus form the building blocks of the state system.

A. Statewide System Concepts

1. Rationale

We do not have complete freedom in "tinker-toying" the local area alternatives together because only certain combinations will fit into a unified state system. We cannot have any area of the state unserved by 911; on the other hand, it would be absurd (not to mention costly) to have some area served by two 911 systems!

We present initially three basic alternatives: a county-by-county approach, an approach that emphasizes maximum cooperation by inclusion of the most regionalized multicounty systems, and an approach that minimizes cooperation by having as many partial-county alternatives as possible.

Our purpose in selecting this method of presentation is to bound the costs for the statewide 911 plan so that the State of Florida can as cleanly as possible separate the issues of finance from the issues of local implementation. Given fairly small differences between the most and the least costly statewide alternative, this separation is feasible;

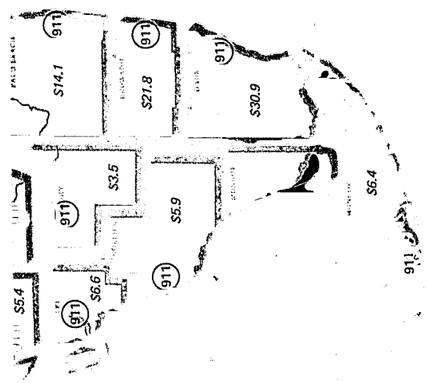
that is to say, the method of finance does not depend on the particular alternatives chosen.

The maximum multicounty system was designed therefore to emphasize the scale economies possible through cooperative 911 efforts, and the maximum partial-county system was designed to emphasize local autonomy as much as possible, with the provision of good 911 service to the public. The single-county alternative is included to make the issues of 911 finance as clear as possible for use in Chapter VII. In subsection C below, we will construct a recommended alternative that in our view combines the scale economy of the multicounty system with the ease of implementation of the partial-county system. Our recommendation is illustrative and by no means unique; we believe that the plan required from the Division of Communications by the Florida Telephone Act of 1974 may be somewhat different, the difference in most cases being promulgated by the desire of some local governments for more rapid implementation.

2. Description of Basic Alternatives

a. Single County

The statewide single-county system alternative comprises 67 individual local 911 systems--one serving each county. Figure 15 indicates the physical boundaries for each of the individual local 911 systems; the approximate location of the 911 centers, as given in Table 11, for each 911 system area; and the recurring monthly cost for each single-county 911 system, as given in Table 12. The costs range from $3225 per month for De Soto County to $30,866 per month for Dade County, with an average single-county system cost of $6400 per month. The overall initial (one time) and monthly (recurring) costs of the single-county statewide system alternative are $827,938 and $428,839, respectively. This



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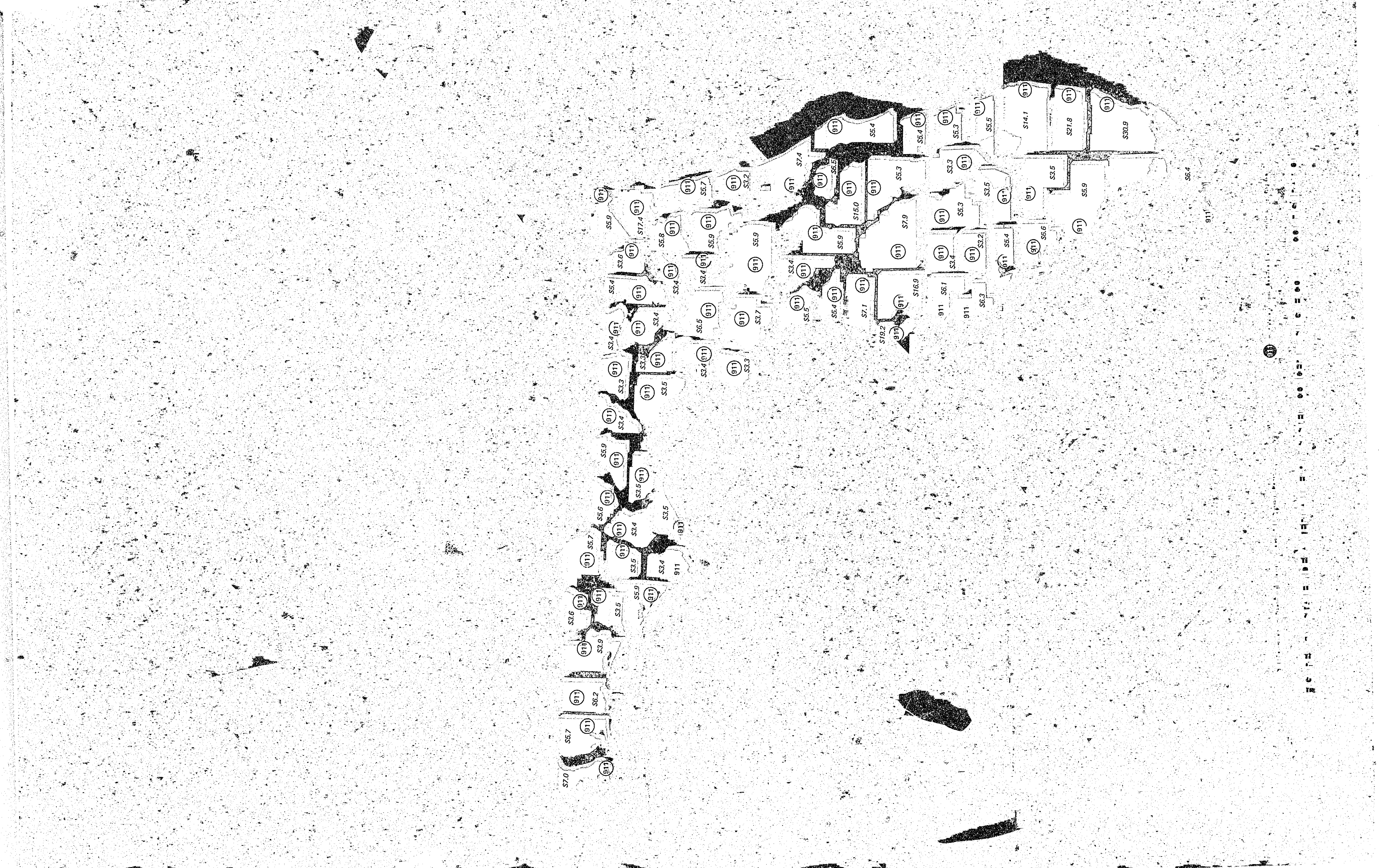


alternative can be viewed as a baseline statewide system concept in terms of cost and local system configuration.

b. Maximum Multicounty

The statewide maximum multicounty system alternative comprises a combination of the local multicounty and single-county configurations that require the least number of local 911 systems to provide statewide coverage. That is, from the 109 local system configurations, we selected the most regionalized alternative for each area throughout the state. This alternative thus represents a lower bound for all possible combinations of the 109 system configurations, both on the overall statewide 911 costs and on the number of individual systems required for coverage.

The maximum multicounty system comprises 40 local 911 systems: 15 multicounty systems covering 42 counties and 25 single-county systems. The physical boundaries for each of the local 911 systems areas are indicated in Figure 16.

The approximate location of each 911 center, as given in Table 11, and the recurring monthly cost of each local 911 system, as given in Table 12, are shown in Figure 16. The range of local system monthly costs, $3298 for Madison County to $30,866 for Dade County, is similar to the single-county system alternative. The overall initial and monthly costs of the maximum multicounty system are $677,254 and $343,738, respectively. The average system cost is $8593 per month and the average monthly cost per county is $5130 for this statewide alternative.

FIGURE [illegible] STATEWIDE ALTERNATIVE [illegible] SYSTEM CONCEPT [illegible] MULTICOUNTY CONFIGURATION

c. Maximum Partial County

The statewide maximum partial-county system alternative comprises a combination of the local partial-county and single-county configurations that result in the largest number of local 911 systems. This alternative represents an upper bound for all possible combinations of the 109 system configurations, both on the overall statewide 911 costs and on the number of individual systems required for coverage.

There are 80 local 911 systems in this statewide alternative system: 20 partial-county systems covering 7 counties and 60 single-county systems. Figure 17 shows the physical boundaries of the 80 local systems, the approximate location of each 911 center, and the recurring monthly cost of each local system.

In this alternative the local system recurring monthly costs range from $3225 for De Soto County to $21,204 for Dade Metro, with an average system cost of $6038 per month and an average monthly cost per county of $7209. The overall initial and monthly costs of the maximum partial-county system are $914,991 and $483,063, respectively.

B. Statewide Costs

1. Comparison of Statewide Alternative Systems

Table 13 shows a comparison of costs, both initial (one time) and monthly (recurring), for the three alternative statewide 911 system conceptual plans that have been presented above. These costs are the sum of the individual costs for each of the component local area 911 systems. The local system areas were described and costed in Tables 11 and 12, respectively.

Table 13

COMPARISON OF STATEWIDE 911 ALTERNATIVE COSTS

Statewide Alternative	Number of Local 911 Systems	Telephone System		Operators and Supervisors	Recording Equipment	Overall Total	
		Initial	Monthly	Monthly	Initial	Initial	Monthly
Maximum Multicounty	40	$76,254	$68,838	$274,900	$601,000	$677,254	$343,738
Single County	67	78,938	64,739	364,100	749,000	827,938	428,839
Maximum Partial County	80	85,991	69,363	413,700	829,000	914,991	483,063

The difference in overall cost between the lower bound, maximum multicounty system and the upper bound maximum partial-county system of these three alternatives is relatively small: about $238,000 for the initial cost and approximately $139,000 for the monthly cost.

The monthly cost of the telephone systems for these alternatives represents a range of from 14.4 percent to 20.0 percent of the overall monthly total cost, with personnel salaries accounting for the remainder. Initial telephone systems costs make up from 9.4 percent to 11.3 percent of the overall initial total cost, with the recording equipment contributing the remainder.

Added to the overall total costs given in Table 13 will be the cost of connecting certain of the adjacent 911 centers to each other by private lines. This cost is estimated to be at least $10,000 for the initial cost and $24,000 for the monthly recurring cost.

2. Existing Systems

In our judgment the cost of 911 in Florida will generally be in addition to the costs of the present emergency telephone systems now serving Florida's public safety agencies. The exact cost increase due to 911 is impossible to estimate without studying each local area in considerable detail.

The candidate cost categories for determining whether the cost of 911 is totally additive to existing systems' costs, or whether only some fraction of the 911 cost is in addition to the cost of existing systems, are:

- Incoming emergency lines
- Outgoing private lines
- Telephone answering equipment

- Telephone line logging recorders
- Telephone answering personnel.

All public safety agencies have either dedicated emergency telephone lines or lines that handle a combination of emergency and administrative calls, over which citizens place calls to request emergency assistance. Some agencies do not now have a sufficient number of lines to provide the grade of service that we are designing for the alternative 911 answering systems, primarily because of a rapid increase in population with its accompanying increase in emergency calls. Depending on the degree of public acceptance and use of the Emergency Telephone Number 911, there might be some possible cost savings to several of the large law enforcement agencies by reducing the number of incoming emergency lines that they now have. We feel that as the lessening of calls on existing 7-digit emergency lines occurs, it could still be as long as a year after implementing 911 before an agency could safely reduce the number of existing lines. Most, if not all, fire protection agencies and the smaller law enforcement agencies will have to keep their existing lines for some time, especially since in most cases they have only two or three lines now.

For the above reasons we believe that the costs of incoming 911 trunks will be, for the most part, in addition to the costs of the existing systems' emergency lines.

The outgoing private lines from the 911 centers to the radio dispatch centers will be required in addition to any outgoing private lines that agencies now have and use for interagency coordination and requests for assistance.

Public safety agencies will still have to retain their present telephone answering equipment because they will be receiving emergency

calls from both the 911 center and their existing emergency lines. It is possible that some agencies might even have to increase the amount or the capacity of their present call-handling telephone equipment to meet the increased service demands caused by increasing population and the high level of service being designed into the 911 systems.

It is highly unlikely that the radio dispatch centers with which the 911 centers will be collocated will have a significant amount of unused capacity on their present logging recorders to handle the incoming 911 trunks and the outgoing private lines. They also will probably not have any spare (if any at all) individual operator position recorders. For this reason, the cost of 911 center telephone line logging recorders and individual operator position recorders will be a cost in addition to present system costs.

Since we are recommending that 911 center personnel be dedicated to the function of answering 911 calls and not of operating radio equipment at the same time, radio dispatch centers collocated with a 911 center and operating a 1-stage dispatch system (the same person answers telephone calls and dispatches) will require 911 operators in addition to their present force. If a 911/dispatch center is now operating as a 2-stage system (separate call answerers and dispatchers), it might be able to use some fraction of its present telephone answering force to serve as 911 operators.

The number of existing telephone answering personnel in a 2-stage system that could be utilized as 911 operators is affected by two primary factors: the present level of telephone answerer staffing and the magnitude of nonemergency calls that are currently handled by these operators.

On our visits to many Florida public safety agencies we observed that in some cases the present level of telephone answerer staffing is

below what it should be to give the required service to the citizens it serves. With the large increase in population now taking place, this problem will worsen, especially for the larger law enforcement agencies.

In law enforcement agencies it is difficult to define exactly which calls from the public are emergency and which are nonemergency. The policy of most law enforcement agencies is discretionary on the immediacy of response. This situation does not generally exist for fire protection and emergency medical agencies where most calls require immediate Code 3 response. Our estimate, based on a large number of studies that have been made in the area of law enforcement communications, is that between 30 and 70 percent of all calls received by a law enforcement agency over its emergency lines can be considered as emergencies. What any given agency considers an emergency call depends to a great extent on the resources that the agency has at its disposal to respond to calls from its citizens. Many agencies would like to increase their level of service to their citizens but lack sufficient funds for the additional personnel and equipment necessary to accomplish this.

Our estimate of 911 center personnel costs, then, represents an upper bound and could possibly be less for some of the alternative 911 centers.

C. Recommended System Concept

In the development of the recommended statewide 911 system concept, we selected local system area configurations from the 109 candidates that would result in a logical and viable plan for Florida. This concept should be considered as a starting point in the statewide implementation plan for 911 and not as the end point. The need for modifications and variations to this concept will surface through discussions among local public safety officials, telephone company personnel, and the State

Division of Communications. This concept then serves as a focal point from which to begin the implementation process.

1. Rationale for Selection

As stated earlier, our intent in developing the recommended alternative was to combine scale economies of a multicounty system with the ease of implementation of a partial-county system. In general, the multicounty alternatives are postulated for small, rural counties where the ability to pay is lower and scale economies are greater. Conversely, the partial-county alternatives are postulated for the larger, urban counties where the ability to pay is higher and the scale economies for regionalization are smaller.

Figure 18 illustrates this difference in scale economies. Based on the costs for the local system alternatives presented in Table 12, Figure 18 shows recurring cost normalized to call volume. We have shown here cost per call plotted as a function of 911 system area population served to demonstrate scale economies for various population sizes. The figure indicates a rapid decrease in cost per call as population increases up to 200 calls per day and near constancy for populations larger than 400 calls per day. Beyond a certain point, then, on the basis of cost per call there is little advantage in serving large populations from a single 911 center. At the other extreme, there is a great deal of advantage in consolidating several small areas into a medium-sized system.

The trade-off of costs and ease of implementation is therefore less of an issue in large counties. And even in the selection of multicounty alternatives it is possible, to some extent, to minimize costs while simultaneously maximizing ease of implementation by taking into account existing experience of institutional cooperation.

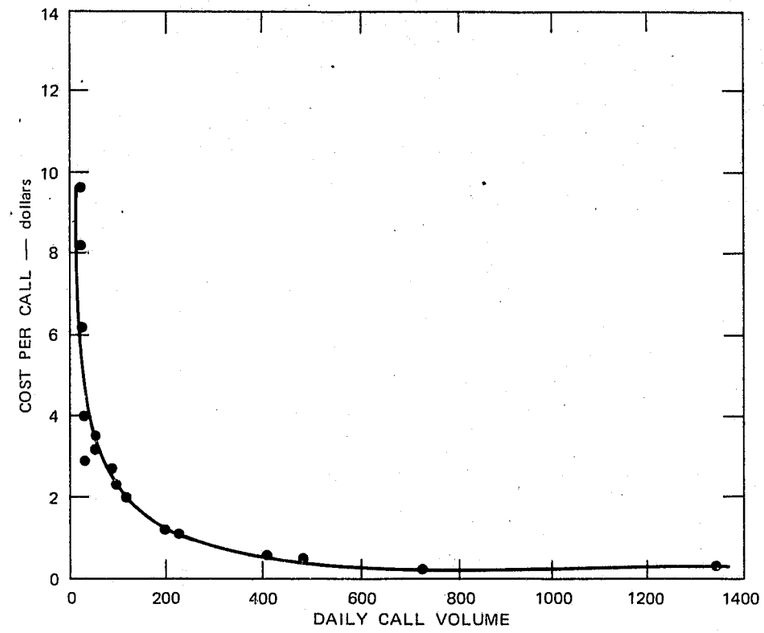


FIGURE 18 COST PER CALL AS A FUNCTION OF DAILY CALL VOLUME

An additional consideration in the development of the recommended alternative is the operational benefits to the citizen. This can be quantified in terms of the number of citizens that would require call transfer because of a mismatch between the serving telephone boundaries and local jurisdictional boundaries. Unnecessary transfers do not minimize the response time and can be frustrating to the citizen.

Selection among alternatives for any given county can not be done in a piecemeal fashion. It requires examination of the total area that would be affected by the selection and comparison of relative costs and benefits of the area configuration alternatives. As examples of this methodology, we will discuss the selection process for two of the configurations in the recommended statewide system.

Leon County is included in three candidate system areas: Leon County in a single-county system; Leon and Wakulla Counties in a combined 911 system; and Leon, Gadsden, Jefferson, and Wakulla Counties in a combined 911 system. However, Jefferson County is also included in still another alternative: Jefferson, Madison, and Taylor Counties in a combined 911 system. Therefore, each of the possible combinations of alternatives for the six-county area of Gadsden, Jefferson, Leon, Madison, Taylor, and Wakulla must be compared. From the nine local system alternatives that apply to the six-county area, five different combinations or configurations are possible. These configurations are:

(1) Six single-county systems.

(2) Leon and Wakulla Counties in a combined system and the other four counties in a single-county system.

(3) Leon and Wakulla Counties in a combined system; Jefferson, Madison, and Taylor Counties in a combined system; and Gadsden in a single-county system.

(4) Jefferson, Madison, and Taylor Counties in a combined system and the other three counties in a single-county system.

(5) Gadsden, Jefferson, Leon, and Wakulla Counties in a combined system and the other two counties in a single-county system.

The 911 system costs for these configurations range from $47,825 initial cost and $21,665 monthly cost for the first alternative, to $31,420 initial cost and $14,863 monthly cost for the fifth alternative. Considering only cost then, Configuration (5) represents significant cost savings to the area. In terms of ease of implementation, the combination of two factors point toward the selection of Configuration 5: (1) it provides the least fractionation of the Division of Forestry service districts since the four-county area of Gadsden, Jefferson, Leon, and Wakulla is served by a single dispatch point; and (2) the sheriff in

Leon County occasionally provides dispatching backup for the Wakulla County sheriff. In addition to these factors, the precedence for institutional cooperation among the counties is also demonstrated by the fact that the combined six-county area has received the Robert Wood Johnson Foundation Grant for Regional Emergency Medical Response Systems.

Finally, in terms of benefits to the citizens, Configuration 5 provides the least telephone exchange boundary overlap. For the six-county area this factor is less significant than the other factors mentioned since the extent of overlap for all configurations is relatively small. An additional benefit accrued is the reinforcement of existing community ties in the four-county area. These ties are evidenced by the fact that cities in the three counties surrounding Leon County are bedroom communities for the many state employees working in Tallahassee.

Another example of the configuration selection process is the two-county area of Orange and Seminole Counties. The choice in this case was between separate 911 centers for each county (Areas 48 and 59) or a combined two-county system (Area 86). The single-county choice would cost $21,255 per month and the combined system would cost $15,937 per month.

We recommended the combined system for two reasons: approximately 14,000 residents would be less inconvenienced by call transfers for this combined system; and the characteristics of the area indicate a large degree of exchange of people between these counties, the border being of less geographic significance. The difference in cost also favors the combined system although the amount is relatively small in terms of the ability to pay of these jurisdictions. This makes selection of the combined system appear logical, but is not our basic reason for the choice.

In these particular examples were were able simultaneously to minimize costs and maximize benefits to the citizen without significant

expense in terms of ease of implementation. This relationship between costs and benefits occurred for many of the multicounty selections because:

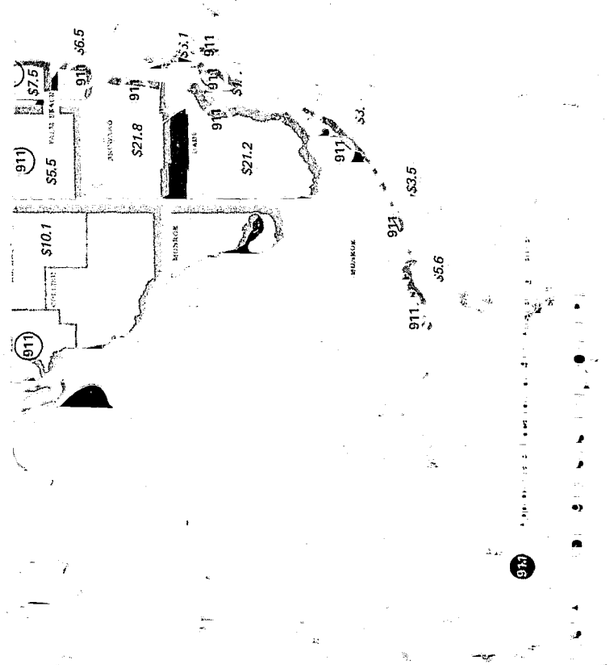
(1) Up to a certain level, regionalization, as noted earlier, results in large scale economies and at the same time may resolve telephone boundary overlaps.

(2) The mutual support of public safety agencies that exists among many of the Florida counties tends to ease the institutional problems of implementation.

2. Description of Recommended Alternative

The recommended statewide alternative 911 system concept comprises 51 local 911 systems: 14 multicounty systems covering 39 counties, 15 partial-county systems covering 6 counties, and 22 single-county systems. The boundaries of these 51 local 911 systems, the approximate locations of the 911 centers, and the monthly costs of each system are shown in Figure 19. In this alternative the range of monthly costs for the local 911 systems is the same as the range of monthly costs for the maximum partial-county alternative: $3298 for Madison County and $21,204 for Dade Metro. The average monthly cost of the local 911 systems is $7604 and the average monthly cost per county is $5788.

The selection process for most of the local configurations in the recommended statewide system concept was reasonably clear-cut and consistent with our rationale. For areas of the state where the candidate systems included multicounty and single-county configurations, the most regionalized multicounty configuration (which would result in the largest cost saving to the area) was selected if it did not adversely affect ease of implementation and operational benefits to the citizen. This condition was met with the following multicounty selections: Bradford and Union; Calhoun and Liberty; Collier, Glades, Hendry, and Lee; De Soto



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and Hardee; Dixie, Gilchrist, and Levy; Escambia and Santa Rosa; Franklin and Gulf; Gadsden, Jefferson, Leon, and Wakulla; Hamilton, Lafayette, and Suwannee; Holmes, Jackson, and Washington; Indian River, Martin, Okeechobee, and St. Lucie; Manatee and Sarasota; and Orange and Seminole.

The one exception to this multicounty selection process was the five-county area that includes Citrus, Hernando, Lake, Pasco, and Sumter Counties. For this area we selected a two-system alternative in which one system serves Lake County and one system serves the remaining four counties rather than the more regionalized five-county system. The large number of fire dispatch points (approximately 23 locations) in Lake County, plus the geographical distance between the northeastern portion of Lake County and the other four counties, would require a significant increase in number and mileage of interconnecting lines with the proposed 911 center in Pasco County. Moreover, the small cost savings of the five-county system is not commensurate with the potential impact on system implementation and operations.

As we stated earlier, cost is less of an issue for the large counties with partial-county configuration alternatives because of diminishing scale economies. Following is a brief discussion of the selection rationale for areas for which partial-county alternatives were postulated, and areas that were treated as exceptions because of their unique requirements or characteristics.

a. Alachua County

We recommend that local 911 system Area Alternative No. 1a be implemented in Alachua County instead of Area Alternative No. 1b, which has already been implemented for part of the county. We make this recommendation because of the extremely high percentage of calls that are currently being transferred from the 911 center (over 90 percent) to other

dispatch centers. Locating 911 answering at the Alachua County Sheriff's Office would greatly decrease the response time on emergency calls.

b. Broward County

Two alternatives were postulated for Broward County: one 911 answering center serving the county (System Area 6), or three 911 answering centers serving the county (Areas 92, 93, and 94). The difference in monthly costs ($21,828 for Area 6 and $28,338 for Areas 92, 93, and 94 combined) is not large considering the ability to pay of these jurisdictions. However, the telephone exchange and jurisdictional boundary overlap would require call transfers for an area serving approximately 20,000 citizens. It is the nature of the boundary mismatch rather than the extent (approximately 3 percent of the population of Broward County) that causes concern. The boundary mismatch affects two entire cities, Pembroke Pines and Coconut Creek. When dialing 911 the citizens in these two communities would be connected to a public safety agency other than their own and would therefore have to be transferred to the correct 911 center. Thus the three-system alternative would have an inequitable effect in that most of the frustration and response delays caused by mismatch would be experienced by citizens in these two communities rather than being more evenly distributed among citizens in several communities. For this reason we recommend the single-county system for Broward County.

c. Dade County

For Dade County we recommend three 911 answering centers, serving Areas 95, 96, and 97. System Area 95 would serve all of Dade County except for the cities of Coral Gables, Hialeah, Miami, and Miami Beach and would use the Dade County Department of Public Safety as the answering agency. Area 96 would use as its answering agency the Miami Police Department and would serve the cities of Coral Gables and Hialeah,

in addition to Miami. System Area 96 would include only the City of Miami Beach and would use that city's police department as the 911 answering agency.

This choice is recommended over two other options: to have one center serving all of Dade County (Area 13), or to have two centers, one serving the four cities named above and the other serving the rest of Dade County (Areas 95 and 98).

Table 14 shows a comparison of recurring costs for the one, two, and three 911 center options.

Table 14

COMPARISON OF OPTIONS FOR DADE COUNTY

Number of 911 Answering Centers	Local Area Number(s)	Total Monthly Recurring Cost
1	13	$30,866
2	95, 98	40,169
3	95, 96, 97	44,625

Based on our assumption of being commensurate with the statewide dispatch plan, we have recommended the three-center option for three reasons:

(1) The three center option--again given the existing dispatch centers--will minimize the number of call transfers required. The additional costs are small in view of the ability to pay of the jurisdictions involved.

(2) Miami Beach appears to have requirements sufficiently different from the rest of Dade County--a population primarily of older citizens and many transients--to justify the small additional cost. Miami Beach has, in addition, only a slight boundary mismatch with adjacent jurisdictions.

(3) The City of Miami is currently undertaking a major modernization program on its police department and facilities. It has adopted the primary/secondary 911 concept* presented to them by SRI as part of their Modern Miami Police Department program, which will differ considerably from that proposed here for the rest of the state. We believe that this concept would be viable even though Coral Gables and Hialeah retain their own dispatch facilities, and that operational arrangements for call relay to these cities could be readily made between Miami and these cities.

d. Monroe County

Two alternatives are postulated for Monroe County: one 911 center serving the county (Area 44) and three 911 centers serving the county (Areas 99, 100, 101). The one 911 system cost, $6420, is significantly less than the three 911 system cost, $13,542. However, the unique characteristics of Monroe County strongly favor the three-system

*This concept, using two groups of operators (primary ones for direct dispatch and call transfer and secondary ones for police-based call referral), would provide a high degree of police response to citizen problems for which a dispatch is not made. We have not recommended it elsewhere in Florida since we cannot justify the added costs without intensive study of the police requirements in each community. If the jurisdictions participating in any of the alternatives believe that the primary/secondary system concept meets their joint needs, we see no reason such a concept should not be accepted by the state, particularly since any additional costs would be paid from local funds.

alternative. The physical separation by water of the populated areas and the severe storms that occur in the area could cause operational problems in a single-county 911 system. Therefore we have recommended the three-system alternative, with the 911 centers located at the Sheriff's Office in Key West and at the Sheriff's Substations in Marathon and Plantation. Each location, using the same radio channels, has radio dispatch capability that can be used as a backup to telephone communications.

e. Palm Beach County

Table 15 shows the three options for Palm Beach County, specifically one, two, or three answering centers, and the recurring costs.

Table 15

ANSWERING CENTER OPTIONS
FOR PALM BEACH COUNTY

Number of 911 Answering Centers	Local Area Numbers	Total Monthly Recurring Costs
1	50	$14,141
2	104, 105	18,330
3	102, 103, 104	19,577

The first option, a single-county system, is not a viable alternative because of two factors: population distribution and densities, and topography. County population is concentrated in the eastern

and western portions of the county and is separated by an extensive area of swampy terrain (see Figures 12 and 13). Therefore, the real trade-off is between Options 2 (east and west areas) and 3 (northeast, southeast, and west areas).

The cost difference between Option 2 and Option 3 (about $1200 a month) is small, especially considering the ability to pay of the county with its 33 municipalities. In terms of operational benefits to the citizens and ease of implementation, Option 3 is the preferred choice since a larger number of calls would be handled by direct dispatch with three 911 centers in the county, thus reducing the number of call transfers. Also, Option 3 does not significantly increase the number of call transfers that would result because of telephone exchange and jurisdictional boundary mismatch. For these reasons, we select Option 3 as the recommended alternative for Palm Beach County.

f. Pinellas County

In Pinellas County the choice is between a two-center system oriented on a north-south basis (System Areas 106 and 107) and a single-county system (Area 52).

This year the legislature passed a local bill, SB 981, that specifies the process by which the decision on control of 911 shall be made. The bill specifies meetings of designated representatives of each jurisdiction under the auspices of the county commissioners, and further specifies that unless three-fifths of the representatives agree on an entity to control the 911 system, the sheriff of Pinellas County will assume this control on January 1, 1975.

According to our cost estimates, the single-county system, to be run by the sheriff, would cost $19,224 monthly; and the two-center system, the one run by the sheriff and the other by the St. Petersburg PD,

would cost $21,979 monthly. The cost difference is small in view of the ability to pay and probable present costs of the jurisdictions. We recommend the two-center option on the bases of minimization of boundary mismatch and consequent better service to the citizens.

g. Volusia County

In Volusia County the choice was between a single 911 system serving the whole county (System Area 64) or two 911 systems serving the county (Areas 108 and 109), one covering the eastern area and one covering the western area. The one-system alternative would cost $7363 per month and the two-system alternative would cost $12,384 per month, a difference of about $5000 per month. On the basis of a comparison of cost only, the one-system alternative would be selected. However, the two-system alternative is the better selection in terms of operational considerations. The heavy population concentrations in the eastern and western portions of the county are geographically separated by swampy terrain in the central portion (see Figures 12 and 13). Given the ability to pay of the county, cost is a less significant factor than operational considerations. Therefore we recommend the two-system alternative for Volusia County.

3. Costs

The initial and monthly costs for the recommended statewide system concept are given in Table 16. In comparing these costs with those of the three statewide alternatives presented earlier (see Table 13), the recommended system costs fall between the maximum multicounty system (minimum expense) and the single-county system (medium expense).

Table 16

COSTS OF RECOMMENDED STATEWIDE 911 ALTERNATIVE

Number of Local 911 Systems	Telephone System		Operators and Supervisors	Recording Equipment	Overall Total	
	Initial	Monthly	Monthly	Initial	Initial	Monthly
51	$82,223	$70,360	$321,100	$677,000	$759,223	$391,460

VII FEASIBLE FINANCIAL INSTRUMENTS

In Chapters V and VI we determined the costs associated with alternative statewide 911 concepts. In this chapter we analyze and recommend methods of financing these alternatives. We first determine the burden that would be imposed on local governments if they are required to finance 911 only from local revenue. We conclude after this analysis that substantial inequities would exist in any financial plan that relied solely on local revenue. We then proposed a subvention formula based on local ability to pay and 911 system scale size that tends to balance the local governments' contribution to 911 support without placing the total burden of such support on the state. We consider various alternatives entailing state collection and subvention of funds.

In Figure 18 we noted that fairly substantial economies of scale may be obtained by combining several small population 911 systems into a single larger one. In rural areas of the state where the local ability to pay is often lower than in urbanized areas, the economies of scale obtained from regionalization of 911 service are particularly important. Our analysis of the financial instruments supports the rationale of regionalized 911 service for areas of low population and low income.

A. Financial Burden of 911 on Local Governments in Florida

In considering state support to local governments for the funding of 911 costs, it is necessary to determine the financial burden that would be imposed on the various local areas if they had to pay the entire costs from their own sources of revenue.

Table 17 shows the cost of 911 in Florida in relation to various indicators of fiscal status for the 67 county areas--including county and all local governments. This would correspond to the county-oriented 911 system concept described in Chapter VI. As shown in Table 17, the 67 county areas vary widely in their ability to support 911 recurring costs. This disparity in local means appears in every category shown in the table.

When the cost of 911 is considered as a percentage of the total county budgets, the range in percentage is large--from a low of 0.1 percent in Dade and Palm Beach Counties to a high of 5.4 percent in Gilchrist County. This means that some county areas would have to increase their total expenditures by 0.1 percent and others would be forced to tax for an additional 5.4 percent of their total budget.

This same disparity is emphasized even more when 911 recurring costs are compared with current police and fire expenditures. In Broward County, 911 recurring costs would represent only 0.9 percent of the police and fire budget; Baker County would have to increase its budget by 243 percent to pay for 911. Thus, whereas Broward County and its cities would have little difficulty in paying for 911, Baker County would be faced with a major financial reorganization to provide the funds.

The per capita cost of 911 reflects these differences for the individual citizen. The recurring costs of 911 for Lafayette County would be $14.98 per capita annually, compared with $0.27 in Dade County.

A comparison of the 911 cost with the total taxable county property assessment, shows that, although none of the percentages are large, there is still a wide disparity among various county areas. In Gilchrist County, the annual system costs represent 0.24 percent of the total taxable value, but in Dade County they equal only 0.003 percent.

Table 17

DISTRIBUTED BURDEN OF 911 ON LOCAL GOVERNMENTS*

County	1	2	3	4	5	6	7	8	9
	Population (1971-72)	911 Cost per Year for County District	911 As Percent of County Expense	911 As Percent of Police and Fire	(2 ÷ 1) 911 Cost Per Capita	911 As Percent of Average Personal Income	911 Cost As Percent of Assessed Valuation	Estimated Number of Emergency Calls	Average Cost per Call
Alachua	113,381	$ 86,520	0.2%	1.9%	$0.763	0.009%	0.02%	83,220	$1.04
Baker	8,702	43,548	3.0	243.1	5.004	0.065	0.12	6,935	6.28
Bay	80,697	75,612	0.6	3.8	0.937	0.012	0.02	55,115	1.37
Bradford	13,600	44,220	1.6	13.7	3.252	0.047	0.08	10,220	4.33
Brevard	240,481	105,648	0.2	1.5	0.439	0.004	0.01	167,535	0.63
Broward	720,047	264,444	0.2	0.9	0.367	0.004	0.01	704,815	0.38
Calhoun	7,712	46,892	2.1	41.6	6.08	0.125	0.15	5,110	9.18
Charlotte	34,063	68,568	1.1	8.1	2.013	0.032	0.03	28,835	2.38
Citrus	25,476	70,524	2.1	19.5	2.768	0.050	0.04	20,440	3.45
Clay	31,993	73,728	1.3	17.9	2.305	0.027	0.06	26,280	2.81
Collier	44,402	73,056	0.6	4.1	1.645	0.018	0.01	36,135	2.02
Columbia	26,222	71,940	1.8	11.6	2.744	0.037	0.08	17,855	4.03
Dade	1,341,526	372,900	0.1	0.5	0.278	0.003	0.004	1,234,510	0.30
Desoto	12,297	41,208	1.5	12.3	3.351	0.053	0.06	9,490	4.34
Dixie	5,608	43,272	3.6	39.1	7.716	0.136	0.15	4,015	10.78
Duval	572,665	213,336	0.2	0.9	0.373	0.004	0.01	497,130	0.43
Escambia	214,017	84,792	0.3	1.8	0.396	0.005	0.01	14,220	5.96
Flagler	4,938	41,412	3.0	27.9	8.386	0.149	0.09	3,650	11.35
Franklin	7,269	44,340	2.8	27.1	6.100	0.141	0.08	4,745	9.34
Gadsden	33,857	71,256	1.2	11.2	2.105	0.038	0.09	24,455	2.91
Gilchrist	3,548	46,032	5.4	60.7	12.974	0.209	0.24	2,920	15.76
Glades	3,796	46,056	2.9	33.5	12.133	0.197	0.07	2,920	15.77
Gulf	10,129	45,864	1.7	18.1	4.528	0.062	0.09	6,570	6.98
Hamilton	7,800	44,256	2.4	23.9	5.674	0.099	0.11	5,110	8.66
Hardee	16,100	44,076	1.5	13.8	2.738	0.047	0.04	11,315	3.90
Hendry	13,538	47,340	1.1	9.6	3.497	0.050	0.04	9,855	4.80
Hernando	21,409	68,976	2.1	15.9	3.222	0.055	0.06	16,425	4.20
Highlands	34,810	68,028	1.2	7.6	1.954	0.033	0.03	26,280	2.59
Hillsborough	531,110	208,320	0.2	1.1	0.392	0.005	0.01	489,465	0.43
Holmes	11,600	46,860	3.3	41.0	4.040	0.085	0.16	7,665	6.11

*All fiscal data except 911 cost are from 1971-72. This is unfortunately the last year for which ad valorem evaluations were published by the Florida Department of Revenue. These figures show no depreciation of capital and equipment, include recurring costs and the cost of intercounty connecting lines. Since the only complete fiscal data we have are from 1971-72 and the cost of 911 is figured for 1975, the resulting figures are higher than they would be with data from 1974-75. However, even considering the unequal growth rate of various counties, it is clear that gross disparities in their ability to finance 911 would still exist.

Table 17 (Continued)

County	1 Population (1971-72)	2 911 Cost per Year for County District	3 911 As Percent of County Expense	4 911 As Percent of Police and Fire	5 (2 ÷ 1) 911 Cost Per Capita	6 911 As Percent of Average Personal Income	911 Cost As Percent of Assessed Valuation	8 Estimated Number of Emergency Calls	9 Average Cost per Call
Indian River	39,108	67,992	0.5	4.4	1.739	0.024	0.02	27,740	2.45
Jackson	34,259	73,548	2.1	17.9	2.147	0 039	0.04	24,090	3.05
Jefferson	8,801	45,216	3.1	31.2	5.138	0.093	0.13	5,840	7.74
LaFayette	2,924	43,800	4.8	71.4	14.979	0.279	0.16	2,555	17.14
Lake	73,462	78,648	0.5	4.4	1.071	0.017	0.02	50,735	1.55
Lee	122,751	83,364	0.5	2.8	0.659	0.008	0.01	95,630	0.87
Lean	113,725	74,940	0.2	1.5	0.658	0.007	0.01	81,760	0.92
Levy	13,570	49,272	1.5	20.5	3.631	0.062	0.06	9,490	5.19
Liberty	3,495	45,336	4.5	70.8	12.972	0.232	0.27	2,555	17.74
Madison	13,924	44,580	2.3	18.1	3.202	0,056	0.07	9,125	4.89
Manatee	106,245	75,108	0.5	4.1	0.707	0.011	0.01	75,920	0.99
Marion	75,734	78,864	0.4	3.9	1.041	0.016	0.02	54,024	1.46
Martin	32,375	69,372	1.2	7.8	2.143	0.029	0.02	24,455	2.84
Monroe	55,031	78,300	1.0	4.5	1.423	0.019	0.02	36,500	2.15
Nassau	21,734	72,624	1.8	21.8	3.341	0.041	0.06	14,965	4.85
Okaloosa	91,109	74,424	0.7	5.4	0.817	0.010	0.02	63,145	1.18
Okeechobee	12,538	46,224	2.0	21.3	3.687	0.057	0.06	9,855	4.69
Orange	384,031	185,460	0.3	1.2	0.483	0.005	0.01	282,875	0.66
Osceola	31,329	69,636	0.7	6.2	2.223	0.036	0.02	24,820	2.81
Palm Beach	389,375	173,448	0.1	1.0	0.445	0.005	0.01	282,510	0.61
Pasco	96,821	90,528	1.0	6.7	0.935	0.019	0.03	83,220	1.09
Pinellas	590,291	233,196	0.2	1.4	0.395	0.005	0.01	569,035	0.41
Polk	248,986	102,864	0.2	1.5	0.413	0.005	0.01	177,025	0.58
Putnam	37,746	74,640	1.2	10.3	1.977	0.029	0.04	25,185	2.96
St. Johns	34,034	71,604	1.1	6.3	2.104	0.032	0.04	23,725	3.02
St. Lucia	54,488	67,296	0.4	3.9	1.235	0.019	0.02	37,960	1.77
Santa Rosa	39,472	7,100	1.2	13.8	1.801	0.023	0.03	27,010	2.63
Sarasota	134,293	78,288	0.3	1.6	0.583	0.008	0.01	98,185	0.80
Seminole	109,689	82,152	0.6	3.7	0.749	0.008	0.02	85,775	0.96
Sumpter	16,264	41,412	2.0	12.7	2.546	0.045	0.06	12,045	3.44
Suwannee	15,894	45,876	1.5	13.6	2.886	0.049	0.06	10,220	4.49

Table 17 (Concluded)

County	1 Population (1971-72)	2 911 Cost per Year for County District	3 911 As Percent of County Expense	4 911 As Percent of Police and Fire	5 (2 ÷ 1) 911 Cost Capita	6 911 As Percent of Average Personal Income	7 911 Cost As Percent of Assessed Valuation	8 Estimated Number of Emergency Calls	9 Average Cost per Call
Taylor	13,899	46,980	1.7	12.8	3.383	0.050	0.06	9,125	5.15
Union	6,385	45,312	4.5	45.5	7.097	0.112	0.26	5,475	8.28
Volusia	184,055	94,608	0.2	1.5	0.514	0.007	0.01	128,480	0.74
Wakulla	6,541	46,452	5.0	43.8	7.102	0.116	0.20	4,380	10.61
Walton	16,446	51,600	2.0	19.4	3.138	0.054	0.10	10,585	4.87
Washington	12,165	46,524	2.6	35.3	3.824	0.080	0.12	8,760	5.31

The average 911 costs per emergency call in different counties is an even more dramatic example of the unequal impact of 911 costs. In Dade County each call will only cost an average of $0.30, but in Liberty County the same call will cost $17.74.

Thus, subvention of funds to the local jurisdictions is necessary to spread the burden of statewide finance of 911 and to distribute cost reductions exploitable by a larger scale of service. Although purely local finance would not be excessive for counties with large urban areas and budgets, other counties that are relatively poor and rural would be placed under an extraordinarily heavy commitment to provide even the minimal service now required by state law. Under these circumstances it seems that the state might take some action to equalize the relative burdens of various county areas. Considering the wide disparity in each measure of the counties ability to pay, it is not equitable to expect each area to support totally its own system. This issue should be kept in mind when specific financial devices are considered.

B. Subvention Policy

We recommend that 911 be financed by statewide collection of revenues and that funds be subvented to the local governments in an equitable and efficient fashion. We further recommend that the subvention be made by formula similar to the formulas used in federal programs such as revenue sharing or categorical grants. The formula in this case would be based on the following three objectives:

(1) Compensation for the unequal fiscal positions of the local governments participating in a 911 system by aiding support of 911 recurring costs in proportion to the difficulty of the participating governments to finance the local share of 911 with their own revenues.

(2) Encouragement of efficient and economical design and management of a 911 system by always requiring some local participation in finance of recurring costs.

(3) Encouragement of regionalization of 911 where appropriate to provide both economies in operation and better emergency services for the public.

In Appendix E we present and discuss the specific subvention formula recommended. The formula apportions a given amount of statewide support among the 911 systems within the state on the basis of population served and assessed valuation per capita. The fraction of state support is thus variable; a 911 system serving an area of high population and low assessed valuation per capita will receive maximum support and an area of low population and high assessed valuation will receive minimum support.

Table 18 shows an application of the formula presented in Appendix E. For this example we selected a population weight of 0.01 and an assessed valuation per capita weight of 0.1, with 80-percent statewide subvention of 911 costs. For each of the 911 systems (for this application there are 67, one for each county area) we show the population, the annual 911 cost from Chapters V and VI, the state share calculated by the formula, and the local share. The amount of the local share is the annual 911 cost less the state share. Under the assumption that the local share will be financed by property tax increases, we have shown the property tax increase required as dollars per $100 of assessed valuation.

Comparing Table 18 with Table 17, we see that counties of large population and low assessed valuation per capita (for example Duval, Hillsborough, Pinellas, and others) have a larger than 80-percent share of 911 costs paid by the state and a low property tax to finance the local share. At the other extreme, counties of low population and relative wealth, like Gilchrist, Liberty, Lafayette, and so on, have a significantly smaller fraction of the 911 costs paid by the state and a correspondingly higher local tax increase to finance 911. Other county areas fall in between these extremes.

Table 18

SUBVENTION SCHEDULE: STATEWIDE 911 BY COUNTY AREA ALTERNATIVE

911 System Area	Population (1971-72)	Annual 911 Cost	Annual State Share	Annual Local Share	
				Amount	Property Tax Rate, Dollars per $100 Assessed Valuation
Alachua	113,381	$ 86,520	$ 79,494	$ 7,026	$0.002
Baker	8,702	43,548	30,493	13,055	0.036
Bay	80,697	75,612	65,525	10,087	0.003
Bradford	13,600	44,220	34,677	9,543	0.018
Brevard	240,481	105,648	95,432	10,216	0.001
Broward	720,047	254,444	207,853	46,591	0.001
Calhoun	7,712	46,892	31,559	15,333	0.048
Charlotte	34,063	68,568	51,298	17,270	0.007
Citrus	25,476	70,524	52,749	17,775	0.010
Clay	31,993	73,728	64,254	9,474	0.008
Collier	44,402	73,056	44,603	28,453	0.005
Columbia	26,222	71,940	61,815	10,125	0.011
Dade	1,341,526	372,900	301,832	71,068	0.001
Desoto	12,297	41,208	29,484	11,724	0.017
Dixie	5,608	43,272	24,607	18,665	0.064
Duval	572,665	213,336	197,830	15,506	0.001
Escambia	214,017	84,792	76,909	7,883	0.001
Flagler	4,938	41,412	18,227	23,185	0.048
Franklin	7,269	44,340	25,922	18,418	0.035
Gadsden	33,857	71,256	65,585	5,671	0.007
Gilchrist	3,548	46,032	18,967	27,065	0.139
Glades	3,796	46,056	12,092	33,964	0.053
Gulf	10,129	45,864	32,253	13,611	0.026
Hamilton	7,800	44,256	28,986	15,270	0.039
Hardee	16,100	44,076	31,873	12,203	0.011
Hendry	13,538	47,340	30,964	16,376	0.014
Hernando	21,409	68,976	54,971	14,005	0.013
Highlands	34,810	68,028	51,739	16,289	0.006
Hillsborough	531,110	208,320	190,073	18,247	0.001
Holmes	11,600	46,860	37,356	9,504	0.032
Indian River	39,108	67,992	50,403	17,589	0.006
Jackson	34,259	73,548	65,563	7,985	0.007
Jefferson	8,801	45,216	32,166	13,050	0.039
Lafayette	2,924	43,800	12,769	31,031	0.118
Lake	73,462	78,648	64,853	13,795	0.003
Lee	122,751	83,364	69,836	13,528	0.002
Leon	113,725	74,940	65,630	9,310	0.002
Levy	13,570	49,272	35,587	13,685	0.017
Liberty	3,495	45,336	18,974	16,362	0.159
Madison	13,924	44,580	33,898	10,682	0.016
Manatee	106,245	75,108	66,160	8,948	0.002
Marion	75,734	78,864	65,198	13,666	0.003
Martin	32,375	69,372	49,474	19,898	0.007
Monroe	55,031	78,300	60,418	17,882	0.004
Nassau	21,734	72,624	56,891	15,733	0.013
Okaloosa	91,109	74,424	68,996	5,428	0.002
Okeechobee	12,538	46,224	32,970	13,254	0.018
Orange	384,031	185,460	162,947	22,513	0.001
Osceola	31,329	69,636	47,988	21,648	0.007
Palm Beach	389,375	173,448	130,977	42,471	0.001
Pasco	96,821	90,528	83,560	6,968	0.002
Pinellas	590,291	233,196	219,284	13,912	0.001
Polk	248,986	102,864	87,480	15,384	0.001
Putnam	37,746	74,640	63,770	10,870	0.006
St. Johns	34,037	71,604	57,541	14,063	0.007
St. Lucie	54,488	67,296	54,364	12,932	0.004
Santa Rosa	39,472	71,100	59,233	11,867	0.006
Sarasota	134,293	78,288	64,494	13,794	0.002
Seminole	109,689	82,152	74,429	7,723	0.002
Sumpter	16,264	41,412	32,546	8,866	0.012
Suwannee	15,894	45,876	35,955	9,921	0.014
Taylor	13,899	46,980	34,018	12,962	0.016
Union	6,385	45,312	29,943	15,369	0.087
Volusia	184,055	94,068	83,362	10,706	0.001
Wakulla	6,541	46,452	30,064	16,388	0.070
Walton	16,446	51,600	42,616	8,984	0.017
Washington	12,165	46,524	36,677	9,847	0.026

Based on: Population weight = 0.01
Assessed valuation per capita weight = 0.100
Statewide share of total 911 costs = 80%

Using the same assessed valuation per capita and population weights, Table 19 shows the subvention schedule for the recommended rather than the individual county area 911 system concept. This recommended alternative comprises fifty-two 911 systems, including some partial and multicounty systems. For multicounty systems, the property tax increase to finance the local share represents the increase obtained by dividing the annual 911 local costs by the combined assessed valuation of all counties. This is equivalent to the local costs being shared by each county in proportion to its assessed valuation--an assumption that we do not necessarily recommended.

In comparing the last columns of Tables 18 and 19, we note that in moving to the recommended system there is a dramatic reduction in the spread of local tax increase among 911 systems. By combining various counties with small populations into multicounty systems, the horizontal tax inequity is greatly reduced compared with that of a single-county system. For the partial-county alternatives, Table 19 shows that the tax increase will be small because the partial-county alternatives were selected to provide sufficient scale size regardless of the finance plan.

Table 20 compares the multi- and partial-county systems of the recommended concept of Table 19 with the county area statewide 911 concept of Table 18. It should be noted that the total yearly recurring cost statewide will be lower for the recommended system concept. For county areas that are part of both (for example, Alachua County) Table 18 shows an annual state share of about $79,500 and Table 19 shows a state share of about $76,500 for the recommended alternative. For Alachua County in the recommended alternative, the population relative to the other 51 systems in Florida is smaller, providing less of a state share even though the absolute population is unchanged. We point this out to emphasize that the purpose of providing the subvention schedules

Table 19

SUBVENTION SCHEDULE: RECOMMENDED STATEWIDE 911 ALTERNATIVE

911 System Area	Population (1971-72)	Annual 911 Cost	Annual State Share	Annual Local Share	
				Amount	Property Tax Rate, Dollars per $100 Assessed Valuation
Alachua	$113,381	$ 86,520	$ 76,949	$ 9,571	$0.002
Baker	8,702	43,548	27,236	16,312	0.045
Bay	80,697	75,612	63,302	12,310	0.003
Broward	720,047	264,444	210,332	54,112	0.001
Charlotte	34,063	68,568	49,034	19,534	0.007
Clay	31,993	73,728	61,263	12,465	0.011
Columbia	26,222	71,940	58,652	13,288	0.014
Duval	572,665	213,336	192,388	20,948	0.001
Flagler	4,938	41,412	14,926	26,486	0.055
Highlands	34,810	68,028	49,470	18,558	0.007
Hillsborough	531,110	208,320	184,850	23,470	0.001
Lake	73,462	78,648	62,624	16,024	0.004
Madison	13,924	44,580	31,380	13,200	0.020
Marion	75,734	78,864	62,974	15,890	0.003
Nassau	21,734	72,624	53,707	18,917	0.016
Okaloosa	91,109	74,424	66,686	7,738	0.003
Osceola	31,329	69,636	45,816	23,820	0.008
Polk	248,986	102,864	85,001	17,863	0.001
Putnam	37,746	74,640	61,016	13,624	0.008
St. Johns	34,037	71,604	54,968	16,636	0.008
Taylor	13,899	46,980	31,500	15,480	0.019
Walton	16,446	51,600	39,768	11,832	0.022
Bradford-Union	19,985	75,120	59,374	15,746	0.022
Calhoun-Liberty	11,207	53,640	36,256	17,384	0.036
Citrus-Hernando-Pasco-Sumter	159,970	108,444	94,585	13,859	0.002
Collier-Glades-Hendry-Lee	184,487	128,244	96,835	31,409	0.002
Desoto-Hardee	28,397	74,736	55,632	19,104	0.011
Dixie-Gilchrist	22,726	90,000	66,651	23,349	0.018
Escambia-Santa Rosa	253,489	106,068	93,041	13,207	0.001
Franklin-Gulf	17,898	52,860	37,570	15,290	0.015
Gadsen-Jefferson-Leon Wakulla	162,924	103,056	90,262	12,794	0.002
Hamilton-Lafayette-Suwannee	26,618	75,672	58,361	17,311	0.013
Holmes-Jackson-Washington	58,024	86,352	76,534	9,818	0.006
Indian River-Martin-Okeechobee-St. Lucie	138,509	99,708	76,995	22,713	0.002
Manatee-Sarasota	240,538	96,312	80,163	16,149	0.001
Orange-Seminole	493,720	201,768	174,403	27,365	0.001
Brevard-North	51,300	69,960	58,216	11,744	0.005
Brevard-Central	71,700	71,952	58,725	13,227	0.003
Brevard-South	117,800	83,712	74,739	8,973	0.002
Dade Metro	757,200	260,700	204,148	56,552	0.001
Miami-Gable-Hialeah	496,600	209,652	172,455	37,197	0.001
Miami Beach	87,700	76,032	46,149	29,883	0.003
Key West	31,000	69,348	46,937	22,411	0.008
Marathon	10,700	44,736	27,267	17,469	0.025
Plantation	14,700	43,548	30,926	12,622	0.018
Palm Beach-Northeast	238,200	94,080	70,103	23,977	0.001
Palm Beach-Southeast	118,800	82,260	53,543	28,717	0.002
Palm Beach-West	32,400	72,396	61,770	10,626	0.011
Pinellas-North	200,200	90,720	83,081	7,639	0.001
Pinellas-South	390,100	178,056	161,493	16,563	0.001
Volusia-East	156,700	86,112	64,930	21,182	0.002
Volusia-West	27,400	73,776	57,769	16,007	0.012

Based on: Population weight = 0.01
Assessed valuation per capita weight = 0.100
Statewide share of total 911 costs = 80%

Table 20

SUBVENTION POLICIES FOR PARTIAL- AND MULTICOUNTY 911 ALTERNATIVES COMPARED WITH SINGLE-COUNTY ALTERNATIVES

County Area	Annual 911 Cost	State Share		Local Share		Property Tax Rate, Dollars per $100 Assessed Valuation
		Amount	Percent	Amount	Percent	
MULTICOUNTY SYSTEMS						
Bradford-Union						
One Multicounty	$ 75,120	$ 59,373	79.0%	$15,747	21.0%	$0.002
Two Single County	89,732	64,634	72.0	25,098	28.0	0.036
Calhoun-Liberty						
One Multicounty	53,640	36,255	67.6	17,385	32.4	0.036
Two Single County	92,228	50,544	54.8	41,684	45.2	0.085
Citrus-Hernando-Pasco-Sumter						
One Multicounty	108,144	94,584	87.5	13,560	12.5	0.002
Four Single County	270,720	223,304	82.5	47,416	17.5	0.007
Collier-Glades-Hendry-Lee						
One Multicounty	128,244	96,833	75.5	31,411	24.5	0.0021
Four Single County	249,816	157,531	63.1	92,285	36.9	0.0062
Desoto-Hardee						
One Multicounty	74,736	55,631	74.4	19,105	25.6	0.010
Two Single County	85,824	61,370	71.5	24,454	28.5	0.014
Dixie-Gilchrist-Levy						
One Multicounty	89,352	66,170	74.0	23,182	26.0	0.018
Three Single County	137,280	78,443	57.1	58,837	42.9	0.045
Escambia-Santa Rosa						
One Multicounty	104,340	91,524	87.7	12,816	12.3	0.0010
Two Single County	153,156	133,745	87.3	19,411	12.7	0.0017
Franklin-Gulf						
One Multicounty	52,860	37,569	71.1	15,291	28.9	0.015
Two Single County	90,204	58,225	64.5	31,979	35.5	0.030
Gadsden-Jefferson-Leon-Wakulla						
One Multicounty	103,056	90,261	87.6	12,795	12.4	0.002
Four Single County	237,864	193,489	81.3	44,375	18.7	0.006
Hamilton-Lafayette-Suwannee						
One Multicounty	75,672	58,360	77.1	17,312	22.9	0.013
Three Single County	133,932	77,729	58.1	56,203	41.9	0.041
Holmes-Jackson-Washington						
One Multicounty	85,392	75,682	88.6	9,710	11.4	0.005
Three Single County	166,500	139,288	83.7	27,212	16.3	0.015
Indian River-Martin-Okeechobee-St. Lucie						
One Multicounty	98,268	75,882	77.2	22,386	22.8	0.002
Four Single County	249,444	186,138	74.6	63,306	25.4	0.006
Manatee-Sarasota						
One Multicounty	96,312	80,162	83.2	16,150	16.8	0.0012
Two Single County	153,996	130,684	84.9	23,312	15.1	0.0016
Orange-Seminole						
One Multicounty	198,744	171,787	86.4	26,957	13.6	0.0011
Two Single County	263,820	234,066	88.7	29,754	11.3	0.0012

Table 20 (Concluded)

County Area	Annual 911 Cost	State Share		Local Share		Property Tax Rate, Dollars per $100 Assessed Valuation
		Amount	Percent	Amount	Percent	
PARTIAL-COUNTY SYSTEMS						
Brevard						
One County Area	$103,920	$ 93,893	90.4%	$ 10,027	9.6%	$ 0.00096
Three Partial	223,032	189,481	85.0	33,551	15.0	0.0032
Dade						
One County Area	365,844	296,189	81.0	69,655	19.0	0.0007
Three Partial	536,544	415,147	77.4	121,397	22.6	0.0012
Monroe						
One County Area	77,580	59,876	77.2	17,704	22.8	0.0043
Three Partial	155,952	104,088	66.7	51,864	33.3	0.0125
Palm Beach						
One County Area	170,760	128,977	75.5	41,783	24.5	0.0012
Three Partial	244,272	182,082	74.5	62,190	25.5	0.0017
Pinellas						
One County Area	233,196	219,335	94.1	13,861	5.9	0.00068
Two Partial	268,776	244,570	91.0	24,206	9.0	0.0012
Volusia						
One County Area	93,168	82,584	88.6	10,584	11.4	0.012
Two Partial	157,392	120,788	76.7	36,604	23.3	0.042

is to advise the state government on the consequences of different statewide alternatives--not to offer local governments a selection among subvention policies.

The hypothetical nature of this formulation should be emphasized, but it clearly demonstrates the capability of a subvention formula to counteract the wide variations in abilities to pay among the 911 system areas and to build incentives among local governments for cooperative 911 efforts.

C. Alternative Instruments of 911 Finance

Table 21 presents four possible ways to finance recurring 911 costs: direct user charges, property tax, state general revenue, and a telephone excise tax. These should be analyzed in the context of four specific considerations: equity, efficiency, administration, and flexibility. Equity may be defined in this context as imposing a socially acceptable financial burden on everyone; i.e., equals should pay equally and unequals should pay in relation to their ability to pay. The financial burden should not be regressive. Efficiency may be defined as the proper use of resources; a tax or pricing policy would be efficient if it encouraged proper use of 911 and inefficient if it encouraged overuse or abuse of the system. Administrative considerations encompass the mechanisms necessary to collect and disburse the funds and the costs surrounding these mechanisms. A financial policy is flexible if it automatically reflects changes in the economic environment without having to be readjusted constantly; i.e., the rate that produces the necessary revenue in 1975 must still produce the necessary revenue in 1980, even though the total figure has increased to reflect changes in the economy.

Table 21

APPROXIMATE TAX RATE NECESSARY IN 1975 TO FINANCE RECURRING 911 COSTS

Fund Source	Collection Mechanism	Maximum Multicounty	Single County	Maximum Partial County	Recommended	Remarks
1. Direct user charge (based on 6,154,995 emergency calls expected to be made annually statewide)	Caller billed by telephone company for each 911 call dialed; collection of revenues may be statewide or on a countywide basis	Statewide Average per Call				Would require cooperation of telephone company for billing. May be useful in discouraging frivolous use of 911. Charge may be levied on someone other than the benefactor of the 911 system, tending to discourage use of 911 by passersby. Might cause delay for billing.
		$0.66	$0.83	$0.93	$0.75	
		Approximate Range Among Counties				
		$0.30 to $13.00				
2. County property tax (based on total county assessment rolls of $91,722,000,000)	An additional millage added to the existing county general fund rate to finance each county's communication needs	Statewide Property Tax Average (mills)				Presumes property is the proper index of benefits received from improved communications. Requires no new tax instrument but may require voter approval, and state subvention. Allows counties to control the quality dimension of 911-related services.
		$0.045	$0.056	$0.063	$0.051	
3. State General Revenue Fund (based on 1975-76 estimated revenue of $2,304,784,000) Retail sales tax*	Use of unentrusted general revenue sources If these prove insufficient, an increment could be added to the existing flat rate sales tax to finance 911; it could be distributed by subvention to individual 911 jurisdiction	0.18% of General Revenue	0.22% of General Revenue	0.25% of General Revenue	0.20% of General Revenue	Assumes growth in general fund revenues will allow funding to 911 without increase rate. No new tax instrument is required but legislative approval of an increased rate or earmarking of sales tax revenue would be necessary. Retail sales are probably a poor index of communication benefits, but sales tax is an accepted means of public service finance in Florida. A tax on retail sales is regressive with respect to revenue. Would require a subvention policy which encourages efficient and economical 911 operations at each jurisdiction.
		0.012% of retail sales	0.015% of retail sales	0.017% of retail sales	0.014% of retail sales	
		0.30% of sales tax collection at 4%	0.38% of sales tax collection at 4%	0.43% of sales tax collection at 4%	0.34% of sales tax collection at 4%	
4. Telephone Excise Tax* (based on established $1,191,855,000 in intrastate calls in 1975	A flat-rate tax is applied to the value of all intrastate calls to be collected on a statewide basis and apportioned to the counties for their 911 communication needs--OR A flat-rate tax is applied to the monthly service charge on each telephone on a statewide basis (basic service)	0.35%	0.43%	0.48%	0.39%	Would not require the public to pay additional taxes; federal tax already being collected, but scheduled for phase-out by 1982. Would provide a rapidly-growing flexible base for taxation. Charges would be effectively proportional to income if total bill is taxed, and regressive if only service charge is included in base. Would require state-wide collection and subvention of tax revenue.
		1.4%	1.8%	2.0%	1.6%	

*As the largest single contribution to the general fund.

1. Direct User Charge

Although the direct user charge is, as will be shown, a poor way to finance 911, it provides a point of reference for comparison with other methods. When the direct user charge alternative is considered in this context, it becomes apparent that this method of finance contains certain flaws. Since each citizen in a particular area would be billed for the same amount per 911 call, the resultant burden on the citizen is clearly regressive; i.e., the user charge does not take into account the relative financial status of different citizens. The poor citizen and the wealthy citizen pay the same amount, which imposes an unequal burden on the former because the amount in question represents a larger proportion of his total income. In this context the direct user charge must be considered inequitable. Since efficiency concerns the proper use of resources, the direct user charge is only debatably efficient. A charge on the use of 911 may tend to discourage crank calls and might also tend to discourage calls from citizens who are concerned about but not involved in the emergency. Considered from the standpoint of necessary administrative mechanisms and costs, the direct user charge method is also deficient. Aside from the fact that it requires extra effort by the telephone companies for billing and then redistributing the funds, there would also be practical problems associated with billing pay-station users and the mismatch between 911 users and the benefactors of emergency services. In addition, there may be mismatches between county boundaries and telephone jurisdictions that would be difficult to adjust. The direct user charge is not particularly flexible, and its use would require constant rate adjustments to generate the necessary revenue in the future.

In summary, the user charge is probably a poorly suited method of finance for a 911 system, but consideration of its implications is a useful benchmark for analyzing other instruments.

2. Property Tax

Use of revenue from the county property tax to finance 911 is another possibility, especially for the local share of 911 funding. This alternative raises the issue of the degree of regressivity of the property tax. Some economists hold that the property tax is regressive because of its failure to consider any economic index except for ownership of property and the fact that poor property owners are taxed at the same rate as rich ones, thus burdening property owners disproportionately. Other economists maintain that, since property taxes generally support public services that benefit property owners, the tax is actually on benefits received and not regressive at all. Any discussion of its equity as a means of financing 911 must take these arguments into account. At the same time, the decision must be made as to whether ownership of property is an adequate index of the benefits that would be received from the 911 service. Thus its relative equity in these circumstances is not clear. With regard to efficiency, this mode of finance will have little real effect on utilization of the 911 system; it will be somewhat a hidden charge and hence will probably not affect the frequency and circumstances of citizens' calls. It would not require any new administrative devices. Florida's property tax base is increasing more rapidly than that of any other revenue source (see Figure 20) and hence the 911 system can probably be funded without a substantial rate increase. Because of the disparity in wealth between counties (see Table 17), there would have to be some mechanism of state subvention as discussed in the last section to equalize the local burden. In various counties 911 costs range from 131 percent to 0.004 percent of assessed valuation. Florida's vigorous activity in construction and development provides a rapidly growing tax base. However, under conditions of diminished construction, revenue from property taxes is noted for its lack of flexibility. Consequently, if Florida were to experience a drop in construction activity, this tax

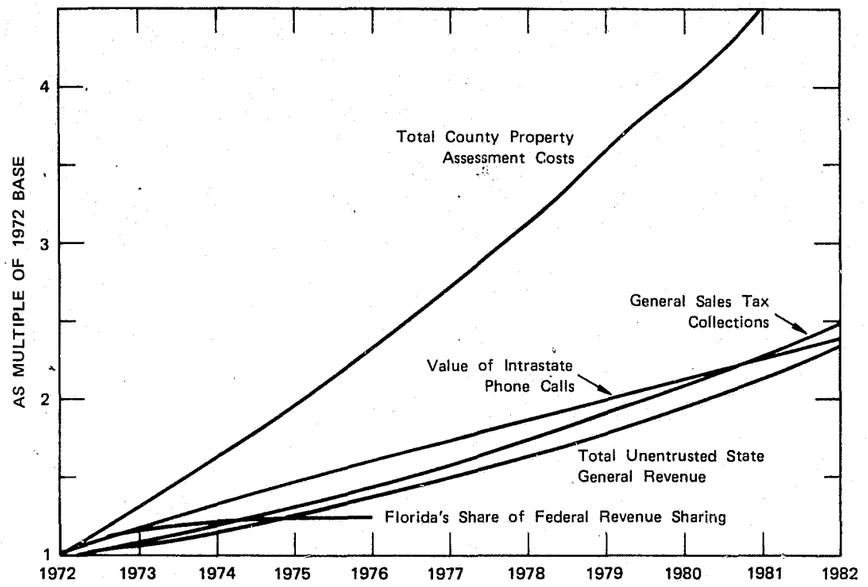

FIGURE 20 RELATIVE GROWTH OF REVENUE INDICATORS

base would stabilize and fail to produce any necessary additional revenue without rate adjustments. We would recommend some use of property tax revenues to provide a local contribution and state subvention to provide the majority of the costs.

3. State General Fund

It is also possible to finance all 911 systems by subvention of revenues with the money apportioned directly from the unentrusted portion of the state general fund. However, this approach raises some questions of equity. For example, the sales tax, the largest contributor to Florida's general fund, is somewhat regressive. This means, obviously, that any sales tax support going to the 911 system would be regressive as well. Simultaneously, there is no connection between the use of 911 and the payment of a retail sales tax, so that no argument about benefits

received can be used to offset this basic inequity. However, Florida's emphasis on the sales tax as a source of revenue indicates the basic acceptability of the tax as a method of general finance. The state's revenue sharing with cities and counties takes some account of disparities among jurisdictions in their ability to finance local activities. If additional state sales tax funds were added to this revenue sharing program, the finance of 911 in this fashion might be quite equitable. Like the use of the property tax as a source of financing the 911 system, there would be little effect on the number of calls if some financing were derived from the sales tax, and this finance method would require minimal new administrative mechanisms. However, it would require a subvention schedule, as discussed in the previous section, that encourages proper and economical development in local jurisdictions. However, if the normal increase in sales tax revenue were insufficient to cover the cost of 911 and an additional increase in the rate became necessary, legislative approval, which has historically been difficult to achieve, would be required. In general, however, use of sales tax revenues is a fairly flexible financial method because the growth in the tax base can provide increases in revenue without increases in tax rates. Figure 20 shows the anticipated growth in sales tax collections. As Table 21 shows, the costs of 911 represent only a small fraction (about 0.33 percent) of anticipated 1975 sales tax revenues.

4. Telephone Excise Tax

In none of the above methods of financing the 911 system is there any clear coincidence between system benefactors and beneficiaries. An alternative method might be the implementation of a tax on citizen and business access to 911, such as a tax on the ease of reaching the 911 answering center. This might be measured by the number of lines to the

center or by the number of telephones present. In any case, such a financial device would have a much closer relationship between those who paid for the system and those who received benefits from the system.

The current federal excise tax on telephone use is gradually being phased out at a rate of 1 percent per year. It is now 8 percent and will be totally eliminated by 1982. Telephone companies routinely collect this tax and forward the revenue to the federal government. It seems logical that as this tax is repealed by the federal government, the state of Florida could levy this tax, or some portion thereof, and use the revenue to support the 911 system. There would be no new burden on the citizen. Florida could duplicate most of the federal procedures for collection of the tax. An excise tax would serve as an alternative to a tax on the number of telephones or lines, both which devices would be rather unwieldy, without losing the increased benefactor-beneficiary coincidence.

The tax could be implemented by applying the rate to the total intrastate bill or to the basic service charge. The first method has the disadvantage that long distance intrastate calls, which would be included, are not a measure of access to 911. The tax on the basic service charge, or rather on the cost of having a phone, does not share this problem but tends to be regressive in that the person with a low income pays as much as a person with a high income. This problem can be rectified, however, by taxing the total bill, which seems to reflect economic status more accurately. By taxing the total bill the rate becomes more progressive. This tax could apply only to intrastate calls. The rate required would be roughly 0.33 to 0.5 percent of the total bill of 1.5 to 2 percent of monthly service charges, as shown in Table 21.

With these factors in mind, it seems that the telephone excise tax would furnish a strong financial base for the 911 system. It is

equitable in that there is a strong benefactor-beneficiary coincidence and that those who can afford more telephone service are required to pay more for 911 (since they have increased access). It also has the advantage of not taxing families who do not have a phone and hence have only limited access to the system. Although it would require a good subvention schedule to encourage efficient 911 development at the local level, this not insurmountable problem would be required by using property tax and sales tax revenues as well. Administratively, as has been shown, no new mechanisms of collection are necessary, although subvention would require some new procedures. The existing mechanism has been a flexible source of revenue. As Figure 20 illustrates, the base of the excise tax (value of intrastate calls) will grow as rapidly as the base of the sales tax. The future growth of this base is estimated by conservative (linear) extrapolation of past growth of the base. Thus the necessity of rate changes is unlikely.

We support then, the recommendation of the finance subcommittee of the 911 Task Force given in Appendix B. It should be noted, however, that, based on current and projected increase in telephone revenue within Florida, the 1-percent tax recommended by the task force would be higher than necessary to cover the costs of 911. If the 1-percent tax were retained by the legislature, funds in excess of those required to support 911 should be used in a trust fund to offset other local and state expenditures in the 911 program. A termination date for the excise tax should also be considered so that in the long term local revenues will become the main source of 911 source.

5. Federal Fund Sources

The feasibility of financing 911 communication systems with federal funds is constrained by the availability of programs within the current structure of federal grants in aid. As the analysis of Chapter VI

illustrates, most of 911 system costs are in the nature of recurring costs, particularly for personnel. The federal government has a general reluctance toward obligating itself to the continuing support of operating expenses in the public sector because of the fear that such expenses will escalate when unions and other organizations learn of the availability of governmental support. There has also been reluctance on the part of federal agencies to support systems whose primary beneficiaries are local users (except for the purpose of demonstration or technological development). Although programs for public safety (and hence 911 communications) have some of the characteristics of classic public benefit and hence deserve some federal attention, most of the benefits accrue to the residents of local jurisdictions, and the rationale for local or state support of public safety functions is traditionally strong. However, some federal monies may be considered as possibilities for the implementation costs of 911 systems as a part of general improvements in emergency communication.

6. Revenue Sharing

Under the provisions of Federal Public Law 92-512, Florida will receive roughly $184 million in shared revenue from the federal government in 1975. Unearmarked funds are available for the use of the State of Florida, its counties, and its cities to support whatever program these jurisdictions desire. Thus, these funds are available for support of a 911 system. There are competing uses for these funds, however, and as Figure 20 displays, these funds grow considerably more slowly than other sources of aid and have a statutory cut-off on the date of the law's expiration in 1976. Use of federal revenue-sharing funds for 911 might then run into increased competition from other programs and would face reorganization in 1976 when federal policy in this area is revised. Since cities, counties, and the state share the revenue-sharing funds on an approximately

equal basis, 911 communication costs would amount to roughly 1 percent of any one jurisdiction's share. It is not recommended then that revenue-sharing funds be relied on to finance 911.

7. Law Enforcement Assistance Administration Funds

By passage of the Crime Control Act of 1973 (Public Law 93-83), Congress continued authorization of funding through LEAA, U.S. Department of Justice, to states for improvement and strengthening of the criminal justice system in their efforts to prevent and control crime. The great bulk of action funding is in the form of block grants to states. During FY 1974 Florida received an award of $15,821,000 in Part C action grant funds, of which $11,501,867 must be passed through to units of general local government. It is anticipated that funding in future years will be at approximately the same level.

Within Florida, the Bureau of Criminal Justice Planning and Assistance (BCJPA), Division of State Planning, functions as the State Planning Agency (SPA) responsible for the administration and implementation of the federal LEAA program. The local LEAA field structure comprises some 15 metropolitan and regional planning units. These units are charged with responsibility to develop within their respective service areas a comprehensive criminal justice plan that will in part make recommendations on the allocation of LEAA resources. As a matter of policy, the BCJPA honors recommendations of these units subject to the conditions of mandatory program and fiscal guidelines imposed by law and LEAA. At this writing there is no LEAA guideline restricting funding of 911 systems.

Therefore, 911 can be considered a program eligible for LEAA funding. Since the 911 system is a component of a broader public safety system that LEAA is empowered to support, action monies can be provided only to fund charges that can be directly identified with law enforcement

purposes. As a matter of policy the BCJPA would provide only funding for the initial development and implementation of 911 systems; it may not be relied on to provide continuing operational support. All funding decisions would be made on an individual basis. Of course, in each instance the Division of Communications would be required to certify that the 911 project is in accord with both the State 911 Emergency Telephone Master Plan and the Florida County and Municipal Law Enforcement Communications Plan.

8. Emergency Medical Funds

The Emergency Medical Services Act passed by Congress in 1973 could also be used to fund implementation of the 911 system. According to figures furnished by the Division of Communications, we estimate that Emergency Medical Communications (EMS) would only receive about $100,000 during the present fiscal year out of the $300,000 to $400,000 that may be expected for Florida. Most of the available funds would be for EMS training at present. We therefore recommend that EMS funds be used to the extent feasible and that, if larger amounts are made available by the Department of HEW, they be used to finance implementation.

D. Recommendations for 911 Finance

On the basis of the wide disparity in ability to pay among the 911 system areas in Florida, we recommend that the state subvent funds directly to those entities to be designated in the state plan as responsible for 911 system operation. To maintain local responsibility for the design and operation of the system consistent with the state plan, we recommend that local governments provide a small fraction of both implementation and operating costs of 911 from locally derived revenue sources.

We recommend that a specific formula based on ability to pay and population served, be used to determine the amount of funds the state

should make available to local governments to help jurisdictions with low assessed valuations per capita and large populations. Such action would both equalize local ability to pay for the local share and encourage cooperative 911 activity among jurisdictions consistent with the state plan.

For the state portion of 911 funding, we believe that federal funds should be used to the extent consistent with other ongoing communications programs in law enforcement and emergency medical communications for 911 implementation. We do not see federal funds as a viable means of finance for recurring costs. We recommend state assumption of 1 percent of the decreasing federal telephone excise tax on intrastate revenue as the source of state funds for both 911 recurring and implementation costs.

Local share of 911 implementation and recurring costs should be financed from property tax increases, state subvention of sales taxes, state revenue sharing, or any other discretionary revenue available to local governments.

VIII 911 ORGANIZATIONAL AND MANAGEMENT TECHNIQUES

A. Organizational and Management Requirements

1. Importance of Organizational Requirements

In this chapter we investigate and suggest alternative organizational and management techniques for the various 911 systems in the state plan. We specifically avoid making organizational and management recommendations for each local area 911 system; to make such recommendations in a responsible and professional manner would require considerably more information on local problems throughout the state than we have acquired.

In this chapter we distinguish between organizational and management requirements. We refer to organizational requirements as the requirements on the 911 organization considered as a whole--primarily its basis for legitimacy as a public agency in an intergovernmental context. Specifically, such legitimacy is essentially grounded in where the 911 operation fits into the intergovernmental hierarchy--should it be, for example, part of a city government, a county government, the state government, or a special district, or what? If a part of a county government, should it be part of the sheriff's operation or part of the county administrative structure, independent of the sheriff?

Management requirements in this chapter refer to the internal workings of the 911 operating organization and the structure required to make the organization effective. A key assumption we are making is that, since the 911 organizational requirements will be the more demanding to meet and more controversial for each local area, they should be considered both in this report and by the local governments concerned more comprehensively; the management requirements will be more straightforward and

will be "driven by" the organizational requirements. This assumption seems to be valid from our observations, particularly in the urban areas of the state where there are often several communications organizations that could manage 911 quite well operationally; in these areas the organizational choice will probably be based on political rather than operational considerations.

2. Specific Organizational Requirements

We see three organizational requirements for 911:

- Effectiveness of resource management.
- Maintenance of a high level of service to the public.
- Accountability to the state, the public safety agencies served, and the public.

a. Effectiveness of Resource Management

The first requirement--effectiveness of resource management--has three criteria associated with it. First, to meet this requirement, the organizational form should minimize any duplication of effort already being performed by other organizations within the local area. At the present time in Florida, emergency service telephone answering is being performed by a large number of organizations. Within a particular area, effort should be made to concentrate this function in the 911 organization. Stated differently, the organization currently performing the bulk of the telephone answering should be given the 911 answering function. In most cases, this criterion means that the agency answering the calls for the largest law enforcement agency in the area should be given the 911 answering responsibility.

Second, the provision of effective resource management requires that the organization performing the 911 answering be in a position to obtain a great deal of cooperation from other public safety agencies in

order to provide the citizen in need with access to multiple resources when required. Many citizen emergencies require the coordinated efforts of more than one existing agency, as was shown in the example of Chapter II for Orange County. To obtain such cooperation requires in our judgment at least one of three preconditions:

(1) That the agency is headed by an individual of considerable political power in the area. In many parts of rural Florida, the sheriff is such a person.

(2) That the agency is headed by an individual who, although lacking political power, has achieved a great deal of professional recognition within the local area because of fairness and professionalism in public safety communications. Several communication directors in various Florida cities exemplify this qualification.

(3) That the agency policy is determined by some consensual process, such as a board of users. From subjective viewpoints of each user, an agency policy would be formed to ensure that the agency head would be subject to sufficient checks and balances and that the 911 function could not be used for wrong reasons.

Third, and perhaps easiest to define, effectiveness in resource management requires that the 911 organization have access to sufficient revenue to ensure continuance of a high level of service. This means that it must be in a position to obtain increased revenue for both capital improvements and increased yearly operating costs.

b. Maintenance of a High Level of Service to the Public

In our view, maintenance of a high level of service to the public means that the functional performance of the 911 organization must become professionalized. From one point of view this means that the organization must have sufficient rigidities to resist changes created by the political climate in each local area; from another point of view this

means that the organization must have the kind of structure that is oriented to the citizen's needs rather than to the needs of local government officials. These points of view are in fact equivalent; they lead to the conclusion that the 911 organization must have the characteristics of a bureaucracy, which is directly accountable to the public served.

c. Accountability

The notion of such a bureaucracy leads directly to the concept of accountability. The organization is essentially accountable to three entities: the public, the state, and the public agencies that it serves. The "public" comprises both the permanent residents (taxpayers) and the nonpermanent residents (tourists). The organization is accountable to the state under the statutory provisions of the recently enacted 911 law and for any state funding. Specifically, the organization must show how it will meet and is meeting the technical and operational standards specified by the state through the Division of Communications. The organization is accountable to the public agencies that it serves because the public will ascribe accountability to these existing organizations rather than to the 911 organization.

For each "constituency"--the public, the state, and the public agencies served--there is a primary mechanism of accountability. For the public, the primary mechanism will be the local elected bodies that act as agent for the public, particularly in the budgetary process. For the state, we believe that yearly subvention on the basis of meeting minimum standards will be an inducement to provide good service. Subvention in this context becomes desirable for entirely different reasons than those given in Chapter VII--specifically, as a means of enforcing a high level of service to citizens. For the agencies, we believe that some type of user board--structured so that agencies can make their concerns clear and understood to the 911 organization--should serve as the primary

accountability mechanism. This will alleviate concerns of participating agencies that their present level of service to the public will be degraded. Such a user board can mandate specific call-answering policies for each agency in the form of standard operating procedures, guidelines, and so on. When the organization is established, we believe that the existence of such a board will prevent many disputes that would otherwise take place and will enhance agency cooperation beyond the 911 system.

B. Local Organizational Alternatives

1. Precedents

From Chapter III, National Experience with 911, the pattern of 911 organization can be summarized as follows:

(1) The most straightforward organizational arrangement--and according to our sample the most common--is to organize 911 answering as part of law enforcement dispatch. The advantages of this organization is that the agency with the largest operational involvement in 911, and hence the greatest responsibility, will also have the greatest authority in its operation.

(2) Where switchboard 911 is chosen, the organization performing the 911 answering is still part of an existing city or county government.

(3) Where consolidated 911 is chosen, there must be some formal mechanism for setting policy on a consensual basis.

Within Florida, experience with 911 is too limited to offer any precedents. We therefore believe that the organizational alternatives to be proposed cannot simply be copied from other parts of the state or the nation but must be compared and evaluated on their own merits. Fortunately, applicable state law on interlocal agreements in Florida, the Florida Interlocal Cooperation Act of 1969 (Chapter 163) provides flexibility when required.

2. Specific Organizational Alternatives

Table 22 shows a comparison of four 911 organizational alternatives. We have considered four such alternatives and for each we examine the responsiveness to the requirements discussed in the last section. The best application is included, along with comments, as a guide to local 911 planning.

The first alternative, to organize the 911 system around the largest law enforcement agency in the area, would have effective resource management according to all three criteria listed above in subsection B-1, provided it enjoys or could be made to enjoy cooperation with other agencies. The service level would be high generally, and the accountability would be high for an elected sheriff. In areas where the agency head is appointed, the accountability--particularly to the public and other agencies--depends on the particular agency head. If the agency head is appointed, we recommend that there be an advisory board of users that reports to a general elected or administrative official above the level of the law enforcement agency head to ensure a continued pattern of cooperation. We believe that this alternative has its greatest application in rural areas, which at the present time constitute the largest number of local area 911 systems in the State of Florida. Additionally, in areas where the police are service oriented (i.e., they place great importance on a broad range of emergency services to citizens rather than a narrow "law enforcement" focus) we see application of this alternative to urban areas--again under the supervision of a user board.

The second alternative would be to place the 911 organization and radio dispatch under a communications agency that is directly connected to city or county government. The resource management capabilities of such an organization depend to a great extent on the agency head and the organizational reputation. The relationship between the communications agency

Table 22

COMPARISON OF 911 ORGANIZATIONAL ALTERNATIVES

Organizational Alternative for 911	Responsiveness to Resource Management	Organizational High Service Level	Requirements Accountability	Best Application	Comments
Largest law enforcement agency	High	Yes	High for elected sheriff; variable for others	Rural areas, single or multicounty; urban areas where police are service oriented	Advisory User Board recommended where agency head is not elected
Communications Agency under city or county government	Variable; depends on agency head and organizational reputation	Yes	High	Urban or rapidly growing areas; as an alternative to largest law enforcement agency	Advisory Board recommended
Independent single-purpose special districts	Low	Variable	Low	Multicounty systems	Not recommended
Dependent social district	High	Variable	Variable	Multicounty systems	Could be governed by proposed multi-county planning and service district

head and the head of the law enforcement agency served is a critical determinant of the resource management capability. If the relationship is positive, then the communications organization has easier access through its service to law enforcement; if negative, then there is likely to be both poor access to capital improvements and waste and duplication--the communications agency is a competitor of the police rather than a partner. The service levels and the accountability of such organizations are usually high by virtue of the communications organization's position in the bureaucratic structure. Such an organizational alternative is recommended for serious consideration in urban or rapidly urbanizing areas. In larger cities, operation of 911 by the communications organization is a prudent measure when the police display a narrow "law enforcement" rather than wider emergency service behavior. In urbanizing areas, a communications organization that is part of county government (but is not attached to the sheriff's office) and provides contract telephone answering and radio dispatch is an excellent alternative. Contract service can be provided in other communications areas such as maintenance to the emerging cities, and thus much duplication between cities and counties can be avoided.

The third alternative would be to set up independent single-purpose special districts to manage 911. Such districts would have limited financial capability which would reduce their resource management effectiveness. Their service level would be variable, determined by the particular individuals and institutional arrangement chosen. Their accountability would be low since the visibility of the elected officials would be negligible. The best application would be for multicounty systems described in Chapters V and VI. A special district could be formed explicitly for 911 that covers the area in question with its own tax base. Given the likely attitude of the legislature, we judge that such districts would be frowned on; in any case, we do not recommend them.

The fourth alternative would be to set up dependent special districts whose governing board would coexist with the local government. Such an alternative could be made quite responsive to the requirements given above, particularly for multicounty systems. We particularly believe that the Multicounty Planning and Area Wide Service Delivery Districts proposed by the Florida Commission on Local Government might be an excellent instrument for governance rather than existing local governments, and should be seriously considered. Except in three instances, the boundaries of these districts coincide completely with the 911 system boundaries proposed; several 911 systems could be organized and governed by one of these districts.

C. Suggested Management Structures

Figure 21 shows a suggested table or organization for management of a rural single- or multi-county 911 system. An elected sheriff would be responsible for operating the 911 system. We recommend a user advisory board composed of the representatives of the heads of all other agencies served--other law enforcement agencies, fire portection agencies, emergency medical, and the like. In rural areas we would expect a minimum of issues that are coupled to the yearly budgetary process as far as 911 is concerned. The budgetary process should be kept at present for communications--with the County Board of Commissioners keeping its present budgetary function. For a multicounty system, the Board of Commissioners can conduct negotiations with other legislative bodies served by the 911 system to arrive at an equitable cost apportionment.

In most of the rural counties we have visited or investigated, there is at present a communications supervisor who is responsible for the sheriff's communications operations. We would recommend that this position be left unchanged and that the 911 operators report directly to him.

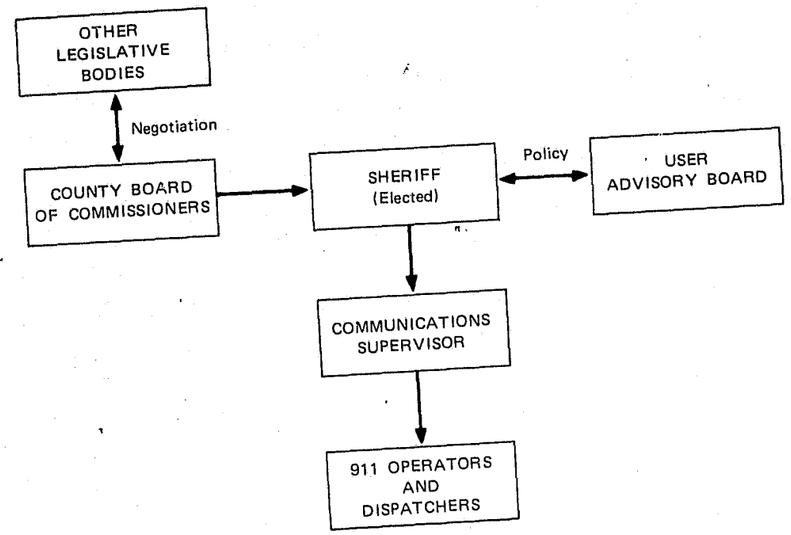

FIGURE 21 MANAGEMENT STRUCTURE FOR RURAL SINGLE-OR MULTI-COUNTY 911 SYSTEMS

Figure 22 shows a suggested management structure for an urban multi-jurisdictional 911 system. The 911 system would be under the largest law enforcement system and its usually appointed police chief, who reports to the city administration. The city administration (either an elected mayor or an appointed manager or administrative official) receives budgetary direction and supervision from an elected group of legislators, e.g., a city council.

To maintain a high level of service to all of the agencies served and the general public, we strongly recommend that a user policy board be appointed by local elected officers of the other jurisdictions served. This board would give explicit direction on call-answering and transfer policies to the appointed police chief. The board should additionally make periodic policy reports to the city administration. Intergovernmental

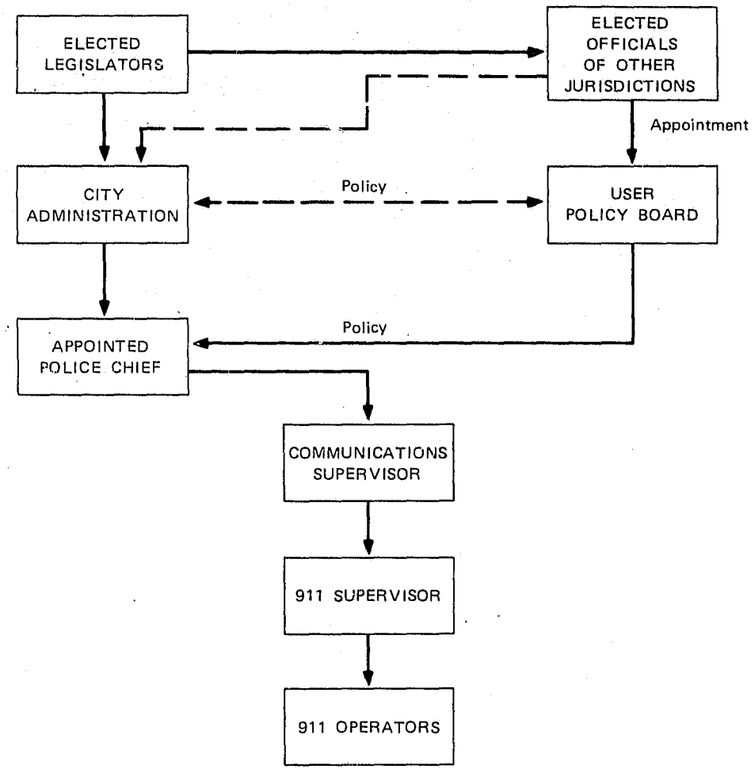

FIGURE 22 MANAGEMENT STRUCTURE FOR URBAN MULTIJURISDICTION 911 SYSTEMS—LAW ENFORCEMENT ORIENTATION

apportionment of costs should be between the elected or appointed officials of the other participating agencies and the city administration.

Within the police department we believe that there should be a separate 911 supervisor who reports to the police chief through a communications supervisor. In small jurisdictions the 911 supervisor would additionally be assigned to a shift as an operator; in large jurisdictions his responsibility would be mainly administration and training.

Figure 23 shows a suggested management structure for an urban county-oriented 911 system. The county communications director, who

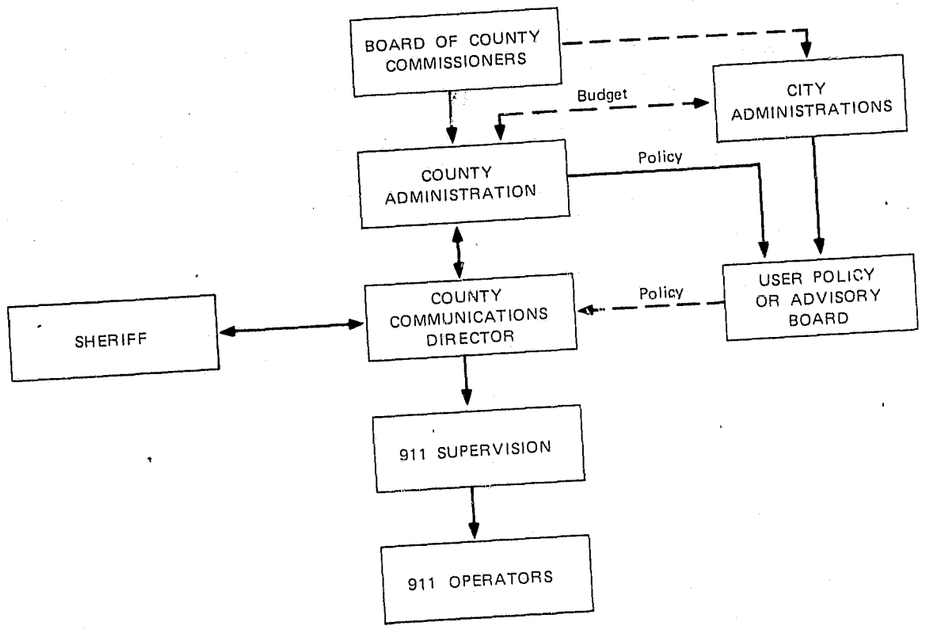

FIGURE 23 MANAGEMENT STRUCTURE FOR URBAN COUNTY 911 SYSTEM

should report to the county administration rather than to the sheriff, receives budgetary direction from the Board of County Commissioners and policy direction from a User Policy or Advisory Board. Whether the board is policy or advisory oriented depends on the reputation of the communications director and the stature of his organization as viewed by the operating agencies that are not part of county government. The county administration would negotiate the share of the budget to support the activities of the noncounty jurisdictions served; the extent to which the county communications director makes policy or responds to the board is determined by the particular situation. The 911 operators would be directly supervised by the county communications director through a 911 supervisor whose duties, as in the case of the law enforcement-oriented system shown in Figure 22, would be determined by the size of the 911 system.

D. Training of Operators

The obvious and conventional purpose of stressing the importance of training for operators in public safety communications systems is that trained operators are better able to deal with a citizen in times of crisis and are more efficient in handling difficult situations. We believe that where 911 systems involve more than one participating jurisdiction (as do many of the alternatives recommended in this report) there is a more fundamental but subtle reason to stress training. Trained operators will follow standard operating procedures and will be less influenced by the particular caprice of officials of either the 911 answering organization or the jurisdictions served by 911. By making operators professional, a uniform and high standard of service to the public will be obtained.

We feel that it is essential that the operator training be uniform across the state. If there are differences in training requirements in different parts of the state, then these differences should be "officially" institutionalized by the state and not left to local offficials to create institutionalized arrangements that suit their own interests rather than the interests of the public.

We therefore recommend that the Division of Communications structure a program of training for 911 operators, both for initial training as 911 is implemented in a particular area and for refresher courses for periodically updating the proficiency of 911 operators. The result of these operator training programs should be a statewide ladder of professional development for 911 operators.

We further recommend that 911 operator training be coordinated with dispatcher training so that the entire public safety communications system will be upgraded simultaneously.

We see two alternatives for training programs. One alternative would be for the Division of Communications to set up schools, either in Tallahassee or in different regions of the state, and perform the training. This has the advantage of uniformity, but the disadvantage of creating potential negative reaction from local officials who would feel imposed on by the state. The other alternative would be for the Division of Communications fund such a program and establish basic standards, but to contract with professional public safety organizations such as APCO, Florida Firefighters Association, Florida Police Chiefs Association, and others that could individually (or preferably collectively) organize and run regional training programs. The Florida telephone companies could also assist and participate in this effort.

It is not clear to us at this time which alternative is preferable. On the basis of our visits to various communications centers within Florida, it appears that existing organizations have done little if anything to improve the training of telephone answerers and radio dispatchers for emergency service agencies. We believe that the Division of Communications should study this problem in depth and then recommend the structure and content of a training program.

IX IMPLEMENTATION PLANNING FOR FLORIDA STATEWIDE 911

In the preceding chapters we have presented, analyzed, and compared the various statewide and local area 911 system concepts, have configured a statewide recommended plan for 911, and have made recommendations for its finance and local organization. In this chapter we discuss the basic question of "How to get there from here," taking into account the many economic, institutional, and technical constraints that affect the planning process.

In making recommendations for a specific implementation plan with a timetable, we face two problems. On the one hand, our recommendation of specific implementation schedules for local governments and telephone companies at this time must be based on both our limited understanding of particular local problems, and our knowledge that the 911 plan will change as institutional dynamics of local governments change. If we provide a specific implementation schedule at this time, we may preclude needed modifications at some later time. Specifically, any plan we present becomes reified by individuals who oppose change, and any proposed changes are viewed by these individuals as "going against the consultants' recommendations."

On the other hand, not to present a specific schedule makes the implementation task more difficult for the local and state officials who have been given this responsibility. To present merely "considerations in formulating a plan" rather than a plan provides in essence only platitudes.

To reconcile these difficulties, we present a specific implementation plan with the following stipulations:

(1) The plan as presented, based on our knowledge of the problems of 911 implementation in Florida, is not unique. Given the present state of institutional patterns that pertain to 911, other plans could be presented that would be equally "optimum" on the basis of the criteria to be presented.

(2) We regard the plan as a starting point rather than a polished result. We would both expect and recommend that it be altered in response to local government and telephone company changes and programs of the Division of Communications.

(3) Our rationale of the plan is intended to provide a guide for changes rather than to justify what we have presented.

(4) We recognize that there are ongoing local government 911 plans that may be implemented within the next year.

A. Rationale for the Plan

In developing the plan, we assumed that the Division of Communications would have a final statewide 911 plan, by January 1, 1976, or approximately a year and a half from now. With the legislative mandate for local governments to place orders with the telephone companies within six months from plan publication and for telephone companies to have service available within two years, the entire state should have 911 by December 1978. We do not believe that earlier implementation would be necessarily adverse, however, provided that cooperation can be achieved.

An important constraint in scheduling implementation is the cost to the phone companies to modify their equipment for 911. Since these costs are not absorbed by the telephone companies' stockholders but are rather passed on to the public, minimization of such costs benefits the citizens and visitors to Florida. In Appendix D, Table D-3 (prepared by the Telephone Committee for the State-County-Municipal Task Force) shows a dramatic reduction in many cases in the cost with time to modify each central office. For this reason, we have scheduled implementation of 911

to minimize costs. This means that the entire implementation is scheduled over three years, from 1976 through 1978.

Table 23 shows an implementation schedule by year for each county area. This is portrayed on the map of Florida presented in Figure 24. The implementation plan is oriented by county area. To publicize to the fullest extent the implementation of 911, we believe that 911 should be implemented within a year in an entire county at a time rather than only partially. The implementation schedule is independent of any particular statewide alternative chosen. We have, however, arranged implementation on a regional basis to provide for maximizing publicity of 911 within newspaper, radio, and television market areas where feasible. This will promote maximum public response with minimum confusion.

For 1976 we have scheduled 911 implementation in county areas that have some 911 now (e.g., Alachua), have plans under way for 911 (e.g., Broward), or are required by law to have 911 that year (i.e., Pinellas).

For 1977 we have scheduled implementation in the largest county areas: Dade, Duval, Orange, and Hillsborough. In these areas minimal savings in telephone modifications will be achieved by waiting; our rational was to provide 911 as quickly as possible to the largest number of people. Since in most cases there is overlap of telephone exchanges into other counties, we have scheduled 911 for the same year.

In 1978, we have scheduled implementation in counties with less population to minimize telephone costs for the smaller telephone companies. Palm Beach County, in which the fragmentation of jurisdictions is greatest, is also scheduled for 1978.

Table 23

TENTATIVE PROPOSED IMPLEMENTATION DATES
FOR 911 BY COUNTY AREA IN FLORIDA

1976	1977	1978
Alachua	Dade	Calhoun
Broward	Duval	Citrus
Madison	Holmes	Clay
Okaloosa	Jackson	Escambia
Pinellas	Marion	Franklin
Taylor	Orange	Gulf
Walton	Osceola	Hernando
Gadsden	Seminole	Lake
Jefferson	Washington	Liberty
Leon	Volusia	Palm Beach
Wakulla	Brevard	Pasco
Hillsborough	Collier	Putnam
Indian River	Glades	Santa Rosa
Martin	Hendry	Sumter
Okeechobee	Lee	Bay
St. Lucie	De Soto	Charlotte
Bradford	Hardee	Manatee
Union	Polk	Sarasota
Hamilton	Highland	Monroe
Lafayette	Baker	Dixie
Suwanee	St. Johns	Gilchrist
	Nassau	Levy
	Columbia	
	Flagler	

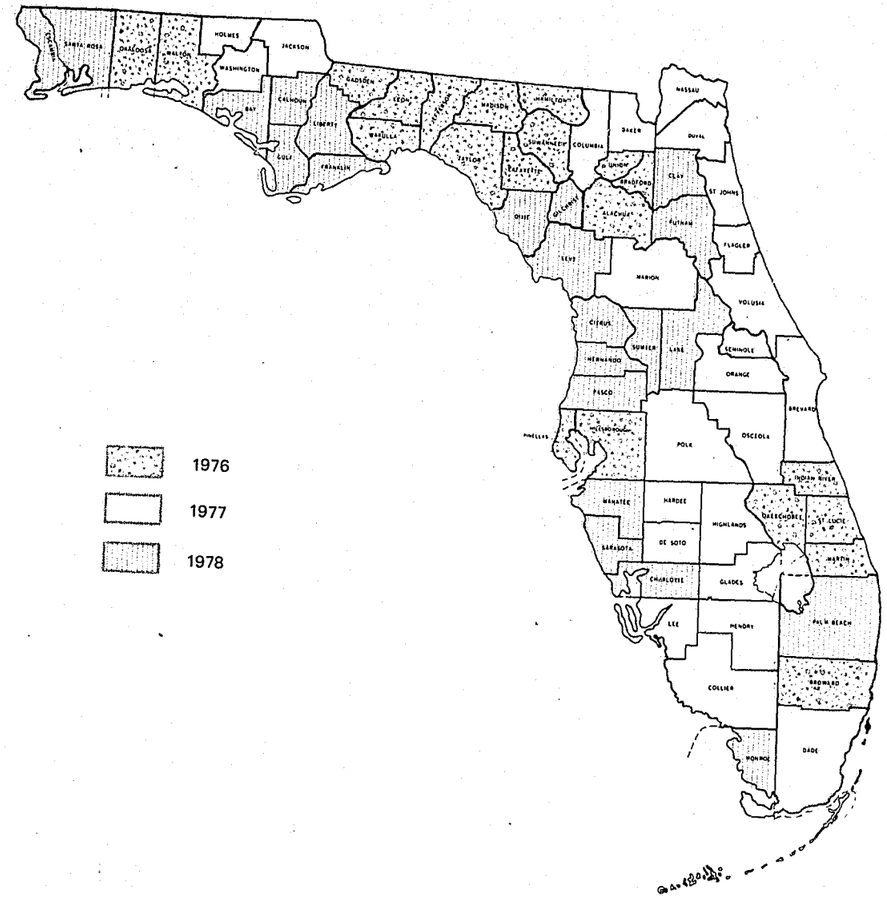

FIGURE 24 COUNTY AREA 911 IMPLEMENTATION PLAN

B. Some Recommendations on the Short-Term Planning Process

We conclude this chapter with some recommendations for the Division of Communications on the short-term planning process--for the next 18 months or so until the final plan is developed.

We believe that the local organization of 911 will be the most important issue facing the Division during this period and that the

Division should meet frequently with local officials during this period. During these meetings we suggest that this report be used as the basis for discussion. The Division should make explicit that it is the responsibility of local governments to show the necessity for modifications from the system concept and timetable being presented here, and that failure to do so on their part will mean that the Division will make the decision for them. In many areas of the state cooperative organizational arrangements for 911 will not come into being easily; there must be the threat of unilateral action by the state to force bilateral state-local planning to become effective.

In Division of Communications-local officials discussions, we further suggest that Division of Communications efforts toward implementation of the Law enforcement Communications Plan be closely coordinated with 911 planning and that dispatch consolidations should be encouraged beyond those specified in the Law Enforcement Communications plan, where feasible, for improvements in law enforcement communications as well as for more effective 911 service. It is also important to coordinate Fire and Emergency Medical Communications planning with 911 at the same time.

We also urge that the legislature determine a state-local subvention formula at the 1975 sessions to convey the sense of seriousness to local officials who may be hesitant.

As discussions with local officials come to decision points, the various telephone companies and the Florida Public Service Commission should be brought into the planning process. Specifically, we recommend that, if economically feasible, necessary telephone company plant modifications and trunking be performed ahead of schedule.

In some areas of the state, various emergency service agencies have previously implemented 7-digit universal emergency numbers that have call

transfer capability to emergency service agencies. These 7-digit systems are quite similar to call-transfer 911. If the agency receiving these calls is designated by the state to be the 911 answering agency, changeover is easily accomplished; the phaseout time of the 7-digit numbers can be determined by the local governments. If the designated 911 answering agency is different from that presently performing the universal emergency answering with 7-digit number, then the 7-digit number system should be eliminated as quickly as practicable after implementation of 911.

APPENDIX A

Florida Emergency Telephone Act of 1974

Appendix A

FLORIDA EMERGENCY TELEPHONE ACT OF 1974

CHAPTER 74-357

Committee Substitute for House Bill No. 3277 & 3340

AN ACT relating to the implementation of the emergency telephone number "911"; providing a title; providing an intent; providing for a state plan; providing a system director; providing for telephone industry coordination; providing for coin telephone conversion; providing for system approval; repealing section 365.17 Florida Statutes, regarding voluntary "911" implementation; providing an appropriation; providing an effective date.

Be It Enacted by the Legislature of the State of Florida:

Section 1. Short title.—This act shall be known and be cited as "the Florida emergency telephone act of 1974".

Section 2. Legislative intent.—The legislature hereby finds and declares that it is in the public interest to shorten the time required for a citizen to request and receive emergency aid. There currently exist thousands of different emergency phone numbers throughout the state. Provision for a single, primary three-digit emergency number through which emergency services can be quickly and efficiently obtained would provide a significant contribution to law enforcement and other public service efforts by making it easier to notify public safety personnel. Such a simplified means of procuring emergency services will result in the saving of life, a reduction in the destruction of property, and quicker apprehension of criminals. It is the intent of the legislature to establish and implement a cohesive statewide emergency telephone number "911" plan which will provide citizens with rapid direct access to public safety agencies by dialing the telephone number "911", with the objective of reducing the response time to situations requiring law enforcement, fire, medical, rescue, and other emergency services.

Section 3. Definitions.—As used in this act, unless the context clearly requires otherwise:

(1) "Department," means the department of general services.

(2) "Division," means the division of communications of the department of general services.

(3) "Local government," means any city, county, or political subdivision of the state and their agencies.

(4) "Public agency," means the state, and any city, county, city and county, municipal corporation, chartered organization, public district, or public authority located in whole or in part within this state which provides or has authority to provide fire fighting, law enforcement, ambulance, medical, or other emergency services.

(5) "Public safety agency," means a functional division of a public agency which provides fire fighting, law enforcement, medical, or other emergency services.

Section 4. State plan.—The division shall develop a statewide emergency telephone number "911" system plan. The plan shall provide for:

(1) The establishment of the public agency emergency telephone communications requirements for each entity of local government in the state;

(2) A system to meet specific local government requirements. Such system shall include law enforcement, fire fighting, and emergency medical services, and may include other emergency services such as poison control, suicide prevention, and civil defense services;

(3) Identification of the mutual aid agreements necessary to obtain an effective "911" system;

(4) A funding provision which shall identify the cost necessary to implement the "911" system; and

(5) A firm implementation schedule, which shall include the installation of the "911" system in a local community within twenty-four (24) months after the designated agency of the local government gives a firm order to the telephone utility for a "911" system. The public agency designated in the plan shall order such system within six (6) months after publication date of the plan.

The division shall be responsible for the implementation and coordination of such plan. The division shall promulgate any necessary rules, regulations, and schedules related to public agencies for implementing and coordinating such plan, pursuant to chapter 120, Florida Statutes.

Section 5. System director.—The director of the division of communications is designated as the director of the statewide emergency telephone number "911" system and, for the purpose of carrying out the provisions of this act, is authorized to coordinate the activities of the system with state, county, local, and private agencies. The director is authorized to employ not less than five (5) persons; three (3) of which will be professional level positions, one (1) secretarial level position, and one (1) fiscal position for the purpose of carrying out the provisions of this act. The director in implementing the system shall consult, cooperate and coordinate with local law enforcement agencies.

Section 6. Regional systems.—Nothing in this act shall be construed to prohibit or discourage the formation of multijurisdictional or regional systems; and any system established pursuant to this act may include the jurisdiction, or any portion thereof, of more than one public agency.

Section 7. Telephone industry coordination.—The division shall coordinate with the Florida public service commission which shall encourage the Florida telephone industry to activate facility modification plans for a timely "911" implementation.

Section 8. Coin telephones.—The Florida public service commission shall establish rules to be followed by the telephone utilities in Florida designed toward encouraging the provision of coin free dialing of "911" calls wherever economically practicable and in the public interest.

Section 9. System approval.—From the effective date of this act, no emergency telephone number "911" system shall be established and no present system shall be expanded without prior approval of the division of communications.

Section 10. Compliance.—All public agencies shall assist the division in their efforts to carry out the intent of this act, and such agencies shall comply with the developed plan.

Section 11. Existing emergency telephone service.—Any emergency telephone number established by any local government or state agency prior to the effective date of this act using a number other than "911" shall be changed to "911" on the same implementation schedule provided in sub-section (5) of section 4 of this act.

Section 12. Federal assistance.—The director of the division of communications is authorized to apply for and accept federal funding assistance in the development and implementation of a state wide emergency telephone number "911" system.

Section 13. Section 365.17, Florida Statutes, is hereby repealed.

Section 14. Appropriation.—

(1) The sum of ninety-five thousand dollars ($95,000) is appropriated from the general revenue fund to the division of communications of the department of general services to carry out the purposes of this act.

Section 15. This act shall take effect July 1, 1974.

Approved by the Governor July 1, 1974.

Filed in Office Secretary of State July 1, 1974.

APPENDIX B

Report of Finance Subcommittee 911 Task Force

Appendix B

REPORT OF FINANCE SUBCOMMITTEE 911 TASK FORCE

The following recommendation for consideration by the 911 Task Force is based on meetings of the Finance Subcommittee, April 18, 1974, and prior to the meeting of the whole Task Force, May 8, 1974.

I. We recommend that the Division of Communications develop a basic 911 plan which will recommend a system for each county, part of a county, or group of counties.

II. We recommend that the State of Florida finance the entire cost of implementation and operation of basic 911 to be borne by public agencies.

III. We recommend the establishment of a trust fund based on state retention of 1 percent of the presently decreasing federal excise tax on telephones. This trust fund will finance:

A. Implementation costs

B. Facilities Development

C. 911 equipment owned by the public agencies and local governments

D. Operating costs of 911

E. To be used to perpetuate support of 911 system operations and to upgrade and improve all local government communications at local level.

IV. As an alternative to establishment of the trust fund, we recommend that the Division of Communications' basic 911 plan set forth a subvention schedule that will specify funding levels:

A. By the State of Florida

B. By the Federal Government

C. By local governments.

The relative amount of state and federal funds as a fraction of the total, should be according to a schedule that will provide positive financial benefit to local governments for cooperative 911 efforts.

V. We request that the Division of Communications consultant provide by the next meeting of the Task Force an annual income projection from the 1 percent federal excise tax for 1978 through 1982.

Read and Approved by:

Russ Marchner, Chairman
Wallace A. Payne
Stuart Price
Jack Skeries
Luci Swanson
Berwin Williams

APPENDIX C

Effects of Response Time on Fire Losses

Appendix C

EFFECTS OF RESPONSE TIME ON FIRE LOSSES

The objective of this appendix is to estimate the cost savings that would result from reduced response time in the provision of fire protection services. Topics considered in estimating savings include:

- Range of fire protection services
- Importance of time
- Benefits to be gained
- Description of variables affecting fire losses
- Selection of estimating variables
- Summary of savings estimates.

1. Range of Fire Protection Services

Fire protection services are no longer limited to fire fighting. As a result of the acquisition of special equipment needed to fight fires effectively and life saving equipment to rescue and treat fire victims, the role of the fireman has been extended to that of providing emergency treatment in a broad range of situations. The availability of this equipment, plus the rigorous training that firefighters receive in the use of this equipment, make this extension a natural one. This concept is being further developed today with paramedic programs to allow necessary (sometimes lifesaving) medical treatment of victims at the scene. Today, fire protection services include fire fighting and fire prevention, rescue and emergency medical aid (e.g., resuscitation), control of hazardous conditions (e.g., leaks and spills, power lines, explosives), miscellaneous aid calls (e.g., lock out, water evacuation, animals in trees, police

assistance), plus response to false alarms (caused by maliciousness, good intent, bomb scare, and alarm malfunctions). All of these activities can be categorized as:

- Fire or threat of fire (including human danger from fire).
- Nonfire human danger (e.g., resuscitator, hazardous conditions).
- Other (e.g., lock out, water evacuation, police assistance).

2. Importance of Time

Over 90 percent of the requests for fire protection services are emergency situations requiring immediate response (usually as Code 3, requiring lights and sirens). Time is the most critical factor in the provision of these services because each passing moment generally results in a deteriorating situation--a fire continues to escalate and destroy and physical illnesses or effects of injuries become more severe. The seriousness of these two situations can be more easily appreciated in the following terms:

- Breathing failure of a human can result in brain damage in three minutes and can produce death in six minutes.
- Within the first five minutes a fire may reach 1000°F, but may take four more hours to reach 2000°F. On this temperature curve, chemical damage from fire doubles for every 17° to 18° increase in temperature. Because of the rapid rise in temperature early in the fire, even seconds saved in attacking a fire may significantly reduce the damage or loss suffered.

The term "response time" refers to the time between the detection of a problem (fire or health danger) and the arrival on the scene of personnel and equipment to resolve the problem. The impact of the 911 system is to reduce the response time period by eliminating delays frequently encountered in attempting to report a problem to the proper agency.

3. Benefits of Reduced Response Time

Three types of major benefits result from reduced response time during the provision of fire protection services:

- Dollar reduction in fire losses.
- Reduction in loss of life and in injuries.
- Indirect benefits (reduction of pain, suffering, lost wages, lost time, and losses in production of goods and services).

In the descriptions that follow, only dollar reduction in property fire losses will be quantified because of the difficulties in assigning appropriate values to the other two benefit areas. However, these benefits do exist and have real value and therefore should be considered at least qualitatively in any final evaluation of the benefits of reduced response time.

Two classes of dollar savings are achieved from reduced fire losses; insured fire losses and uninsured (out of pocket) losses. A reduction in fire losses creates an immediate reduction in uninsured losses. The reduction in insured losses is somewhat deferred in time but is ultimately reflected in reduced fire insurance rates, which change to reflect actual loss experience over time.

4. Variables Affecting Fire Losses

The major variables considered in making the cost savings estimates for this study are:

- Value of fire losses in Florida
- Behavior of a fire over time
- Fire temperature effect on damage
- Other factors.

An important point concerning all of these variables is the fact that none of them are precisely known, and that actual values vary widely over the types of fires that may occur. However, the values presented here were carefully developed from other research* and experience and were conservatively selected whenever serious doubts about accuracy existed.

a. Value of Florida Fire Losses

Since Florida has no statewide fire reporting system, information on annual losses is not available. However, nationwide estimates are available from the National Fire Protection Association† that will be used to estimate Florida annual losses.

The most recent national figures are for 1971 (current losses are generally higher because of inflation and other factors) and are shown in Table C-1.

Table C-1

NATIONAL FIRE LOSS IN 1971

	Dollar Loss	Approximate Number of Fires
Residential building loss	$ 874,100,000	699,000
Nonresidential building loss	1,392,100,000	297,900
Nonbuilding loss	477,260,000	655,100
Total	$2,743,460,000	

*National Fire Protection Association, IIT Research Institute reports on fire department operations analysis, and SRI measurements of the dynamics of structural fires.

†"Accident Facts--1973 Edition," National Safety Council.

Residential buildings include family dwellings, apartments, mobile homes, hotels, and others. Most such fires occurred in one and two family homes. Nonresidential buildings include industrial, storage, store and office, public assembly and school, institutional, and miscellaneous buildings. Nonbuilding fires include aerospace and aircraft, forest fire, motor vehicles, and miscellaneous. Most of these fires were vehicle fires. The average dollar loss for nonresidential buildings is almost four times as great as the loss for residential buildings ($4,670 versus $1,250), which indicates greater fire involvement and longer burning times for nonresidential building fires. The average dollar loss for nonbuilding fires was about $730.

Approximately 3.9 percent of the estimated market value of ordinary real estate in the United States is located in Florida.* This figure (3.9%) is used to estimate the value of fire loss in Florida as a percentage of the national fire loss data (Table C-1). The results of this computation are presented in Table C-2.

Table C-2

ESTIMATED ANNUAL FLORIDA FIRE LOSS

Residential building loss	$34,100,000
Nonresidential building loss	$54,300,000
Nonbuilding loss	$18,600,000

*"Taxable Property Values," U.S. Department of Commerce, Bureau of the Census, Census of Governments 1967, Vol. 2.

These values will be used to estimate the savings that will result from faster response to fires in progress (in subsections 5 and 6).

b. Behavior of a Fire over Time

Within a building, a fire that is small in relation to the size of its immediate enclosure behaves very much like an unconfined fire in that it has ample air supply and space above to dissipate heat and fire gases. The burning rate is fuel surface controlled, and the fire spreads to involve fuel nearby as a result of heat transfer by thermal radiation and convection. As the fire increases in size, the fire behavior tends to shift toward that of a confined fire.

In a compartmented enclosure, flashover (spontaneous ignition of nearby materials) eventually occurs in the compartment of origin as temperature rises; fire spread to adjoining spaces occurs by barrier penetration and by flow of fire gases through openings in walls and floors. From experimental full-scale building burns,* it has been found that the spread of fire through a building divided into various interconnecting spaces can be described as a succession of flashovers in additional compartments. The importance of flashover is that temperatures rise rapidly during flashover, reaching 1000°F in about 5 minutes. Thus a major objective in fire fighting is to prevent initial or successive flashovers whenever possible. Improved response times make this possible more frequently.

The sequence of fire behavior over time is illustrated in Figure C-1, which also indicates how building area (or volume) is involved over

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*T. E. Waterman et al., "Prediction of Fire Damage to Installations and Built-up Areas from Nuclear Weapons, Final Report, Phase III, Experimental Studies, Appendix E," Contract No. DCA-8, National Military Command System Support Center, Washington, D.C. (1964).

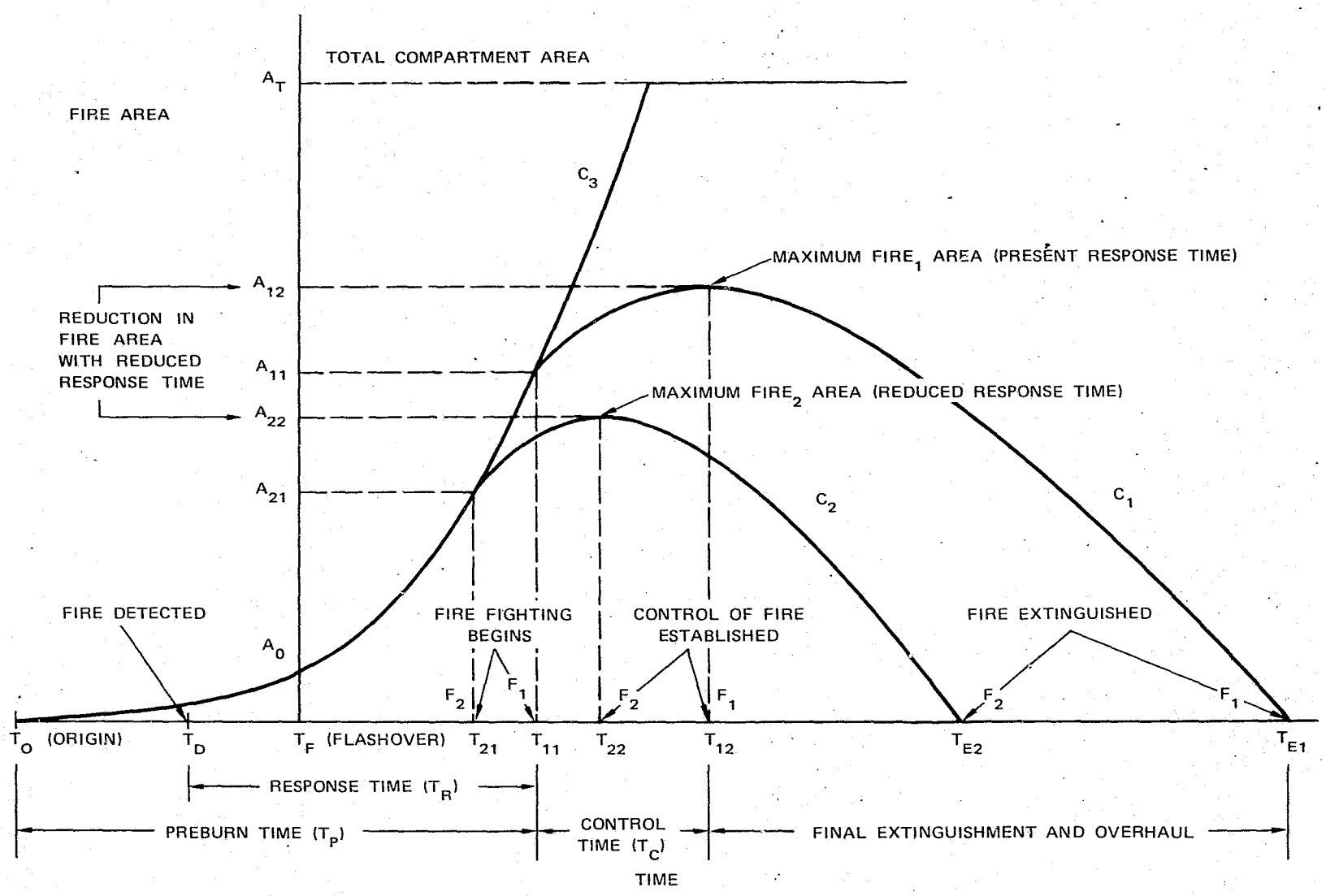

FIGURE C-1 FIRE TIME HISTORY CURVES (ONE COMPARTMENT)

time.* A fire begins at T_0 and usually spreads slowly until the temperature rises to a point where surrounding materials ignite spontaneously (T_F--flashover). After flashover, the building area involved in the fire increases rapidly and follows curve C_3 to involve the full compartment if not inhibited.

The fire growth follows C_3 until fire-fighting units arrive on the scene and begin controlling the fire. Two curves (C_1 and C_2) indicate the result of beginning control operations at different points in time. A_{11} indicates the area involved when units arrive at time T_{11}; the fire extent then follows C_1 until it is controlled at T_{12} (with an involved area of A_{12}). For most fires it is believed that fire size changes relatively little after fire-fighting operations begin (depending on fire-fighting effectiveness); thus A_{12} is not much greater than A_{11}.

Another curve, C_2, indicates the fire extent when fire fighting begins earlier at T_{21} with an involved area of A_{21}. This fire then follows curve C_2 and comes under control at T_{22} with an involved area of A_{22} (again not much larger than A_{21}). The difference between the greatest involved areas for the two fires is indicated by the distance from A_{22} to A_{12}, which represents the reduction in damaged areas achieved as a result of beginning fire control earlier in time. One may also note that if fire fighting begins before flashover, very little area (and damage) will result. It may also be observed that if most of the area is already involved when fire fighting begins, little can be done to prevent a total loss except to prevent fire spread to other compartments.

Response time, T_R, indicates the time from the discovery of the fire, T_D, until units arrive on the scene and fire fighting begins (T_{11}

*Adapted from "Fire Department Operations Analysis," IITRI Project J 6105 Final Report (January 1968).

or T_{21}). T_D can occur any time between the fire origin, T_0, and the beginning of fire fighting (e.g., T_R would be near zero if a blanket or fire extinguisher were readily available to the discoverer of a small fire).

In summary, these sample curves indicate how a shortening of response time reduces the time between discovery and control of a fire, and thus reduces the damaged area (and also the value lost because of the fire). The curves also indicate that the amount of savings depends on the steepness of the growth curve at the time fire fighting begins; after flashover, the curve rises rapidly. However, no representative curves are available to relate loss area reduction with response time reductions. Indirect estimates based on factors described in the next two subsections must be used.

c. Fire Temperature Effects on Damage

After open flames develop from a combustible material in a compartment, air temperatures in the compartment rise rapidly. This rate of temperature rise is illustrated in Figure C-2, identified as the ASTM E-119 Standard Temperature Curve. This curve is a standard figure used for comparative purposes. Note that 5 minutes after ignition, the temperature has risen to about 490°C (about 915°F). At 10 minutes the temperature is about 690°C (1275°F) and at 20 minutes is about 820°C (1500°F). To demonstrate that the standard figures are realistic (actually conservative), the temperature rise from an actual room fire is overlaid on the same scale. This actual sample is only one of many similar curves observed in SRI fire experiments.*

*"Measurements of the Dynamics of Structural Fires," Contract DAHC20-70-C-0219, DCPA Work Unit 2561A, Annual Report, SRI, Menlo Park, California (August 1972).

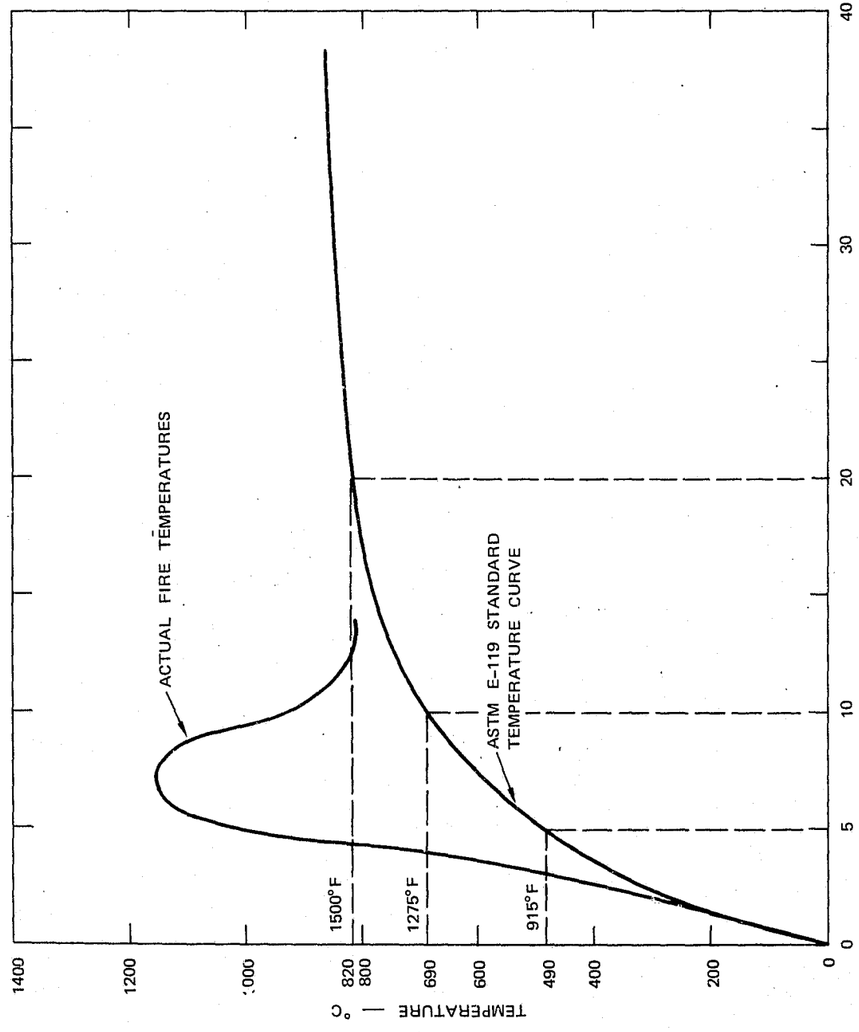

FIGURE C-2 TIME-TEMPERATURE CURVES

The destructive action of fire has been related to the standard temperature curve in the following way: for every 10°C (18°F) increase in temperature, the chemical damage done by the fire doubles. With the rapid increase in temperature indicated by the standard curve, chemical damage doubles many times each minute until the rate of increase begins to slow (about 10 minutes).

However, the chemical damage done by fire does not easily translate into costable damage. Many objects are essentially valueless after being even slightly burned by flames; thus a small degree of chemical damage may result in total loss. On the other hand, complete destruction of the object might represent many thousands more units of chemical damage without significantly changing the dollar loss value.

d. Other Factors

The actual behavior of any specific fire and the dollar value damage that results depend on the interaction of a large number of variables. Some of these variables are: combustibility of nearby materials, oxygen supply, wind rates, outside temperatures, discovery time, communication delays, equipment availability, distance from equipment to the fire scene, manpower availability, water supply, fire-fighting effectiveness, accessibility to the fire, loss evaluation, inflation, replaceability of destroyed objects, and repairability of damaged objects.

Little work has been done to relate the effects of improvements in any of the areas listed above or described earlier to dollar loss values. Changing monetary factors alone (e.g., inflation) make this task very difficult. Any predictive system requires reasonably accurate fire experience and loss data, at a minimum on a year-by-year basis and for the different classes of fires (e.g., building types, brush, vehicle). At the present time, Florida-wide loss data must be estimated.

5. Estimating Fire Loss Reduction

This subsection presents table values to use in computing estimated savings of fire loss reductions resulting from decreased response times. The factors leading to these values are described here.

a. Cost and Time-Temperature Relationship

Compared with actual data (Figure C-2), the standard fire temperature curve presents reasonable (actually conservative) burn rates. Temperature does affect the spread and dollar cost damage of a fire and can serve as a realistic estimating base. However, the doubling rate of chemical damage, although scientifically sound, does not realistically reflect dollar value loss damages due to fire.

A very conservative use of the standard time-temperature curve is to estimate dollar loss reductions as a linear proportion of temperature reductions due to improved response times (rather than the overly optimistic geometric proportions suggested by the doubling rate of chemical damage). The temperature reductions associated with reduced response times appear in Table C-3.

Table C-3

FIRE TEMPERATURE REDUCTION AS A FUNCTION OF DECREASED RESPONSE TIME

			Response Time Reduction (minutes)			
			0.5	1.0	1.5	2.0
Time and temperature when fire fighting begins (minutes)	5	(490°C)	25°C	54°C	88°C	132°C
	10	(690°C)	14°C	28°C	48°C	62°C
	20	(820°C)	4°C	8°C	12°C	16°C

b. Response Time Reduction

Precise average response time reductions due to 911 are unknown because of application differences. However, reasonable reduction times based on other experiences indicate average savings of 1 to 1-1/2 minutes.* To cover adequately the expected response time savings, Table C-3 presents estimates for 0.5, 1.0, 1.5, and 2.0 minute reductions.

c. Selection of Points on the Time-Temperature Curve

The use of the time-temperature curve depends to a considerable extent on the time of discovery of a fire: early detection allows earlier responses (with low curve values) and late detection causes delayed responses (with high curve values). Average response times of fire-fighting units are in the 5-minute range. However, residential fires are usually detected earlier (with less loss per fire) than nonresidential building fires (with much greater loss per fire). Thus appropriate time points to use on the standard time-temperature curve vary by type of fire (about 5 minutes for residential fires and 10 to 20 minutes for nonresidential fires).

d. Cost Reduction Table Values

To consider adequately the impact of variables previously described, the reduction values shown in Tables C-3 and C-4 are given for:

- Range of response time (reflecting improvements in fire reporting systems) 0.5, 1.0, 1.5 and 2.0 minutes.

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*T. I. Dayharsh et al., "Joint City-County Coordinated Emergency Services Communication System Implementation Study," Stanford Research Institute, Interim Report No. 1 - Volume 1 (May 1974).

- Range of starting time points on the time-temperature curve (reflecting behavior of fire temperature at time fire fighting begins) 5, 10, and 20 minutes.

The estimated reduction values are expressed as a percentage of present dollar losses in Table C-4.

Table C-4

COST REDUCTION PERCENTAGE AS A FUNCTION OF DECREASED RESPONSE TIME

		Response Time Reduction (minutes)			
		0.5	1.0	1.5	2.0
Time fire fighting begins (minutes)	5	5%	11%	18%	27%
	10	2%	4%	7%	9%
	20	0.5%	1%	1.5%	2%

6. Summary of Savings Estimates

It is clear that precise estimates of the fire loss savings to be achieved by improved (reduced) response times are impossible to determine because of inexact knowledge of parameter values. The preceding sections describe major reasons for this variability and indicate a conservative range of possible dollar savings reduction percentages (Table C-4) for major variable values.

However, study of this problem area, analysis of previous experience and engineering judgment, provide the basis for a reasonable estimate of annual fire loss savings by the State of Florida via the implementation of 911 (using the Florida annual loss estimates in Table C-2).

Based on an average response time reduction of 1 minute with an average residential building fire loss reduction of 11 percent and with

an average nonresidential and nonbuilding fire loss reduction of only 2 percent the annual dollar savings would be approximately $5.2 million. This figure does not include the extra lives saved and injuries reduced, plus other saving described in subsection 3.

A minimum estimated savings of $1.7 million would result from a response time reduction of 30 seconds, reducing residential losses by 7 percent and including no savings from other fire types. Estimated savings could run as high as $16 million if a 15 percent reduction in response time yielded a 15 percent reduction in total fire losses. This last figure is not unrealistic: a response time reduction of 17 percent in an urban/suburban community resulted in a one-year reduction in injuries of 17 percent and a fire loss reduction of 19.5 percent. However, this largest savings figure is not considered a reliable (or proved) estimate because significant variations in fire loss figures do occur from year to year, even in a given area.

APPENDIX D

Florida Telephone Statistics

Appendix D

FLORIDA TELEPHONE STATISTICS

This appendix presents the basic telephone company data that we obtained and have used in our conceptual designs of the alternative local 911 systems discussed in this report. Also presented are data indicating the cost effect on Florida's telephone companies of implementing 911.

1. Basic Telephone Data

Table D-1* lists for each central office the exchange name, the type of switching equipment now employed, the prefix numbers in use, the number and distribution of main stations, and future telephone company plans where known. The following definitions will assist in understanding this table:

- Central office--a place where the switching of telephone calls is done.
- Exchange--a geographical area within which there is a single, uniform set of charges for telephone service. The exchange area may be served by one or more central offices, each with its own service area.
- Prefix--the first 3 digits of a 7-digit telephone number.
- Main station--a telephone station that is connected directly to a central office and has a uniquie telephone number. It is not an extension station.

*All tables in this appendix are grouped at the end of the appendix.

An analysis of the data given in Table D-1 shows that 100 of the central offices (24.8 percent of the total) have service boundaries that extend across county lines. Of these 100 offices, 85 have a 2-county overlap, 13 have a 3-county overlap, and 2 overlap into 4 different counties. The number of main stations served by these 100 offices total 414,473, which represents 13.2 percent of all main stations in Florida. A summary of some of the data in this table was presented in Table 3 of the main text.

The basic information making up Table D-1 was supplied by the telephone companies in response to a questionnaire distributed to them by the Division of Communications.

Table D-2 lists for each county the number of telephone companies providing service and their names, the number of main stations per company, and the total number of main stations in the country. The data given in this table show that 32 of the counties are served by only 1 telephone company, 23 counties are served by 2 companies, 8 counties are served by 3 companies, and 4 counties are served by 4 companies.

2. Costs to Florida Telephone Companies

In this section we present a general description of the telephone switching equipment modifications necessary to handle 911 and the estimated cost impact on each Florida telephone company to make 911 available in each of their respective central offices.

a. Modifications Required

Telephone company central office switching equipment is usually classified as belonging to one or two general categories or types of equipment: common control or direct/progressive control.

In common control equipment the dial pulses from the calling telephone are registered, analyzed, and resent in the form of a routing code to operate switches as required to establish the desired connection. Such equipment has logic circuits built into it and is sometimes described as being "semiintelligent". Common control equipment, which includes crossbar, electronic, and certain modified step-by-step equipment, is the simpler and less expensive of the two types to condition (or modify) for accepting and routing 911 calls. The primary work that must be done to this equipment is related to software, i.e., a reprogramming of logic functions must be accomplished. A minimal amount of hardware (wiring) changes may be necessary.

In direct/progressive control equipment the dial pulses from the calling telephone directly control the switches that establish the desired connection. This type of system might be described as a slave to the digits that are dialed. Modification of direct control equipment, which includes step-by-step, XY, all-relay, and motor-switch equipment, has different problems and solutions, depending on whether a telephone number prefix beginning with the digit 9 is involved.

In a central office where no prefix starts with the digit 9 and whose calls are not routed to an office where this situation exists, the first problem in modifying the equipment to accept and route 911 calls is to clear (i.e., make available) the ninth level of the first selector. A selector is an electromechanical switch that connects an incoming call to one of many (usually 100) output circuits. Two principal things must be done to clear the ninth level of the first selector: (1) the dial speed test, revertive call, and other administrative functions assigned to this level must be reassigned; and (2) the absorb and blocking class

marks must be removed from this level. These two actions require considerable rewiring. Further, an additional bank of second and third selectors might have to be purchased and installed.

Central offices whose prefix begins with 9 or whose calls are automatically routed to an office having a 9 prefix are sometimes more expensive to modify for the receipt of 911 calls than are central offices whose prefix begins with other numerals. Modification may require only that a bank of second selectors be bought and installed, or it may require that the office be directorized (senderized). The latter means adding additional special equipment that will provide the direct control equipment with some common control capability.

To make such modifications to the switching equipment in the 404 COs owned and operated by Florida's 20 telephone companies will cost the telephone companies an estimated $6.7 million. The expense of modifying or conditioning CO equipment will not be passed on directly to the public safety agencies being served, but will be averaged over all of the telephone companies' rate payers. The direct telephone costs that the public safety agencies will have to pay will be only for the tariffed items, such as telephone lines, terminal equipment, and certain special service features that might be ordered.

b. Cost to Each Company

Table D-3 presents an estimate of the magnitude of what it will cost Florida's telephone companies to implement 911 service in each of their central offices.* Cost magnitude estimates have been made for

*The information in Table D-3 was contributed by Mr. Clayton H. Moore, Jr., of the Florida Public Service Commission and Mr. Robert J. Burns of the General Telephone Company of Florida, acting as members of the State-County-Municipal Task Force Telephone Subcommittee.

each year from 1974 (now) through 1980. The letter codes used in the table are defined as follows:

S = significant cost--more than $5 per main station
M = moderate cost--between $1 and $5 per main station
N = negligible cost--less than $1 per main station.

Although most of those central offices that require a significant expenditure are in the $10 to $30 range, several range as high as $75 per main station.

Based on the data presented in Tables D-1 and D-3 and the implementation schedule described in Chapter IX, we calculated the cost to each of the 20 telephone companies in Florida for modifying their CO equipment to handle 911. The estimated costs are given in Table D-4. To obtain those costs we assumed that a negligible cost (N) would be $1 per main station, a moderate cost (M) would be $5 per main station, and a significant cost (s) would be $20 per main station.

The costs given in Table D-4 are only for CO changeout (conditioning or modification of CO equipment) and do not include the costs for the interoffice trunking required to provide basic 911 by means of tandem trunking.

The implementation schedule and its associated costs should be carefully discussed and revised, if necessary, on the basis of several considerations. First, some of the smaller telephone companies may require Rural Electrification Administration (REA) financing to make the necessary modifications. Such financing may take up to two years to obtain; it is thus necessary to develop this modification schedule far enough in advance. Second, there may be delivery problems of the various suppliers of telephone central office equipment that will necessitate revision of this schedule. Third, the central office modifications required may for some years exceed the number of trained personnel

available. This, too, should be thoroughly determined. The larger companies, Southern Bell and General in particular, may have difficulty obtaining the large amounts of funds required. All these considerations are quite important for implementation of a given county area because 35 of the 67 counties of Florida are served by more than one telephone company.

Table D-1

TELEPHONE COMPANY STATISTICS

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
Florala Telephone Co:											
Laurel Hill	Laurel Hill	Relaymatic[1]	904	652	-	-	-	331	331	Okaloosa	331
Paxton[2]	Paxton	SXS	904	834	-	-	-	-	-	Walton	-
Florida Central Telephone Co:											
Baker	Baker	SXS	904	537	799	32	2	833	833	Okaloosa	833
Cherry Lake	Cherry Lake	SXS	904	929	496	16	3	515	515	Madison	515
Freeport	Freeport	SXS	904	835	530	61	4	595	595	Walton	595
Glendale	Glendale	SXS	904	859	344	9	1	354	354	Walton	354
Lee	Lee	SXS	904	971	395	15	2	412	412	Madison	412
Ponce De Leon	Ponce De Leon	SXS	904	836	(407	25	3)	207	435	Holmes	207
				836				228		Walton	228
Florida State Telephone Co:											
Alford	Alford	S/C SXS	904	579	(412	21	4)	409	437	Jackson	409
				579				28		Washington	28
Bonifay	Bonifay	S/C SXS	904	547	1,541	257	18	1,816	1,816	Holmes	1,816
Cottondale	Cottondale	S/C SXS	904	352	468	64	5	537	537	Jackson	537
Grand Ridge	Grand Ridge	Kellogg SXS	904	592	715	38	6	759	759	Jackson	759
Kingsley Lake	Kingsley Lake	N/E XB	904	533	195	29	18	242	242	Clay	242
Lawtey	Lawtey	N/E XB	904	782	403	34	3	440	440	Bradford	440
Malone	Malone	S/C SXS	904	569	560	54	4	618	618	Jackson	618
Reynolds Hill	Reynolds Hill	A/E SXS	904	956	524	22	2	548	548	Holmes	548
Santa Rosa Beach	Santa Rosa Beach	S/C SXS	904	267	205	32	2	239	239	Walton	239
Seagrove Beach	Seagrove Beach	S/C SXS	904	231	214	19	6	239	239	Walton	239
Sneads	Sneads	S/C SXS	904	593	630	69	6	705	705	Jackson	705
Starke	Starke	N/E XB	904	964	2,080	477	24	2,581	2,581	Bradford	2,581
Westville	Westville	Kellogg SXS[3]	904	548	343	36	2	381	381	Holmes	381

* Refer to last page of this table for list of abbreviations.

1. Will be replaced by a SXS in 1975.
2. This CO will be established in 1975.
3. Will be replaced by a S/C XY in second quarter of 1974.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
Florida Telephone Corp:											
Apopka	Apopka	N/E NX-1 XB	305	886	3,984	793	83	4,860	6,227	Orange	6,227
		S/C XY[4]		889	1,120	247	0	1,367			
Kenansville	St. Cloud	N/E NX-2 XB	305	436	109	27	11	147	147	Osceola	147
Kissimmee	Kissimmee	N/E NX-1 XB	305	348	42	11	5	58	8,566	Osceola	8,540
				846	2,316	919	191	3,426			
		S/C XY		847	4,353	703	0	5,056			
				846,7[5]	-	-	-	26		Orange	26
St. Cloud	St. Cloud	S/C XY	305	892	3,834	401	36	4,271	4,271	Osceola	4,271
Windermere	Windermere	N/E NX-1 XB	305	876	879	121	22	1,022	1,022	Orange	1,022
Winter Garden	Winter Garden	N/E NX-1 XB	305	656	(4,469	1,043	66)	5,475	5,578	Orange	5,475
				656				103		Lake	103
Astor	Astor	N/E NX-2A XB	904	759	262	29	7	298	298	Lake	298
Belleview	Belleview	S/C XY	904	245	2,113	228	33	2,374	2,374	Marion	2,374
Beverly Hills	Beverly Hills	N/E NX-1 XB	904	746	1,790	111	6	1,907	1,907	Citrus	1,907
Bushnell	Bushnell	N/E NX-1 XB	904	793	2,450	351	35	2,836	2,836	Sumter	2,836
Clermont	Clermont	S/C XY	904	394	2,166	442	45	2,653	2,653	Lake	2,653
Crystal River	Crystal River	S/C Motor Switch SXS	904	795	2,160	531	36	2,727	2,727	Citrus	2,727
Dade City	Dade City	N/E CX-10,000 SXS[6]	904	567	3,336	746	58	4,140	4,140	Pasco	4,140
Eustis	Eustis	Northern Electric #5XB	904	357	5,062	875	61	5,998	5,998	Lake	5,998
Groveland	Groveland	S/C XY	904	429	(1,230	211	22)	1,427	1,463	Lake	1,427
				429				36		Sumter	36
Highlands	Ocala	S/C XY	904	694	2,041	233	13	2,287	2,287	Marion	2,287
Homosassa Springs	Homosassa Springs	N/E NX-1 XB	904	628	1,437	230	15	1,682	1,682	Citrus	1,682
Howey-in-the-Hills	Howey-in-the-Hills	N/E NX-2A XB	904	324	258	41	10	309	309	Lake	309
Inverness	Inverness	N/E NX-1 XB	904	726	5,224	764	37	6,025	6,025	Citrus	6,025
Lady Lake	Lady Lake	N/E NX-2 XB	904	753	(639	58	11)	1,111	1,126	Lake	1,111
				753				15		Sumter	15
				871	374	40	4	418		Marion	418
Leesburg	Leesburg	N/E NX-1 XB	904	728	336	61	0	397	9,285	Lake	9,247
				787	6,726	1,996	128	8,850			
				728, 787	-	-	-	38		Sumter	38

4. Will be replaced by an NX-1 XB in July 1974.
5. 846,7 means prefixes 846 and 847.
6. Will be replaced by a S/C ESC in the third quarter of 1974.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
Florida Telephone Corp: (Continued)											
Montverde	Montverde	N/E NX-2 XB	904	469	221	25	10	256	256	Lake	256
Mount Dora	Mount Dora	S/C XY	904	383	(4,234	519	46)	4,383	4,799	Lake	4,383
				383				416		Orange	416
Ocala	Ocala	S/C XY	904	622	3,699	1,174	16	4,889	15,261	Marion	15,261
				629	5,617	1,494	243	7,354			
		S/C ESC[7]		732	1,822	1,196	0	3,018			
Oklawaha	Oklawaha	N/E NX-2A XB	904	288	1,142	91	8	1,241	1,241	Marion	1,241
Salt Springs	Salt Springs	S/C Motor Switch SXS	904	685	435	60	7	502	502	Marion	502
San Antonio	San Antonio	N/E NX-1 XB	904	588	639	117	37	793	793	Pasco	793
Shady Road	Shady Road	S/C XY	904	237	1,605	212	19	1,836	1,836	Marion	1,836
Silver Springs	Ocala	S/C Motor Switch SXS	904	236	2,042	198	44	2,284	2,284	Marion	2,284
Tavares	Tavares	S/C ESC	904	343	3,467	428	48	3,943	3,943	Lake	3,943
Trilacoochee	Trilacoochee	N/E NX-1 XB	904	583	(1,057	103	7)	543	1,167	Pasco	543
				583				624		Hernando	624
Umatilla	Umatilla	S/C XY	904	669	(1,579	177	25)	1,616	1,781	Lake	1,616
				669				165		Marion	165
Wildwood	Wildwood	N/E NX-1 XB	904	748	1,923	359	50	2,332	2,332	Sumter	2,332
Williston	Williston	S/C ESC	904	528	(1,380	227	14)	1,526	1,621	Levy	1,526
				528				95		Marion	95
General Telephone Co. of Florida:											
Alafia	Tampa	SXS	813	677	4,318	370	80	4,768	4,768	Hillsborough	4,768
Bayshore	Tampa	SXS	813	840	787	75	85	947	947	Hillsborough	947
Brandon	Tampa	SXS	813	685,9	10,202	1,190	155	11,547	11,547	Hillsborough	11,547
Carrollwood[8]	Tampa	EAX	813	961, 2,3,5	-	-	-	-	-	Hillsborough	-
East	Tampa	SXS	813	621, 2,6	9,473	2,165	234	11,872	11,872	Hillsborough	11,872
Hyde Park	Tampa	SXS	813	251, 3,4,5, 6,7,8	10,492	2,797	300	13,589	13,589	Hillsborough	13,589
Keystone	Tampa	SXS	813	920					2,700	Hillsborough	1,798
				920	(2,562	109	29	2,700)		Pasco	804
				920						Pinellas	98

7. ESC is electronic equipment.
8. This CO will be established in 1974. It will have stations transferred to it from the Keystone, Lutz, and Sulpher Springs COs.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
General Telephone Co. of Florida: (Continued)											
Land O'Lakes	Tampa	EAX	813	996	1,122	114	23	1,259	1,259	Pasco	1,259
Lutz	Tampa	SXS	813	949	3,715	256	45	4,016	4,016	Hillsborough	2,677
				949						Pasco	1,339
Oldsmar	Tampa	SXS	813	855	1,106	134	20	1,260	1,260	Hillsborough	376
				855						Pinellas	884
Ruskin	Tampa	SXS	813	645	2,472	325	69	2,866	2,866	Hillsborough	2,866
Seminole	Tampa	SXS	813	231, 2,3,4, 5,6,7, 8,9	13,390	1,901	294	15,585	15,585	Hillsborough	15,585
Sulphur Springs	Tampa	SXS	813	932, 3,5	18,274	2,453	354	21,081	21,081	Hillsborough	21,081
Sweetwater	Tampa	SXS	813	883, 4,6	12,535	1,466	180	14,181	14,181	Hillsborough	14,181
Tampa Main	Tampa	SXS	813	223, 4,5,6, 7,8,9	5,430	7,156	380	12,966	12,966	Hillsborough	12,966
Temple Terrance	Tampa	SXS	813	985, 6,8	10,629	1,271	184	12,084	12,084	Hillsborough	12,084
University	Tampa	5XB	813	971, 4,7 947	8,972	932	297	10,201	10,201	Hillsborough	10,201
Wallcraft	Tampa	SXS	813	830,1, 2,3,4, 5,7,9	16,586	2,038	258	18,882	18,882	Hillsborough	18,882
Westside	Tampa	SXS	813	872, 6,7	15,892	7,516	886	24,294	24,294	Hillsborough	24,294
		5XB		871,9							
Wimauma	Tampa	SXS	813	634	2,399	166	23	2,588	2,588	Hillsborough	2,588
Ybor	Tampa	SXS	813	241, 2,3,4, 5,7	6,168	2,331	312	8,811	8,811	Hillsborough	8,811
Bayou	St. Petersburg	SXS	813	541, 4,6	13,900	1,652	207	15,759	15,759	Pinellas	15,759
Gandy[9]	St. Petersburg	EAX	813	576	-	-	-	-	-	Pinellas	-
Lealman	St. Petersburg	SXS	813	521,2, 5,6,7	31,112	3,065	400	34,577	34,577	Pinellas	34,577
North Gulf Beach	St. Petersburg	SXS	813	391, 2,3,7	22,579	1,798	351	24,728	24,728	Pinellas	24,728

9. This CO will be established in 1974. It will have stations transferred to it from the Lealman CO.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
General Telephone Co. of Florida: (Continued)											
Pasadena	St. Petersburg	SXS	813	341, 2,3,4, 5,7	28,315	3,083	359	31,757	31,757	Pinellas	31,757
		EAX		381, 4,6							
St. Petersburg Main	St. Petersburg	SXS	813	826, 7,8 893,4, 5,6,8 862	33,591	9,211	843	43,645	43,645	Pinellas	43,645
		EAX		821, 2,5							
South	St. Petersburg	SXS	813	866,7	10,554	848	159	11,561	11,561	Pinellas	11,561
South Gulf Beach	St. Petersburg	SXS	813	360, 3,7	7,403	1,148	238	8,789	8,789	Pinellas	8,789
Alturas	Bartow	SXS	813	537	537	55	8	600	600	Polk	600
Auburndale Main	Auburndale	SXS	813	967	3,754	608	87	4,449	4,449	Polk	4,449
Babson Park	Lake Wales	SXS	813	638	963	92	25	1,080	1,080	Polk	1,080
Bartow Main	Bartow	SXS	813	533	4,616	1,351	138	6,105	6,105	Polk	6,105
Bradley	Mulberry	SXS	813	428	441	132	8	1,769	1,769	Polk	1,769
Cypress Gardens[10]	Winter Haven	EAX	813	324, 5,6	-	-	-	-	-	Polk	-
Dundee	Haines City	SXS	813	439	1,687	170	33	1,890	1,890	Polk	1,890
Frostproof Main	Frostproof	SXS	813	635	1,593	221	37	1,851	1,851	Polk	1,851
Haines City Main	Haines City	SXS	813	422	3,792	672	122	4,586	4,586	Polk	4,586
Haines City North	Haines City	LXP-4[11]	813	424	236	124	60	420	420	Polk	420
Highlands	Lakeland	SXS	813	646	5,125	629	55	5,809	5,809	Polk	5,809
Indian Lake Main	Indian Lake	SXS	813	692	255	67	11	333	333	Polk	327
				692						Osceola	6
Lake Alfred	Winter Haven	SXS	813	956	1,623	203	41	1,867	1,867	Polk	1,867
Lakeland Main	Lakeland	SXS[12]	813	682, 3,6,8	23,546	5,705	605	29,856	29,856	Polk	29,856
Lakeland North	Lakeland	SXS	813	858	3,869	307	53	4,229	4,229	Polk	4,229
Lake Wales East[13]	Indian Lake	EAX	813	696	-	-	-	-	-	Polk	-

10. This CO will be established in 1975. It will have stations transferred to it from the Winter Haven Main CO.
11. Will be replaced by an EAX in 1974.
12. An EAX will be added in 1974 and prefix 687 will be introduced.
13. This CO will be established in 1974. It will have stations transferred to it from the Lake Wales Main CO.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
General Telephone Co of Florida: (Continued)											
Lake Wales Main	Lake Wales	SXS	813	676	5,228	1,027	153	6,408	6,408	Polk	6,408
Mulberry Main	Mulberry	SXS	813	425	1,432	312	34	1,778	1,778	Polk	1,778
Pinecrest	Plant City	SXS	813	737	1,629	90	25	1,744	1,744	Hillsborough	1,744
Plant City Main	Plant City	SXS	813	752,4	9,413	1,460	214	11,087	11,087	Hillsborough	11,087
Polk City Main	Polk City	SXS[14]	813	984	627	92	12	731	731	Polk	731
Winter Haven Main	Winter Haven	SXS	813	293, 4,9	15,017	3,236	375	18,628	18,628	Polk	18,628
Zephyrhills Main	Zephyrhills	SXS	813	782	502	6,202	74	6,778	6,778	Paso	6,611
				782						Hillsborough	94
										Polk	73
Anna Maria	Bradenton	SXS	813	778	472	352	79	903	903	Manatee	903
Bay	Bradenton	SXS	813	755, 6,8	16,858	1,377	193	18,428	18,428	Manatee	18,428
Bradenton Main	Bradenton	SXS[15]	813	742, 3,4,5, 6,7	14,620	2,975	300	17,895	17,895	Manatee	17,895
Englewood Main	Englewood	SXS	813	474	4,705	452	60	5,217	5,217	Sarasota	2,609
				474						Charlotte	2,608
Longboat Key	Sarasota	SXS	813	383	2,297	238	35	2,570	2,570	Manatee	1,230
				383						Sarasota	1,340
Myakka City Main	Myakka	SXS	813	322	635	32	1	398	398	Manatee	345
				322						Sarasota	53
N. Port Charlotte Main	N. Port Charlotte	SXS	813	426	2,223	88	24	2,335	2,335	Sarasota	2,335
Northside	Sarasota	SXS	813	355	5,636	970	133	6,739	6,739	Sarasota	3,425
				355						Manatee	3,314
Osprey	Venice	SXS	813	966	1,593	145	24	1,762	1,762	Sarasota	1,762
Palmetto Main	Palmetto	SXS	813	722	6,716	644	127	7,487	7,487	Manatee	7,487
Parrish	Palmetto	SXS	813	776	456	48	6	510	510	Manatee	510
St. Armands	Sarasota	SXS	813	388	1,801	453	42	2,296	2,296	Sarasota	2,296
Sarasota Main	Sarasota	SXS	813	955, 8,9	18,270	5,339	379	23,988	23,988	Sarasota	23,988
		5XB		366							
Siesta Key[16]	Sarasota	5XB	813	246,8	-	-	-	-	-	Sarasota	-
Southside	Sarasota	SXS	813	921, 2,4	19,498	2,010	230	21,738	21,738	Sarasota	21,738
Springs[17]	Sarasota	EAX	813	371, 7,9	-	-	-	-	-	Sarasota	-

14. Will be replaced by an EAX in 1974.
15. An EAX will be added in 1974 and prefixes 748,9 will be introduced.
16. This CO will be established in 1975. It will have stations transferred to it from the Southside CO.
17. This CO will be established in 1974. It will have stations transferred to it from the Sarasota Main and Southside COs.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
General Telephone Co of Florida: (Continued)											
Venice Main	Venice	SXS	813	458,8	12,588	1,645	169	14,402	14,402	Sarasota	14,402
Clearwater Main	Clearwater	SXS[18]	813	441, 2,3,5, 6,7	25,159	6,845	520	32,524	32,524	Pinellas	32,524
Dunedin	Clearwater	SXS	813	733,4	12,291	1,105	132	13,528	13,528	Pinellas	13,528
Hudson Main	Hudson	SXS	813	868	7,040	505	76	7,621	7,621	Pasco	7,621
Indian Rocks	Clearwater	5XB	813	595,6	7,203	932	100	8,235	8,235	Pinellas	8,235
Largo	Clearwater	SXS	813	581,4	17,873	2,068	180	20,121	20,121	Pinellas	20,121
Moon Lake	Hudson	EAX	813	856	1,128	94	11	1,233	1,233	Pasco	1,233
New Port Richey Main	New Port Richey	SXS[19]	813	842, 8,9	14,422	1,772	183	16,377	16,377	Pasco	16,377
Pinellas	Clearwater	SXS	813	531,6	12,485	1,680	174	14,339	14,339	Pinellas	14,339
Safety Harbor	Clearwater	SXS	813	726	5,733	573	110	6,416	6,416	Pinellas	6,416
St. George	Clearwater	SXS	813	784	3,487	244	42	3,773	3,773	Pinellas	3,773
Tarpon Springs Main	Tarpon Springs	SXS	813	934,7	12,390	1,326	177	13,893	13,893	Pinellas	8,522
				934,7						Pasco	5,371
Gulf Telephone Co:											
Keaton Beach	Keaton Beach	N/E NX-2A XB	904	578	94	9	3	106	106	Taylor	106
Perry	Perry	N/E NX-1D XB	904	584	3,370	625	40	4,023	4,035	Taylor	4,023
				584				12		Madison	12
Indiantown Telephone System:											
Indiantown	Indiantown	SXS	305	597	-	-	-	829	829	Martin	829
Northeast Florida Telephone Co:											
Macclenny	Macclenny	S/C SXS	904	259	1,557	280	25	1,862	1,862	Baker	1,862
Sanderson	Sanderson	Kellogg K-60[20]	904	275	185	14	1	200	200	Baker	200
North Florida Telephone Co:											
Alachua	Alachua	S/C ESC	904	462	1,338	212	24	1,574	1,574	Alachua	1,574
Branford	Branford	N/E NX1-D	904	935	821	100	9	930	1,036	Suwannee	930
				935	55	5	2	62		Gilchrist	62
				935	40	4	0	44		Lafayette	44
Brooker	Brooker	N/E CX[21]	904	485	302	29	0	331	397	Bradford	331
				485	60	5	1	66		Alachua	66

18. An EAX will be added in 1975 and prefixes 461,2 will be introduced.
19. An EAX will be added in 1974.
20. Will be replaced by a S/C SXS in July 1974.
21. Will be replaced by a N/E NX-2A XB in June 1974.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
North Florida Telephone Co: (Continued)											
Callahan	Callahan	N/E NX1-D	904	879	1,301	153	24	1,478	1,478	Nassau	1,478
Citra	Citra	N/E CX	904	595	347	41	0	388	388	Marion	388
Crescent City	Crescent City	N/E NX2-A	904	698	789	170	10	969	969	Putnam	969
Florahome	Florahome	S/C XY	904	659	198	14	2	214	219	Putnam	214
				659	5	0	0	5		Clay	5
Florida Sheriffs Boys Ranch	Florida Sheriffs Boys Ranch	N/E CX	904	842	100	24	0	124	124	Suwannee	124
Fort White	Fort White	N/E CX	904	497	241	31	5	277	277	Columbia	277
Hastings	Hastings	N/E NX2	904	692	614	211	11	836	907	St. Johns	836
				692	65	6	0	71		Putnam	71
High Springs	High Springs	N/E NX2-A	904	454	1,063	178	21	1,262	1,331	Alachua	1,262
				454	35	0	0	35		Columbia	35
				454	30	3	1	34		Gilchrist	34
Hilliard	Hilliard	Leich LXP-2	904	845	751	90	24	865	865	Nassau	865
Interlachen	Interlachen	S/C XY	904	684	865	78	9	952	952	Putnam	952
Jasper	Jasper	N/E NX2-A	904	792	930	215	20	1,165	1,165	Hamilton	1,165
Jennings	Jennings	N/E CX	904	938	390	32	13	435	435	Hamilton	435
Lake Butler	Lake Butler	N/E NX2-A	904	496	789	122	18	929	953	Union	929
				496	20	4	0	24		Bradford	24
Live Oak	Live Oak	N/E NX1-D	904	362,4	2,802	686	56	3,544	3,544	Suwannee	3,544
Luraville	Luraville	N/E NX2-A	904	776	502	30	3	535	535	Suwannee	535
Mayo	Mayo	N/E NX1-D	904	294	670	126	5	801	801	Lafayette	801
McIntosh	McIntosh	N/E NX2-A	904	591	1,034	144	14	1,192	1,218	Marion	1,192
				591	20	6	0	26		Alachua	26
Melrose	Melrose	N/E NX2-A	904	475	789	47	4	840	1,059	Putnam	840
				475	100	4	0	104		Alachua	104
				475	75	8	0	83		Bradford	83
				475	30	2	0	32		Clay	32
Orange Springs	Orange Springs	N/E CX	904	546	311	18	3	332	375	Marion	332
				546	40	3	0	43		Putnam	43
Raiford	Raiford	N/E NX2-A	904	496	274	23	5	302	303	Union	302
				496	1	0	0	1		Bradford	1
Waldo	Waldo	N/E NX2-A	904	468	633	41	27	701	777	Alachua	701
				468	65	10	1	76		Bradford	76
Wellborn	Wellborn	N/E CX	904	963	351	30	4	385	385	Suwannee	385
White Springs	White Springs	N/E CX	904	397	298	63	12	373	437	Hamilton	373
				397	35	2	1	38		Columbia	38
				397	10	12	4	26		Suwannee	26

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
Orange City Telephone Co:											
Deltona Lakes	Deltona	N/E NX-2A XB	904	789	-	-	-	827	827	Volusia	827
Lake Helen	Lake Helen	N/E NX-2A XB	904	228	-	-	-	704	704	Volusia	704
Orange City	Orange City	N/E NX-2A XB	904	775	-	-	-	2,382	2,382	Volusia	2,382
Quincy Telephone Co:											
Greensboro	Greensboro	S/C SXS	904	442	565	28	2	595	595	Gadsden	595
Gretna	Gretna	S/C SXS	904	856	556	32	2	590	590	Gadsden	590
Quincy	Quincy	S/C SXS	904	627	3,860	699	38	4,597	4,597	Gadsden	4,597
St. Joseph Tel & Tel Co:											
Alligator Point	Alligator Point[21a]	-	-	-	-	-	-	-	-	Franklin	-
Altha	Altha	S/C XY	904	762	470	29	5	504	594	Calhoun	504
				762	87	3	0	90		Jackson	90
Apalachicola	Apalachicola	S/C XY	904	653	975	190	16	1,181	1,202	Franklin	1,181
				653	21	0	0	21		Liberty	21
Beaches	Beaches	S/C XY	904	648	295	20	5	320	584	Gulf	320
				648	225	27	12	264		Bay	264
Blountstown	Blountstown	S/C XY	904	674	1,397	282	18	1,697	1,697	Calhoun	1,697
				674	0	0	0	0		Jackson	0
Bristol	Bristol	S/C XY	904	643	603	66	5	674	674	Liberty	674
Carrabelle	Carrabelle	S/C XY	904	697	826	110	26	962	962	Franklin	962
				697	0	0	0	0		Liberty	0
Chattahoochee	Chattahoochee	S/C XY	904	663	1,106	132	17	1,255	1,255	Gadsden	1,255
Eastpoint	Eastpoint	S/C XY	904	670	306	49	3	358	358	Franklin	358
Hosford	Hosford	S/C XY	904	379	269	21	6	296	296	Liberty	296
Port St. Joe	Port St. Joe	S/C XY	904	227,9	1,650	362	40	2,052	2,052	Gulf	2,052
Wewahitchka	Wewahitchka	S/C XY	904	639	778	91	10	879	939	Gulf	879
				639	59	1	0	60		Calhoun	60
Tyndall AFB	Tyndall AFB	S/C XY	904	286	1,045	81	69	1,195	1,195	Bay	1,195
Southeastern Telephone Co:											
Crawfordville	Crawfordville	SXS	904	926	1,019	89	8	1,116	1,116	Wakulla	1,116
Crestview	Crestview	SXS	904	682	3,267	589	48	3,904	3,904	Okaloosa	3,904
DeFuniak Springs	DeFuniak Springs	SXS	904	892	(2,159	423	43)	2,598	2,625	Walton	2,598
				892				27		Holmes	27
Destin	Destin	SXS	904	837	(889	293	54)	1,108	1,236	Okaloosa	1,108
				837				128		Walton	128
Ft. Walton Beach	Ft. Walton Beach	SXS	904	242	6,119	948	62	7,129	7,129	Okaloosa	7,129
Ft. Walton Beach-Main	Ft. Walton Beach-Main	SXS	904	243,4	6,798	1,942	176	8,916	8,916	Okaloosa	8,916
Greenville	Greenville	SXS	904	948	(593	59	7)	653	659	Madison	653
				948				6		Jefferson	6
Madison	Madison	SXS	904	973	1,556	333	36	1,925	1,925	Madison	1,925

21a. Presently served by Carrabelle CO.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
Southeastern Telephone Co: (Continued)											
Monticello	Monticello	SXS	904	997				2,180	2,219	Jefferson	2,180
				997	1,888	302	29	27		Leon	27
				997				12		Madison	12
Panacea	Panacea	SXS	904	984	277	41	10	328	328	Wakulla	328
Shalimar	Shalimar	XB	904	651	3,960	217	28	4,205	4,205	Okaloosa	4,205
Sopchoppy	Sopchoppy	SXS	904	962	324	24	4	352	352	Wakulla	352
St. Marks	St. Marks	SXS	904	925	150	42	8	200	200	Wakulla	200
				925	0	0	0	0		Jefferson	0
575-6	Tallahassee	SXS	904	575,6				10,693	10,837	Leon	10,693
				575,6	9,512	1,219	106	144		Gadsden	144
877-8	Tallahassee	SXS	904	877,8				9,950	10,196	Leon	9,950
				877,8	8,398	1,657	141	246		Wakulla	246
385-6	Tallahassee	SXS	904	385,6				10,263	10,296	Leon	10,263
				385,6	9,109	1,091	96	33		Gadsden	33
Tallahassee-Main	Tallahassee-Main	XB	904	222,4	8,198	4,464	0	12,662	18,488	Leon	18,488
				488	0	5,249	0	5,249			
				599	0	248	329	577			
Valparaiso	Valparaiso	SXS	904	678				3,857	4,087	Okaloosa	3,857
				678	3,565	455	67	230		Walton	230
Southern Bell Tel & Tel Co:											
South Area:											
Airport	Miami	5XB	305	871,3,4	1,164	1,311	313	2,788	2,790	Dade	2,790
		5XB		526	0	2	0	2			
Allapattah	Miami	SXS[22]	305	633,4,5,7	17,350	4,500	617	22,467	22,467	Dade	22,467
Bayshore	Miami	5XB	305	854,6	13,393	1,866	157	15,416	15,416	Dade	15,416
Beach	Miami	SXS	305	631,2,4,8	18,997	4,053	871	23,921	35,445	Dade	35,445
		#1 ESS		672,3,4	10,417	741	366	11,524			
Biscayne	Miami	5XB	305	573,6,7	7,249	3,186	213	10,648	10,648	Dade	10,648
Canal	Miami	5XB[23]	305	221,3,6	20,527	1,720	231	22,478	23,619	Dade	23,619
		5XB[23]		552[24]	1,122	19	0	1,141			

22. Will be changed to #1 ESS in May 1974.
23. Will be changed to #1 ESS in June 1974.
24. Prefix 552 will be transferred to this office from the Golden Glades CO when the ESS is installed in this office in June 1974.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
Southern Bell Tel & Tel Co: South Area: (Continued)											
Flagler	Miami	5XB	305	642,3,9	16,756	3,270	430	20,456	21,704	Dade	21,704
		5XB		541	1,081	167	0	1,248			
Gables	Miami	5XB	305	443,4,5	18,252	4,761	184	23,197	38,682	Dade	38,682
				446,8[25]	12,233	2,894	358	15,485			
Hialeah	Miami	5XB	305	821,2,3	21,001	3,191	370	24,562	28,013	Dade	28,013
		5XB		558	3,154	297	0	3,451			
Kendall	Miami	5XB	305	271,4,9	20,381	1,444	164	21,989	21,989	Dade	21,989
Key Biscayne	Miami	SXS[26]	305	361	3,012	339	68	3,419	3,419	Dade	3,419
Little River	Miami	SXS	305	756,7,8,9	15,778	3,323	408	19,509	32,328	Dade	32,328
				751,4[27]	9,997	2,648	174	12,819			
Metro	Miami	#1 ESS	305	324,5[28]	4,647	1,586	266	6,499	6,499	Dade	6,499
Miami Main	Miami	#1 ESS	305	358	1,041	2,107	0	3,148	18,234	Dade	18,234
		SXS		350[29] 374[29]	1,260	1,165	632	3,057			
		SXS		371,3,7,9	8,538	3,032	459	12,029			
Miami Springs	Miami	SXS[30]	305	885,7,8	18,689	4,814	476	23,979	23,979	Dade	23,979
North Miami	Miami	5XB	305	891,3,5	16,198	2,581	317	19,096	19,096	Dade	19,096
Northside	Miami	5XB	305	691,3,6	15,296	2,688	548	18,532	25,088	Dade	25,088
		5XB		835,6	5,625	900	31	6,556			
Opa-Locka	Miami	SXS	305	681,5,8	17,285	3,293	381	20,959	20,959	Dade	20,959
Palmetto	Miami	5XB	305	591,2,3	818	2,074	60	2,952	2,952	Dade	2,952
South Miami	Miami	SXS	305	661,5,6,7	26,923	4,879	453	32,255	32,255	Dade	32,255

25. Prefixes 446,8 will be transferred to the Alhambra CO when a #1 ESS is installed there in March 1975.
26. Will be changed to #2 ESS in September 1974.
27. Prefixes 751,4 will be transferred to the Miami Shores CO in July 1974.
28. Prefixes 595,7 will be introduced in this CO in March 1974.
29. Prefixes 350 and 374 will be transferred to the Grande CO in November 1974.
30. Will be replaced in June 1975 by the Ponciana CO having a #1 ESS. Prefix 883 will also be introduced at this time.

Table D-1 (Continued)

X	Telephone Company: Central Office (CC)	Exchange	Type of Switching* Equipment	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
	Southern Bell Tel & Tel Co:											
	South Area: (Continued)											
	Surfside	Miami	SXS	305	861,6	13,048	1,134	329	14,511	29,581	Dade	29,581
			SXS		864,5[31]	13,679	1,152	239	15,070			
	West Miami	Miami	5XB	305	261,4,6	14,743	2,448	162	17,353	17,353	Dade	17,353
	Carol City	North Dade	SXS[32]	305	620,1,4,5	20,917	1,918	245	23,080	23,080	Dade	23,080
	Golden Glades	North Dade	5XB	305	551	10,908	2,149	155	13,212	13,212	Dade	13,212
	North Dade Main	North Dade	SXS	305	940,4,5,7,9	25,458	5,296	536	31,290	31,290	Dade	31,290
	Oleta	North Dade	5XB	305	931,2	7,545	811	203	8,559	8,559	Dade	8,559
	Big Pine Key	Big Pine Key	CDO (355-A)	305	872	683	81	31	795	795	Monroe	795
	Capehart	Homestead	CDO	305	257	1,433	97	0	1,530	1,530	Monroe	1,530
	Homestead	Homestead	5XB	305	245,7,8	16,707	2,446	406	19,559	19,559	Dade	19,559
	Islamorada	Islamorada	CDO (355-A)	305	664	849	233	71	1,153	1,153	Monroe	1,153
	Key Largo Main	Key Largo	CDO (355-A)	305	852	2,331	413	67	2,811	2,811	Monroe	2,811
	Largo Sound	Key Largo	Nippon Trailer[33]	305	451	996	120	27	1,143	1,143	Monroe	1,143
	Key West	Key West	SXS	305	294,6	9,019	1,772	402	11,193	11,193	Monroe	11,193
	Marathon	Marathon	CDO (355-A)	305	743	2,428	634	102	3,164	3,164	Monroe	3,164
	Vaca Key	Marathon	Nippon XB Trailer	305	289	100	88	6	194	194	Monroe	194
	North Key Largo	North Key Largo	CDO (355-A)	305	367	330	29	7	366	366	Monroe	366
	Perrine	Perrine	5XB	305	232,3,5,8	23,993	2,856	349	27,198	33,075	Dade	33,075
			5XB		251	5,222	655	0	5,877			
	Sugarloaf Key	Sugarloaf Key	CDO (355-A)	305	745	565	80	15	660	660	Monroe	660
	Southeast Area:											
	Belle Glade Main	Belle Glade	SXS	305	996	4,512	1,197	206	5,915	5,915	Palm Beach	5,915
	Boca Raton Main	Boca Raton	5XB	305	391,2,5,368	17,113	2,562	285	19,960	29,432	Palm Beach	19,960
			5XB		390,9[34]	7,807	1,522	143	9,472		Broward	9,472
	Boynton Beach Main	Boynton Beach	5XB	305	732,4,7	12,328	1,224	177	13,729	13,729	Palm Beach	13,729

31. Prefixes 864,5 will be transferred to the Indian Creek CO when a #1 ESS is installed there in September 1974.
32. This office will be replaced with the Brentwood CO when a #1 ESS is installed there in February 1975.
33. Will be replaced by a #2 ESS in August 1974.
34. Prefixes 390,9 will be transferred to Deerfield Beach CO in October 1974.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching* Equipment	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
Southern Bell Tel & Tel Co:											
Southeast Area: (Continued)											
Deerfield Beach Main	Deerfield Beach	5XB	305	421,6,7,8	3,552	454	46	4,052	4,052	Broward	4,052
Delray Beach Main	Delray Beach	SXS	305	272,3,6	12,980	2,154	250	15,384	15,384	Palm Beach	15,384
Coral Ridge	Ft. Lauderdale	SXS[35]	305	563,4,5,6	22,931	6,427	549	29,907	29,907	Broward	29,907
Cypress	Ft. Lauderdale	5XB[36]	305	771,2,6	14,986	3,641	297	18,924	18,924	Broward	18,924
Jacaranda[37]	Ft. Lauderdale	ESS	305	472,3	-	-	-	-	-	Broward	-
Ft. Lauderdale Main	Ft. Lauderdale	SXS	305	522,3,4,5,7	23,343	7,589	899	31,831	43,943	Broward	43,943
		ESS		763,4,5	9,592	2,273	247	12,112			
Oakland	Ft. Lauderdale	5XB[38]	305	462,3,731,3,5,9	28,418	2,530	309	31,257	31,257	Broward	31,257
Plantation	Ft. Lauderdale	5XB	305	581,3,4,7	25,376	3,648	664	29,688	40,943	Broward	40,943
		5XB		791,2	9,749	1,506	0	11,255			
Ft. Pierce Main	Ft. Pierce	5XB	305	461,4,5,6	17,469	3,310	495	21,274	21,274	St. Lucie	21,274
Hobe Sound Main	Hobe Sound	5XB	305	546	1,998	224	35	2,257	2,257	Martin	2,257
Hollywood Main	Hollywood	SXS	305	922,3,7,9	23,884	3,189	84	27,157	47,506	Broward	47,506
		ESS		920,1,5	16,738	2,655	956	20,349			
West Hollywood	Hollywood	5XB	305	981,3,7,9	28,399	2,379	760	31,538	54,741	Broward	54,741
		5XB		961,2,3,6	20,893	2,310	0	23,203			
Jupiter Main	Jupiter	SXS[39]	305	746,7	(5,775	931	102)	3,408	6,808	Palm Beach	3,408
				746,7				3,400		Martin	3,400
Pahokee Main	Pahokee	SXS	305	924	(1,918	415	55)	2,348	2,388	Palm Beach	2,348
				924				40		Martin	40

35. Will be replaced by an ESS in January 1975. Prefixes 561,4,6 will also be introduced at this time.
36. An ESS will be installed in November 1974 and prefixes 491,2 will be introduced.
37. This CO will be placed in service in November 1974.
38. Another 5XB will be added in January 1974. Prefixes 484,5,6 will also be introduced at this time.
39. Will be replaced by a 5XB in December 1974.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
Southern Bell Tel & Tel Co:											
Southeast Area: (Continued)											
Coral Springs	Pompano Beach	5XB	305	752,3	3,564	36	9	3,609	3,609	Broward	3,609
Federal	Pompano Beach	5XB	305	941, 2,3,6	27,744	4,140	658	32,542	45,039	Broward	45,039
		5XB		781, 2,5	10,914	1,583	0	12,497			
Margate	Pompano Beach	5XB	305	971, 2,4	14,764	1,934	218	16,916	16,916	Broward	16,916
Tamarac Lakes	Pompano Beach	5XB	305	721, 2,6,8	5,074	370	50	5,494	5,494	Broward	5,494
Port St. Lucie Main	Port St. Lucie	ESS	305	878	1,208	43	1	1,252	1,252	St. Lucie	1,252
Sebastian Main	Sebastion	SXS	305	589	(2,897	294	57)	2,498	3,248	Indian River	2,498
				589				750		Brevard	750
Stuart Main	Stuart	5XB	305	283,7	(9,962	1,893	197)	12,002	16,510	Martin	15,360
				283,7				50		St. Lucie	1,150
		5XB		334	(4,019	358	81)	3,358		Martin	
				334				1,100		St. Lucie	
Vero Beach Main	Vero Beach	SXS[40]	305	562, 7,9	13,086	2,405	290	15,781	15,781	Indian River	15,781
				562, 7,9	0	0	0	0		St. Lucie	0
Gardens	West Palm Beach	5XB	305	622,3, 4,5,6	9,140	775	91	10,006	10,006	Palm Beach	10,006
Greenacres	West Palm Beach	5XB	305	964, 5,7,8	20,518	1,572	277	22,367	22,367	Palm Beach	22,367
Haverhill	West Palm Beach	5XB	305	683, 4,6,9	18,516	2,654	358	21,528	21,528	Palm Beach	21,528
Lake Worth	West Palm Beach	SXS[41]	305	582, 5,6,8	22,163	2,457	361	24,981	24,981	Palm Beach	24,981
West Palm Beach Main	West Palm Beach	SXS	305	832,3	11,606	3,623	498	15,727	23,109	Palm Beach	23,109
		5XB		655,6, 7,8,9 675	4,354	2,900	128	7,382			
Riviera Beach	West Palm Beach	SXS	305	842, 4,8	20,427	3,437	441	24,305	24,305	Palm Beach	24,305
Royal Palm Beach[42]	West Palm Beach	ESS	305	-	-	-	-	-	-	Palm Beach	-

40. Will be replaced by a 5XB in May 1974.
41. Will be replaced by an ESS in November 1974.
42. This CO will be placed in service in September 1974.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
Southern Bell Tel & Tel Co:											
North Area:											
Archer	Archer	SD	904	495	(774	50	9)	825	833	Alachua	825
				495				8		Levy	8
Azalea Park	Orlando	XB	305	273, 5,7	14,766	1,533	283	16,582	16,582	Volusia	16,582
Keystone Heights	Keystone Heights	SD	904	473				1,784	1,899	Clay	1,784
				473	(1,726	153	20)	60		Putnam	60
				473				55		Bradford	55
Baldwin	Baldwin	SD (SXS)	904	266	(757	88	22)	720	867	Duval	720
				266				147		Nassau	147
Brooksville	Brooksville	SXS	904	796				6,091	6,241	Hernando	6,091
				796	(5,035	1,069	137)	120		Pasco	120
				796				30		Citrus	30
Bronson	Bronson	SD	904	486	479	83	12	574	574	Levy	574
Bunnell	Bunnell	SXS (355-A)	904	437	810	175	40	1,025	1,025	Flagler	1,025
Cantonment	Cantonment	SXS (355-A)	904	931				2,262	2,324	Escambia	2,262
				968	(2,119	160	45)				
				931				62		Baldwin Co. Alabama	62
Cedar Keys	Cedar Keys	SD	904	543	259	41	9	309	309	Levy	309
Chiefland	Chiefland	SD	904	493	1,153	204	41	1,398	1,398	Levy	1,398
Chipley	Chipley	XB	904	638	(2,337	356	43)	2,596	2,736	Washington	2,596
				638				140		Jackson	140
KSC	Cocoa	XB	305	863	2	75	34	111	111	Brevard	111
Merritt Island	Cocoa	XB	305	452	6,354	820	122	7,296	7,296	Brevard	7,296
Cocoa Main	Cocoa	XB	305	631, 2,6	14,497	2,956	365	17,818	17,818	Brevard	17,818
Cocoa Beach	Cocoa Beach	XB	305	783,4	6,382	1,553	323	8,258	8,258	Brevard	8,258
Cross City	Cross City	SD	904	498	(1,093	234	43)	1,276	1,370	Dixie	1,276
				498				94		Taylor	94
Daytona Beach Main	Daytona Beach	#1 SXS[43]	904	252, 3,5,8	19,850	4,869	880	25,599	25,599	Volusia	25,599
Ormond Beach	Daytona Beach	5XB	904	672,7	(13,449	1,490	240)	15,173	15,179	Volusia	15,173
				672,7				6		Flagler	6
Port Orange	Daytona Beach	5XB	904	761,7	10,002	903	190	11,095	11,095	Volusia	11,095
Deltona	Debary	SXS	305	574	1,805	53	3	1,861	1,861	Volusia	1,861
Debary Main	Debary	SXS	305	668	2,862	269	39	3,170	3,170	Volusia	3,170
Deland	Deland	5XB	904	734,6	9,519	1,436	207	11,162	11,162	Volusia	11,162
DeLeon Springs	DeLeon Springs	SXS (355-A)	904	985	815	54	21	890	890	Volusia	890

43. Will be replaced by a #1 ESS in March 1975.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching* Equipment	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
Southern Bell Tel & Tel Co: North Area: (Continued)											
Dunnellon	Dunnellon	SXS	904	489				1,911	2,521	Marion	1,911
				489	2,192	293	36	550		Citrus	550
				489				60		Levy	60
East Orange	East Orange	SXS	305	568	1,418	135	18	1,571	1,571	Orange	1,571
Bowe Gardens	Eau Gallie	Nippon XB[44]	305	259	817	69	0	886	886	Brevard	886
Indian Harbour Beach	Eau Gallie	5XB	305	773	3,413	404	44	3,861	3,861	Brevard	3,861
Eau Gallie Main[45]	Eau Gallie	SXS	305	254	7,794	1,073	145	9,012	9,012	Brevard	9,012
Satellite[46]	Eau Gallie	SXS	305	262	4,370	259	44	4,673	4,673	Brevard	4,673
Fernandina	Fernandina	SD (SXS)	904	261	3,428	535	64	4,027	4,027	Nassau	4,027
Flagler Beach Main	Flagler Beach	SXS (355-A)	904	439	667	107	36	810	810	Flagler	810
Palm Coast	Flagler Beach	SXS (355-A)	904	445	406	50	7	463	463	Flagler	463
Ft. George	Ft. George	SD (SXS)	904	251	125	46	8	179	179	Duval	179
Gainesville	Gainesville	ESS	904	372,3, 6,8 392	29,755	5,151	730	35,636	35,636	Alachua	35,636
Geneva	Geneva	SXS	305	349	521	15	4	540	540	Seminole	540
Graceville	Graceville	SXS (355-A)	904	263	1,825	188	30	1,683	2,043	Jackson	1,683
				263				360		Holmes	360
Green Cove Springs	Green Cove Springs	SD (SXS)	904	284	2,177	327	49	2,425	2,553	Clay	2,425
				284				128		St. Johns	128
Gulf Breeze	Gulf Breeze	SXS (355-A)	904	932	2,999	306	66	2,482	3,371	Santa Rosa	2,482
				932				889		Escambia	889
Havana	Havana	SXS (355-A)	904	539	1,381	139	15	1,535	1,535	Gadsden	1,535
Hawthorne	Hawthorne	SD	904	481	1,213	119	26	1,093	1,358	Alachua	1,093
				481				265		Putnam	265
Holley-Navarre	Holley-Navarre	SXS (355-A)	904	939	501	33	18	482	552	Santa Rosa	482
				939				70		Escambia	70
Arlington	Jacksonville	5XB	904	721,4,5	16,103	2,299	26	18,428	18,428	Duval	18,428
Beachwood	Jacksonville	5XB	904	641,6	3,425	346	68	3,839	3,839	Duval	3,839
Clay	Jacksonville	SXS	904	353	4,046	3,226	0	7,272	35,764	Duval	35,764
		SXS		355	5,123	2,196	0	7,319			
		SXS		356	5,140	2,257	0	7,397			
		5XB		633	0	2,800	0	2,800			
		SXS		791	486	243	0	729			
		ESS		354	4,821	2,196	550	7,567			
		ESS		358	1,439	692	549	2,680			

44. Will be replaced by an ESS in April 1975.
45. This entire office will cut to the Bowe Gardens CO in April 1975.
46. This entire office will cut to the Indian Harbour Beach CO in April 1974.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching* Equipment	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
Southern Bell Tel & Tel Co: North Area: (Continued)											
Ft. Caroline	Jacksonville	5XB	904	743,4	10,886	913	129	11,928	11,928	Duval	11,928
Lake Forest	Jacksonville	SXS		764	7,356	800	0	8,156	24,977	Duval	24,977
		SXS		765	7,372	559	417	8,348			
		SXS		768	7,876	597	0	8,473			
Oceanway	Jacksonville	5XB	904	751	574	80	0	654	5,293	Duval	5,293
		5XB		757	4,208	336	95	4,639			
Normandy	Jacksonville	5XB	904	781	5,940	726	163	6,829	14,477	Duval	14,477
		5XB		786	6,485	1,105	58	7,648			
Riverside	Jacksonville	SXS	904	384	4,528	733	0	5,261	25,739	Duval	25,739
		SXS		387	3,348	766	0	4,114			
		SXS		388	6,930	1,119	118	8,167			
		SXS		389	6,955	1,033	209	8,197			
San Josi	Jacksonville	5XB	904	731,3,7	13,612	2,164	164	15,940	15,940	Duval	15,940
San Marco	Jacksonville	#1 SXS[47]	904	396,8	9,261	4,524	239	14,024	14,024	Duval	14,024
Wesconnett	Jacksonville	5XB	904	711	7,493	543	199	8,235	14,168	Duval	14,168
		5XB		772	3,455	249	0	3,704			
		5XB		778	2,009	110	110	2,229			
Jacksonville Beach	Jacksonville Beach	SXS	904	246,9	11,151	1,394	355	12,900	12,900	Duval	12,900
Jay	Jay	SXS (355-A)	904	675	1,348	181	24	1,553	1,553	Santa Rosa	1,553
Lake City	Lake City	XB	904	752,5				8,740	8,890	Columbia	8,740
				752,5	7,228	1,374	288	95		Baker	95
				752,5				55		Union	55
Lynn Haven	Lynn Haven	SXS (355-A)	904	265	2,293	165	26	2,484	2,484	Bay	2,484
Mandarin	Mandarin	SXS	904	268	2,800	231	29	2,310	3,060	Duval	2,310
				268				750		St. Johns	750
Maxville	Maxville	SD (SXS)	904	289	384	22	3	254	409	Duval	254
				289				155		Clay	155
Melbourne	Melbourne	XB	305	723,4,7	14,062	2,508	396	16,966	16,966	Brevard	16,966
Micanopy	Micanopy	SD	904	466				601	645	Alachua	601
				466	590	41	14	4		Levy	4
				466				40		Marion	40
Middleburg	Middleburg	SD (SXS)	904	282	1,381	69	8	1,458	1,458	Clay	1,458
Milton	Milton	SXS (355-A)	904	623	5,371	674	134	6,179	6,179	Santa Rosa	6,179
Munson	Munson	SXS (355-A)	904	957	221	16	2	239	239	Santa Rosa	239
Newberry	Newberry	SD	904	472	978	91	9	973	1,078	Alachua	973
				472				105		Gilchrist	105
New Smyrna Beach	New Smyrna Beach	#1 SXS	904	427,8	8,403	1,030	210	9,643	9,643	Volusia	9,643
Oak Hill	Oak Hill	SXS (355-A)	904	345	551	40	8	958	958	Volusia	958
				345				1		Brevard	1

47. Will be replaced by a #1 ESS in July 1974.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
Southern Bell Tel & Tel Co: North Area: (Continued)											
Oldtown	Oldtown	SD	904	542	446	31	14	491	491	Dixie	491
Orange Park	Orange Park	SD (SXS)	904	264	6,947	744	79	7,770	7,770	Clay	7,770
Colonial	Orlando	ESS	305	894,6,8	16,073	4,770	375	21,218	21,218	Orange	21,218
Orlando Main	Orlando	SXS XB	305	422,3,5 841,3,9	16,804	9,426	865	27,095	27,095	Orange	27,095
Pine Castle[48]	Orlando	XB	305	851,5,7 839	16,685	3,742	490	20,917	20,917	Orange	20,917
Pine Hills	Orlando	XB	305	293, 5,8,9	22,114	3,536	462	25,682	26,112	Orange	25,682
				293, 5,8,9				430		Seminole	430
Oviedo	Oviedo	SXS	305	365	1,688	262	26	1,976	1,976	Seminole	1,976
Pace	Pace	SXS (355-A)	904	994	1,906	186	30	2,122	2,122	Santa Rosa	2,122
Palatka	Palatka	SXS	904	325,8	7,535	1,315	185	8,995	9,035	Putnam	8,995
				325,8				40		Clay	40
Panama City	Panama City	SXS SXS	904	763,9 785	17,594	3,300	370	21,264	21,264	Bay	21,264
Panama City Beach	Panama City Beach	SXS (355-A)	904	234	2,460	558	228	3,246	3,246	Bay	3,246
Penney Farms	Penney Farms	SD (SXS)	904	529	355	23	2	380	380	Clay	380
Ferry Pass	Pensacola	5XB	904	476,7,8	15,394	1,618	312	17,324	17,324	Escambia	17,324
Warrington	Pensacola	#1 SXS	904	452, 3,5,6	18,671	1,551	560	20,782	20,782	Escambia	20,782
Belmont	Pensacola	#1 SXS	904	432, 3,4,8	22,113	5,679	625	28,417	28,417	Escambia	28,417
Pierson	Pierson	SXS (355-A)	904	749	889	106	27	1,027	1,022	Volusia	1,022
Pomona Park	Pomona Park	SD	904	649	805	59	7	871	871	Putnam	871
Ponte Verda	Ponte Verda	2A ESS	904	285	1,158	97	11	1,266	1,266	St. Johns	1,266
Sanford	Sanford	XB	305	322,3	12,028	2,130	328	14,026	14,486	Seminole	14,026
				322,3				460		Volusia	460
St. Augustine	St. Augustine	#1 SXS[49]	904	824,9				10,517	10,532	St. Johns	10,517
				824	8,692	1,557	283	7		Flagler	15
				829				8		Flagler	
Sunny Hills	Sunny Hills	Nippon XB	904	773	241	16	1	258	258	Washington	258
Titusville	Titusville	XB	305	267,9	11,977	1,712	312	14,001	14,001	Brevard	14,001
Trenton	Trenton	SD	904	463	883	138	31	962	1,052	Gilchrist	962
				463				90		Levy	90
Vernon	Vernon	SXS (355-A)	904	535	641	58	9	708	708	Washington	708

48. The new Sand Lake CO having an ESS will be created from part of the Pine Castle CO.
49. A #2A ESS relieving office is scheduled for service in July 1974. Prefix 794 will also be introduced at this time.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching Equipment*	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
Southern Bell Tel & Tel Co: North Area: (Continued)											
Weeki Wachee Springs Main	Weeki Wachee Springs Main	SXS	904	596	1,430	143	28	1,601	1,601	Hernando	1,601
Welaka	Welaka	SD	904	467	696	64	16	776	776	Putnam	776
Yankeetown	Yankeetown	SXS	904	447	497	88	13	543	598	Levy	543
				447				55		Citrus	55
Youngstown-Fountain	Youngstown-Fountain	SXS (355-A)	904	722				560	566	Bay	560
				722	531	25	10	2		Washington	2
				722				4		Calhoun	4
Yulee	Yulee	SD (SXS)	904	225	627	79	23	729	729	Nassau	729
South Georgia Tel Co:											
Boulougne Area	Folkston, Ga.	SXS	904	536	-	-	-	52	52	Nassau	52
Southland Tel Co:											
Atmore	Atmore, Al.	SXS	904	369	392	22	7	421	421	Escambia	421
Molino	Molino	SXS	904	587	649	31	6	686	686	Escambia	686
Walnut Hill	Walnut Hill	SXS	904	327	484	26	1	511	511	Escambia	511
United Tel Co of Florida:											
Alva	Fort Myers	XB	813	728	373	55	4	420	432	Lee	420
				728				12		Hendry	12
Arcadia	Arcadia	XB	813	494	3,521	701	59	4,281	4,282	De Soto	4,281
				494				1		Highlands	1
Avon Park	Avon Park	SXS	813	453	3,285	639	60	3,972	3,984	Highland	3,972
				453				12		Polk	12
Boca Grande	Boca Grande	SXS (XY)	813	964	298	75	10	379	383	Lee	379
				964				4		Charlotte	4
Bonita Springs	Bonita Springs	XB	813	992	2,260	320	42	2,446	2,622	Lee	2,446
				992				176		Collier	176
Bowling Green	Bowling Green	SXS	813	375	662	66	8	691	736	Hardee	691
				375				45		Polk	45
Cape Coral	Cape Coral	XB	813	542	5,795	750	53	6,598	6,598	Lee	6,598
Cape Haze	Cape Haze	CX-1000[50]	813	697	999	110	6	1,115	1,115	Charlotte	1,115
Clewiston	Clewiston	SXS	813	983	1,886	551	56	2,485	2,493	Hendry	2,485
				983				8		Collier	8
Cypress Lake	Fort Myers	XB	813	481	4,737	520	44	5,301	5,301	Lee	5,301
Everglades	Everglades	XB	813	695	369	141	24	533	534	Collier	533
				695				1		Monroe	1

50. Will be replaced by a XB in December 1974.

Table D-1 (Continued)

Telephone Company: Central Office (CO)	Exchange	Type of Switching* Equipment	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
United Tel Co of Florida: (Continued)											
Fort Meade	Fort Meade	SXS[51]	813	285	1,456	242	28	1,726	1,726	Polk	1,726
Fort Myers-East	Fort Myers	SXS[51]	813	694	4,831	536	68	5,435	5,435	Lee	5,435
Fort Myers-Main	Fort Myers	XB	813	332,4	6,625	3,856	207	10,688	10,688	Lee	10,688
Fort Myers-South	Fort Myers	XB	813	936,9	6,282	1,729	124	8,135	8,135	Lee	8,135
Fort Myers Beach	Fort Myers Beach	SXS	813	463	2,649	541	83	3,273	3,273	Lee	3,273
Golden Gate	Naples	SXS	813	767	648	86	8	742	742	Collier	742
Immokalee	Immokalee	SXS	813	657	1,063	429	54	1,513	1,546	Collier	1,513
				657				33		Hendry	33
Labelle	Labelle	CX-1000[52]	813	675	1,117	310	35	1,305	1,462	Hendry	1,305
				675				157		Glades	157
Lake Placid	Lake Placid	XB	813	465	2,204	474	44	2,721	2,722	Highlands	2,721
				465				1		Charlotte	1
Lehigh Acres	Lehigh Acres	SXS	813	369	3,371	250	18	3,639	3,639	Lee	3,639
Marco Island	Marco Island	SXS	813	394	1,733	358	45	2,136	2,136	Collier	2,136
Moore Haven	Moore Haven	CX-1000[53]	813	946	634	171	21	826	826	Glades	826
Naples-Main	Naples	SXS[54]	813	642,9	8,925	2,568	129	11,622	11,622	Collier	11,622
Naples-Southeast	Naples	XB	813	774	4,863	942	70	5,875	5,875	Collier	5,875
North Fort Myers	North Fort Myers	SXS[55]	813	995	6,927	772	95	7,772	7,794	Lee	7,772
				995				22		Charlotte	22
North Naples	North Naples	SXS	813	597	2,027	314	23	2,364	2,364	Collier	2,364
Okeechobee	Okeechobee	SXS	813	763	3,543	885	94	4,145	4,522	Okeechobee	4,145
				763				259		Glades	259
				763				107		Highlands	107
				763				11		St. Lucie	11
Pine Island	Pine Island	SXS	813	283	1,303	154	29	1,484	1,486	Lee	1,484
				283				2		Charlotte	2
Port Charlotte	Port Charlotte	SXS[56]	813	625,9	7,954	891	56	8,874	8,901	Charlotte	8,874
				625,9				27		De Soto	27
Punta Gorda	Punta Gorda	SXS	813	639	4,445	888	73	5,406	5,406	Charlotte	5,406
Sanibel-Captiva	Sanibel-Captiva	SXS	813	472	1,073	318	55	1,446	1,446	Lee	1,446
Sebring	Sebring	SXS	813	385	5,497	1,124	71	6,692	6,692	Highlands	6,692
Wauchula	Wauchula	SXS	813	773	2,208	625	43	2,876	2,876	Hardee	2,876
Zolfo Springs	Zolfo Springs	CX-1000[57]	813	735	631	126	15	772	772	Hardee	772
Moorings	Naples[58]	XB	813	261,2	-	-	-	-	-	Collier	-

51. Will be replaced by a XB in May 1975.
52. Will be replaced by a XB in August 1974.
53. Will be replaced by a XB in 1975 or 1976.
54. Will be phased out in 197 .
55. Will be replaced by a XB in September 1974.
56. Will be replaced by a XB in November 1975.
57. Will be changed in 1978.
58. This CO will be established in the 2nd quarter of 1975.

Table D-1 (Concluded)

Telephone Company: Central Office (CO)	Exchange	Type of Switching* Equipment	Area Code	Prefix	Number of Main Stations: Residence	Business	Coin	Total	CO Total	County(s) Served by CO	County Total
Vista-Florida Tel System:											
Lake Buena Vista	Lake Buena Vista	ESS type	305	824,8	7,500		200	7,700	7,700	Orange	7,700
West Florida Telephone Co:											
Greenwood	Greenwood	XB	904	594	-	-	-	344	344	Jackson	344
Marianna	Marianna	XB	904	482	-	-	-	4,129	4,265	Jackson	4,265
		XB		526	-	-	-	136			
Winter Park Telephone Co:											
Altamonte	Winter Park	N/E XB	305	830, 1,4	12,014	2,413	240	14,667	17,734	Seminole	17,699
		SXS[59]		838	2,748	284	0	3,032			
				830, 1,4,8	-	-	-	35		Orange	35
Goldenrod	Winter Park	N/E XB	305	671,8	5,801	558	59	6,418	10,696	Seminole	6,418
				671,8	3,868	371	39	4,278		Orange	4,278
Lake Brantley	Winter Park	ESS	305	862,9	4,945	905	81	5,931	5,931	Seminole	5,931
Midway	Winter Park	N/E XB	305	644, 5,6,7	15,584	4,839	540	22,911	23,271	Orange	22,911
		ESS		628	1,519	789	0				
				644, 5,6,7 628	-	-	-	360		Seminole	360

59. Will be replaced by an ESS in December 1974.

*SXS = Step-by-Step
XB = Crossbar
S/C = Stromberg Carlson
N/E = North Electric
A/E = Automatic Electric

Table D-2

TELEPHONE COMPANIES SERVING EACH COUNTY

County	Number of Companies	Telephone Company	Number of Main Stations	
			Per Company	Per County
Alachua	2	North Florida	3,733	42,861
		Southern Bell	39,128	
Baker	2	Northeast Florida	2,062	2,157
		Southern Bell	95	
Bay	2	St. Joseph	1,459	29,013
		Southern Bell	27,554	
Broadford	3	Florida State	3,021	3,591
		North Florida	515	
		Southern Bell	55	
Brevard	1	Southern Bell	83,633	83,633
Broward	1	Southern Bell	351,803	351,803
Calhoun	2	St. Joseph	2,261	2,265
		Southern Bell	4	
Charlotte	2	General	2,608	18,032
		United	15,425	
Citrus	2	Florida Tel. Corp.	12,341	12,976
		Southern Bell	635	
Clay	3	Florida State	242	14,291
		North Florida	37	
		Southern Bell	14,012	
Collier	1	United	24,969	24,969
Columbia	2	North Florida	350	9,090
		Southern Bell	8,740	
Dade	1	Southern Bell	581,291	581,291
Desoto	1	United	4,308	4,308
Dixie	1	Southern Bell	1,767	1,767
Duval	1	Southern Bell	200,940	200,940
Escambia	2	Southern Bell	68,126	69,744
		Southland	1,618	
Flagler	1	Southern Bell	2,319	2,319
Franklin	1	St. Joseph	2,501	2,501

Table D-2 (Continued)

County	Number of Companies	Telephone Company	Number of Main Stations	
			Per Company	Per County
Gadsden	4	Quincy	5,782	8,749
		St. Joseph	1,255	
		Southeastern	177	
		Southern Bell	1,535	
Gilchrist	2	North Florida	96	1,163
		Southern Bell	1,067	
Glades	1	United	1,242	1,242
Gulf	1	St. Joseph	3,251	3,251
Hamilton	1	North Florida	1,973	1,973
Hardee	1	United	4,339	4,339
Hendry	1	United	3,835	3,835
Hernando	2	Florida Tel. Corp.	624	8,316
		Southern Bell	7,692	
Highlands	1	United	13,493	13,493
Hillsborough	1	General	204,038	204,038
Holmes	4	Florida Central	207	3,339
		Florida State	2,745	
		Southeastern	27	
		Southern Bell	360	
Indian River	1	Southern Bell	18,279	18,279
Jackson	4	Florida State	1,992	9,550
		St. Joseph	90	
		Southern Bell	2,859	
		West Florida	4,609	
Jefferson	1	Southeastern	2,186	2,186
Lafayette	1	North Florida	845	845
Lake	1	Florida Tel. Corp.	31 344	31,344
Lee	1	United	57,016	57,016
Leon	1	Southeastern	49,421	49,421
Levy	2	Florida Tel. Corp.	1,526	4,512
		Southern Bell	2,986	
Liberty	1	St. Joseph	991	991

Table D-2 (Continued)

County	Number of Companies	Telephone Company	Number of Main Stations	
			Per Company	Per County
Madison	3	Florida Central	927	3,529
		Gulf	12	
		Southeastern	2,590	
Manatee	1	General	50,112	50,112
Marion	3	Florida Tel. Corp.	26,463	30,326
		North Florida	1,912	
		Southern Bell	1,951	
Martin	2	Indiantown	829	21,886
		Southern Bell	21,057	
Monroe	2	Southern Bell	23,009	23,010
		United	1	
Nassau	3	North Florida	2,343	7,246
		Southern Bell	4,851	
		South Georgia	52	
Okaloosa	3	Florala	331	30,283
		Florida Central	833	
		Southeastern	29,119	
Okeechobee	1	United	4,145	4,145
Orange	4	Florida Tel. Corp.	13,166	144,573
		Southern Bell	100,761	
		Vista-Florida	7,700	
		Winter Park	22,946	
Osceola	2	Florida Tel. Corp.	13,958	12,964
		General	6	
Palm Beach	1	Southern Bell	187,040	187,040
Pasco	3	Florida Tel. Corp.	5,476	46,211
		General	40,615	
		Southern Bell	120	
Pinellas	1	General	279,256	279,256
Polk	2	General	92,456	94,239
		United	1,783	
Putnam	2	North Florida	3,049	14,056
		Southern Bell	11,005	

Table D-2 (Concluded)

County	Number of Companies	Telephone Company	Number of Main Stations	
			Per Company	Per County
St. Johns	2	North Florida	836	13,497
		Southern Bell	12,661	
St. Lucie	2	Southern Bell	23,676	23,687
		United	11	
Santa Rosa	1	Southern Bell	13,057	13,057
Sarasota	1	General	73,948	73,948
Seminole	2	Southern Bell	16,972	47,380
		Winter Park	30,408	
Sumter	1	Florida Tel. Corp.	5,257	5,257
Suwannee	1	North Florida	5,544	4,544
Taylor	2	Gulf	4,129	4,223
		Southern Bell	94	
Union	2	North Florida	1,231	1,286
		Southern Bell	55	
Volusia	2	Orange City	3,913	101,528
		Southern Bell	97,615	
Wakulla	1	Southeastern	2,242	2,242
Walton	3	Florida Central	1,177	4,611
		Florida State	478	
		Southeastern	2,956	
Washington	2	Florida State	28	3,592
		Southern Bell	3,564	

Table D-3

COST IMPACT ON TELEPHONE COMPANIES OF IMPLEMENTING 911
IN EACH OF THEIR CENTRAL OFFICES

Telephone Company: Central Office (CO)	Magnitude of Cost to Provide "911" 1974	1975	1976	1977	1978	1979	1980
Florala Telephone Co.:							
Laurel Hill	S*	N	N	N	N	N	N
Paxton	S	N	N	N	N	N	N
Florida Central Telephone Co.:							
Baker	M	M	M	M	M	M	M
Cherry Lake	S	S	S	S	S	S	S
Freeport	S	S	S	S	S	S	S
Glendale	M	M	M	M	M	M	M
Lee	S	S	S	S	S	S	S
Ponce De Leon	S	S	S	S	S	S	S
Florida State Telephone Co.:							
Alford	M	M	M	M	M	M	M
Bonifay	M	M	M	M	M	M	M
Cottondale	M	M	M	M	M	M	M
Grand Ridge	S	S	S	S	S	S	S
Kingsley Lake	S	M	M	M	M	M	M
Lawtey	M	M	M	M	M	M	M
Malone	S	S	S	S	S	S	S
Reynolds Hill	S	S	S	S	S	S	S
Santa Rosa Beach	M	M	M	M	N	N	N
Seagrove Beach	M	M	M	M	M	M	M
Sneads	S	S	S	S	S	S	S
Starke	N	N	N	N	N	N	N
Westville	S	S	S	S	S	S	S
Florida Telephone Corp.:							
Apopka	N	N	N	N	N	N	N
Kenansville	N	N	N	N	N	N	N
Kissimme	N	N	N	N	N	N	N
St. Cloud	N	N	N	N	N	N	N
Windermere	N	N	N	N	N	N	N
Winter Garden	N	N	N	N	N	N	N
Astor	N	N	N	N	N	N	N
Belleview	N	N	N	N	N	N	N
Beverly Hills	N	N	N	N	N	N	N
Bushnell	N	N	N	N	N	N	N
Clermont	N	N	N	N	N	N	N

*Refer to last page of this table for definitions of S, N, and M.

Table D-3 (Continued)

Telephone Company: Central Office (CO)	Magnitude of Cost to Provide "911" 1974	1975	1976	1977	1978	1979	1980
Florida Telephone Corp.:							
Crystal River	N	N	N	N	N	N	N
Dade City	N	N	N	N	N	N	N
Eustis	N	N	N	N	N	N	N
Groveland	N	N	N	N	N	N	N
Highlands	N	N	N	N	N	N	N
Homosassa Springs	N	N	N	N	N	N	N
Howey-in-th-Hills	N	N	N	N	N	N	N
Inverness	N	N	N	N	N	N	N
Lady Lake	N	N	N	N	N	N	N
Leesburg	N	N	N	N	N	N	N
Montverde	N	N	N	N	N	N	N
Mount Dora	N	N	N	N	N	N	N
Ocala	N	N	N	N	N	N	N
Oklawaha	N	N	N	N	N	N	N
Salt Springs	N	N	N	N	N	N	N
San Antonio	N	N	N	N	N	N	N
Shady Road	N	N	N	N	N	N	N
Silver Springs	N	N	N	N	N	N	N
Tavares	N	N	N	N	N	N	N
Triacoochee	N	N	N	N	N	N	N
Umatilla	N	N	N	N	N	N	N
Wildwood	N	N	N	N	N	N	N
Williston	N	N	N	N	N	N	N
General Telephone Co. of Florida:							
Alafia	-	-	N	N	N	N	N
Bayshore	-	-	M	M	M	M	M
Brandon	-	-	N	N	N	N	N
Carrollwood	-	-	N	N	N	N	N
East	-	-	N	N	N	N	N
Hyde Park	-	-	N	N	N	N	N
Keystone	-	-	M	M	M	M	M
Land O'Lakes	-	-	M	M	M	M	M
Lutz	-	-	N	N	N	N	N
Oldsmar	-	-	N	N	N	N	N
Ruskin	-	-	N	N	N	N	N
Seminole	-	-	N	N	N	N	N
Sulphur Springs	-	-	M	M	M	M	M
Sweetwater	-	-	N	N	N	N	N
Tampa Main	-	-	N	N	N	N	N
Temple Terrace	-	-	N	N	N	N	N
University	-	-	N	N	N	N	N

Table D-3 (Continued)

Telephone Company: Central Office (CO)	Magnitude Of Cost To Provide "911" 1974	1975	1976	1977	1978	1979	1980
General Telephone Co. of Florida:							
Wallcraft	-	-	N	N	N	N	N
Westside	-	-	N	N	N	N	N
Wimauma	-	-	N	N	N	N	N
Ybor	-	-	N	N	N	N	N
Bayou	-	-	N	N	N	N	N
Gandy	-	-	N	N	N	N	N
Lealman	-	-	N	N	N	N	N
North Gulf Beach	-	-	N	N	N	N	N
Pasadena	-	-	-	-	-	-	-
	-	-	N	N	N	N	N
St. Petersburg Main	-	-	N	N	N	N	N
South	-	-	N	N	N	N	N
South Gulf Main	-	-	N	N	N	N	N
Alturas	-	-	M	M	M	M	M
Auburndale Main	-	-	N	N	N	N	N
Babson Park	-	-	N	N	N	N	N
Bartow Main	-	-	N	N	N	N	N
Bradley	-	-	M	M	M	M	M
Cypress Gardens	-	-	N	N	N	N	N
Dundee	-	-	N	N	N	N	N
Frostproof Main	-	-	S	S	S	S	S
Haines City Main	-	-	N	N	N	N	N
Haines City North	-	-	M	M	M	M	M
Highlands	-	-	N	N	N	N	N
Indian Lake Main	-	-	S	S	S	S	S
Lake Alfred	-	-	S	S	S	S	S
Lakeland Main	-	-	N	N	N	N	N
Lakeland North	-	-	N	N	N	N	N
Lake Wales East	-	-	M	M	M	M	M
Lake Wales Main	-	-	N	N	N	N	N
Mulberry Main	-	-	M	M	M	M	M
Pinecrest	-	-	M	M	M	M	M
Plant City Main	-	-	M	M	M	M	M
Polk City Main	-	-	M	M	M	M	M
Winter Haven Main	-	-	M	M	M	M	M
Zephyrhills Main	-	-	M	M	M	M	M
Anna Maria	-	-	N	N	N	N	N
Bay	-	-	N	N	N	N	N
Bradenton Main	-	-	N	N	N	N	N
Englewood Main	-	-	N	N	N	N	N
Longboat Key	-	-	N	N	N	N	N

Table D-3 (Continued)

Telephone Company Central Office (CO)	Magnitude Of Cost To Provide "911" 1974	1975	1976	1977	1978	1979	1980
General Telephone Co. of Florida:							
Myakka City Main	-	-	M	M	M	M	M
N. Port Charlotte Main	-	-	N	N	N	N	M
Northside	-	-	N	N	N	N	N
Osprey	-	-	S	S	S	S	S
Palmetto Main	-	-	S	S	S	S	S
Parrish	-	-	M	M	M	M	M
St. Armands	-	-	N	N	N	N	N
Sarasota Main	-	-	-	-	-	-	-
	-	-	S	S	S	S	S
Siesta Key							
Southside	-	-	S	S	S	S	S
Springs	-	-	N	N	N	N	N
Venice Main							
Clearwater Main	-	-	N	N	N	N	N
Dunedin	-	-	N	N	N	N	N
Hudson Main	-	-	S	S	S	S	S
Indian Rocks	-	-	N	N	N	N	N
Largo	-	-	N	N	N	N	N
Moon Lake	-	-	N	N	N	N	N
New Port Richey Main	-	-	S	S	N	N	N
Pinellas	-	-	N	N	N	N	N
Safety Harbor	-	-	N	N	N	N	N
St. George	-	-	N	N	N	N	N
Tarpon Springs Main	-	-	M	M	M	M	M
Gulf Telephone Co.:							
Keaton Beach	N	N	N	N	N	N	N
Perry	N	N	N	N	N	N	N
Indiantown Telephone System:							
Indiantown	S	N	N	N	N	N	N
Northeast Florida Telephone Co.:							
Macclenny	M	M	M	M	M	M	M
Sanderson	M	M	M	M	M	M	M
North Florida Telephone Co.:							
Alachua	N	N	N	N	N	N	N
Branford	N	N	N	N	N	N	N
Brooker	M	N	N	N	N	N	N
Callahan	M	M	M	M	M	M	M

Table D-3 (Continued)

Telephone Company Central Office (CO)	Magnitude Of Cost To Provide "911" 1974	1975	1976	1977	1978	1979	1980
North Florida Telephone Co.:							
Citra[1]							
Crescent City	S	S	S	S	N	N	N
Florahome	S	N	N	N	N	N	N
Florida Sheriffs Boys Ranch	M	M	M	M	M	M	M
Fort White	M	M	M	M	M	M	M
Hastings	M	M	M	M	M	M	M
High Springs	N	N	N	N	N	N	N
Hilliard	M	N	N	N	N	N	N
Interlachen	M	M	N	N	N	N	N
Jasper	N	N	N	N	N	N	N
Jennings	N	N	N	N	N	N	N
Lake Butler	S	S	S	S	S	S	S
Live Oak			N	N	N	N	N
Luraville							
Mayo	N	N	N	N	N	N	N
McIntosh			N	N	N	N	N
Melrose	N	N	N	N	N	N	N
Orange Springs	M	M	M	M	M	M	M
Raiford	N	N	N	N	N	N	N
Waldo	N	N	N	N	N	N	N
Wellborn	M	M	M	M	M	M	M
White Springs[2]	S	S	S	S	S	S	S
Orange City Telephone Co.:							
Deltona Lakes	M	M	M	M	M	M	M
Lake Helen	M	M	M	M	M	M	M
Orange City	M	M	M	M	M	M	M
Quincy Telephone Co.:							
Greensboro	M	M	M	M	M	M	M
Gretna	M	M	M	M	M	M	M
Quincy	M	M	M	M	M	M	M

[1]Need office changeout to accomplish "911" equipment cost for changeout - $500,000.

[2]Level required - A complete changeout of the office is necessary. This changeout is scheduled for 1980 and will include "911."

Table D-3 (Continued)

Telephone Company Central Office (CO)	Magnitude Of Cost To Provide "911" 1974	1975	1976	1977	1978	1979	1980
St. Joseph Tel & Tel Co.:							
Alligator Point	S	S	S	S	S	S	S
Altha	S	S	S	S	S	S	S
Apalachicola	S	S	S	M	M	M	M
Beaches	S	S	S	S	M	M	M
Blountstown	S	S	S	S	S	S	S
Bristol	S	S	S	S	M	M	M
Carrabelle	S	S	S	S	S	S	S
Chattahoochee	S	S	M	M	M	M	M
Eastpoint	S	S	S	S	S	S	S
Hosford	S	S	S	S	S	S	S
Port St. Joe	N	N	N	N	N	N	N
Wewahitchka	S	S	S	S	S	S	S
Tyndall AFB	S	S	S	S	S	S	S
Southeastern Telephone Co.:							
Crawfordville	-	-	S	S	S	S	S
Crestview	-	-	S	S	M	M	M
DeFuniak Springs	-	-	M	M	M	M	M
Destin	-	-	N	N	N	N	N
Ft. Walton Beach	-	-	N	N	N	N	N
Ft. Walton Beach-Main	-	-	N	N	N	N	N
Greenville	-	-	S	S	S	S	S
Madison	-	-	N	N	N	N	N
Monticello	-	-	S	S	S	S	S
Panacea	-	-	S	S	S	S	S
Shalimar	-	-	N	N	N	N	N
Sopchoppy	-	-	M	M	M	M	M
St. Marks	-	-	M	M	M	M	M
575-6	-	N	N	N	N	N	N
877-8	-	N	N	N	N	N	N
385-6	-	N	N	N	N	N	N
Tallahassee-Main	-	N	N	N	N	N	N
	-	-	-	-	-	-	-
Valparaiso	-	-	N	N	N	N	N
Southern Bell Tel & Tel Co.:							
South Area:							
Airport	N	N	N	N	N	N	N
Allapattah	N	N	-	-	-	-	-
Bayshore	N	N	N	N	N	N	N
Beach	N	N	-	-	-	-	-
	N	N	N	N	N	N	N
Biscayne	N	N	N	N	N	N	N

Table D-3 (Continued)

Telephone Company Central Office (CO)	Magnitude Of Cost To Provide "911" 1974	1975	1976	1977	1978	1979	1980
Southern Bell Tel & Tel Co.:							
South Area:							
Canal	N	N	N	N	N	N	N
Flagler	N	N	N	N	N	N	N
Gables	N	N	N	-	-	-	-
Hialeah	N	N	N	N	N	N	N
Kendall	N	N	N	N	N	N	N
Key Biscayne	N	N	N	N	N	N	N
Little River	N	N	-	-	-	-	-
Metro							
Miami Main	N	N	N	-	-	-	-
Miami Springs	N	-	-	-	-	-	-
North Miami	N	N	N	N	N	N	N
Northside	N	N	N	N	N	N	N
Opa-Locka	N	N	N	N	-	-	-
Palmetto	N	N	N	N	N	N	N
South Miami	N	N	N	N	-	-	-
Surfside	N	N	-	-	-	-	-
West Miami	N	N	N	N	N	N	N
Carol City	N	-	-	-	-	-	-
Golden Glades	N	N	N	N	N	N	N
North Dade Main	N	N	N	-	-	-	-
Oleta	N	N	N	N	N	N	N
Big Pine Key							
Capehart							
Homestead							
Islamorada	S	S	S	M	M	M	M
Key Largo Main	S	S	S	M	M	M	M
Largo Sound							
Key West	S	S	S	S	S	N	N
Marathon	S	S	-	-	-	-	-
Vaca Key	S	M	M	M	M	N	N
North Key Largo	S	S	S	S	S	M	M
Perrine	N	N	N	N	N	N	N
Sugarloaf Key	S	S	S	S	S	S	S
Southeast Area							
Belle Glade Main	S	M	M	M	M	M	M
Boca Raton Main	N	N	N	N	N	N	N
Boynton Beach Main	N	N	N	N	N	N	N
Deerfield Beach Main	N	N	N	N	N	N	N
	-	-	-	N	N	N	N

Table D-3 (Continued)

Telephone Company Central Office (CO)	Magnitude Of Cost To Provide "911" 1974	1975	1976	1977	1978	1979	1980
Southern Bell Tel & Tel Co.:							
Southeast Area:							
Delray Beach Main	M	-	-	-	-	-	-
	-	N	N	N	N	N	N
Coral Ridge	N	N	N	N	N	-	-
Cypress	N	N	N	N	N	N	N
Jacaranda	M	N	N	N	N	N	N
Ft. Lauderdale Main	N	N	-	-	-	-	-
Oakland	N	N	N	N	N	N	N
Plantation	N	N	N	N	N	N	N
Ft. Pierce Main	N	N	N	N	N	N	N
Hobe Sound Main	M	M	M	M	M	M	M
Hollywood Main	N	N	N	-	-	-	-
West Hollywood	N	N	N	N	N	N	N
Jupiter Main	S	-	-	-	-	-	-
Pahokee Main	S	S	S	S	-	-	-
	-	-	-	-	N	N	N
Coral Springs	N	N	N	N	N	N	N
Federal	N	N	N	N	N	N	N
Margate	N	N	N	N	N	N	N
Tamarac Lakes	N	N	N	N	N	N	N
Port St. Lucie Main	M	M	N	N	N	N	N
Sebastian Main	M	M	M	M	-	-	-
Stuart Main	M	M	M	M	M	N	N
Vero Beach Main	M	M	M	M	M	M	M
Gardens	N	N	N	N	N	N	N
Greenacres	N	N	N	N	N	N	N
Haverhill	N	N	N	N	N	N	N
Lake Worth	M	M	M	-	-	-	-
	N	N	N	N	N	N	N
West Palm Beach Main	M	M	M	-	-	-	-
	M	M	N	N	N	N	N
Riviera Beach	M	M	M	M	-	-	-
Royal Palm Beach	M	M	M	M	N	-	-
North Area:							
Archer	S	-	-	-	-	-	-
Azalea Park							
Keystone Heights							
Baldwin	M	M	M	M	M	M	M

Table D-3 (Continued)

Telephone Company Central Office (CO)	Magnitude Of Cost To Provide "911" 1974	1975	1976	1977	1978	1979	1980
Southern Bell Tel & Tel Co.:							
North Area:							
Brooksville	S	S	S	N	N	N	N
Bronson	M	M	M	M	M	M	M
Bunnell	S	S	S	S	S	S	S
Contonment	S	S	S	S	S	S	S
Cedar Keys	S	S	S	S	S	S	S
Chiefland	S	S	S	S	S	S	S
Chipley	M	M	M	M	M	M	M
KSC	N	N	N	N	N	N	N
Merritt Island	N	N	N	N	N	N	N
Cocoa Main	N	N	N	N	N	N	N
Cocoa Beach	N	N	-	-	-	-	-
Cross City	S	S	S	S	S	S	S
Daytona Beach Main	M	N	N	N	N	N	N
Ormond Beach	N	N	N	N	N	N	N
Port Orange	N	N	N	N	N	N	N
Deltona	N	N	N	N	N	N	N
Debary Main	S	S	S	S	S	S	S
Deland	M	M	M	M	M	M	M
DeLeon Springs	S	S	S	S	S	S	S
Dunnellon	N	N	N	N	N	N	N
East Orange	N	N	N	N	N	N	N
Bowe Gardens	M	N	N	N	N	N	N
Indian Harbour Beach	N	N	N	N	N	N	N
Eau Gallie Main	S	-	-	-	-	-	-
Satellite	-	-	-	-	-	-	-
Fernandina	-	N	N	N	N	N	N
Flagler Beach Main	S	S	S	S	S	S	S
Palm Coast	N	N	N	N	N	N	N
Ft. George	S	S	S	S	S	S	S
Gainesville	-	-	-	-	-	-	-
Geneva	S	S	S	S	S	S	S
Graceville	S	S	S	S	S	S	S
Green Cove Springs	S	S	S	S	S	S	S
Gulf Breeze	S	S	S	S	S	S	S
Havana	S	S	S	S	S	S	S
Hawthorne	M	-	-	-	-	-	-
Holley-Navarre	S	S	S	S	S	S	S
Arlington	N	N	N	N	N	N	N
Beachwood	N	N	N	N	N	N	N

Table D-3 (Continued)

Telephone Company Central Office (CO)	Magnitude Of Cost To Provide "911" 1974	1975	1976	1977	1978	1979	1980
Southern Bell Tel & Tel Co.:							
North Area:							
Clay	N	N	N	N	N	N	N
Ft. Caroline	N	N	N	N	N	N	N
Lake Forest	N	N	N	N	N	N	N
Oceanway	N	N	N	N	N	N	N
Normandy	N	N	N	N	N	N	N
Riverside	N	N	N	N	N	N	N
San Josi	N	N	N	N	N	N	N
San Marco	N	N	N	N	N	N	N
Wesconnett	N	N	N	N	N	N	N
Jacksonville Beach	N	N	N	N	N	N	N
Jay	S	S	S	S	S	S	S
Lake City	N	N	N	N	N	N	N
Lynn Haven	S	S	S	S	S	S	S
Mandarin	N	N	N	N	N	N	N
Maxville	M	M	N	N	N	N	N
Melbourne	N	N	N	N	N	N	N
Micanopy	M	-	-	-	-	-	-
Middleburg	M	M	M	M	N	N	N
Milton	M	M	M	M	N	N	N
Munson	S	S	S	S	S	S	S
Newberry	M	-	-	-	-	-	-
New Smyrna Beach	M	M	M	M	M	M	M
Oak Hill	S	S	S	S	S	S	S
Oldtown	S	S	S	S	S	S	S
Orange Park	N	N	N	N	N	N	N
Colonial	N	N	N	N	N	N	N
Orlando Main	M	M	N	N	N	N	N
Pine Castle	N	N	N	N	N	N	N
Pine Hills	N	N	N	N	N	N	N
Oviedo	M	M	M	M	M	M	M
Pace	S	S	S	S	S	S	S
Palatka	N	N	N	N	N	N	N
Panama City	N	N	N	N	N	N	N
Panama City Beach	M	M	M	M	M	N	N
Penney Farms	M	M	M	M	M	M	M
Ferry Pass	N	N	N	N	N	N	N
Warrington	N	N	N	N	N	N	N
Belmont	N	N	N	N	N	N	N
Pierson	S	S	S	S	S	S	S

Table D-3 (Continued)

Telephone Company Central Office (CO)	Magnitude Of Cost To Provide "911" 1974	1975	1976	1977	1978	1979	1980
Southern Bell Tel & Tel Co.:							
North Area:							
Pomona Park	S	S	S	S	S	S	S
Ponte Verda	N	N	N	N	N	N	N
Sanford	N	N	N	N	N	N	N
St. Augustine	S	S	S	S	S	S	S
Sunny Hills	S	S	M	M	M	M	M
Titusville	N	N	N	N	N	N	N
Trenton	S	S	S	S	S	S	S
Vernon	S	S	S	S	S	S	S
Weeki Wachee Springs Main	S	S	S	S	S	S	S
Welaka	S	S	S	S	S	S	S
Yankeetown	S	S	S	S	S	S	S
Youngstown-Fountain	S	S	S	S	S	S	S
Yulee	M	M	M	M	M	M	M
South Georgia Tel Co.:							
Boulougne Area	S	S	S	S	S	S	S
Southland Tel Co.:							
Atmore	-	-	-	-	-	-	-
Molino	M	M	M	M	M	M	M
Walnut Hill	S	S	S	S	S	S	S
United Tel Co. of Florida:							
Alva	M	M	M	M	M	M	M
Arcadia	N	N	N	N	N	N	N
Avon Park	S	S	S	S	S	S	S
Boca Grande	S	S	S	S	S	S	S
Bonita Springs	N	N	N	N	N	N	N
Bowling Green	N	N	N	N	N	N	N
Cape Coral	N	N	N	N	N	N	N
Cape Haze		N	N	N	N	N	N
Clewiston	N	N	N	N	N	N	N
Cypress Lake	N	N	N	N	N	N	N
Everglades	M	M	M	M	M	M	M
Fort Meade	N	N	N	N	N	N	N
Fort Myers-East	N	N	N	N	N	N	N
Fort Myers-Main	N	N	N	N	N	N	N
Fort Myers-South	N	N	N	N	N	N	N
Fort Myers Beach	N	N	N	N	N	N	N

Table D-3 (Concluded)

Telephone Company Central Office (CO)	Magnitude Of Cost To Provide "911" 1974	1975	1976	1977	1978	1979	1980
United Tel Co. of Florida:							
Golden Gate	M	M	M	M	M	M	M
Immokalee	S	S	S	S	S	S	S
Labelle	N	N	N	N	N	N	N
Lake Placid	N	N	N	N	N	N	N
Lehigh Acrea	N	N	N	N	N	N	N
Marco Island	N	N	N	N	N	N	N
Moore Haven	S	S	N	N	N	N	N
Naples-Main	S						
Naples-Southeast	N	N	N	N	N	N	N
North Fort Myers	N	N	N	N	N	N	N
North Naples	S	S	S	S	S	S	S
Okeechobee	N	N	N	N	N	N	N
Pine Island	N	N	N	N	N	N	N
Port Charlotte	S	S	N	N	N	N	N
Punta Gorda	S	S	N	N	N	N	N
Sanibel-Captiva	N	N	N	N	N	N	N
Sebring		N	N	N	N	N	N
Wauchula	N	N	N	N	N	N	N
Zolfo Springs	S	S	S	S	S	S	N
Moorings		N	N	N	N	N	N
Vista-Florida Tel. System:							
Lake Buena Vista	N	N	N	N	N	N	N
West Florida Tel. Co.:							
Greenwood	-	S	S	S	S	S	S
Marianna	-	M	M	M	M	M	M
Winter Park Tel. Co.:							
Altamonte	M	M	M	M	M	M	M
Goldenrod	M	M	M	M	M	M	M
Lake Brantley	N	N	N	N	N	N	N
Midway	M	M	M	M	M	M	M

Note: S = $20 per main station
M = $5 per main station
N = $1 per main station

Table D-4

ESTIMATED COST OF 911 MODIFICATIONS
TO FLORIDA TELEPHONE COMPANIES
(In Thousands of Dollars)

Telephone Company		Cost
Florala Telephone Co.		$ 0.33
Florida Central Telephone Co.		42.1
Florida State Telephone Co.		72.7
Florida Telephone Corporation		108.7
General Telephone Co. of Florida		2,142.1
Gulf Telephone Co.		4.1
Indiantown Telephone System		0.829
Northeast Florida Telephone Co.		5.16
North Florida Telephone Co.		551.1
Orange City Telephone Co.		9.78
Quincy Telephone Co.		14.6
St. Joseph Telephone and Telegraph Co.		132.2
Southeastern Telephone Co.		249.3
Southern Bell Telephone and Telegraph Co.		3,037.9
South area	$ 706.3	
Southeast area	636.9	
North area	1,694.7	
South Georgia Telephone Co.		1.04
Southland Telephone Co.		11.9
United Telephone Co. of Florida		299.2
Vista-Florida Telephone System		*
West Florida Telephone Co.		17.5
Winter Park Telephone Co.		13.6
Total		$6,714.1

*This company already provides 911 service throughout its service area.

APPENDIX E

A Proposed State-Local Subvention Formula for 911 Costs

Appendix E

A PROPOSED STATE-LOCAL SUBVENTION FORMULA FOR 911 COSTS

In this appendix we present and discuss the subvention formula used to generate the subvention schedules presented in Chapter VII of the main text. The formula used there to generate the data in Tables 18 through 20 is:

$$S_i = \delta \cdot E \left[\frac{A_i (1 - \alpha P_t / P_i)^2}{\sum_{i=1}^{N} A_i (1 - \alpha P_t / P_i)^2} \right] ,$$

where

$$A_i = \left[\frac{E_i (1 - \gamma V_i / V_t)^2}{\sum_{i=1}^{N} E_i (1 - \gamma V_i / V_t)^2} \right] ;$$

and

$$\sum_{i=1}^{N} A_i = 1 ,$$

where

E = total annual statewide 911 recurring cost

E_i = annual recurring cost for 911 system area i

P_i = population served by 911 system area i

V_i = assessed valuation per capita for 911 system area i

V_T = assessed valuation per capita average for all 911 systems

δ = overall fraction of state subvention on a statewide average

N = number of 911 system areas in state

γ = assessed valuation per capita weighting

α = population weighting.

In this formula a fraction of the total statewide 911 annual cost E, represented as $\delta \cdot E$, is to be apportioned between N 911 systems in Florida. The amount of funds to be distributed then, is fixed; the formula performs a double weighting to distribute this fixed sum to N 911 system areas. In Chapter VII we arbitrarily fixed δ at 0.8; this means that the state will finance 80 percent of the total 911 costs for the examples chosen.

The factor A_i, where all the A_i are less than 1, represents the fractional apportionment based only on assessed valuation per capita. The parameter γ is selected so that for any assessed valuation per capita, V_i, $\gamma V_i/V_t$ is always less than 1. The amount of equalization using this formula is thus limited to the extent that γ can be no larger than V_t/V_i. For example, if a given system has an assessed valuation per capita V_i that is much less than the average V_t, the system will have a relatively higher A_i compared with other systems and will receive a higher percentage of 911 costs subvented.

As is shown in the formula, the factor A_i is multiplied by $(1 - \alpha P_t/P_i)^2$. α is the parameter that represents the weight given to population and is correspondingly selected so that $\alpha P_t/P_i$ is always less than 1. This in turn means that α can be no greater than P_i/P_t, which correspondingly limits the ability of the formula to equalize differences in population size. Again correspondingly, for a given system of large population

(i.e., one having a P_i large compared with the statewide population average P_t), the factor $(1 - \alpha P_t/P_i)$ will be large and will result in turn in a larger subvention.

Summarizing then, the formula is such that 911 systems serving large populations with small assessed valuation per capita receive maximum state subvention and systems serving small populations of higher wealth receive minimum state subvention.

END