Final Report

CIVIL DEFENSE COMMUNICATIONS:

A Methodology for Determining Requirements for County and State

Prepared for:

OFFICE OF CIVIL DEFENSE
OFFICE OF THE SECRETARY OF THE ARMY
WASHINGTON, D.C.

September 1968

Work Unit 2211C
Contract No. DAHC 20-67-C-0136

STANFORD RESEARCH INSTITUTE
MENLO PARK, CALIFORNIA

STANFORD RESEARCH INSTITUTE
MENLO PARK CALIFORNIA

September 1968

Final Report

CIVIL DEFENSE COMMUNICATIONS:

A Methodology for Determining Requirements for County and State

DETACHABLE SUMMARY

Prepared for:

OFFICE OF CIVIL DEFENSE
OFFICE OF THE SECRETARY OF THE ARMY
WASHINGTON, D.C.

By:

Albert J. Mandelbaum
Thomas W. Cook

Work Unit 2211C
Contract No. DAHC 20-67-C-0136
SRI Project No. 6300-230

DETACHABLE SUMMARY

A major objective of this study was to develop a methodology for determining the communications requirements to support the civil defense (CD) operations of a county and state. This includes as well the CD communications requirements for the state CD subdivision, e.g., a state mutual aid area. Communications requirements were defined to include circuits, equipments, and networks; and policies, plans and operating procedures pertaining to the communications sub-systems extending from the Emergency Operations Centers (EOCs) of these governmental levels to higher, subordinate and lateral EOCs, and to CD-supporting agencies.

The determination of circuit and associated materiel requirements as developed in this study depended upon the potential threat; the existing and planned CD organization, concept of CD operations, and emergency CD plans and operating procedures; and upon the communications needlines* structure, grades of communication service selected, existing resources, and the added requirements for improved system survivability.

A seven step procedure for determining the circuit and materiel requirements; preparation of associated communications plans and procedures; and the formulation of an implementation program, is presented in this report. A check list is included to assure that no steps are overlooked.

Certain basic principles and considerations are presented pertaining to the determination of essential communications requirements, maximum use of existing resources, advanced planning, joint planning with the telephone company and other commercial or public utility organizations that have communications resources, grades of service implications, program management, and the need for determining communications requirements of the various governmental echelons on a case-by-case basis.

---

* A "needline" is defined as a requirement for a communication channel or linkage between any two CD elements or nodes (among agencies, facilities and key individuals) that must communicate with one another to effect direction and control and coordination of civil defense operations, and to forward civil defense intelligence and other essential information. The needline does not specify the means, mode, numbers of circuits or techniques of communications for this.

STANFORD RESEARCH INSTITUTE
MENLO PARK CALIFORNIA

September 1968

Final Report

CIVIL DEFENSE COMMUNICATIONS:

A Methodology for Determining Requirements for County and State

Prepared for:

OFFICE OF CIVIL DEFENSE
OFFICE OF THE SECRETARY OF THE ARMY
WASHINGTON, D.C.

By:

Albert J. Mandelbaum
Thomas W. Cook

Work Unit 2211C
Contract No. DAHC 20-67-C-0136
SRI Project No. 6300-230

ABSTRACT

A step-by-step procedure is presented for determining the communications requirements to support the civil defense (CD) operations of a county, state subdivision, and a state. Communications requirements include landline and radio circuits, networks and equipments, and the complementary policies, plans, and operating procedures pertaining to the communications systems and linkages that extend from Emergency Operations Centers (EOCs) of these governmental entities to higher, subordinate and lateral EOCs and to associated CD-supporting agencies. This procedure or methodology considers the potential threat, the civil defense organization and concept of operations, the roles and responsibilities of participating agencies, and existing communications resources. It includes a "needlines" development, traffic analyses, system survivability assessments, and the determination of circuit requirements based on the grade of communications service selected. Guidance is furnished in the report for the preparation of the essential complementary civil defense communications plans.

CONTENTS

ILLUSTRATIONS

TABLES

I INTRODUCTION

Background

The methodology presented here is a continuation of that given in reference 4* which depicted a step by step procedure and rationale for determining the civil defense (CD) communications requirements† of a community. This methodology is based on the research, findings, and conclusions contained in Civil Defense Communications: Requirements for Community, County and State; Mandelbaum and Cook, Stanford Research Institute, September 1968 (OUO).

Objectives and Scope

The objectives and scope of this study are extracted from that stated in Sections I and IV of the study named above and are quoted as follows:

"Objectives

(1) Complete the development of a procedural manual for determining quantitative communication requirements of state and local emergency organizations prior to, during, and after emergencies."

"Scope

(1) Based on established emergency operations functions and earlier work, define communications traffic and circuit requirements of state and local civil defense organizations as a function of time, numbers and kinds of messages, their length,

---

* Frequent mention is made in this test to reference 4: "Civil Defense Communications: A Methodology for Determining Requirements of a Community," SRI, August 1967. (See list of References in Volume I.)

† As used in this report, communications requirements include materiel (circuits, equipments, and facilities); doctrine (concept of operations, policies, plans and operating procedures); and personnel requirements.

priority and other characteristics..... . Develop a planning guide for communications for states . . . for various attack and time phases."

Briefly, this volume covers the procedure for determining the CD communications requirements of a county (operational area) and of a state and its major subdivisions. It is similar in form and treatment to reference 4 which covered the CD communications requirements of a community.

The California Disaster Plan, the basic emergency operations plan of the state, describes an "operational area" as a state CD agency embracing the county and the municipalities in the county, for assuring coordination and mutual aid operations. Essentially, the "operational area" staff and roles are those of the county; accordingly, the provisions of this methodology for the county will be equally applicable to the "operational area."

The "Concept of Operations Under Nuclear Attack" (FCDC Part G, Ch. 1, App. 1) defines "operating zones" principally on the basis of geographic area and to a lesser degree, population density. These zones can include all or portions of communities and counties that have an EOC and a zone controller who is charged with CD responsibilities. The provisions of this methodology for the county are similarly applicable to the "operating zone" where it has an EOC and CD missions, roles, and responsibilities equivalent to those of the county.

The state CD organization may contain several subdivisions, each of which encompasses a designated number of counties, to facilitate operational direction and control and mutual aid. For example, the CD organization of the State of California includes six mutual aid regions, each of which includes a certain number of the 58 counties in the state. These mutual aid regions have EOCs and staff organizations similar to those of the state CD organization. Their CD operational roles are also similar to the CD role of the state. Accordingly, the following methodology for determining the CD communications requirements of a state is equally applicable to the CD subdivisions of the state.

This report presents the procedure for any county or state in developing, costing, and programming the CD communications requirements that would be generated by the threat, as well as by the direct and subsequent fallout effects of a nuclear attack.

Method of Approach

The approach used in this text consists of a series of consecutive steps indicated in Figure 1. The steps are covered in detail in subsequent paragraphs. A check list covering these steps is given in Appendix A at the end of this volume.

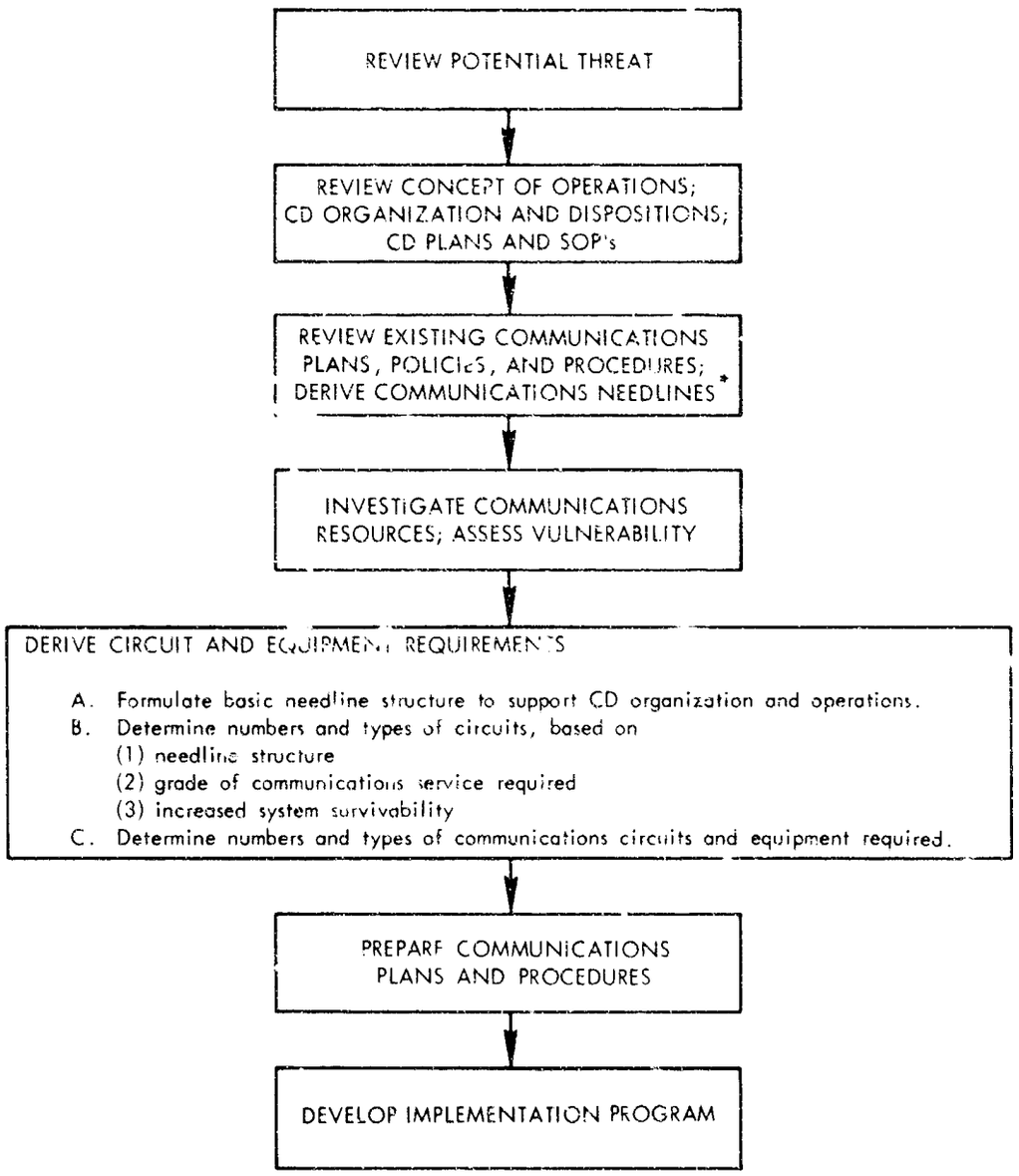
The general approach to determine CD communications requirements of the county and state was derived from the study and analysis of these requirements for the County of Santa Clara, California, the state of California, and California Mutual Aid Region II. An assumed nuclear attack pattern was used as a situation model. Consideration in the study was given to the many variations among counties and states in such factors as geographic size, population, number and sizes of counties and incorporated municipalities,* threat, emphasis on CD matters, CD organizations, concepts of operations, supporting departments and agencies, and communications resources.

---

* Incorporated municipalities, cities, and towns are synonomous and are used interchangeably in this study. Unincorporated municipalities and rural areas are so stated.

FIGURE 1

STEPS IN DETERMINING CIVIL DEFENSE COMMUNICATIONS REQUIREMENTS FOR A COMMUNITY, COUNTY, OR STATE



* A "needline" is defined as a requirement for a communications channel or linkage between any two CD elements or nodes (among agencies, facilities, or key individuals) that must communicate with one another to effect direction and control and coordination of CD operations, and to forward CD intelligence and other essential information. The needline does not specify the means, mode, numbers of circuits, or techniques of communications for this channel (or channels).

II GENERAL CONSIDERATIONS

Basic Assumptions

The determination of requirements is based upon the following assumptions:

1. Sufficient circuits will be provided to assure timely handling of peak loads of the highest precedence traffic within prescribed grades of service (i.e., within acceptable time delays).

2. The circuitry that is adequate to handle peak loads of high precedence traffic will also handle low precedence traffic without undue delay.

3. The circuitry will be at least as survivable as the facilities served.

4. The emergency communications system will be designed to cope with the maximum loads of essential traffic generated under the "worst case" situations. The worst case situation occurs when the maximum amount of high precedence traffic is generated at any one time or period by the maximum number of subordinate elements.

For example, a worst case situation would occur in a county when all its municipalities were affected by blast damage, fire, and fallout at the same time -- and NUDET, damage and casualty, RADEF, or request for aid messages were filed by all simultaneously.

Basic Principles

The following considerations and principles which affect communication requirements are applicable:

1. To the practical maximum, operating departments or agencies of government will perform assigned emergency activities similar to those they normally perform in peacetime. Emergency operations will be carried out principally at the local level (FCDG Ch. A-2, p. 6). Mutual aid and coordination of operations will be conducted at state and state subdivision levels.

2. Maximum use should be made of existing communications resources in planning for CD communications. Any required additions should be incorporated into the peacetime system and used to the maximum for normal daily operations. This procedure will ensure the availability and readiness of a CD communications system in the event of an emergency. The structure and operating procedures of the CD communications system should be similar, insofar as practicable, to those established for the normal peacetime use of the communication resources concerned.

3. A basic CD organization, concept of operations, and an operations plan developed by the county and state are essential to, and must be developed in advance of, the determination of communications requirements. These must be developed well in advance of any emergency.

4. The funding support for CD capabilities and facilities (including communications) will vary appreciably with the potential threat and the financial ability of the county and state concerned. In the continued absence of grave international tension and immediate threats of nuclear attack, the allocations of funds at the federal, state, and local levels will become increasingly limited. Accordingly, plans for CD communications systems should be developed from an austere viewpoint.

5. The most important factor in determining the number of circuit terminals in each element (node) of the CD organization is the command decision (by the executive authorities and as recommended by the administrative and CD authorities) concerning the desired grade of communication service required during an emergency situation.

6. The number of incorporated communities and CD supporting agencies in the county, counties in a state subdivision, and number of state subdivisions as well as the needlines among these nodes, are central in the communications.

II GENERAL CONSIDERATIONS

Basic Assumptions

The determination of requirements is based upon the following assumptions:

1. Sufficient circuits will be provided to assure timely handling of peak loads of the highest precedence traffic within prescribed grades of service (i.e., within acceptable time delays).

2. The circuitry that is adequate to handle peak loads of high precedence traffic will also handle low precedence traffic without undue delay.

3. The circuitry will be at least as survivable as the facilities served.

4. The emergency communications system will be designed to cope with the maximum loads of essential traffic generated under the "worst case" situation. The worst case situation occurs when the maximum amount of high precedence traffic is generated at any one time or period by the maximum number of subordinate elements.

For example, a worst case situation would occur in a county when all its municipalities were affected by blast damage, fire, and fallout at the same time -- and NUDET, damage and casualty, RADEF, or request for aid messages were filed by all simultaneously.

Basic Principles

The following considerations and principles which affect communication requirements are applicable:

1. To the practical maximum, operating departments or agencies of government will perform assigned emergency activities similar to those they normally perform in peacetime. Emergency operations will be carried out principally at the local level (FCDG Ch. A-2, p. 6). Mutual aid and coordination of operations will be conducted at state and state subdivision levels.

2. Maximum use should be made of existing communications resources in planning for CD communications. Any required additions should be incorporated into the peacetime system and used to the maximum for normal daily operations. This procedure will ensure the availability and readiness of a CD communications system in the event of an emergency. The structure and operating procedures of the CD communications system should be similar, insofar as practicable, to those established for the normal peacetime use of the communication resources concerned.

3. A basic CD organization, concept of operations, and an operations plan developed by the county and state are essential to, and must be developed in advance of, the determination of communications requirements. These must be developed well in advance of any emergency.

4. The funding support for CD capabilities and facilities (including communications) will vary appreciably with the potential threat and the financial ability of the county and state concerned. In the continued absence of grave international tension and immediate threats of nuclear attack, the allocations of funds at the federal, state, and local levels will become increasingly limited. Accordingly, plans for CD communications systems should be developed from an austere viewpoint.

5. The most important factor in determining the number of circuit terminals in each element (node) of the CD organization is the command decision (by the executive authorities and as recommended by the administrative and CD authorities) concerning the desired grade of communication service required during an emergency situation.

6. The number of incorporated communities and CD supporting agencies in the county, counties in a state subdivision, and number of state subdivisions as well as the needlines among these nodes, are central in the communications.

7. Normally, the communications facilities devoted to Public Safety or Emergency Services (fire, police, engineering, transportation, ambulance, etc.) will not be diverted for other functional purposes--except for the transmission of FLASH emergency messages--if other means are available. These facilities may be used as a backup means of communication if the primary means fails. The vehicles associated with such nets may be deployed for emergency linkage during intensive fallout radiation and especially if such communication can be conducted by remote control from inside adjacent protected EOCs or shelters.

8. The CD communications requirements of a county can be divided into three option categories that vary in the elaborateness of the services and equipment provided. These categories are generally: (a) a basic minimum set of requirements--the absolute minimum irrespective of grade of service, (b) requirements necessary to provide an "intermediate" grade of service (maximum delay time of 2 min 24 sec for the transmission of FLASH emergency messages), and (c) requirements necessary to provide an "optimum" grade of service (maximum delay time of 1 min 12 sec for transmission of FLASH emergency messages.) Choices among these options are made by command decision, taking into account the existing communications resources, the costs of providing the various grades of service, and the availability of funds for civil defense. Options above the minimum requirements of the state are also available.

9. Joint planning with the local and statewide telephone company, public utilities companies, and other CD-supporting agencies is necessary to assure timely availability and maintenance of emergency communications. Communications planning and provision

of resources and capabilities to support civil defense must be undertaken in peacetime; it may be too late when international tension begins to increase or hostilities are imminent.

10. The responsibility for the design of the CD communications system and the development of appropriate implementation programs should be assigned to a Director for Communications, an individual having a comprehensive background in telecommunications--preferably a full-time civil service employee in the county or state concerned. He should be furnished adequate and qualified staff support to conduct the necessary inventories, reviews and estimates, and to prepare appropriate requirements programs and associated operational plans and procedures.

11. Because of the innumerable variations in counties and states--including geographic size, terrain configuration, population distributions; number of incorporated cities, counties, suburban and rural areas; proximity to strategic targets; emphasis on civil defense, CD organizations and facilities; assigned emergency roles and functions; and communication resources--it is impracticable to prescribe a standard CD communications system for each. The communications requirements must be determined on a case-by-case basis. The procedure given here for determining these requirements is based on this approach.

III PROCEDURE FOR DETERMINING COMMUNICATIONS REQUIREMENTS

The steps to be taken in determining CD communications requirements for a county and state are as follows.

Step 1: Review the Potential Threat

The county or state under consideration should determine its proximity with respect to strategic areas or potential point targets of an enemy nuclear attack. The threat may consist of (a) the direct effects of a nuclear burst (blast, fire, initial radiation), (b) radioactive fallout from the target area, or (c) the combined effects of both. State or federal CD and military agencies can help to assess the magnitude of the potential threat. This assessment will provide a basis for emphasizing and developing a CD posture and concept of operations.

Step 2: Review the Civil Defense Organization and Concept of Operations

The planned emergency structure for civil defense should be reviewed in detail, covering:

a. Organization

(1) Official legislation authorizing the CD structure; setting forth CD emergency objectives and policies; and assigning overall peacetime and emergency responsibilities for CD planning, implementation, and operations.

(2) The peacetime CD organization including the roles and responsibilities of the senior CD official,* the size and composition of his staff, and the peacetime location of his offices and facilities.

---

* For the purposes of this text, the titles senior CD official, Director for Civil Defense, or CD Coordinator are synonomous and may be used interchangeably.

(3) The emergency CD organization, including:

(a) The organization, roles, and responsibilities of the Director for Civil Defense and the Emergency Council (if any), and their emergency locations--e.g., the EOC and alternate EOC.

(b) The organiza ion, roles, and responsibilities of the various staff sections and elements assigned to assist the Director for Civil Defense; and the floor plan of the locations of these staff sections in the EOCs, or elsewhere.

(c) The Emergency Public Safety and Services organization (fire, police, engineering, medical, etc.) and the assigned roles and responsibilities of each service; the hierarchical organization of each Emergency Service, including the roles and locations of subordinate echelons, units, or teams, and the territorial jurisdiction of the subordinate echelons, as applicable.

(d) The locations of the EOCs of the incorporated municipalities, autonomous areas (state universities, federal or state hospital complexes, federal reservations, etc.), military bases, and state agencies or subdivisions located in the county and state subdivisions. The locations of EOCs of the county, state, and subdivisions.

(e) The roles and responsibilities of CD-supporting agencies; their CD organization; and the locations of their staff elements, teams, and emergency operating offices. (Examples of CD-supporting agencies are the local telephone company, public utilities companies, large industrial plants, taxicab and other transportation companies, Red Cross, Salvation Army, and other volunteer agencies or groups, military headquarters and installations.)

(f) The direction and control structure, indicating the channels for direction and control and coordination among Civil Defense Directors and CD staffs including:

- Federal, state, state subdivision, and county CD Directors, their EOCs; and pertinent CD-supporting agencies.
- Access to the Emergency Broadcast System (EBS) by state and subdivisions and access by the county to EBS stations and other radio and TV broadcast stations in the county.
- CD-supporting agencies in the state, subdivision, and county.
- Operations centers for the Emergency Services (if not in the EOC) and the emergency structure of these services down to subordinate echelons, units, and teams.

b. Concept of Operations

(1) The published or unpublished official basic CD concept--which may be mass evacuation of segments of the population, use of public fallout shelters, use of private (expedient) home shelters, or a combination of these.

(2) Basic operations plans and annexes, policies, and procedures published by the state and county to indicate the activities, functions, and operations to be conducted by the various CD organizational elements during the preattack, postattack, and recovery phases. This includes SOPs for Increased Readiness Conditions.*

(3) The current status of CD programs, including planned augmentations of CD capabilities and facilities (EOCs, etc.).

---

* Descriptions of increased readiness actions are given in Par G, Chapt. 5, FCDG, July 1957.

(4) Actual liaison and coordination between the CD staff and subordinate government departments; adjacent county, state, and federal CD agencies or installations, privately owned CD-supporting companies; and volunteer organizations.

(5) The status of CD indoctrination of the public and the results of any CD exercises conducted to date in the county or state.

Step 3: Review Communications Doctrine and Develop Needlines Structure

a. Doctrine

A review is made of:

(1) The communications sections or annex to the basic county or state CD operations plan, or separate CD communications plans.

(2) Peacetime and planned emergency communications concepts and procedures (SOPs) including methods contemplated for message preparation and transmission (written or verbal); use of operators and a message center in the EOC; use of formatted messages and procedences; use of procedural and technical traffic controls; pre-emption authorizations; and other items.

Note. If no emergency communications plan or SOPs exists, it will be necessary to develop these in the process of determining communications requirements. Examples of the contents and format of Emergency Communications Plans and SOPs are given in Appendices B and C respectively of reference 3, and in references 5 and 6.

b Needlines

A tabulation is made of the operational agencies, facilities or key individuals who must communicate with one another in accomplishing the CD mission of the country, state subdivision, and state.

Examples of CD needline tabulations are given in Tables 1, 2, and 3 for Santa Clara County, Mutual Aid Region II, and the State of California, respectively. They are based on the CD organization, roles, geographic disposition, and direction and control and coordination channels established for the participating departments, services, agencies, and elements

Table 1

COMMUNICATIONS NEEDLINES FOR THE COUNTY
(OPERATING AREA) CIVIL DEFENSE ORGANIZATION

Included below are (a) the needlines that exist between the County EOC and other agencies with which it must communicate to effect timely and adequate CD operations (i.e., between agencies in column 1 and column 2) and (b) the needlines that exist between county agencies that are involved in CD operations and their subordinate elements (i.e., between agencies in column 2 and column 3).

Column 1	Needlines Between	Column 2	Needlines Between	Column 3
County EOC		- EOC, state mutual aid region - State warning point - National warning point[1] - State agencies in county -Police.(Highway Patrol) offices -Highway departments offices -Health & Welfare installations - Headquarters, military installations - Public utility service centers[2] -Telephone -Electricity and gas -Water - Emergency Broadcast Service - EOCs of adjacent counties - Civil Defense supporting agencies a. American Red Cross b. Salvation Army c. Airport operations office[5] d. Large commercial plants[6] - EOCs of incorporated municipalities - EOCs of autonomous areas in county[7] - Alternate EOC - Key county CD officials[3]		

Table 1 (continued)

Column 1	Needlines Between	Column 2	Needlines Between	Column 3
County EOC		- Chief of Police (Sheriff)[3]		• Outlying county police offices • Individual patrol vehicles • Municipal police chiefs[4] • State police detachments in county
		- Chief, Fire District[3]		• Fire stations • Team chiefs • Regional fire organization • Municipal fire chiefs
		- Director, Public Works[3]		• Heads of field offices and yards; field teams • Chiefs, municipal public works
		- Director, Public Health & Welfare		• Hospitals (municipal, county, state) • Directors, municipal public health & welfare departments
		- Director, Transportation[3]		• County transportation vehicle yards • Private and commercial transportation dispatch offices
		- Radiological Defense Officer		• County RADEF monitoring stations • Municipal Radiological Defense Officers
		- Chief, Public Information[3]		• EBS Station • Other radio and TV broadcasting stations in county • National news service offices
		- Director of supply		• Supply storage points • Municipal supply directors

Table 1 (concluded)

Notes:

1. If the national warning point terminates in the county.
2. Communications to points from which utility repair teams can be dispatched and controlled.
3. If department heads are not located in the EOC during emergency periods, needlines exist between their separate locations and the EOC.
4. This needline extends to the municipal EOC if the respective department head is to be located there during the emergency period. If the department heads of the emergency CD services of the county or municipality are located in the EOC during the emergency period, a separate needline is not shown for each.
5. If an airport is located in the county.
6. If the large commercial plant, having its own fire, guards, and fallout protection facilities, is located in unincorporated areas of the county.
7. Autonomous areas may include state universities, hospitals, federal institutions, etc., which do not come under county jurisdiction.

Source: Stanford Research Institute.

Table 2

COMMUNICATIONS NEEDLINES FOR MUTUAL AID REGION II

Between		Between	
Column 1	Column 2		Column 3
Region EOC	1. Alternate Region EOC (if any) 2. State EOC (primary & alternate) 3. EOC's Operational Areas (counties) 4. Nearest warning point (NAWAS extensions) 5. Key CD officials 6. Emergency Broadcast System (EBS) access 7. EOCs, adjacent regions 8. U.S. Weather Bureau Rawin station (if in region) 9. Federal government agencies (senior headquarters in region) 10. Senior military services bases in region 11. Senior Reporting Center, telephone company in region 12. Local public utility service centers* - Telephone - Electricity and gas - Water 13. Senior field headquarters of state departments in region a. Agriculture b. Highway Patrol c. Conservation (Division of Forestry) d. Fish and Game		• Operational areas, counties, and cities • State police detachments (radiological monitoring and reporting stations) Forestry stations for • Fire and Rescue • Radiological monitoring and reporting stations

Table 2 (concluded)

Column 1	Column 2	Column 3
	e. Department of Justice (DOJ)	• All terminals on DOJ teletype network (warning and law enforcement information)
	f. Public Works (Division of Highways)	• Highway field offices and corporation yards
	g. General Services	• Procurement offices
	14. Major CD-supporting agencies	
	a. Red Cross	
	b. Salvation Army	
	15. Senior operating headquarters of major industrial organizations in region pertaining to	
	a. Telephone	
	b. Public Utilities	
	c. Transportation	
	Automotive	
	Air	
	Railroad	
	* Local maintenance and repair centers servicing the region EOCs.	

Table 3

COMMUNICATIONS NEEDLINES FOR THE CALIFORNIA DISASTER OFFICE

Between		Between
Column 1	Column 2	Column 3
State Primary EOC (CDO) California State Warning Point (CDO)	1. Alternate EOC (CDO) 2. Hq OCD Region (seven) 3. EOCs, mutual aid regions (six) 4. Other state warning points (22) 5. Key CD officials 6. Emergency Broadcast System (EBS) access 7. EOCs, adjacent states' CD Hq 8. U.S. Weather Bureau offices* 9. Federal government agencies (senior Hq in state--18) 10. Senior military services Hq 11. Senior reporting center Telephone Co. 12. Local public utility service centers† - Telephone - Electricity and gas - Water 13. Chief Executives of State Departments a. Agriculture b. Highway Patrol c. Conservation (Divison of Forestry) d. State Fire Marshal e. Justice f. Fish and Game g. Public Works (Division of Highways)	Senior Hq of field elements of the following departments in each mutual aid region • Agriculture • Highway Patrol • Forestry • Fire Districts • County sheriffs • Fish and Game Districts • Districts and yards

Table 3 (concluded)

Column 1	Between	Column 2	Between	Column 3
		h. General Services (Procurement Office)		• Local offices
		i. Public Utilities Commission		
		j. State Military Department		• Major National Guard unit Hq District offices
		k. Public Health		
		l. Veterans Affairs		
		m. Education		
		n. Water Resources		
		o. Social Welfare		
		p. Youth Authority		
		q. Correction		
		r. Parks and Recreation		• District offices
		14. Major CD supporting agencies Hq		
		a. Red Cross		
		b. Salvation Army		
		15. Senior operating Hq of statewide industrial organizations pertaining to		
		a. Telephone		
		b. Public utilities		
		c. Transportation		
		- Automotive		
		- Air		
		- Railroad		

* U.S. Weather Bureau Rawin stations within each state are indicated in FCDG, Part E, Ch 5, App 6.

† Local maintenance and repair centers, servicing EOCs, and operating centers of the various state departments.

Step 4: Investigate the Existing Communications Resources and Assess Their Vulnerability to Nuclear Attack

a. Existing Communications Resources

The existing communications resources of the county and state should be reviewed, particularly the communications planned for (1) the EOC, (2) operating departments or emergency services, (3) coordination with higher and subordinate headquarters and adjacent states and counties, (4) special functions, such as warning (intercity and intracity circuitry), and (5) access to or connection with the EBS network. From this review the vulnerability of these resources to a nearby nuclear attack should be estimated. The resources review should cover the following:

(1) Materiel Resources

(a) Radio Systems

Identify by name (department or service served) base station call signs, locations, output power or areas of coverages, frequencies, number of channels, modes of operation, and number of mobil vehicles:

- State and county owned radio systems and networks (e.g., fire, police, public works, civil government).
- Privately owned radio systems of CD-supporting companies (e.g., telephone company, public utilities, ambulance, railroad, aviation, taxicab, other transporiation services) in the state and county.
- Radio links from the state, state subdivision, or county EOC to higher headquarters, adjacent state and county EOCs, state and local service agencies (e.g., state police, intercity fire, forestry service nets, etc.). Determine if state and county vehicles can switch to and communicate on county, special region, state, or national frequencies.

- Emergency RACES radio systems and equipment especially provided for CD use, and general incidence and availability of amateur or citizens band radio stations.
- Radio broadcast and television facilities in the state or county (including EBS networks access as well as the designated primary and alternate EBS stations); location of transmitters and studios; frequency allocations or channel assignments; output power day and night; keying lines.
- Assess the vulnerability to blast damage of transmitter antennas, buildings, access wire lines or radio links, and emergency power resources of these facilities, and determine increased survivability requirements, e.g., hardening, burial, or increased guying.

(b) Telephone System and Circuitry

- Locations of telephone exchanges serving CD facilities (EOCs); and the vulnerability of such telephone exchanges to nuclear attack.
- Telephone Company (Telco) outside plant distribution (overhead and buried) to CD facilities and estimates of its vulnerability.
- Types and routing of toll circuits to higher headquarters and EOCs of adjacent counties; availability of alternative routings of these circuits; and estimates of system survivability in event of nuclear attack.
- Identification and directory (including telephone numbers) of the existing telephone service to pertinent CD or CD-supporting installations of the state, subdivisions, or county.

- Plans for emergency line-load control operations; and criteria or lists of certain lines to CD agencies and CD-supporting agencies, elements and installations, included in the "essential" category.
- Emergency switchboards and telephone terminals in, and trunks to, the various EOCs.
- Existing or planned private lines from the EOCs to various CD installations, CD-supporting facilities, and key individuals to meet emergency requirements.

(c) Special Provisions for Communications

- Emergency standby power. Determine the existence and location of backup power units and fuel to furnish emergency electrical power in the event of commercial power failure at the various CD installations. Estimate length of time that these units can provide power for extended in-shelter periods.
- Antennas. Determine the existence or availability of emergency antennas for radio sets (to replace antennas that may be damaged by blast), and evaluate the vulnerability of the existing antenna systems.
- Special equipment. Determine the existence or availability of (1) remote-control wire or radio means for operating mobile radio units which may be located adjacent to shelters during the in-shelter phase), and (2) handie-talkies or other equipment that might be used for communications between sheltered CD structures and special emergency teams.

(2) Personnel Resources

Review the planned sources and availability of communications personnel (county employees, private company personnel, individual volunteers, citizens band, and amateur licensed radio operators); their intended CD assignments (if any) as well as their level of training in CD communications operations, and availability for employment as emergency communications personnel. The files of the local FCC office should indicate the names and locations of licensed radio operators residing in the county.

b. Communications Plans and Programs

(1) Determine the designation and assignment of the emergency Director of Communications, his role, and responsibilities in normal peacetime and in emergencies. His responsibilities for peacetime and emergency communications planning, preparation of implementation programs and operating procedures should be ascertained, as well as his emergency location (e.g., EOC) and staff organization there.

(2) Review the published SOPs for communications noting the use of written messages, approved message formats, message precedence allocations, user restrictions, message routing restrictions, modes (voice or teletype), brevity codes and prosigns, circuit restoration priorities, normal origin points, and message routing for various types of functional messages (NUDET, RADEF, emergency messages, etc.)

(3) Determine the degree of coordination with the telephone company* and other CD-supporting agencies. Discussions should

---

* Coordination with, and assistance from, the telephone company is essential in developing damage estimates. This includes general estimates of damage to telephone central office buildings and equipment for various blast overpressure levels; radiation protection factors for personnel in these buildings; and effects, if any, of the thermal pulse resulting from nearby nuclear detonations. An example of the assessment of damage to the local telephone system is given in Reference 3.

be held with the pertinent CD Director, operating departmental heads, representatives of the local or state telephone company, public utilities companies, Industrial Advisory Committees and EBS stations, and other CD-supporting agencies--to determine prior arrangements for, or status of, coordination and joint emergency communications planning.

(4) Determine the degree of financial and procurement support that can be expected for the overall CD program as well as the proportionate allocations for CD communications. Past, current, and planned local, state, and federal fiscal support for procurement of CD communications equipment, the leasing of circuits, and the compensation of employees engaged to CD work should be reviewed. This review will provide a basis for estimating the probable future availability of funds for program support and phasing.

(5) Review current planning and programs for augmentation of civil defense communications systems.

c. Inspection and Review

It is important that first-hand observations be made of communications installations and facilities. The practicability of achieving communications should be verified in the EOCs and other CD-supporting installations. The following include the observations that should be made:

(1) Within the installation, note and test the following:

- The existence and operability of the telephone and teletype switchboards and common-user or private-line telephone and teletype terminals. The operability of terminals of state or county owned radio stations, or the keying of lines to such radio terminals if remote from the installation. This includes radio and wire links from the EOC to emergency centers of operating departments and public safety services if not located in the EOC.

- The reception of the EBS station(s) by battery-powered transistor broadcast receivers.
- The operability of the RACES radio sets and the quality of reception and transmission between the installation and its next higher or subordinate headquarters. Test particularly the communications among the EOCs using the assigned RACES sets.
- The communications handie-talkies available in EOCs and those on the outside--for the quality of communications between the EOC and nearby radio-equipped vehicles (fire, police, etc.).
- The remote control of radio sets mounted in vehicles stationed outside the EOC (if remote-control capabilities are provided).

(2) Within each pertinent EOC, note, test, and diagram (where applicable) the following:

- The number and location of telephone and radio terminals in the EOC with respect to the location of the CD Director, staff sections, message center, and communications terminals, and Emergency Services and CD-supporting agencies representatives.
- The capacity and type of emergency switchboard.
- The planned number, availability, and the preassignments of communications operators.*
- Number of private lines from the EOC or emergency switchboard to other installations and individuals; the number of common user trunks to Telco central offices and county or state administrative (nonemergency) switchboards; and

---

* See "Directional and Control for Civil Defense Emergency Operations" McGee and Preisser, SRI, March 1966, for information concerning the organization, operations, and personnel requirements for message center operations within the EOC and other headquarters echelons.

the number and types of circuits to be called up in emergencies.

- The location and type of facilities for communicating with operating departments or public safety operations centers (fire, police, public works, and other state or county owned base radio stations and with radio-equipped vehicles).
- Facilities for communicating with higher and subordinate EOCs, the EBS network or station, and CD-supporting emergency service points (for example, the telephone company's emergency service center, and public utilities' emergency repair offices).
- The emergency location of the operating departments or echelons, emergency services chiefs and their staffs, if not located in the EOC; and the availability of telephone and/or radio circuits to their emergency offices.
- The emergency telephone directory for the EOC and for calls to other CD installations.

d. System Assessment

It is noted that Cornell Aeronautical Laboratory Report, Cal No. VP-2269-H-5, entitled "Communications Research Study (Methods of Evaluation) Final Report" dated May 1967 presents a method for making an initial evaluation of command and control communications at the local CD level by engineering analysis. The steps in the analysis consist of data collection for system definition, identification and analyses of requirements, an assessment of attack damage to the system, and an engineering analysis to evaluate the effectiveness and identify major system weaknesses. The application of the above method to the county communications system under consideration is most appropriate at this point, to assure adequate data collection and determination of requirements.

Step 5: Derive the Materiel* Requirements for the CD Communications Systems

The derivation of materiel requirements for the county, the state, and state subdivisions is covered in separate subsections below: These take into account (a) requirements for communications systems and component subsystems to support the CD concept of operations and CD organization, (b) requirements for system survivability, and (c) grade of communications service desired. Option levels for requirements, (i.e., basic, intermediate, and optimum) together with supplementary facilities and services are also considered.

a. County Communications Materiel Requirements

(1) Concept of Operations and Organization

The following illustrate requirements based on two general concepts of operation for civil defense:

Case 1. If the concept of operations is total mass evacuation from the county on receipt of warning, the only communications subsystems required are:

(a) Circuits from warning points of higher headquarters systems (state, federal) to a designated reception point, (e.g., the county EOC), and intracity links from this reception point to EOCs of municipalities and rural points in the county.

(b) The existing public safety and services networks (e.g, police, fire, public work, public utilities, and civic transportation radio nets) for guiding and assisting in the evacuation of people to other areas.

(c) Linkage from the county EOC to the EBS station.

(d) Linkage from the county EOC to the state CD subdivision (if a manned EOC remains in the county after mass evacuation).

---

* Materiel requirements include circuits, equipments, and facilities.

Note: The mass evacuation of a county's population as a concept of operations upon receipt of an extreme emergency warning is considered unlikely.

Case 2. If the CD concept of operation is based primarily on the use of public and home shelters (and no mass evacuation), the following subsystems will be required:*

(a) Circuits from warning points of higher headquarters systems (state, federal) to the county EOC, and links to the EOCs of municipalities and to selected rural points.

(b) A communications system comprising telephone and RACES radio subsystems from the county EOC to municipality EOCs, state region EOC, adjacent county EOCs, to the alternate county EOC (if any), and to nearby military headquarters.

(c) Emergency Services (police, fire, public works, transportation, medical and ambulance) radio networks.

(d) Links from the EOC to emergency operating centers of CD-supporting agencies--i.e., the telephone company, public utilities, ambulance companies, taxicab companies, and other designated commercial companies employing fixed base and vehicular radio systems.

(e) Wire and radio backup links from the EOC to the EBS station and other radio and TV stations in the county.

---

* The provision of public shelters versus the use of home shelters (deliberate or expedient) are generally matters of municipal jursidiction and decision. The county (in California) has a mutual aid coordinating role, and cannot direct the peacetime construction of public or private shelters in the communities. However, the county must be prepared to arrange for the relocation of segments of the population that may be seriously threatened by fire or other imminent disaster, and attempt to find alternate shelter, by coordination with its communities, adjacent counties, or state CD subdivision headquarters, if the level of radiation permits such movement.

(f) Wire or radio links to state agencies in the county which have CD functions.

(g) Augmentation in the communications facilities and equipment to increase system survivability against nuclear effects.

Note: The needlines given in Step 3 indicate the elements (nodes which must be connected).

(2) Survivability Requirements

Because of the vulnerability of communications installations to the effects of nuclear blast, thermal pulse, and radiation (initial and fallout), additional facilities are required to assure continuity of communications. These include (1) the provision of backup means of communications (e.g., RACES radio nets; and redundancy and alternative routing of landlines); (2) the hardening of building structure and radio towers, and the burial of wire lines and cables; and (3) the provision of auxiliary backup electrical power equipment, such as gasoline motor generators and fuel.

(3) Grade of Service and System Options

(a) Grade of Service

For the purpose of this text, grade of communications service is defined as the probability of establishing communications between a calling party and a called party (that is, the probability that one will not find an "all-circuits-busy" situation when initiating a call) --and the maximum probable delay time before establishing such a connection and transmitting a high precedence (FLASH) message.

(b) System Options

For any given communications system, the number of circuits and the equipment will depend on the grade of

service desired. The choices depicted in this text are given in three option categories: (1) a basic minimum set of requirements, (2) requirements for an intermediate grade of service, and (3) requirements for an optimum grade of service.

The basic minimum circuit and equipment requirements are the absolute minimum requirements to provide CD communications irrespective of the grade of service. For an intermediate grade of service, the circuits and equipment requirements are based on a maximum delay time of 2 min 24 sec for highest precedence messages. For a practicable optimum grade of service, the number of circuits and the equipment required are based on a maximum delay time of 1 min 12 sec. The numbers can be varied to take account of economic feasibility considerations and to provide supplementary facilities and equipment for improved service.

(4) Basic Minimum Requirements

The basic minimum circuit and equipment requirements are:

(a) EOC

Common-user telephone connections or service between the county EOC and (1) municipal and state region EOC; (2) key CD individuals (homes and offices); (3) the local telephone company service of reporting center; (4) emergency service centers of CD-supporting agencies--including public utility companies, ambulance services, hospitals, and transportation companies (taxicab, bus, tracking companies, etc.); (5) nearby military installations; (6) Red Cross, Salvation Army, and other disaster relief agencies; (7) nearby Civil Air Patrol operations centers; (8) fire, police, and other CD-supporting agencies of the county and state; and (9) EOCs of adjacent counties. (No provision is made for an emergency switchboard in the EOC).

(b) RACES

Radio backup links from county EOC to EOCs of municipalities.

(c) Emergency Services

Base radio stations operated from the EOC for fire, police, and engineering services; or common-user telephone circuits to distant base radio stations.

(d) EBS Station

One common-user circuit from the EOC to the EBS station.

(e) Other Agencies and Supporting Services

A common-user telephone line and a RACES radio link from the county EOC to the next higher CD headquarters--i.e., the state region.

(5) Intermediate and Optimum Requirements

(a) Correlation of Grade of Service and Determination of Circuit Requirements

The number of circuits required between nodes of the county EOC and of the municipalities, depends primarily upon the acceptable "grade of service" (previously defined in terms of the time delays). The acceptable grade of service is a matter of command decision. To ascertain the delay times upon which such decision can be based, a "worst case" situation is assumed, as follows:

- One FLASH Emergency message is filed at each city EOC for transmission to the county EOC.
- All such FLASH messages are filed simultaneously.
- All messages are in the same format (Emergency Report Form) and require a transmission time of 1 min. 2 sec. each.* (Each message consists of 25 words and is transmitted at a rate of 20 words per minute).

---

* The average transmission and copy time for the FLASH Emergency Report is that observed in CD Exercise SIMO VI (i.e., 1 min 12 sec). See Section III, Volume I.

For this "worst case," the grade of service (delay time) relationship to the number of circuits or common-user terminals (telephone or radio) can be expressed as

$$T = \frac{tn}{i}$$

where:

T = the elapsed time between the beginning of of the first message and the receipt of the last message of a one-time group of messages at the senior node (county EOC)

t = transmission time of one message (1 min 12 sec)

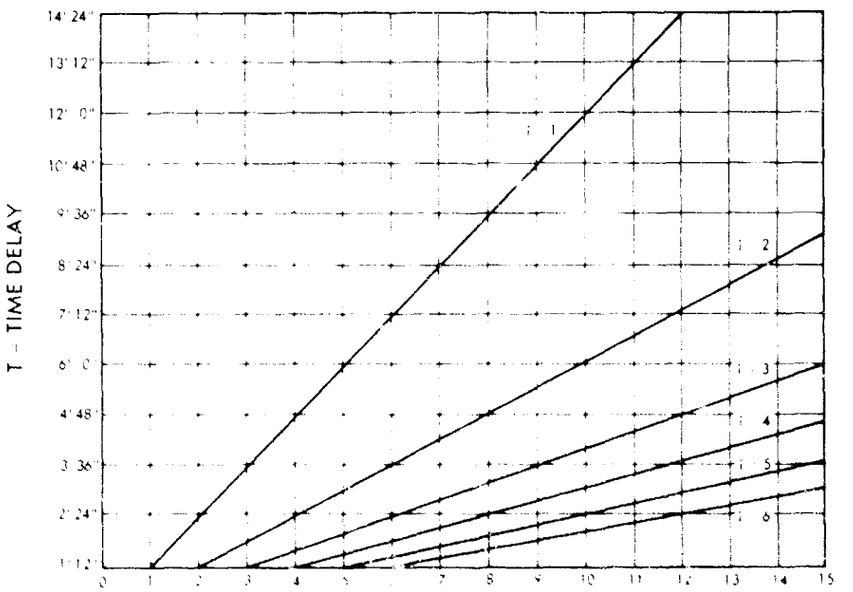
n = number of subordinate elements in the networks; or the total number of FLASH emergency messages in the one-time group filed simultaneously at the subordinate nodes

i = number of terminals of the receiving node

The relationship between the number of subordinate nodes in a network, the delay times and the number of terminals required at the receiving (senior) headquarters is illustrated in Figure 2. For example, for the grade of service equivalent to a maximum delay of 2 min 24 sec in the receipt of the n^{th} (last message) at the county EOC, the number of municipal EOCs cannot exceed two, if there is only one common-user telephone terminal in the county EOC (see graph line i = 1). If there are two common-user telephone terminals in the county EOC, the number of municipal EOCs can be increased to four for the same grade of service (see i = 2). If the number of common-user telephone terminals in the county EOC is increased to three, the number of subordinate city EOCs can be increased to six for this same grade of service (see

FIGURE 2

REQUIREMENTS FOR COMMON-USER TELEPHONE TERMINALS AS A FUNCTION OF ACCEPTABLE DELAY TIME AND THE NUMBER OF SUBORDINATE ELEMENTS IN A COMMUNICATIONS NETWORK



$$T = \frac{txn}{i}$$

i = Number of terminals at the receiving node.

* If the value for i is a fraction or a mixed number, select the next higher whole number for i.

SOURCE: Stanford Research Institute.

line i = 3). Thus, the grade of service can be increased by providing the appropriate number of common-user circuits to the senior headquarters.

(b) Example: Santa Clara County

An example is given using the situation in Santa Clara County, California. There are 15 incorporated municipalities in the county. Assume that in a "worse case" situation all 15 city EOCs filed FLASH Emergency messages simultaneously for transmission to the County EOC. Assume that each FLASH message required 1 min 12 sec to transmit. If there were only one line to, and one receiving operator in, the county EOC, the last message would be received by the County CD Coordinator 15 x 1 min. 12 sec = 18 min 0 sec after the initation of the first call. If there were two terminals and operators at the county EOC, this maximum delay time would be reduced to one-half. Similarly, each increase reduces the delay time proportionately. The criteria for an intermediate grade of service is that the maximum delay time on the last FLASH message in this worst case situation should not exceed 2 min 24 sec; and for an optimum grade of service, this maximum delay time should not exceed 1 min 12 sec.

In the case of Santa Clara County, one common user telephone terminal in the country EOC would be the absolute minimum. However, for an intermediate grade of service (i.e., a time delay not to exceed 2 min 24 sec), the number of common user trunk terminals in the county EOC for communications to the municipality EOCs, using the formula in the preceding paragraph, would be eight. For the optimum grade of service 15 common user trunk terminals would be required in the county EOC switchboard, to provide simultaneous (no delay) circuit connections from each municipal EOC.

(c) Determining Circuit and Operation Requirements

With Figure 2, and with the known number of municipal EOCs in the county, the minimum number of circuits and operators required in the county EOC for this county-municipality EOC network can be determined for intermediate and optimum grades of service. However, additional circuitry, both telephone and radio, will also be required at the county EOC, as indicated in Tables 4A and B to provide for communication to other agencies and services in the numbers and types listed under the intermediate and optimum categories. A unit basis for determining common user telephone circuit and RACES network requirements for each option category is listed in Table 4B. The rationale for determining these requirements is given in the next three pages.

(1) Needline and Type Circuit Correlation

In Table 4A a correlation is depicted between the various needlines (given in Table 1) and the most practicable types of circuits to implement these needlines. Included are common user (CU) and private line (PL) telephone trunk circuits and terminals, and radio transmitter-receiver (T/R) linkages. RACES links and nets are used primarily to back up wire circuits from the country EOC to its municipalities, to adjacent counties, and to the state mutual aid region. For primary or backup radio communications to county departments and agencies (including public safety agencies) the existing county-owned radio communications facilities will normally be used.

(ii) Traffic Circuit and Grade of Service Correlation

In Table 4B a correlation is made among the FLASH messages, needlines, and numbers of CU circuits, and RACES stations required at the County EOC for each grade of communications service. The FLASH messages that would be generated during the trans- and post-attack phase, their formats, routing, and the communications systems employed for their transmission are listed. The communications linkages in terms of CU telephone and RACES terminals are shown for each grade of service, assuming the "worst case" FLASH traffic situation described in the preceding paragraphs. The PL requirements for each grade of service are indicated in Table 4A. The radio terminals other than RACES are to be provided by the existing public safety or other county-owned radio systems

In the correlation shown in Table 4B, it is assumed that no two types of FLASH messages will occur simultaneously in the "worst-case" situation.

(iii) Added Circuitry Requirements

Reference is made to Note 12, Table 4A which indicates that additional common user circuitry will be required from the county EOC to the EOCs of its cities which have populations above certain sizes, to cope with the increased expected volumes of traffic (of lower than FLASH precedence) between these nodes. For the intermediate and optimum categories these circuit numbers will be as follows - for cities of 25,000 to 100,000 population, not less than 2 CU* channels; for 100,000 to

* These channels may consist of CU telephone and teletype channels. See Summary Table I, reference '4.

to 500,000 population, not less than 3 CU* channels; and for cities of 500,000 and above not less than 7 CU* channels. Reference 14 contains the rationale for this added increase in circuits.

The RACES radio nets are intended primarily to back up the direction and control wire circuits. They accordingly provide for increased communication system survivability in the event that portions of the telephone system are d ged or destroyed.

(iv) Summary of Requirements

Applying the foregoing correlations, a summary of the minimum telephone trunk requirements for the county EOC, and the numbers of radio stations in each county RACES net, is presented for each grade of service.

- Minimum Grade of Service

  1 CU telephone trunk circuit.

  1 PL telephone of l t letype circuit for increased attack warning from state readiness or warning system.

  1 RACES terminal for communication to all municipalities in the county.

  1 RACES terminal for communications to the state or state region EOC, and to adjacent county EOCs.

- Intermediate Grade of Service

  N CU telephone trunk circuits (where N equals the number of municipalities and autonomous areas in the coun that have EOCs).

  1 to 6 additional CU telephone and letype trunk circuits for cities above 25,000 population (see basis in Note 12, Table 4A).

1 CU telephone trunk circuit for communications to state region EOC and adjacent county EOCs.

1 PL telephone or teletype circuit for increased readiness or attack warning from state warning system.

1 PL to the EBS station.

PLS to base radio station dispatchers of County Emergency Services, if not located in the EOC (see Note 8, Table 4A).

1 RACES terminal in the state region RACES net for communication to the state region EOC and EOCs of adjacent counties.

1 RACES terminal for each County-to-Municipality net where the number of nets equals $\frac{N}{9}$ (rounded to the next higher whole number).

- Optimum Grade of Service

N CU telephone trunk circuits.

1 to 6 additional CU telephone and teletype trunk circuits for cities above 25,000 population (see basis in Note 12, Table 9A).

1 CU trunk circuit for communications to state region and adjacent county EOCs.

1 PL telephone or teletype circuit for increased readiness or attack warning from the state warning system.

PLs to the agencies listed in the "Optimum" column in Table 9A.

1 RACES terminal in the state region RACES net for communications to the state region EOC, and to EOC's of adjacent counties.

1 RACES terminal for each county-to-municipality net where the number of nets equals $\frac{N}{5}$ (rounded to the next higher whole number).

The numbers of required CU and PL trunks and RACES terminals in the county EOC are not rigid, but represent minimum requirements for each of the grade of service categories given.

Listed on pages 32 and 33, reference 3, are supplementary optional facilities and services some of which could be added advantageously to the county's requirements; these items should be reviewed accordingly.

Table 4A

COMMUNICATIONS CIRCUIT AND MATERIEL REQUIREMENTS
for
COUNTY (OPERATIONAL AREA)

Mode and Element	Circuit and Materiel Requirements		
	Minimum	Intermediate	Optimum
Wire System			
Switchboard in EOC[1]		1	1
Private Line (PL) and Common User (CU) lines[2]			
County EOC to:			
Federal warning point (NAWAS)	CU	CU	CU
State warning point (bells and lights)	PL	PL	PL
State mutual aid region EOC	CU	1 or 2 CU*	PL/1 or 2* CU
State departments and agencies[3]			
Dept. of Justice	TTY	TTY	TTY
Highway Patrol	(CU)	CU	PL/CU
Highway (Const. & Maint.)	(CU)	CU	CU
Forestry Service	(CU)	CU	CU
Water Resources	(CU)	CU	CU
Fish & Game (Conservation)	(CU)	CU	CU
Health & Welfare (incl. hospitals)	(CU)	CU	PL/CU†
Hq. military installations (in or near the county)	(CU)	CU	PL/CU†
EOCs, adjacent counties	(CU)	CU	PL/CU†
Civil Air Patrol Operations Office	(CU)	CU	PL/CU†
Public utility service centers[4]			
Telephone	(CU)	CU	PL/CU
Electricity & Gas	(CU)	CU	PL/CU
Water	(CU)	CU	PL/CU
Emergency Broadcast Service station[5]	(CU)	PL/CU	PL/CU
Other radio and TV broadcasting stations[5]	(CU)	CU	PL/CU†
Newspapers[5]	(CU)	CU	CU
County departments and agencies[6]			
Alternate EOC	(CU)	CU	PL/CU
Key county CD officials	(CU)	CU	PL/CU
Mobile communications vans[7]	(CU)	CU	PL/CU
Police (Sheriff's Dept.)	(CU)	CU	PL/CU
Fire service and district Hq.	(CU)	CU	PL/CU
Highway maintenance	(CU)	CU	PL/CU
County government transportation	(CU)	CU	PL/CU+
Public works (engineering)	(CU)	CU	PL/CU
Health & Medical (ambulance)	(CU)	CU	PL/CU
Hospitals	(CU)	CU	PL/CU
County school dept.	(CU)	CU	CU
Welfare dept.	(CU)	CU	PL/CU†

* 2 CU circuits are required if the county population exceeds 2 million.
† These private lines are optional.

Source: Stanford Research Institute.

Table 4A (continued)

Mode and Element	Circuit and Materiel Requirements: by Option Categories		
	Minimum	Intermediate	Optimum
Base radio stations of county Emergency Services[8]	(CU)	PL/CU	PL/CU
Separate county RADEF monitoring stations[9]	(CU)	CU	PL/CU
CD - supporting (private) agencies[10]	(CU)	CU	PL/CU*
American Red Cross	(CU)	CU	CU
Salvation Army	(CU)	CU	CU
Airport Operations Office[11]	(CU)	CU	PL/CU
Commercial transportation company (dispatcher)[19]	(CU)	CU	CU
Taxicab companies (radio dispatcher)	(CU)	CU	PL/CU*
Incorporated municipalities			
EOCs	(CU)	PL/CU[12]	PL/CU[12]
Alternate EOCs	(CU)	CU	CU
Autonomous area EOCs[12a]	(CU)	CU	PL/CU
Radio[13]			
County EOC to:			
State mutual aid region EOC (RACES)	T/R	T/R	T/R
State agencies: 14, 15			
CD EOC[15]			T/R*
Highway Patrol net		T/R[14]	T/R
Forestry net		T/R[14]	T/R
Div. of Highways net		T/R[14]	T/R
Intercity law enforcement nets	(T/R)	T/R	T/R
Intercity fire nets (region, state, or national)	(T/R)	T/R	T/R
Military installations[16]	--	T/R	T/R
EOCs, adjacent counties[17] (RACES)	(T/R)	T/R	T/R
Public utility service centers	--	--	T/R*
Telephone	--	--	T/R*
Electricity & Gas	--	--	T/R*
Water	--	--	T/R*
EBS station	T/R	T/R	T/R
County departments & agencies:[6]			
Alternate EOC (state region net-RACES)	T/R	T/R	T/R
Mobile communications vans		T/R	T/R
Police Hq.[8]		T/R	T/R
Fire Hq.[8]		T/R	T/R
Highway maintenance[8]		T/R	T/R
County transportation[8]		T/R	T/R
Public works[8]		T/R	T/R
Health & medical (ambulance)[8]		T/R	T/R
Hospitals	--		T/R*

* Private line and radio stations optimal.

Table 4A (continued)

Mode and Element	Circuit and Materiel Requirements: by Option Categories Minimum	Intermediate	Optimum
Base radio stations of county agencies[8]	--	T/R	T/R
Separate county RADEF monitoring stations[18]	--	T/R	T/R
CD-supporting (private) agencies			
Commercial transportation[19]	--	--	T/R*
Taxicab companies[20]	--	--	T/R*
Airport Operations Office	--	--	T/R*
Incorporated municipalities			
County EOC (RACES)[21]			
EOCs (RACES)	T/R	T/R	T/R
Alternate EOCs	--	--	T/R
Autonomous Area EOCs	--	--	T/R
Broadcast receiver, EOC (to receive EBS)	--	R*	R*
Miscellaneous[22]			
Backup motor generators (EOC, EBS Public Safety Services)	Required	Required	Required
Reserve fuel storage facility	Required	Required	Required

Notes:

1. An assumption is made that the EOC and Communications Center (including the switchboard) are collocated. The EOC switchboard should have sufficient drops to serve the in-house subscribers (key officials, EOC staff sections, message center, telephone and radio terminal operators), external private lines, and common-user trunks to commercial central offices. The number of common-user trunks to the EOC and the switchboard capacity to terminate these trunks for the grade of service corresponding to minimum, intermediate, and optimum options should be about equal to the total number of in-house subscriber telephones divided by the number opposite each option as follows:

Option	Total In-House Subscribers
Minimum	4
Intermediate	3
Optimum	2

2. The symbols CU, PL, or T/R indicate the requirement for one common user (CU) telephone terminal, one private line (PL) telephone terminal or one radio transmitter-receiver (TR) set respectively. Private lines include user-to-user terminal circuits and direct trunks from the EOC switchboard to distant emergency switchboards or user terminals. Private lines will be furnished only on an emergency call-up basis. Where the abbreviations PL/CU are used they signify that a private line and a common-user circuit are both required. In the minimum option category only one CU telephone circuit and terminal are indicated for the county EOC; the (CU) indicates needlines which must be served by this one CU terminal (see page

Table 4A (continued)

3. The agencies of the state departments pertain to state-owned installations in or near the county which have CD roles or can provide alternate channels of communication to other counties, regions, or state CD agencies.

4. These service centers pertain to public or privately owned utilities which serve more than one municipality in the county.

5. The EBS station designated to serve the county.

6. These include county departments headquarters, and field installations plus service storage yards located at a distance from the county EOC--from which the dispatch or control of pertinent services can be accomplished.

7. It is assumed that the existing emergency communications mobile vans can be connected into the commercial telephone systems.

8. This pertains to the location of the radio dispatcher (operator) of the main base radio station of each county emergency service which may be located at a distance from the EOC Communications Center.

9. This concerns county RADEF monitoring stations which are not part of nor use the communications facilities of other CD emergency services such as fire, police, forestry service networks.

10. This pertains to emergency service centers of private company installations and plants that are located in unincorporated areas of the county, and which furnish their own fire, police, transportation, and shelter facilities along with associated communications facilities.

11. This concerns commercial airports which may be located in the county.

12. The number of trunk circuits between the county EOC and each of the EOCs of its municipalities may vary with the size of the municipality. In the intermediate and optimum option categories these numbers will be - for cities of 25,000 to 100,000 population not less than 2 CU channels; 100,000 to 500,000 population not less than 3 CU channels; for cities of 500,000 to one million or more not less than 7 CU channels. These may be CU telephone or teletype channels (see reference 14).

12a. There may be autonomous areas such as state or private universities, and federal or state hospitals which may furnish internal fire, police, transportation, and police services and shelter.

13. Radio facilities may consist of a radio receiver (R) only (for monitoring), or transmitter-receiver station (T/R) for two way communications.

Table 4A (concluded)

14. This refers to state CD-supporting installations which are located in the county. Transmitter/Receiver installations are made where the agency has a radiological monitor and reporting role into the county.

15. This refers to the state civil defense EOC (e.g., California Disaster Offices).

16. Equipment for this link will most probably be provided by the military agency.

17. The assumption is made that each EOC has a RACES radio terminal in the state mutual aid region RACES net.

18. This pertains to separate RADEF monitoring stations which do not have access to telephone service.

19. The radio facilities of private or commercial transportation companies by FCC regulations can be used only in connection with transportation services.

20. This refers to base radio stations of taxicab companies which operate in more than one municipality.

21. The number of RACES radio transmitter receivers in the county EOC for communications with the EOCs of incorporated municipalities depend upon the grade of service selected. This grade of service depends in turn on the number of RACES nets, and maximum number of stations in each net. For an intermediate grade of service, not more than nine stations should be in a net--and thus Municipal EOCs/9 T/Rs are required in the county EOC. For an optimum grade of service Municipal EOCs/5 T/Rs are required in the county EOC. The "worse case" time delay for the last FLASH message in each net, with trained operators, accordingly would be 4 min 48 sec and 9 min 36 sec respectively. These time delays are considered quite adequate in view of the alternative routes available, and improbability of the "worst case" situation occurring.

22. "Miscellaneous" includes supplementary facilities and services described in pages 32-34 "Civil Defense Communications: A Methodology for Determining Requirements for a Community" (see reference 3).

* Radio equipments optional.

Table 4

FLASH MESSAGE SUMMARY, NEEDLINE

Flash Message & Format	Routing	Comm. System Used	Needlines	Number of Required Minimum	I
Attack Warning-ER					
	State Region to County	NAWAS Wng Point DOJ Teletype & Bells and Lights	1	1	
	County to Municipalities	CU Telephone	1 from the County EOC to each municipality EOC	1	
	County to Unincorporated village	County Sheriff Radio System	1 from the County EOC to each sheriffs office in each		
	County to Public	EBS	--		
Deploy Emergency Service Teams-ER	Co. EOC (Emergency Service Chiefs) to county Public Safety, Utilities and other Emerg Svcs establishments	Emergency Service Radio Networks	1 from the Co. EOC to each Emergency Svc establishment or deployed team		
		EOC Pvt line to Telco	1		
Nuclear Detonation Report-NR	Each municipality EOC to County EOC	CU telephone RACES net[3]	1 from each municipality EOC to Co. EOC	1	
	County EOC to State Region EOC	CU telephone RACES net[4]	1	1	
Immediate Damage & Casualty Assessment-ER	Each Municipality EOC to County EOC	CU telephone RACES net	1 from each municipality to Co. EOC	1	
	County EOC to State Region EOC	CU telephone RACES net	1	1	
Uncontrollable fires Report-ER (BOS-HIFIRE 7-8-9)	Each municipality EOC to County EOC	County and regional fire radio networks	1 from each municipality to Co. EOC		
	County EOC to State Region EOC	County and regional fire radio networks	1		
Request for Immediate Aid (Fire, Rescue, Medical, Remedial Movement)-ER	Each municipality EOC to County EOC	CU Telephone RACES	1 from each municipality EOC to Co. EOC	1	
Coordination for Immediate Aid	County EOC to County Emergency Svcs Teams	Emergency Services Radio Networks	1 from the Co. EOC to each Co. Emergency Service establishment or deployed team		
Warning of Impending Fallout Arrival-ER	State Region EOC to Co. EOC	CU telephone RACES	1	1	
	Co. EOC to Municipality EOCs	CU telephone RACES	1 from Co. EOC to EOC of each municipality	1	
Critical Increase in Radiation Levels-RR	Each municipality EOC to Co. EOC	CU telephone RACES	1 from each municipality EOC to Co. EOC	1	
	Each County Monitor to Co. EOC	Emergency Svcs Radio	1 from each monitor to Co. EOC		
	Co. EOC to State Region EOC	CU telephone RACES	1	1	
Requests for Remedial Movement Aid & Guidance-ER	Each municipality EOC to Co. EOC	CU telephone RACES	1 from each municipal EOC to Co. EOC	1	
Coordination and Directions for Remedial Movement-ER	Co. EOC to municipalities EOCs	CU, RACES	1 from Co. EOC to each municipality EOC	1	
	Co. EOC to adjacent county EOCs	CU, RACES	1 from Co. EOC to each municipality EOC	1	
	Co. EOC to State Region EOCs	CU, RACES	1 from Co. EOC to each municipality EOC	1	
	Co. EOC to Co. emergency Svcs (police, transportation, medical, engineering)	Emergency Services Radio Nets	1 from Co. EOC to each county emergency services installation or deployed vehicles.	1	
Maximum circuit & RACES requirements for any one "worst" case situation				1	

A

Table 4B

SUMMARY, NEEDLINES AND CIRCUIT CORRELATIONS--FOR COUNTY

	Number of Common User Circuits Required by Grade of Service			Maximum Number of RACES T/R Stations Per Net		
	Minimum	Intermediate	Optimum	Minimum	Intermediate	Optimum
	1	1	1			
	1	$\frac{N}{2}$	N^2			
er-						
	1	$\frac{N}{2}$	N	N	N/9	N/5
	1	1	1	1 T/R	1 T/R	1 T/R
	1	$\frac{N}{2}$	N	N	$\frac{N}{9}$	$\frac{N}{5}$
	1	1	1	1 T/R	1 T/R	1 T/R
o. EOC						
	1	$\frac{N}{2}$	N	N	$\frac{N}{9}$	$\frac{N}{5}$
nt						
	1	1	1	1 T/R	1 T/R	1 T/R
	1	$\frac{N}{2}$	N	N	$\frac{N}{9}$	$\frac{N}{5}$
to	1	$\frac{N}{2}$	N	N	N/9	N/5
C						
	1	1	1	1 T/R	1 T/R	1 T/R
	1	$\frac{N}{2}$	N	N	$\frac{N}{9}$	$\frac{N}{5}$
pality	1	$\frac{N}{2}$	N	N	N/9	N/5
pality	1	1	1	1 T/R	1 T/R	1 T/R
pality	1	1	1			
	1	$\frac{N}{2}$	N			
on				N	$\frac{N}{9}$	$\frac{N}{5}$
	1	$\frac{N}{2}$	N	N	$\frac{N}{9}$	$\frac{N}{5}$

Remarks

1. These columns indicate the minimum number of Common User telephone trunk terminations required in the County EOC for the respective grades of service--for each type flash message listed. These numbers are not added vertically for each separate message because it is assumed that no two types of flash message will occur at the same time; although all of one type may be called in simultaneously under the assumed "worst case" situation.
2. N equals the number of municipality and autonomous area EOCs in the county.
3. See note 21, Table 4A.
4. The county EOC will have one T/R in the State Region RACES net.

General

The requirements for private telephone and teletype lines (PL), additional Common User (CU) telephone circuits to cope with precedence traffic in cities of populations above 25,000, and county-owned radio links, are indicated in Table 4A under the respective grade of service categories.

Flash message formats include:

- ER - Emergency Reports
- NR - Nuclear Detonation Reports
- RR - Radiation Reports

(d) Special Considerations

Although Tables 4A and B cover overall requirements, there are special considerations concerning RACES radio networks and supplementary facilities and services that should be taken into account before final decisions are made:

- An alternative to providing a special emergency switchboard in the county EOC would be to furnish subscriber lines from the telephone terminals in the EOC of the various staff and operating positions, through a protected buried cable to the telephone company central office.
- If the county owns or operates a separate switchboard to serve the civic administration, tie-lines should be established between this switchboard and the emergency CD switchboard in the EOC to provide alternate routing and channels
- Base radio stations used for the Emergency Services (fire, police, public works, and civic transportation) are best located in the EOC. However, private lines for keying and controls and backup radio link should be provided between the EOC and any of these stations that are at locations distant from the EOC.
- Radio receivers and transmitters capable of monitoring and having access into state police, intercity fire, forestry service, or other official state, or national safety or service radio networks should be

provided in the EOC as alternative means for the receipt of warning, direction and control, intelligence, and other emergency information from higher headquarters and adjacent county EOCs.

- Terminal facilities should be provided in the county EOC for receipt of emergency warning signals and narrative (teletype) information on any special networks (e.g., state CD microwave or wire teletype networks) established by the state.

(e) RACES Radio Networks

For the optimum option, RACES radio nets should consist of no more than five stations total in each net--one headquarters net control station and four subordinate stations.* For the intermediate option, each net should not consist of more than nine stations. The provision of these nets is based on the assumption that adequate numbers of "clear" radio frequencies would be available for these nets. If the radio frequencies are not available, the number of RACES radio stations in each net will have to be increased--but should not exceed 30 stations per net in any case.

The number of radio frequencies that can be used will depend on radio interference among the prescribed nets. Interference is a function of the proximity, frequency, and power emissions of the various RACES radio stations. Interference potential can be verified only by actual tests of candidate radio equipments on site.

---

* For instance, in the EOC there would be one net control RACES set for each four subordinate municipality EOC's.

The county EOC and subordinate county installations should be provided with expedient backup antennas and lead-ins (transmission lines) for the RACES sets that can be easily installed, to ensure quick restoration of operations in the event of damage to the permanent antennas.

(f) Emergency Services Radio Networks

County-owned radio stations and radio-equipped vehicles of the existing fire, police, public works, and city government radio nets--as well as those of privately owned ambulance services, hospitals, medical services, and land transportation services--will in general be used to support their parent organizations in an emergency. No more than 30 radio-equipped vehicles should be assigned to any one net or frequency if frequency availability permits. These vehicles should normally be assigned to specific locations during the transattack and postattack periods to provide additional communications backup (when practicable) to the communications system (except when dispatched by the chiefs of the respective emergency services for functional operations).

Privately owned CD-supporting companies, such as the public utilities, telephone company, and water company, have their own emergency service centers and radio communications to their own vehicles. These emergency or service centers should be connected by private line to the EOC.

(g) Coordination with the Federal Communications Commission (FCC)

FCC Rules and Regulations provide for specific permissible CD communications for various types of radio networks, and prescribe the procedure and forms for obtaining

pertinent FCC authorization. These Rules and Regulations prescribe the use of certain licensed communication facilities in accordance with category of message and service class. A detailed listing of the agencies and activities comprising the various safety and special radio services is contained in Parts 89, 91, 93, 95, and 97 of FCC Rules and Regulations.

The networks of amateur stations operate in the Radio Amateur Civil Emergency Service (RACES) in accordance with an FCC approved Civil Defense Communications Plan. Local CD authorities may establish and secure authorization of RACES networks by drafting Communications Plans in accordance with the Commission's RACES Rules, and forwarding the plan and application for "Authorization to Operate Stations" to the FCC via State and Federal Civil Defense Offices. See Subpart F, Part 97, "FCC Rules and Regulations," pertaining to RACES plans, authorization, and procedures.

(6) Supplementary Facilities and Services

If decision-makers wish to improve the grade of service for increased operational responsiveness and coordination among CD elements, and for increased system survivability above that provided by the equipment listed in the optimum category,

certain additional CD communications facilities and services can be programmed. Decisions to include these items would be based on the availability of funds, the threat (i.e., the proximity of the county to a strategic target), the probability of fallout on the county after an attack, and the CD policies of the county. Such additional facilities could include (not listed in order of priority):

(a) Remote-control equipment that would enable vehicles located outside shelters to be operated from within the shelters.

(b) Backup radio links that would connect the EOC to the emergency service centers of the telephone and other public utilities, to taxicab base radio stations, and to other CD-supporting private companies in the community.

(c) Paired handie-talkie radio sets for each county sheltered installation for communications with nearby deployed emergency service teams.

(d) Sound-powered or local battery, and magneto signaling field telephones to be used with the private lines in lieu of common battery dial-type or manual-type telephones (in the event that central office switching equipment or batteries are damaged).

(e) Amplifier megaphones for use by the police for traffic control during emergency remedial evacuation, and for control of local joint operations (e.g., search and rescue, firefighting, evacuation, and guidance) during the postattack phase.

(f) A high power receiver, amplifier, and loudspeaker system for the EOC for reception of broadcasts from the local EBS station or for long-distance reception of remote EBS station broadcasts.

(g) Burial of overhead telephone subscriber loops and aerial cables or wire lines that carry the CD circuitry of the EOC.

(h) Backup power facilities and fuel supplies for each EOC to assure at least a two-weeks' supply of electrical power--for direct use, or for charging storage batteries.

(i) Private lines from the EOC to hospitals, casualty and reception centers,* medical centers, the Red Cross office, nearby military facilities, and the EOCs of adjacent communities.

(j) Designation of an alternate EOC and provision of an emergency manual switchboard, private and common-user circuits, and telephone and radio facilities that partially duplicate those in the main EOC. Private lines and backup radio links between the main and alternate EOCs would also be included.

Procurement of additional items could also be programmed to meet the needs of future increases.

---

* For use also in the event of natural disasters.

b. State and CD Subdivision Communications Materiel Requirements

(1) Concepts of Operation

In general, the basic concept of operations of the state will include:

(a) Alerting and directing all political subdivisions and agencies in the state to assume increased readiness conditions.

(b) Receiving and disseminating official attack warning to all political subdivisions and the general public via the NAWAS, state warning, and EBS systems.

(c) Making maximum use of fallout shelters (public and private) as the basic lifesaving measure

(d) Receiving and transmitting to higher and lower headquarters, as appropriate, intelligence information concerning nuclear detonations, damage and casualties, fallout movement and contamination, fire situations, status of resources and utilities, and requests for aid and assistance beyond the capabilities of subordinate elements.

(e) Requesting aid and resources from federal authorities (if necessary), allocating available resources to subordinate CD subdivisions, and coordinating mutual aid operations among its major CD subdivisions and emergency operating departments.

(f) Allocating resources and coordinating post-attack recovery operations.

If the geographic size and number of counties are sufficiently great, the state may establish CD subdivisions (e.g., California has established six civil defense mutual aid regions, each containing a designated number of contiguous counties).

The organization, roles, and concepts of operations for these state CD subdivisions would be similar to those of the state (except for the transmission of initial readiness condition and attack warning signals to counties and municipalities).

(2) Grade of Service and Materiel Options

Because of the fundamental lifesaving responsibility and guiding role of the state in developing an effective CD posture among and within its CD and political subdivisions (region, county, municipalities), the state must assure adequate and survivable communications down to and among these echelons. In the conduct of its operations, great numbers of high precedence messages can be expected. Thus, with respect to materiel requirements, the existing state-owned and operated systems must be integrated and utilized to the maximum, and augmented by commercial and amateur capabilities as necessary to assure a high grade of service. Accordingly, in Table 5 only the unit basis for a minimum set of requirements for a high grade of service is given. The unit numbers may be increased or augmentations made for particular reasons unique to each state or CD subdivision.

The basis for selecting the number and types of circuits tabulated in Table 5 is:

(a) the state and state region needlines developments depicted in Tables 2 and 3--which indicate the elements or nodes to be connected.

(b) the traffic characteristics and the grade of communications service required--which dictate the number and types of channels for each needline, and

(c) the existing state communications resources and the need for system survivability--which establish additional numbers and types of circuit required (e.g., RACES to back up Telco circuits).

Table 5

MINIMUM COMMUNICATIONS CIRCUIT AND MATERIEL REQUIREMENTS FOR THE STATE AND STATE REGION

Materiel Item	Minimum (Unit Basis)
1. The State	
Wire Communications	
Switchboard in EOC[1]	one
Telephone and teletype lines*	
• State EOC to:	
- Alternate EOC[2]	1 CU*
- EOCs, state CD regions	1 PL,* 1 CU, 1 TTY*
- Alternate EOCs, state CD regions	1 CU, 1 TTY
- State warning points	1 PL
- Key CD officials[3] - other key personnel[3]	2 PL, 1 CU[3]
- EBS access	2 PL (1 input, 1 control)
- EOCs, adjacent states' CD Hq	1 CU
- U.S. Weather Bureau offices[4]	1 CU, 1 TTY
- Federal government agencies represented (Senior Hq in state)	1 CU
- Senior military services Hq	1 CU
- Senior reporting (service) center, Telephone Company	1 PL, 1 CU
- Local public utilities service centers	
Telephone company	1 PL, 1 CU
Electricity and gas	1 PL, 1 CU
Water	1 PL, 1 CU

* The wire circuits are classified as common user (CU) which can be switched to interconnect all subscribers; private line (PL) which connects only two individuals or private switchboards and restricts calls to specific individuals who may use the line; and teletype (TTY) for teletype service. Radio teletype circuits are abbreviated RATT.

Table 4 (continued)

Material Item	Minimum (Unit Basis)
- Emergency Hq of CD participating state agencies' senior executives represented in State EOC	1 PL, 1 CU
- Emergency Hq of CD-supporting non-state agencies (Red-Cross, Salvation Army, etc.)	1 CU
- Senior Emergency Hq of statewide industrial organizations pertaining to transportation - bus, trucking, air, railroad	1 CU
- Federal Region EOC	1 PL, 1 or 2 CU,* 1 TTY
- NAWAS	1 PL
- NACOM-1	1 PL
• Alternate state EOC	
- Switchboard	one
- To other agencies[5]	1 CU 1 TTY to Federal Region 1 CU to each agency connected to the main State EOC
• Emergency Hq of participating state departments t ::	
- Senior Hq of pertinent districts, zones, or subareas of their departments in each state region	1 CU
- Mobile communications vans, having access to the commercial telephone system	1 CU
• Access into state owned or leased switched wire systems	1 PL
• Dial TWX service	1 TTY
Radio	
• State EOC to:	
Alternate state EOC (RACES)	T/R† - voice
- EOCs of state CD subdivisions (regions) (RACES)	T/R - voice and RATT‡
- NACOM-2	T/R - voice

* Two CU circuits to Federal Region if state population exceeds two million (see reference 14).

† T/R, radio transmitter-receiver.

‡ RATT, radio teletype circuit.

Table 5 (continued)

Materiel Item	Minimum (Unit Basis)
- State agencies radio network (access into)	
- Fire nets (intercity, statewide, and national)	T/R - voice
- State police or highway patrol net	T/R - voice
- Intercity law enforcement (statewide net)	T/R - voice per net
- Forestry, highway, conservation, water resources, etc.[5] nets	
- State common user microwave or switched radio networks	T/R
- Special state owned and operated emergency networks	T/R
- Commercial telephone-radio service	T/R
- Federal region EOC, and adjacent states' EOCs	T/R - voice and RATT
- EBS network (access to)	T/R - voice
- Operations office, local airport	T/R - voice
- Senior military Hq in state[6]	T/R - voice
• Alternate State EOC	
- Radio access into same nets as state primary EOC	T/R - voice and RATT
Miscellaneous[7]	
Back up electric power (at primary EOC, alternate EOC)	1
Reserve fuel storage	1
Optional items[7]	
2. State CD Subdivision (Region)	
Wire Communications	Minimum (Unit Basis)
Switchboard in EOC[1]	1
Telephone and teletype lines	
• Region EOC to:	
- Alternate CD Region EOC (if any)[2]	2 CU
- State EOC (primary and alternate)[2]	PL, 1 or 2 CU,* 1 TTY

* 2 CU circuits are required if the population of the state region exceeds 2 million.[14]

Table 5 (Continued)

Material Item	Minimum (Unit Basis)
- Nearest warning point (NAWAS and state warning system)	1 FI
- Key CD officials[3] per CD Region Administrator	1 PL, 1 CU
- Other key officials	1 CU
- EBS station access	1 PL
- U.S. Weather Bureau Rawin Station[4] (if in the region)	1 CU, 1 TTY
- Federal government agencies represented	1 CU
- Senior military bases in region	1 CU
- Senior reporting center, telephone company in region	1 PL, 1 CU
- Public utilities service centers	1 CU
Electricity and gas	1 PL, 1 CU
Water	1 CU
- Emergency Hq of field elements of departments in region (represented by EOC)	1 PL, 1 CU
- Emergency field Hq of CD supporting agencies (Red Cross, Salvation Army, etc.)	1 CU
- Mobile communications vans (having telephone access)	1 CU
- Access into state owned or leased switched wire system	1 PL
- Dial TWX service	1 TTY
Radio	
• Region EOC to:	
- EOCs, operational areas (counties) (RACES)	T R Voice

Table 5 (continued)

Materiel Item	Minimum (Unit Basis)
- State departmental radio networks (access into)	T/R voice per net
Fire (intercity) net	
State police or highway police net	
Intercity law enforcement (statewide) net	
Forestry, highway, conservation, water resources, etc.[5] nets	
- EBS network (access into)	T/R - voice
- State primary and alternate EOC (RACES) (and EOCs of adjacent regions)	T/R - voice and RATT
- Major military installations in region	T/R - voice
Miscellaneous[7]	
Backup electric power (at EOC)	
Reserve fuel storage	

Notes:

1. The switchboard should have a sufficient number of drops to provide at least for the following:

   a. Subscribers in the EOC

      - CD Director - two telephones
      - CD Emergency Council - one telephone
      - Each functional staff section - one telephone
      - Each senior representative of the public safety or other operating state department represented in the resources and management grouping - one telephone

Table 5 (continued)

- Each senior representative of each federal government agency represented - one telephone
- Each senior representative of major industries, public utilities or CD-supporting agency represented - one telephone
- Each telephone and radio operator position in the Communications Center - one telephone
- The message center - one telephone
- The EBS radio announcer (if present) - one telephone

b. Trunk circuits from the EOC

- Each private line to other agencies - one circuit terminal
- To the telephone central office(s) serving the EOC - one circuit terminal for each four common user telephone terminals in the EOC

The switchboard may be a manually operated, or be an automatic board with one operator for information or private line switching services.

2. The alternative state EOC need not have a switchboard. However, it should have subscriber terminals in the main EOC switchboard, and common-user subscriber lines to the nearest commercial central office. The number of these terminals and lines should be the total of the following: one for the EOC functional staff, plus one each for representatives planned to be present in the alternate EOC: the resources management and operations management state agencies, operating federal government departments, and CD-supporting industrial and private organizations; teletype circuits to the state regional EOCs, federal regional EOC, and U.S. Weather Bureau Rawin stations, and PL and CU circuits for access to local and state telephone company service centers and other public utility emergency operations and service centers.

3. Key CD officials include the Governor, CD Director, members of the CD council, EOC staff section heads, senior executives of state departments (especially of the public safety and other operating departments), senior representatives of the resources and management groups, designated representatives of major industries, statewide public utilities (especially of the telephone company), and CD-supporting agencies and volunteer and EOC personnel organizations listed in the Emergency Alert list at the EOC, and in the Communications SOP. 1 PL should be provided from the EOC to the Governor and another to the State CD Director. To alert all other officials, all available C' telephone and radio facilities in the EOC should be used.

Table 5 (concluded)

4. CW and TTY direct circuit to U S. Weather Bureau Rawin stations located in the state (see FCDG, Part E, Ch 3, app 6, for locations).

5. This includes access into all statewide radio networks operated by the various state agencies.

6. Terminal to be provided by the military service.

7. "Miscellaneous" includes the optional supplementary facilities and services described in pages 32-34, reference 4.

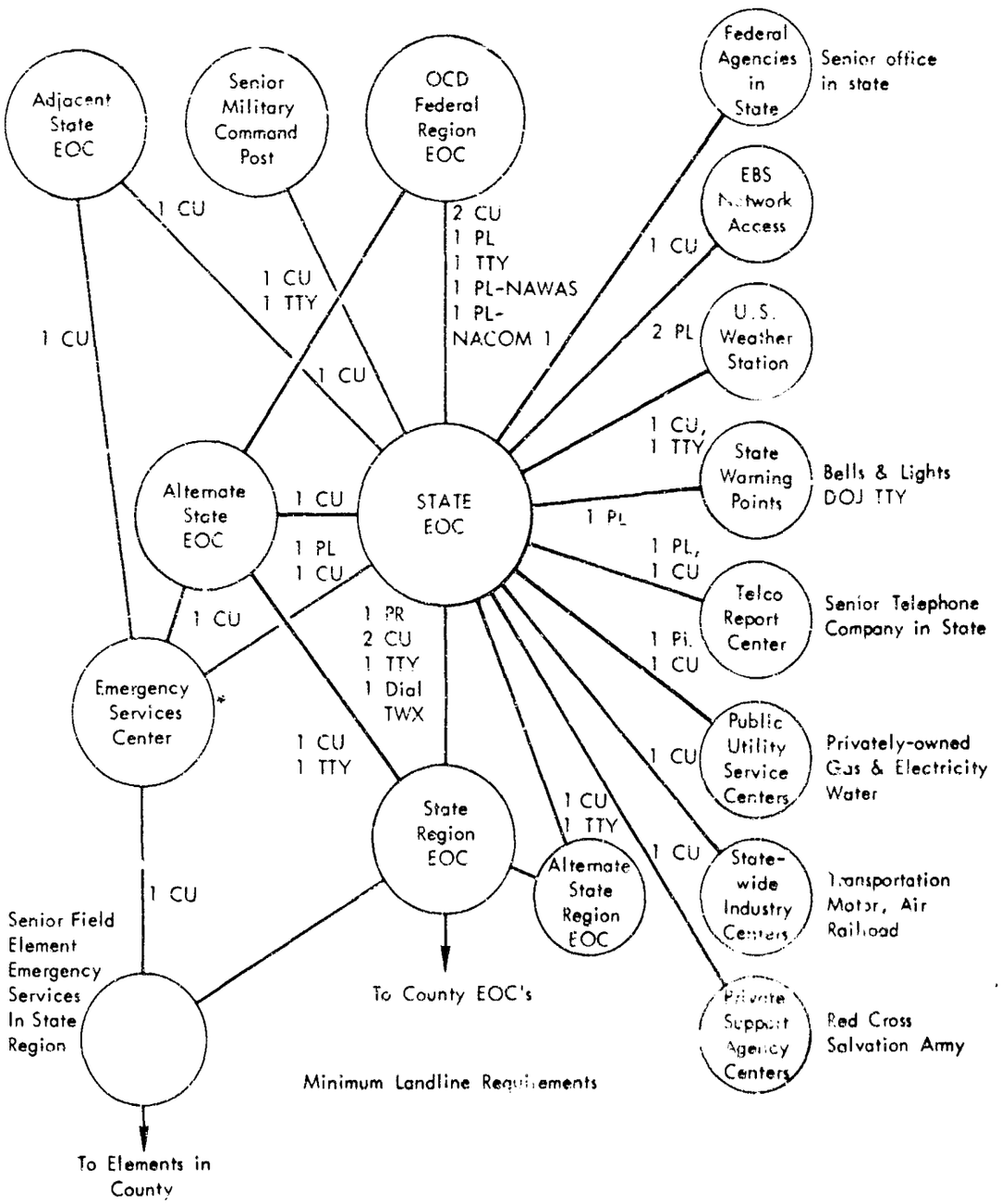
Concerning the number of circuits required, the basic premise as described on page 28, was the requirement that the system be able to transmit FLASH messages within acceptable delay periods (grade of service)--which in the case of the state, should not exceed 1 min 12 seconds for any one Emergency FLASH report. Consideration is given also to the circuits required for the expeditious movement of large volumes of less urgent traffic, as indicated in reference 14.

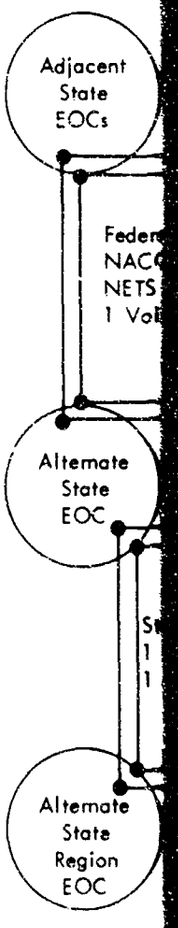
Table 6 correlates the FLASH message traffic and the circuits required. It gives a summary of the FLASH messages generated during the trans- and postattack phases coming into or out of the state and state region EOCs; message routings; the communications systems normally used in each case; the numbers and types of telephone circuits, and RACES stations required to assure the desired grade of service, and probable message incidence. In any one FLASH message situation, it will be noted that the greatest number and types of circuits for the grade of service required, does not exceed that listed in Table 5.

Figures 3 and 4 depict schematically the minimum number of landline circuit and radio station requirements between the state EOC, the State Region EOC, and the agencies and elements with which they must communicate for effective and timely CD communications. The minimum number of circuits and stations depicted in Figures 3 and 4 are the same as those listed in Table 5.

(3) Special Considerations

The alternative or optional items, RACES network items, and coordination with FCC for approval of radio networks and





* Circuits are provided to each senior Emergency Service Emergency Operations Center, if it is located away from the State EOC.

* Radio station should be loc to the respec alternate rout

Figure 3

MINIMUM CIVIL DEFENSE LANDLINE AND RADIO REQUIREMEN FOR A STATE -- SCHEMATIC DIAGRAM

A

ederal encies in State — Senior office in state

EBS twork ccess

U.S. eather tation

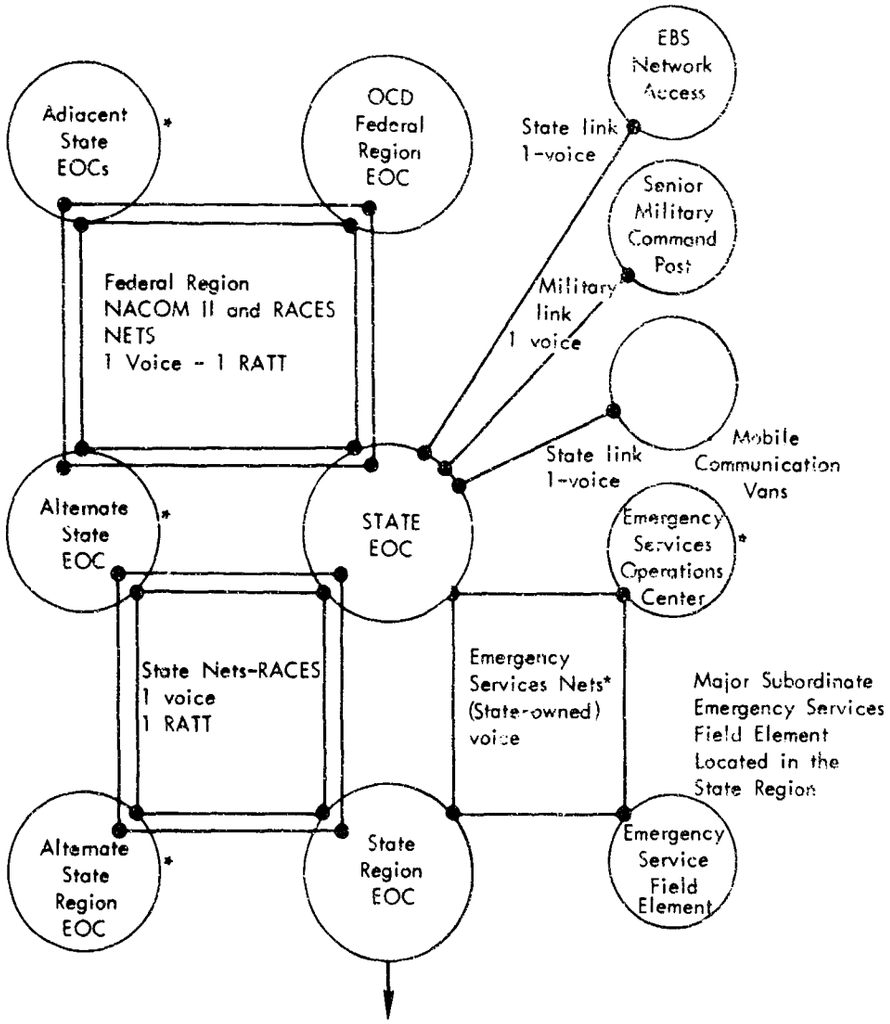
State aming oints — Bells & Lights DOJ TTY

Telco pport enter — Senior Telephon Company in State

ublic tility rvice nters — Privately-owned Gas & Electricity Water

tate- wide dustry nters — Transportation Motor, Air Railroad

ivate pport gency nters — Red Cross Salvation Army



Minimum Radio Requirements

* Radio station (transmitter and receiver) terminals of existing state-owned networks, should be located in the EOCs shown, for direction and control communications to the respective Emergency Services (Fire, Law Enforcement, etc.), and for alternate routing or backup.

Center,

Figure 3

M CIVIL DEFENSE LANDLINE AND RADIO REQUIREMENTS FOR A STATE -- SCHEMATIC DIAGRAM

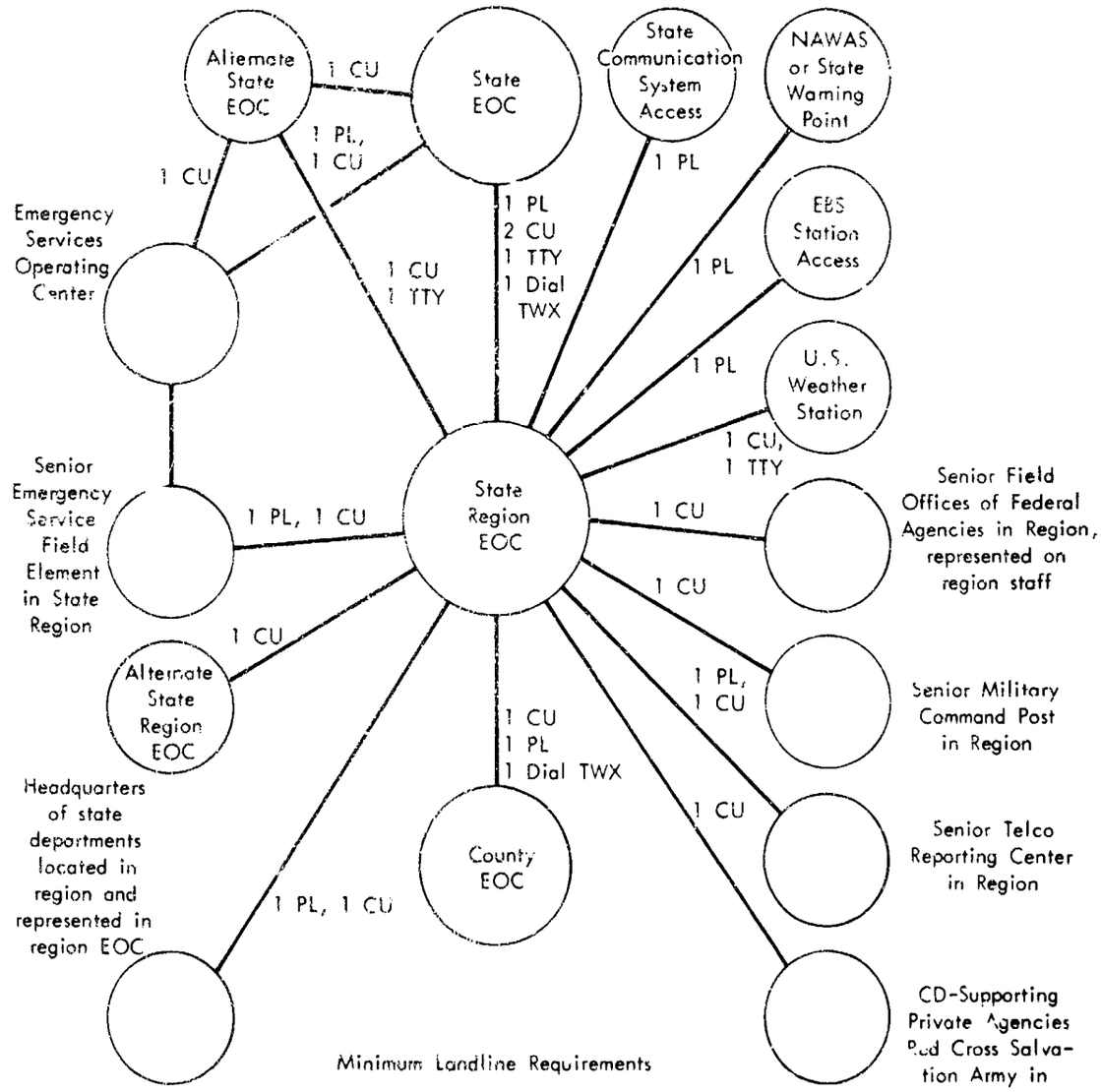


Figure 4

MINIMUM CIVIL DEFENSE LANDLINE AND RADIO REQUIREMENTS FOR A STATE SUBDIVISION (e.g. State Mutual Aid Region) -- SCHEMATIC

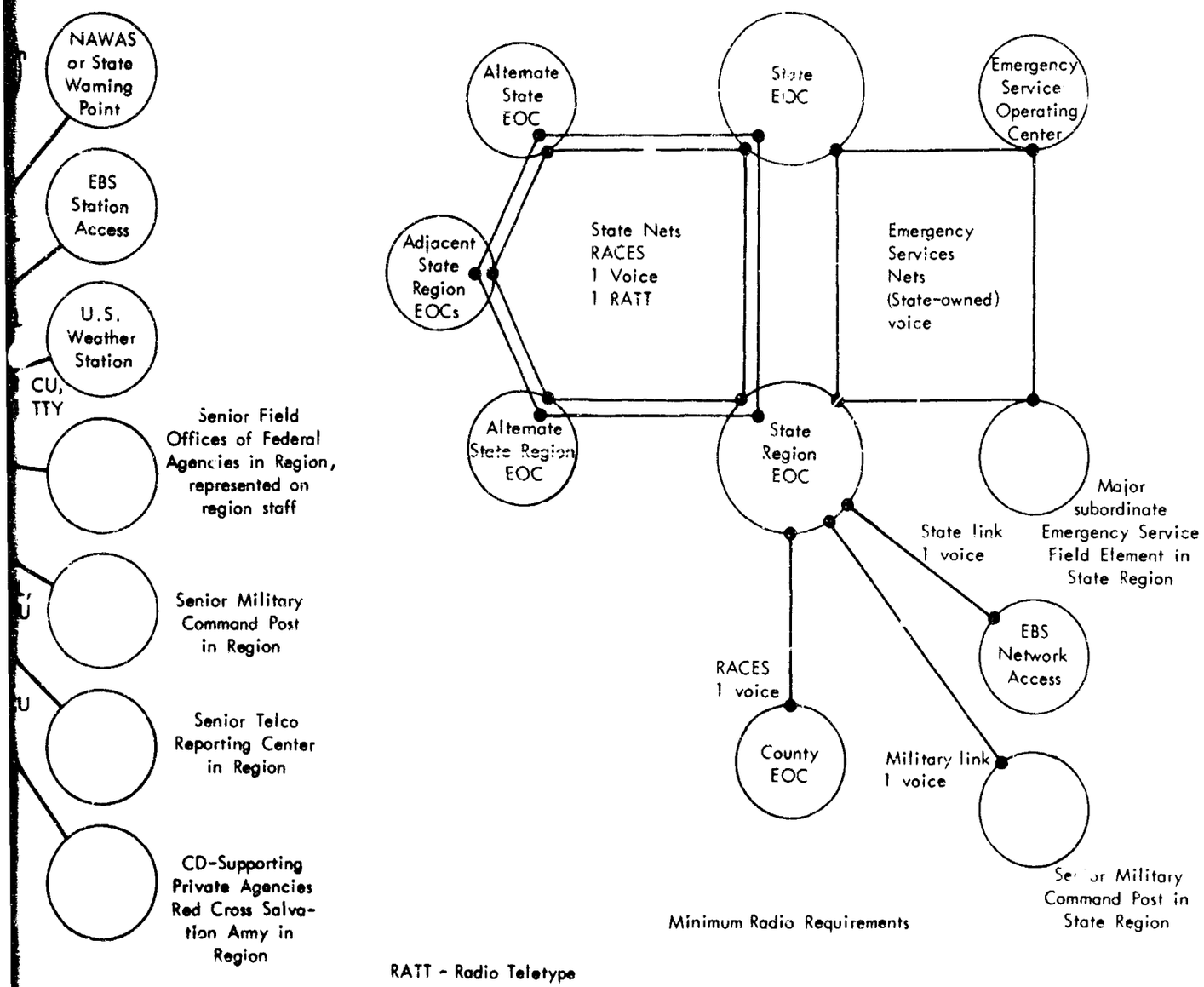


Figure 4

NIMUM CIVIL DEFENSE LANDLINE AND RADIO REQUIREMENTS
E SUBDIVISION (e.g. State Mutual Aid Region) -- SCHEMATIC DIAGRAM

their emergency utilization, that were reviewed in the previous paragraphs for the county,* are equally applicable to the State and its CD subdivisions.

(4) Requirements Summary

After the unit requirements have been determined on the basis of grade of service, system survivability, and optional augmentations, an overall summary is made of major items of equipment, circuits, and installations. The total requirements minus the items on hand indicate the additional number required to achieve the desired level of readiness in materiel.

Step 6: Prepare Communications Plans and Procedures

Communications plans and procedures are essential elements of communications requirements.

Communications plans and SOPs generally cover objectives, policies, and principles; organization roles and responsibilities; and provisions for communications personnel and operating procedures.

To assure integration, compatibility, and effective interface of communications operations among all elements, these plans and SOPs must be prepared in close coordination with and cooperation among the designated Director for Civil Defense, the chiefs of the public safety departments or services (fire, law enforcement, public works) and other participating departments and agencies, as well as CD-supporting agencies including the telephone company, public utilities, and other commercial and volunteer agencies).

a. Civil Defense Communications Plan for County or State

The CD Communications plan may appear as an annex to the Basic CD Operations plan, or as a separate correlated supporting plan. The format of the communications plan may vary from county to county and state to

state, but certain essential elements should appear in all. Generally, the county CD plan uses the same format as that of the state, and often the municipal CD plans or annexes do also. Appendix B of this report presents a format and indicates the contents of a county or state CD communications plan. The communication planning for the state CD subdivision (e.g., mutual aid region) is included in the state communications plan.

b. Standard Operating Procedures (SOPs)

Standard operating procedures for communications are an essential adjunct to communications plans. They cover procedural details pertaining to the operations of the various elements of the CD communication systems. No attempt is made in this text to present a model SOP. An example of the format for a communications SOP is given in Appendix C, reference 4. The items contained in communications SOPs include the following:

- Increased readiness conditions, and actions to be taken by communications agencies staffs and personnel at each condition level,* at respective EOCs in other CD communications installations and facilities.
- Index of radio call signs, networks and frequencies of all radio networks, (government, RACES, etc) to be employed in CD operations.
- RACES Radio voice procedures, radio teletype procedures.
- Q signals, 10-Code prosigns signals.
- Definition of bells-and-lights alerting and readiness conditions signals; definition of federal attack warning signals.
- Approved message formats including NUDET, RADEF, Emergency, Resources status message forms.
- Telephone CD directory, listing intra-office and inter-agency telephone numbers for CD-EOCs and other CD-associated agencies' staff elements and key CD individuals.

---

* Descriptions of increased readiness actions are given in Part G, Chap 5, Federal Civil Defense Guide, July 1957.

- Alerting call-up list, indicating sequence of individuals to be called from the EOC upon receipt of change of readiness conditions or attack warning.
- Teletype calls signs for TWX service if this teletype service is available at the EOC.
- Telephone circuit and facilities call-up list upon increased readiness conditions: includes private line and common user circuits, switchboard, and handsets to be provided by the telephone company as planned.
- Circuit restoration priority list, in event of circuit damage.
- Emergency assignment list of portable RACES radio sets.
- Emergency list and location of radio-equipped vehicles of the public safety and other participating services.
- Lists of telephone numbers and circuits to be placed on Essential Category (Category A) in event of line load control.
- Rosters of communications personnel, their emergency assignments, and business and home telephone numbers in event of increased readiness conditions.
- Geographic location code.
- Brevity codes; authorized abbreviations.
- Schematic diagrams of state or county-owned or operated radio and wire networks that are planned to be used during the emergency period.
- Voice (radio and telephone) message transmissions procedures.
- Message procedures and time standards; normal message routing for various types of messages.
- FLASH message handling; circuit preemption.

- Communications discipline provisions; authorized system operators or users.
- General emergency instructions to the public concerning nonuse of telephones, and listening to EBS transmissions.

c. General Planning Provisions

Because of the important role of the commercial telephone system in support of CD operations, coordination must be achieved between the CD communications planners and representatives of the telephone company. An example of the emergency capability of the telephone company and coordinated CD planning requirements is given in Appendix D, Reference 4.

The preparation of communications plans and SOPs is conducted coincidentally with the determination of communications material requirements because of their interrelationship.

Communications plans and SOPs may be published as separate texts and in large quantity for distribution to all CD agencies and installations; key civil officials; commercial agencies involved in CD operations or communications; county and state government offices, departments, and subdivisions that may be involved in CD matters; volunteer agencies; all potential operating personnel; and subordinate and higher CD headquarters. They should be used in peacetime for reference and guidance, for indoctrination of personnel, and as texts for emergency communications training. Parts of the CD communications plan may be extracted verbatim and included in the SOPs so that the latter is a complete text for instruction purposes.

IV PROGRAM DEVELOPMENT

The major decisions to be made by the senior executive and legislative echelons of the county government with respect to implementation of CD communications requirements will primarily concern (1) option category decisions determined on the basis of the grade of service desired, (2) the priority in which elements of the program are to be implemented, and (3) funds to be allocated.

Step 7: Implementation of Program Formulation

In general, the CD agency or element of the state or county government, in conjunction with the fiscal and budget divisions, prepares the CD programs. Other subdivisions and agencies of the state or county government that may be involved in civil defense are consulted concerning their needs. The minimum, intermediate, and optimum requirements, plus any desired supplementary communications equipment, may then be tabulated and costed. Included are personnel salaries as well as training and maintenance costs. On the basis of the probable availability of funds, a phased program, including the alternatives and recommended priorities in implementation, is developed. This together with appropriate justification in support of the program, is prepared for submission to the proper authorities, at the time and in the format prescribed by the respective government. The program is then presented to the decision-makers for approval. The logic and rationale by which (1) the requirements were developed, (2) the cost bases were established, and (3) the overall phased program was formulated should be presented clearly and succinctly.

Appendix A

CHECK LIST FOR THE DETERMINATION AND IMPLEMENTATION OF COMMUNICATIONS REQUIREMENTS

	CHECK
1. Review potential threat	____
2. Review emergency organization for civil defense	____
3. Review the concept of civil defense; civil defense doctrine (published or stated); and official CD policies, plans, and SOPs	____
4. Review current CD communication doctrine; draft needlines	____
5. Review existing communications resources and assess their vulnerability to nuclear attack:	
a. Materiel resources	
b. Personnel resources	
c. Communications plans and SOPs; civic support, provisions for coordination in the use of county-owned, state-owned, and commercial communications	____
6. Derive communications materiel requirements	
a. Establish basis for requirements:	
(1) Determine general CD communications subsystems required by correlation with organization, concept of operations, and contemplated employment of existing communications	____
(2) Determine or postulate acceptable grades of service for the emergency communications systems	____

(3) Determine general requirements for increasing survivability ____

b. Determine needs, inadequacies, and agumentations required (in terms of circuits, networks, installations, type of equipment, and survivability measures) for the following systems: ____

(1) Warning systems communications

- Access to federal and state warning systems ____
- County to city ____

(2) Public safety and other county or state operating services communications systems (to support the operations of the various emergency functions) ____

(3) Linkage from county or state and subdivision EOCs to key individuals and CD-supporting agencies and services ____

(4) Linkage from county, state, or state subdivision EOCs to

- Higher headquarters ____
- Adjacent county or state EOCs ____
- Alternate county or state EOCs ____

(5) Linkage to EBS station(s) or network ____

(6) RACES, and other amateur and citizen band emergency networks (as planned) ____

(7) EOC internal communications facilities ____

c. Tabulate requirements for systems, circuits, and equipment for:

(1) Basic minimum system ____

(2) Intermediate system (in the case of the county ____

(3) Optimum system (in the case of the county) ____

(4) Optional additions for improved service and survivability ____

d. Determine feasible additional circuits, equipment, and facilities based on needs, funding availability, and judgment factors. ____

7. Prepare CD communications doctrine

a. CD communications plans or communications annex to basic operations plan ____

b. CD communications SOPs ____

c. Official instructions covering CD communications organization, management staffing, responsibilities, and training ____

8. Prepare program to provide or procure necessary circuits, equipment, and facilities

a. Formulate program(s) for implementation ____

b. Determine costs ____

c. Submit program(s) to appropriate authorities for approval and funding ____

Appendix B

CIVIL DEFENSE COMMUNICATIONS PLAN

The civil defense communications plan should include the following elements.

Introduction

Purpose

The purpose of the communications plan. For instance, the plan may be designed (1) to furnish information and guidance to all governmental, commercial, private, and volunteer agencies and to the general public concerning the availability and use of communications facilities and resources to support civil defense operations during all phases of an emergency situation; (2) to provide a basis for planning and implementing communications programs and measures in advance of an emergency; and (3) to provide for maximum coordination in CD communications planning and operations among officials, higher headquarters, adjacent entities, military agencies, and any designated special CD agencies, local, state, or federal.

Scope. The subject matter covered in the plan. For example, the subjects could be: (1) the organization, roles, and responsibilities of the various communications elements and staffs in the CD organization; (2) the concepts, policies, and procedures for communications in support of CD operations; (3) the mobilization, assignment, and training of communications personnel for and during CD emergencies; and (4) communications information and data to be kept on file.

Authorities and References

The basis authorization for the plan. This includes references to federal, state, and county ordinances or official CD plans; and to ordinances, resolutions, and other enactments that give the provisions of the plan the force of law.

Situation

A statement from the basic CD operations plan indicating the reason for the communications plan. This statement indicates in general terms the nature of the threat to the community and to communications.

Mission

The peacetime and emergency communications missions of the designated communications elements. This includes the responsibilities and tasks assigned to each element during each of the phases.

Organization and Functions

General. The general organization and functions of the departments and agencies that are concerned with civil defense both in peacetime and during the emergency period. Chart diagrams of the CD organization of the state, state subdivisions, and county, indicating command and coordination channels, may be included. This chart should include the designation of supporting organizations, e.g., military forces, American Red Cross, or others.

Communications Systems

The communications systems and networks that will provide warning and communications service during the emergency period and the agencies to which they pertain (government, commercial, private, and amateur). The peacetime and emergency functions and utilization of these systems are briefly described.

Communications charts and diagrams should be included to indicate both the circuitry and the direction-and-control and coordination channels from the EOC to higher headquarters, adjacent entities, military units, state agencies, and other CD-supporting agencies. These diagrams should also depict the circuits and networks to be called up or activated for the emergency period, together with call signs, frequencies, and other identifying or descriptive material.

Communications Organization and Functions During Peacetime

Identification of the chiefs and staffs of the agencies responsible for peacetime CD communications operation, planning, training, and coordination--and descriptions of their CD roles and responsibilities. These agencies include the CD agency, the Communications Department, the communications staffs of the public safety and other participating departments (e.g., fire, police, public works), and elements of commercial and private organizations (e.g., telephone company, public utilities, water works, private ambulance services), which are concerned with communications coordination and emergency planning.*

Examples of tasks of the communications elements of a peacetime CD agency are:

- Prepare emergency communications plans and SOPs, coordinating with other departments, public utilities, the telephone company, the EBS network or station, taxicab and other private agencies as appropriate, and higher CD headquarters.
- Develop requirements programs and budgets, and procure approved items of communications equipment.
- Arrange for installation and rental of private lines and other communications services; maintain and operate, or test periodically, existing emergency equipment and circuits.
- Prepare and distribute information to the public concerning warning and appropriate communications procedures.
- Maintain files on communications personnel resources and assignments, and on communications material resources and locations.
- Recruit and train volunteer communications personnel (i.e., RACES and other radio amateurs) as well as designated city employees in CD communications procedures and operations; conduct CD communications exercises.

---

* Communications plans for using amateur, or government-owned, and certain commercial radio systems in CD operations, together with applications for authorization to operate stations, must be submitted to FCC as prescribed in "FCC Rules and Regulations."

Communications Organization and Functions During a CD Emergency

1. The emergency communications organization. This includes:

   - The Communications and Warning Section, located in the EOC and alternate EOC.
   - The Operating Communications Section in the EOC and alternate EOC, which may consist of message center personnel, and switchboard, radio, and telephone operators.
   - Communications Sections of the police, fire, engineering, and other Emergency Services; and other operating departmental networks located in the EOC.
   - Representatives of the telephone company and public utilities located in the EOC, who are attached to, or coordinate with, the Communications and Warning Section during the emergency period.
   - Representatives (announcers) of the EBS station or network at the EOC.
   - Assignments of communications chiefs and staffs, telephone and radio (RACES) operators, and maintenance personnel at subordinate system echelons (e.g., alternate EOCs or mobile communications centers, if any.)

2. The emergency roles and responsibilities of communications elements. These include the assigned roles and responsibilities of (a) the Director for Communications at the EOC, (b) the chiefs of the communications sections of the Emergency Services and other operating departments.

   The role and responsibilities of the Director for Communications might include:

   - Supervising operation of all communications systems.
   - Conducting the EOC and alternate EOC communications and message center operations.

- Alerting and warning of CD emergency elements and agencies and key officials.
- Achieving technical and operational coordination with representatives of CD-supporting communications organizations and elements (telephone company and public utilities representatives).
- Maintaining data on the operational status of the communications systems; informing the Director for Civil Defense concerning system capabilities, deficiencies, and damage; and making recommendations as appropriate.
- Supervising and assuring (a) the adherence to communications discipline, and the use of operational and technical controls; (b) expeditious movement of traffic; and (c) periodic testing of the system for operability.
- Coordinating with other staff sections and with higher authority concerning communications matters or assistance required.
- Formulating plans for the emergency restoration of damaged communications.
- Reassigning communications personnel as required

The chiefs of communications elements of the Emergency Services and other operating department communications systems might be responsible for:

- Observance of communications discipline and prescribed procedures (SOPs).
- The expeditious movement of communications traffic.
- Continuous manning of their communications facilities.
- Maintenance and repair of their equipments.
- Progress reports to their headquarters or directors or managers on the status of communications.
- Schedule of communications personnel as available and as required for 24-hour system operation during the emergency period.

that are integrated into the city emergency organization; auxiliaries; volunteers; and persons impressed into service.

- The sources for communications personnel will be: employees of the communications department, and of the fire, police, public works, and other specified departments; volunteer RACES and other amateur and citizens band radio operators; operators of privately owned and commercial radio-equipped vehicles, and of base radio stations of CD-supporting companies.
- The Director for Civil Defense of the city may be subject to the authority of the county CD Director during a war-caused state of extreme emergency, in accordance with the terms of a joint-powers agreement among the county and the several cities within the county, or as directed by the state. This relationship should be clearly defined.
- Coordination for the provision of interface CD communications among city, county, state subdivision, state, and other designated CD agencies will be established in peacetime to assure timely and reliable communications during an emergency period.

General and Technical Information

Information of a general or technical nature,* including:

1. Organizational and layout diagrams of the EOC, alternate EOC, public safety and other operating services, and CD-supporting agencies; the diagrams will indicate telephone, radio and teletype terminals, switchboard, etc.
2. Maps or overlays showing the locations of the EOC, alternate EOC, headquarters or units of the public safety and other operating services, EBS station, telephone central offices, and emergency service centers of the telephone company, public utilities, and other CD-supporting organizations.

---

* This may be included in either the Communications Plan or SOP or both to assist communications chiefs and operating personnel.

3. Reference to Communications Standard Operating Instructions (SOPs); and to prescribed Readiness Conditions.

Direction and Control

A clear statement (supported by explanatory diagrams) of the CD emergency direction-and-control structure, command and coordination relationships, and command channels from the governor of the state down to the Director for Civil Defense of the community.

Communication and Emergency Operations Centers Locations

- The titles and geographic locations of the peacetime headquarters:
  - State: EOC and alternate EOCs of the federal region, state, state CD subdivisions.
  - County: EOC and alternate EOCs of the pertinent state CD subdivision county, and its municipalities.
- The chain of succession of direction and control in the event the state EOCs are destroyed or out of communications.

REFERENCES

1. Strope, Walmer E., Concept of Operations Under Nuclear Attack, Office of Civil Defense, Washington, D.C., June 26, 1967 (Part G, Chap. 1, App. 1, FCDG) - formerly entitled Zone-Oriented Provisional Concept of Emergency Operations

2. Mandelbaum, A. J. and T. W. Cook, Civil Defense Communications: Requirements for San Jose, California, Stanford Research Institute, Menlo Park, California, August 1967

3. _____, Civil Defense Communications: A Methodology for Determining Requirements for a Community, Stanford Research Institute, Menlo Park, California, August 1967

4. Five City Study: Guide for Participants, Office of Civil Defense, Washington, D.C., May 1965

5. Civil Defense Operations Plan, Santa Clara County, California, March 1962

6. Civil Defense and Disaster Plan, California Disaster Office, Sacramento, California, November 1963

7. McGee, A. A. and C. T. Rainey, Alternative Patterns of Assignment of Authority in Civil Defense, Stanford Research Institute, Menlo Park, California, December 1966

8. Moll, K. D. and R. I. Hirshberg, The Cost and Feasibility of Emergency Cooperation Among Local Governments, Stanford Research Institute, Menlo Park, California, October 1967

9. Preisser, N. L. and L. J. Wells, San Jose Civil Defense Communications Simulation, SIMO VI, Stanford Research Institute, Menlo Park, California, October 1966

10. EOC Functional Chart and Flow Diagram, Attachment A, California Disaster-Office, Sacramento, California, 1968

11. Intelligence Operations Plan, California Disaster Office, Sacramento, California, September 1966

12. Procedures Manual for Emergency Reporting, California Disaster Office, Sacramento, California, September 1966

13. Federal Civil Defense Guide, Office of Civil Defense, Washington, D.C.

14. Thayer, Self, Burco and Tiffany, Civil Defense Communications Requirements at the Local, State, and Regional Levels, Stanford Research Institute, Menlo Park, California, July 1966

UNCLASSIFIED

Security Classification

DOCUMENT CONTROL DATA - R & D

Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified

ORIGINATING ACTIVITY (Corporate author) STANFORD RESEARCH INSTITUTE Menlo Park, California 94025	2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED 2b. GROUP

3. REPORT TITLE

CIVIL DEFENSE COMMUNICATIONS: A METHODOLOGY FOR DETERMINING REQUIREMENTS FOR COUNTY AND STATE

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

5. AUTHOR(S) (First name, middle initial, last name)

Albert J. SANDELBAUM, Thomas W. COOK

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
September 1968	108	14

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
DAHC 20-67-C-0136 b. PROJECT NO. OCD Work Unit 2211C (5S-1101-2211C-02)	
	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)

10. DISTRIBUTION STATEMENT

This document has been approved for public release and sale; its distribution is unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	Office of Civil Defense Department of the Army, OSA Washington, D.C. 20310

13. ABSTRACT

A step-by-step procedure is presented for determining the communications requirements to support the civil defense (CD) operations of a county, state subdivision, and a state. Communications requirements include landline and radio circuits, networks and equipments, and the complementary policies, plans and operating procedures pertaining to the communications systems and linkages that extend from Emergency Operations Centers (EOCs) of these governmental entities to higher, subordinate and lateral EOCs and to associated CD-supporting agencies. This procedure or methodology considers the potential threat, the civil defense organization and concept of operations, the roles and responsibilities of participating agencies, and existing communications resources. It includes a "needlines" development, traffic analyses, system survivability assessments, and the determination of circuit requirements based on the grade of communications service selected. Guidance is furnished in the report for the preparation of the essential complementary civil defense communications plans.

DD FORM 1 NOV 65 1473 (PAGE 1)

S/N 0101-807-6801

UNCLASSIFIED

Security Classification

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Five-City Study						
communications requirements						
Pre-trans-, and postattack phases						
TELCO (telephone Company)						
Fallout						
survivability						
Redcons (Readiness Conditions)						
Communications Resources						
SOPs (Standing Operations Procedures)						
EOC (Emergency Operations Center)						
RADEF LRadiological Effects)						
Direction and Control structure						
Mutual Air Region						
Emergency Services						
NUDET (Nuclear detonation)						
Worst-case situation						
needlines						
common-user circuit						
private line						
Bells-and-lights system						
grade of service						
NAWAS (National Warning System)						
NACOM (National Communications System)						
RACES (Radio Amateur Civil Emergency Services)						
EBS (Emergency Broadcast System)						
mHz) megahertz)						
Central office						
Line load control						
FLASH precedence						
Primary communications						
Backup communications						
Message format						