California EMS Communications Plan

Final Draft

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An aging Emergency Medical Services (EMS) communications system combined with California's growing population and need for EMS services has placed an increased demand on already crowded radio frequencies. The current EMS radio system is fragmented and lacks coordination at both the state and regional level. Independent public safety and private EMS agencies are not able to communicate with each other. These factors all create unacceptable delays and reduced service levels for EMS services to the public.

1.2 Key Issues

A 1998 needs analysis completed by the California EMS Authority documented missing elements that are critical to effective EMS communications in California[1]. The key issues facing virtually all areas of California are:

- Lack of ability for providers (EMS and public safety) to communicate with each other
- Gaps in communications coverage in some areas and conflicting coverage in others
- An aging communications hardware and system backbone
- No recognized standards to guide the development of EMS communications
- Limited statewide direction or technical guidance on EMS communications issues
- No strategic statewide planning for EMS communications services
- A lack of funding to respond to these issues

1.3 Solution/Benefits

A statewide EMS communications plan is needed to address these critical problems. The plan will allow for implementation of its recommendations in a cohesive manner, with the overall goal being to assure a high-quality EMS communications network in California. The benefits of implementing a statewide EMS communications plan are extensive and relate directly to the ability to assure the consistent and high quality delivery of emergency medical care to all in need.

1.4 Next Steps

This plan and its accompanying vision and guidelines provide a foundation for the implementation of an integrated communications network for the state. Its success is largely dependent on its adoption at the state level and implementation of the goals and tasks at the local EMS agency levels.

[1] *California EMS Communications Needs Assessment: A review of needs and potential future direction., Special Project # 6024. (September 1998)*

2.0 INTRODUCTION

2.1 Introduction

Improved public safety communications has become an issue of national concern. Improving communications systems has been identified as one of fourteen categories proposed for continued development by the National Highway Traffic Safety Administration's "EMS Agenda for the Future". Recognition that public safety communication system problems are growing is also demonstrated by a grant to the National Law Enforcement and Corrections Technology Center (NLECTC) funded by the U.S. Department of Justice. NLECTO used the grant to develop a video titled, "Why Can't We Talk," that outlines the frustrations and problems of public safety agencies when they are unable to communicate with each other during emergencies.

Imagine the following scenarios:

- A police officer is shot and repeatedly radios dispatch to send help, but cannot be heard due to interference. Backup units and ambulance response are delayed.

- Emergency responders must drive around a city with their windows open to listen for screams before emergency communications can be restored after an earthquake.

- EMS personnel are transporting a critical heart patient that becomes unconscious and they are unable to communicate with their base hospital for medical instructions or to notify the emergency department staff that they are coming in with an emergency.

- Confusion breaks out at the scene of an emergency when police, fire, and EMS personnel are unable to communicate with each other. During the Oklahoma City bombing incident, fire fighters were told to evacuate the building due to a suspected second bomb threat; all other public safety personnel could not be notified because they all used different radio frequencies.

All of the above incidents actually occurred --- three of them in California --- and these, or similar events, could be repeated.

This plan seeks to identify the growing problems of fragmented and out-of-date communications systems and equipment and to address them through planning and resource allocation.

2.2 Problem Statement

An aging Emergency Medical Services (EMS) Communications System, combined with California's population growth, has resulted in an increased number of emergency calls per year, crowded emergency medical radio frequencies, and a fragmented emergency medical communications system that lacks coordination regionally and/or statewide. Because independent public safety agencies are not able to talk to each other, delays in

emergency medical assistance occur and the public does not receive the optimum level of service they expect or should receive.

Due to government downsizing, reallocation of resources in healthcare funding, funding for equipment and infrastructure replacement has been drastically reduced. Many local EMS programs are using communications systems and equipment that are twenty to twenty-five years old. The average life expectancy of a communications system is ten years. There are no apparent funds to resolve these issues.

2.3 Solution

The recognition by the California EMS Authority of the fragmentation, lack of communications capability and aging communications infrastructure have culminated, allowing the Authority to develop and implement a comprehensive State EMS Communications Plan. The goal of this plan is to provide a master plan for problem recognition, resource development, guideline implementation and monitoring of coordinated EMS communications systems that will provide more effective links for EMS providers in the state.

Better communications will lead to better uses of resources, increased use of pre-arrival instructions and faster response times that will reduce the numbers of deaths and injuries to the public.

3.0 SUMMARY OF ISSUES AND NEEDS

3.1 History and Background

The white paper, "Accidental Death and Disability: The Neglected Disease of Modern Society" published by the National Academy of Sciences-National Research Council (NAS-NRC) marked the beginning of the emergency medical services (EMS) system we know today. The Emergency Medical Services Program was formally established with the passage of the Highway Safety Act of 1966. In 1972, the Department of Health, Education and Welfare allocated $16 million to EMS demonstration programs, while the Robert Wood Johnson Foundation appropriated $15 million for 44 EMS projects. Most of California's EMS communications equipment was purchased during the 1970s when federal grant funds were available to support the development of EMS systems at the regional and local level.

During the 1980s, a state communications plan was discussed and a committee was established to develop a communications plan. Although several draft plans were developed, none were formally approved. Subsequently, the National Highway Traffic Safety Administration (NHTSA) developed and published a two-part Communications Plan Model in 1995.

The California Emergency Medical Services (EMS) Authority recognizes that emergency medical communication is a critical element to an EMS system. Until recently, no formal assessment or planning guide existed within California to assist with the development of a coordinated and comprehensive EMS communications system. Northern California EMS, Inc., a multi-county EMS agency, received funding from the California EMS Authority to conduct a needs assessment, prepare a resource inventory on the status of California's EMS communications resources (Phase One), and develop a California State EMS Communications Plan (Phase Two). This document is the final product of the planning process.

3.2 Lack of Interagency Operability

One significant issue facing EMS and public safety providers in the state is the lack of interagency operability. These providers lack the ability to communicate effectively with each other in the state. Currently, California's public safety departments operate on every available frequency band allocated for public safety use. However, radio users in one band cannot talk to users operating on a different band. As a result, communications among EMS agencies and public safety agencies can be severely restricted. The increasing complexity, size, and frequency of disasters and emergency incidents have escalated the requirements for a coordinated multi-agency response among different levels of government.

3.3 Target Issues

The following targeted recommendations were identified in the recently completed California EMS Communications Needs Assessment:

1. Adopt EMS communications guidelines that link nationally-accepted standards (ATSM) for EMS communications systems;

2. Strive for state and local EMS communications systems to meet these nationally-accepted standards of functional performance;

3. Strive for local EMS communications systems to be compatible with, and not interfere with, systems in neighboring areas and within the state or in other geographical areas;

4. Implement a statewide medical coordination channel, interagency/mutual aid channels, and local medical coordination channels in the interim;

5. Develop emergency medical dispatch (EMD) standards as a core standard in all EMS dispatching centers;

6. Make maximum use of state and other common resources, when this approach is appropriate and cost-effective;

7. Designate the State EMS Authority as the lead liaison on state and regional communications issues and as a representative of local EMS systems in dealing with federal agencies and national organizations;

8. Provide uniform direction and standards for EMS communications with consideration for the varying needs of the diverse regions in California; and,

9. Encourage the utilization of technology to ensure the earliest of 9-1-1 EMS response.

During the same study, it was determined that there was significant support from the local EMS agencies for the State EMS Authority to take on a significant leadership role regarding statewide communications.

The key roles identified included the need for the California EMS Authority to provide:

- master planning
- communications plan coordination
- funding resource support
- training requirements
- technical guidance

Local EMS agencies believe the role of the California EMS Authority should be master-planning and advocating for unmet needs. For example, the State EMS Authority should work toward the designation of a single EMS mutual aid frequency similar to fire mutual aid, designing a system and coordinating frequencies for statewide resource allocation, and provide a leadership role in implementing a communications plan, and advocating funding for state and local government at the federal level.

4.0 ADMINISTRATIVE OVERVIEW

4.1 State Authority

California Health and Safety Code Division 2.5, Section 1797.103 establishes the State of California EMS Authority as the responsible agency to maintain the state EMS plan. This Code Section provides substantial permission for the Authority to plan and implement guidelines for EMS systems and to provide technical assistance to local EMS agencies. Each local EMS agency is required to submit a plan and periodic updates to the Authority based on the EMS System Standards and Guidelines, which include a communications component.

Additionally, statewide planning for coordinated use of radio frequencies for EMS communications is necessary so individual efforts do not become counterproductive to the system. New Federal Communications Commission (FCC) and Emergency Medical Radio Service (EMRS) rules require that frequency coordination complies with state EMS communications plans where they exist.

The EMS Authority currently provides limited assistance to California EMS providers and agencies with radio licensing and frequencies. The Authority requests a copy of the completed FCC Form 601 with the provider request. If the Authority verifies the application is a BLS or ALS provider then a letter of support is sent back to the applicant provider. The provider then sends the letter to the FCC with their application.

5.0 EMS COMMUNICATIONS ELEMENTS

5.1 Overview

This section describes the key elements of the desired State EMS Communications Plan. The EMS communications system must provide the means by which emergency medical resources can be accessed, mobilized, managed, and coordinated in both day-to-day and disaster situations. The California EMS communications system must therefore employ sufficient communications paths and operational capabilities among all participants to facilitate EMS communications.

Nothing in this plan should be construed to imply a bias for differing delivery models for processing and dispatching of an EMS request (e.g., single agency PSAPs, PSAPs that transfer requests to a secondary PSAP for further processing, etc.) or to disallow a variety of other processes to occur to an EMS call that otherwise provides for speedy and competent flow of an EMS request.

5.2 Access

The California EMS communications system must have the ability to expeditiously receive and process any incoming requests that report emergencies and require emergency medical assistance. The goal is to assure a system whereby all individuals should be able to summon help rapidly in an emergency situation whether for medical, police, fire, rescue, or other emergency need. Local, statewide, and national uniformity is required to fully enable this concept.

Multiple emergency telephone number problems have largely been remedied through the establishment of public safety answering points (PSAP) with a single number to call for all emergency services in any given area. The PSAP can be part of an existing dispatch center or may be an autonomous agency established for this purpose.

The State of California has provided for a cohesive statewide emergency telephone number “9-1-1” system to provide citizens with this rapid direct access to public safety agencies. Most residents of the state also have enhanced 9-1-1 (E9-1-1). E9-1-1 contains several added features including: the automatic number indicator (ANI), and the automatic location indicator (ALI) that provide added safeguards in case the caller hangs up before giving all necessary information to the telecommunicator. The lack of ANI/ALI information on all wireless calls is a serious problem for EMS and may be addressed with federal legislation.

Within California, 9-1-1 legislation has also enacted provisions for all wireless 9-1-1 calls to be received by the California Highway Patrol (CHP). After the CHP telecommunicator determines the caller telephone number, nature and location of the emergency, the call is managed by the CHP or transferred to the appropriate local 9-1-1 PSAP. At this point, the call is handled as any emergency request.

On many major freeways and highways throughout California (including many urban and some rural areas) highway call boxes have increased access to roadside services for motorists. A common misconception is that the call boxes provide access to 9-1-1.

Motorists do place calls to 9-1-1 from the call boxes, but roadside repairs and service are the primary function of the call boxes.

5.3 Dispatch and Response

Trained personnel receive requests, obtain information and may provide emergency medical dispatch services. A trained telecommunicator sends appropriate emergency resources and may provide emergency medical advice according to prescripted protocols to the victim before the arrival of a field medical team. The telecommunicator also coordinates the response of the emergency medical resources with the response of other emergency agencies, such as law enforcement, rescue, and fire departments. The telecommunicator should have direct communications to all medical facilities involved with EMS in its service area and should maintain current data on EMS treatment capabilities of all medical facilities and emergency support services in the service area. All public safety providers should be able to communicate with each other on a common frequency during emergency medical events.

On notification of the need for emergency medical assistance, the communications system must enable prompt dispatch of EMS vehicles (including notification of rotor-wing aircraft) to the location of the emergency. The communications system must further enable telecommunications specialists to communicate with responding vehicles at all times, including while enroute to the scene, while at the scene, while enroute to and at the hospital emergency department, and during their return to availability for further assignment.

To ensure a standard level of quality and knowledge exists, the telecommunicator should have emergency medical dispatcher (EMD) training. This means that all EMS requests throughout the state should have pre-arrival medical instructions as appropriate for the event. This also means that these services may have priority dispatch procedures and tiered response based on local protocols. The trained telecommunications staff person who is EMD trained is the principal link between the public caller requesting emergency medical assistance and the EMS resource delivery system. With proper training, program administration, supervision, and medical direction, EMDs can accurately query callers, select appropriate methods of response, provide pertinent information to responders, and give appropriate aid and direction for patients through the caller. Through careful application and reference to written, medically-approved emergency dispatch protocols, sound decisions concerning EMS responses can be made in a safe, reproducible and non-arbitrary manner. These benefits are realized by EMS systems when appropriate implementation, sound medical management and quality assurance/quality improvement (QA/QI) at dispatch are provided within the EMD/EMS system.

Technology may assist with the dispatch and response function. This includes computer aided dispatch (CAD) software and the use of Automatic Vehicle Location (AVL) systems. AVL systems can provide real-time geographic location of vehicles to ensure the most appropriate vehicle is dispatched to the scene of an incident. Additionally, an AVL system can display vehicle positions to telecommunications specialists on either tabular and/or graphic displays as well as providing the information necessary to a Computer-Aided Dispatch (CAD) program when utilized in a “System Status

Management" structure. Consequently, these capabilities are considered an integral component of dispatch and response in urban areas.

5.4 Local Coordination

The EMS communications system must provide EMS field personnel (Advanced and Basic Life Support) with a channel for communications that permits the exchange of vital medical information between both EMS field personnel and emergency department personnel while the patient is at the scene of the medical emergency and while enroute to a receiving facility.

5.5 Regional and Statewide Medical Coordination

In addition to local coordination capability, the EMS communications system must provide a communications channel to enable medical coordination between EMS field personnel and emergency department personnel, EMS field personnel and dispatch center personnel and between different dispatch agencies. This needs to occur during situations in which a vehicle is out of its primary area and unable to access an emergency department using the channel of that area (specialty care transport, mutual aid, etc.) and in isolated critical situations during which prolonged use of the local medical coordination channel would not be feasible due to other communications traffic. Such uses of a statewide medical channel could be limited only to the temporary duration of such situations.

5.6 Scene Coordination

The EMS communications system must have the capability for mobile and portable radios in the same local area to communicate between agencies and disciplines consistently while on the scene of an emergency requiring multiple vehicle response.

In addition, the EMS communications system must have the capability for mobile and portable radios from different areas to communicate directly (unit-to-unit) while on the scene of an emergency requiring multiple vehicle response.

5.7 Resource Coordination

Resource coordination (e.g., first responder, ambulance and other EMS resources) is needed to ensure that a high level of care is always available to the patient. The EMS communications system must provide for wireless coordination of EMS resources between hospitals, providers, and dispatch centers for response to a disaster or mass casualty incident. Telephone lines between dispatch centers can be used for resource coordination during normal operations; however, radio communications are needed during situations following earthquakes, hurricanes, tornadoes, floods, fires, etc., when telephone lines are inoperative, or when telephone central office switching facilities are jammed or disabled.

5.8 Interagency/Mutual Aid Coordination

Medical emergencies often involve the response of other public safety services, most commonly law enforcement and fire. Interagency communications are needed to support daily EMS operations and mutual aid agreements, for the cooperative action of all emergency response units during disaster situations and at those times when a county Emergency Operations Center (EOC) is involved. Although the various services generally operate on different radio frequencies, interagency radio communications can be provided by use of mechanisms such as mobile relay control stations, cross-band operations, and interservice use of common radio frequencies. Telephone lines between dispatch centers can be used for interagency coordination during normal operations; however, radio communications are needed during disaster situations following earthquakes, hurricanes, tornadoes, floods, fires, etc., when telephone lines are inoperative, or when telephone central office switching facilities are jammed or disabled.

5.9 Back-up Communications

The concept of back-up communications is in general, the provision of sufficient equipment and procedures to enable an overall improvement in system reliability over time, through either redundancy or the provision of alternate means. With regard to EMS communications specifically, the concept of back-up communications as applied to base station or other fixed radio equipment means to:

- Enable dispatch and response communications to continue despite outage of the primary dispatch and response radio base station.
- Enable local medical coordination communications to continue despite outage of the primary base hospital.
- Minimize the need for additional, widespread training and maintain needed flow of EMS personnel.

5.10 Telephone Interconnection

The EMS communications system may provide interconnection with specialty information and treatment centers such as the Environmental Protection Agency (EPA) and Chemical Transportation Emergency Center (CHEMTREC) information centers for hazardous material spills, poison control centers, burn centers, hyperbaric oxygen centers, spinal cord injury center, and neonatal centers. The required level of confidentiality may exceed what is typically available within land mobile radio systems. This requirement includes the ability for EMS personnel to exchange information directly with sources located outside their EMS communications system and at diverse locations only accessible via the public switched telephone network.

5.11 Training EMS Telecommunicators

Telecommunicators should be formally trained in call taking, EMS events, telecommunications and radio communications techniques. All EMS telecommunications

specialists should be cross-trained in EMD communications practice and procedures. Problems occur when medically-trained telecommunications specialists are not experienced in the use of communications equipment or when public safety communications center personnel are not familiar with the basic concepts and terminology of EMS. Sufficient cross training should be provided in all disciplines to ensure that medical protocols and technical communications procedures are clearly understood and uniformly applied throughout the system and service areas.

6.0 STATE DIRECTION

6.1 Introduction

In recognition of the important role the State can and should play in the EMS communications-planning arena, this plan calls for the development and maintenance of several important roles at the California EMS Authority. These roles emphasize the following characteristics at the State level:

- Conduct a statewide inventory and needs assessment for regional communications interfaces
- Establish statewide EMS communications standards and guidelines for local EMS agencies
- Adherence to the standards through the review and approval of the local EMS plans and annual plan updates
- Develop clear and coordinated policy on frequency review and letters of support in coordination with the designated frequency coordinators in the state
- Adopt statewide EMD standards and curricula for EMS telecommunicators
- Research and develop a plan to implement a single statewide EMS coordination channel
- Identify gaps in EMS communications coverage, particularly in rural areas, and provide technical assistance
- Provide technical assistance and workshops in all areas of the state to include:
  - Potential funding sources
  - Excess inventory and public resource sharing
  - Federal and State EMS communications rules and guidelines
  - Strategic alliances with other state agencies
  - Technical guidance on regional communications interfaces

Through this state leadership role EMS communications will become a more cohesive and prominent component of the EMS system throughout the state.

6.2 Method

This plan proposes a new leadership role for the California EMS Authority in the area of EMS communications. To support this role, staff support at the analyst level is needed. The position should have adequate training and experience in the telecommunications field and in the methods and delivery of EMS in California. An Advisory Committee is also recommended if funding is available. This committee would meet on an as-needed basis to provide advice on the development of policy and technical guidance documents for the Authority. Technical support for the Authority would be made available from the California Department of General Services. Potential makeup of this Advisory Committee would include:

- Associated Public-Safety Communications Officials-International, Inc. (APCO)
- California Ambulance Association
- California Department of General Services
- California EMS Authority
- California Fire Chiefs Association
- California Highway Patrol
- California Police Chiefs Association
- California Peace Officers Standards and Training
- Emergency Nurses Association
- EMS Administrators Association of California
- California Governor's Office of Emergency Services
- California Office of the State Fire Marshal
- Representatives of dispatch agencies (e.g., fire and private ambulance)
- California Office of Traffic Safety
- California Healthcare Association

6.3 Implementation

It is expected that the steps for approval of this concept and of the plan will be as follows:

- Review and solicit input on the draft plan and guidelines from the Advisory Committee
- Solicit input on the plan from EMS agencies
- Prepare final plan and guidelines
- Adopt plan and implement recommendations

Components of the plan would then be implemented including the staff and leadership recommendations at the EMS Authority. The preliminary date for implementation would be fiscal year 2000/2001.

6.4 Role of The State EMS Authority

1) Role Of State Level Management By California EMS Authority

The California EMS Authority will track the federal government's and national organizations' activities affecting EMS communications and provide feedback including:

- Systematic review of EMS activity at the federal and national level

- Update local EMS agencies and approved advisory committees on key needs and directions
- Seek out and secure additional sources of communications funding
- Regularly participate in federal communications law and rulemaking decisions
- Participate with state agencies and state and regional telecommunications associations that have a jurisdictional interface with EMS communications.

2) Complete Regional Inventory And Needs Assessment On Interoperability

The California EMS Authority will facilitate a statewide inventory and needs assessment relative to EMS communications areas and regional interoperability. The goal would be to develop an inventory of total coverage, regional interfaces and then provide technical guidance on the development of regional interfaces as an interim step toward a single statewide coordination frequency. The plan should also call for defining EMS communications/provider service areas, users in those areas, percentage of radio coverage and grade of service to determine current and future needs. A study of the use and application of advanced technologiesy relating to EMS should also be undertaken. The analysis should include a review of potential interfaces with the developing California State Public Safety Radio Network. As a long-range plan, the California EMS Authority will develop standards for statewide interoperability.

3) Complete State EMS Communications Plan

A State EMS Communications Plan will be adopted as part of an effort to provide standardized communications capabilities among all system participants.

Review Plans Annually

Review local EMS plans and their communications components and the Statewide EMS Communications Plan to determine that they are contemporary, effective, and relevant to the current EMS communications system.

Develop Statewide Regional Interoperability Plans Consistent With The Inventory And Needs Analysis Conducted Under 1) Above.

Statewide/regional communications radio frequency plans need to be developed to assure interoperability between providers and regions during routine and major emergency events. The effort for provider interoperability includes:

- The development of a seamless statewide communications interface between all EMS providers, appropriate dispatch centers and hospitals
- Each local EMS plan will be mandated to address this issue
- The interoperability standard will be outcome-based (e.g., “All EMS providers shall have the capability…”) with open architecture and interface standards to be set by a future established state technical workgroup

- The California EMS Authority will provide for technical guidance to assure regional interfaces where appropriate
- The plan calls for continued efforts at the state level to provide for a single method for achieving this standard considering spectrum availability

The stages of interoperability efforts include:

- Stage one -- radio frequency coordination within regions
- Stage two -- radio frequency coordination between regions
- Stage three -- identify single statewide frequency
- Stage four -- assure statewide capability for EMS provider interoperability

Strengthen EMS Communications Personnel Training Standards And Assist With Local Personnel Standards And Training

- Define EMS communications specialist skill and training standards
- Adopt qualifications and standards for EMS communications operators
- Develop training resources for areas with limited access to telecommunicator-training facilities
- The California EMS Authority will have the staff and resources to conduct the work of this plan

Upon approval of the State EMS Communications Plan, the California EMS Authority will identify personnel and resources needed to assure statewide functions and assistance needs to local EMS agencies are met.

State Provides Positive Direction By Means Of Laws, Rules, And Funding Policies

The California EMS Authority will provide direction to local EMS agencies through laws, rules, and funding policies to ensure that the compliance and standardization goals of this plan are met.

Progress Reporting On EMS Communications Plan

Feedback mechanisms will be established through regional meetings, focus group interviews and direct surveys of providers and local EMS agencies to track the progress of the goals of this plan statewide and from the local EMS agencies to track the progress of the implementation of the State EMS Communications Plan locally. The results of this feedback will be reported and made available as needed.

7.0 LOCAL SYSTEM STANDARDS

7.1 Overview

There are eight sections in the EMS System Standards and Guidelines, of which communications is one. The system requirements defined in the following section will be added to the EMS System Standards and Guidelines. All local/regional EMS agencies will be expected to incorporate these guidelines in the communications section of the EMS System Plans submitted to the Authority. These guidelines relate only to local system-level attributes of communications systems. Each system requirement defined in this section is noted as "current" and "future" requirements of the EMS System Standards and Guidelines. For clarity, the standards are also listed with the appropriate plan category from Section 5.0 of this plan listed in parenthesis.

7.2 Local EMS Agency Guidelines

Functional Performance Standards – Current And Future Requirement

Public Education (Access 2.0)

Public education plans should be in place to educate the public about appropriateness of 9-1-1 calls and information on how to access the system and system limitations if any (e.g., phantom rings on highway call boxes).

Interface Between Public and Call-Taking Center (Access, Dispatch & Response)

- Each plan should call for periodic monitoring of access point viability and functionality.
- Establish an interface standard of no more than 15 seconds from end of call dialing to PSAP switch connection
- Programs to respond to the inaccurate public perceptions of highway call box access (e.g.. call boxes that create a ring for the caller while the system warms up, but are not connected to local PSAP; as a result caller believes PSAP is not answering call).
- Statewide (regionwide) enhanced 9-1-1 access:

  - Toll-free call
  - Sufficient lines
  - Sufficient answering positions and operators
  - Written medical protocols (operational and medical) for telecommunications specialists

Call Taking and Dispatch (Dispatch & Response 3.0)

The following are performance standards for emergency medical events that are considered emergent.

Dispatch Center and Providers

- All dispatch and provider clocks should be calibrated to link with the time of the National Institute of Technology (WWV) clock time

Call Taking

- During the busiest hour of any shift,10 seconds should be the maximum amount of time from calling party to connection with the PSAP telecommunicator pickup at 9-1-1 primary, secondary and wireless phone access points
- The minimum initial data set for call taking: (a) location for response, (b) call-back number, and (c) nature of call
- EMD program approved by the local EMS agency shall be in place for the system for all emergent and urgent medical calls at a location to be defined by the local system
- Procedures should be established to assure that the local EMS medical director approves all protocols for EMD of local dispatch agencies

Dispatch to Provider

- For urban areas alerting unit in one minute or less 90 percent of the time is ideal and within 90 seconds is the maximum.
- Rural standards should be set that are realistic for the resources and the method of coverage (e.g., volunteer, paid, etc)
- For wilderness areas the performance standard should be for “best effort”
- Specified performance standards for equipment and radio coverage saturation area to be defined and monitored locally
- Response time standards are for “emergencies” only as defined

Provider to Field

- Field enroute time one minute or less 90 percent of the time for all urban providers and “best efforts” for rural areas

Local Policies (Local Coordination)

- Local EMS agencies shall assure that dispatch time definitions shall be measured against a standardized definition of “response time” relevant to the local agency’s needs
- Local providers shall provide and measure compliance with locally developed benchmark standards so that the total time from call taker receipt of call to provider dispatch is 2.5 minutes or less 90 percent of the time in urban areas based on locally developed policies
- In urban areas, it should be the eventual goal of local EMS systems to have a 90 second total dispatch time from call taker receipt to provider dispatch on 90 percent of all emergent requests
- Suggested benchmark times may include time from request dialing to call-taking pickup, dispatch to time of EMS enroute, enroute time to arrival time
- All event times are considered early benchmarks, shall be implemented over time and may be adjusted where justified based on local needs
- All call-taking and dispatch functions should have a process improvement review program in place and functioning

EMS Resource Coordination – Current And Future Requirement

An EMS dispatch center will be present in sufficient locations to assure adequate EMS dispatch. The plan will address the following to improve capacity:

- Dispatch center monitors location, status, and capability of response units in area
- Dispatch center has the capability to allocate all available resources
- Written policies and procedures for resource allocation are available to telecommunications specialists
- Computer-Aided Dispatching (CAD)

Direct EMS Dispatch – Current And Future Requirement

EMS dispatch centers will provide sufficient resources to ensure efficient direct EMS dispatching including:

- Simple, direct line of communications
- Dispatch will be provided by trained EMDs who prioritize each call and rapidly determine life threatening emergencies

Mobile Radio Communications – Future Requirement (Local Coordination 4.0)

Local EMS plans will identify sufficient mobile radio communications links among the necessary EMS providers including the following provisions:

- For dispatch and coordination of communications
- For two-way voice communications between EMS ambulances and dispatch facilities; ambulances and designated EMS hospitals; ambulances and non-EMS hospitals; and between all hospitals and within the EMS area
- To minimize delay for EMS access to hospital channels used for medical direction

Meets State And Federal EMS Program Requirements – Future Requirement ((Dispatch & Response 3.0, Local Coordination 4.0 and Regional & Statewide Medical Coordination 5.0)

Local EMS plans will follow state and federal communications requirements including:

- Plans will provide for reliable communications between EMS ambulances for dispatch and routing from dispatch centers and for medical direction from EMS hospitals
- Plans will define statewide radio frequency requirements and compatibility factors
- Plans will specify sufficient number of dispatch and medical coordination frequencies
- EMS base stations equipped to avoid interference from reception of radio communications intended for other radio stations
- Incorporate FCC licensing provisions, number of frequencies available, transmission characteristics, other authorized users of radio frequencies

Provide Continued Communications During Disasters – Future Requirement (Resource Coordination 7.0, Interagency/Mutual Aid 8.0, Backup Up Communications 9.0

Local EMS plans will include the availability of a communications system for disasters insuring that systems are in place to:

- Provide alternative and backup communications links for telephone lines (i.e., radio and microwave)
- Provide for use of common disaster channels, multi-agency, multi-channel radios, or cross-patch of channels at public safety communications base stations
- Provide independent standby power sources available for fixed communications facilities
- Assure sufficient telephone lines, radio channel capacity, and operating positions

- Assure disaster communications procedures that emphasize interagency coordination
- Assure disaster systems and procedures are periodically exercised to maintain competence among users

Communications Operators Are Trained In EMS And In Communications – Future Requirement (Training EMS Telecommunications 11.0)

Local EMS plans will require that all EMS telecommunicators are trained for a variety of tasks including:

- All EMS telecommunications specialists will be cross-trained in EMD (according to California State standards) communications practice and procedures.

Communications Systems Meet Technical Standards Applicable To All Public Safety Communications Systems – Future Requirement (Overview 1.0, Local Coordination 4.0, Scene Coordination 6.0)

Local EMS plans will ensure system compliance with applicable public safety standards to include:

- Meeting all FCC rules and regulations
- Assuring that all EMS communications are recorded
- Providing at least 95 percent reliable radio coverage for two-way mobile voice communications between hospital and ambulance as locally defined and monitored
- Assuring that equipment is durable and easy to operate
- Assuring reliability of on scene communications

7.3 Interface With Other EMS Systems (Resource Coordination 7.0)

EMS Communications Coverage Boundaries Are Defined And Respected – Future Requirement

Local EMS providers will work with neighboring EMS providers to ensure optimal communications performance that provides for:

- Normal radio communications coverage boundaries are mapped out and mutually agreed upon
- Adoption of appropriate standard operating procedures
- Centralized monitoring of all EMS channel traffic and real-time centralized assignment of operating frequencies where appropriate if using UHF frequencies

Frequency Allocations And Usage Are Coordinated Statewide – Future Requirement (Regional & Statewide Medical Coordination 5.0)

Local EMS plans will incorporate statewide frequencies ensuring that:

- Local EMS agency will adhere to any state EMS communications and frequency coordination plan that exists

Provide For Continuous Tone-Controlled Squelch System (CTCSS) Tones And Coordinate Other Control Tones And Codes - Future Requirement

Local EMS plans will encourage the availability of CTCSS tones and other control tones.

Local Systems Are Interconnected With Fixed Radio Links – Future Requirement

Local EMS plans will include standardized inter-hospital communications:

- Designating at least one standard frequency within state for inter-hospital communications

Standardize Mobile Unit Parameters – Future Requirement (Training 11.0)

Local EMS plans provide minimum standardization to assure:

- Adherence to common mobile frequency plan
- Equipping ambulances for selective calling codes, CTCSS, and maintenance of radio contact when traveling from one EMS region to another
- Provision of statewide uniform training of communications operators

7.4 Compatibility With Other Communications Systems (Interagency 8.0)

EMS Frequencies Coordinated With Other Public Safety Frequencies – Future Requirement

Local EMS plans will show coordination between EMS frequencies with other public safety frequencies. This may include working with local APCO chapters, developing a coordinated frequency master plan or developing a single communication plan.

Coordination At Shared Radio Sites – Future Requirement

EMS communications users will coordinate the use of shared radio sites to ensure compatibility through:

- Use of isolators and bandpass cavity filters
- Intermodulation analysis
- Minimum use of antennas
- Directional antenna use
- Minimum radiated power use
- Minimum antenna height/elevations
- Mutual operating frequencies
- Cross-channel radio patch equipment

7.5 Utilization of State and Common Resources (Regional & Statewide Medical Coordination)

Shared Radio Sites – Future Requirement

Local EMS plans will identify what shared radio sites are being used and will attempt to use common radio sites and radio resources when appropriate and cost effective.

Shared State And Common System Components (i.e., microwave, telephone) – Future Requirement

Local EMS plans will identify what shared and common system components are used and needed.

Effective Use Of State-Provided Services – Future Requirement

Local EMS plans will identify which state-provided services are used and which are needed. This may include:

- Centralized purchasing through state contracts
- Developing arrangements for statewide maintenance services
- Providing engineering design services
- Developing standardized equipment specifications and boilerplate materials
- Sponsoring EMS communications operator training programs

8.0 GOALS & OBJECTIVES

8.1 Introduction

The goals of the California EMS Communications Plan are based on the assessment conducted during year one of this statewide effort. These goals call for activities at the state level and for performance goals and objectives to be considered by each EMS agency for evaluating, planning, and implementing acceptable EMS communications systems. Determining the local goals and objectives will be largely based on individual assessments and needs that are determined based on those assessments.

8.2 Goals

Goal 1 - EMS communications planning should be based on an assessment, and the development and implementation of a State EMS Communications Plan.

Goal 2 - EMS communications systems should meet the needs of EMS and conform to nationally-accepted standards of functional performance.

Goal 3 - Local EMS communications systems should be compatible, but not interfere, with EMS communications systems in adjacent communications regions.

Goal 4 - Local EMS communications systems should make maximum use of state and other common resources where this approach is appropriate and cost effective.

Goal 5 - The California EMS Authority should provide leadership in EMS communications and implement the State EMS Communications Plan.

8.3 Objectives/Tasks

Goal 1 - EMS communications planning should be based on an assessment, and the development and implementation of the State EMS Communications Plan.

The thrust of the goal is being met with year one's EMS communications assessment conducted in preparation for this plan and the development and approval of the plan. The assessment and plan process is a dynamic and renewing process that will assure relevance and connection to changing needs.

Potential Tasks:

- Development of initial EMS Communications Plan
- Obtain feedback and input on the plan

- Implement plan components
- After the first year, review and update the plan every five years

Goal 2 - EMS communications systems should meet the needs of EMS and conform to nationally-accepted standards (e.g., ASTM) of functional performance.

As part of this plan's goals, is the publication (included herein), distribution, and implementation of a set of local EMS agency guidelines consistent with national standards that have been developed. Local EMS agencies should integrate the new communications guidelines into their local EMS Plans.

Potential Tasks:

- Development of statewide guidelines
- Local EMS agency assessments conducted every five years
- Incorporation of guidelines in EMS plans
- Annual reports

Goal 3 - Local EMS communications systems should be compatible but not interfere, with EMS communications systems in adjacent communications regions.

Included within the guideline document is an assessment piece and standards for local EMS agencies to evaluate and respond to communications interoperability and incompatibilities.

Potential Tasks:

- Local EMS agencies to conduct assessment every five years
- Current status and needs reflected in the local EMS System Standards and Guidelines
- Define linkage and interagency communications needs
- Resource needs and gaps in coverage without potential solutions are reviewed and responded to by the EMS Authority
- Annual written plan of action and review with summary of changes and updates
- Implement programs to respond to the needs

Goal 4 - Local EMS communications systems should make maximum use of state and other common resources where this approach is appropriate and cost effective.

Included with the development of a state leadership role is the responsibility to monitor needs and inventory resource availability (especially within state and

local governments) and to respond to EMS communications capital equipment needs locally.

Potential Tasks:

- Need assessments conducted by local EMS agencies
- State identifies resource availability and capabilities
- State works with local EMS agencies to respond to resource needs

Goal 5 - The California EMS Authority should provide leadership in EMS communications and implement the State EMS Communications Plan.

The Authority will be charged with the responsibility to assess, develop, and implement statewide EMS communications system policy, resource lists, and technical guidance efforts as part of this plan.

Potential Tasks:

- Develop an EMS communications section within the Authority
- Begin targeting key statewide leadership issues as identified in the year one assessment and this plan
- Provide an annual report on efforts and resources that have been identified to the EMS Commission

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APPENDIX A

GLOSSARY OF COMMUNICATIONS TERMS

APPENDIX A – Glossary of Communications Terms

Terms

backbone – a point-to-point wireless communications system utilizing several fixed stations.

call-taker – an individual who is responsible for staffing an appropriately-equipped answering position that receives incoming 9-1-1 calls and is trained and oriented to that position.

communications – the transmission of information from one point to another by means of electromagnetic waves (ANSI/IEEE Std. 100-1988).

communications system – those resources and arrangements for notifying the EMS system of an emergency, for mobilizing and dispatching resources, for exchanging information, for remote monitoring of vital indicators, and for the radio transmission of treatment procedures and directions.

continuous tone-controlled squelch system (CTCSS) – (also known as a "tone-controlled squelch" or "digitally-controlled squelch") a system wherein radio receiver(s) are equipped with a tone responsive device which allows audio signals to appear at the receiver audio output only when a carrier modulated with a specific tone is received. The tone must be continuously present for continuous audio output. CTCSS functions are sometimes referred to by various trade names such as Private Line or PL (Motorola Communications & Electronics), Channel Guard or CG (Ericsson/General Electric Mobile Radio Department).

dispatch – the process of receiving a request for emergency medical assistance and the act of sending an EMS vehicle or air ambulance in response to each request.

dispatcher – a person that has been trained and assigned the responsibilities for the receiving the request for an emergency medical response and is formally trained and oriented to his/her position.

dispatch triage – the process of sorting through requests for emergency medical assistance based on information provided by the reporting party so that the appropriate resources are sent.

emergency call – a call that requires immediate action.

emergency medical dispatcher (EMD) – a person who has completed an approved EMD training course and who is EMD certified.

emergency medical dispatching – reception and management of requests for emergency medical response using approved standardized dispatch protocols or guidelines.

emergency medical services (EMS) – the provision of services to patients requiring immediate assistance due to illness or injury, including access, response, rescue, prehospital and hospital treatment, and transportation.

emergency operations center (EOC) – (1) a secure, protected facility designed and equipped for the use of community officials to manage response of a community in time of emergency. (2) A dispatch center designed and operated by a community or within a geographic area for a combination of emergency resources, such as police, fire, and EMS.

Emergency Medical Radio Service (EMRS):

EMS Base Hospital: A hospital that has been granted a contract by the local EMS agency to provide medical control services to field personnel.

EMS plan – a plan for the delivery of emergency medical services.

EMS region – the geographic area served by a given EMS system.

Federal Communications Commission (FCC) – a board of five commissioners appointed by the President under the Communications Act of 1934 to formulate Rules and Regulations and to authorize use of radio communications. The FCC regulates all communications in the United States by radio or wireline, including television, telephone, radio facsimile and cable systems.

frequency – the number of cycles, repetitions, or oscillations of a periodic process completed during a unit of time. The frequency of waves in the electromagnetic spectrum (radio waves) is designated in hertz (Hz), kilohertz (kHz or 1,000 Hz), megahertz (MHz or 1,000,000 Hz). One hertz is equivalent to one cycle per second.

hospitals – a licensed acute-care inpatient health care facility in the state of California.

Hospital Emergency Administrative Radio (HEAR) – Motorola Communications and Electronics trade name for a system of VHF radio systems.

interface – a concept involving the specification of the interconnection between two pieces of equipment or systems. The specification includes the types, quantity, and function of the interconnection circuits and the type and form of the signals to be interchanged via these circuits.

interference – interference in a signal transmission path is either extraneous power that tends to interfere with the reception of the desired signals or the distribution of signals which results in loss of signal or distortion of information.

med channels - UHF frequencies assigned by the FCC their use is limited to approved EMS functions.

medical control – directions and advice provided from a centrally designated medical facility staffed by appropriate EMS personnel, operating under medical physician supervision, supplying professional support through radio or telephone communications for on-site and transit, Basic and Advanced Life Support Services given by field personnel such as EMTs or Paramedics.

9-1-1 – a three-digit emergency telephone number accepted and promulgated nationally as the statewide emergency telephone number.

pre-arrival instructions – medically approved written instructions given by certified emergency medical telecommunications specialists to callers over the telephone to provide aid to the patient and control of the situation at the scene of an emergency prior to the arrival of prehospital care providers. Pre-arrival instructions include critical medical instructions as cardiopulmonary resuscitation, Hemlich maneuver (choking), emergency childbirth, and external hemorrhaging.

public safety answering point (PSAP) – the location at which an emergency telephone call is answered and, either appropriate resources are dispatched or the request is relayed to the appropriate responder.

public safety agency – functional division of a public agency that provides fire fighting, police, ambulance, emergency medical, or other emergency services.

regional EMS system – an emergency medical service area (trade, catchment, market, patient flow, geographic or governmental) that provides essentially all of the definitive emergency medical care for all emergencies and for the most critically ill and injured patients within the area.

repeater – (or mobile relay) a combination of apparatus for receiving both one-way or two-way communications signals and delivering corresponding signals which are either amplified or reshaped or both.

Special Emergency Radio Service (SERS) – that portion of radio communications frequency resources authorized by the FCC for use in the alleviation of emergency situations endangering life or property.

statewide EMS system – a network of EMS systems, integrated and coordinated at the state level.

telecommunicator – an individual who is responsible for staffing an appropriately equipped answering, dispatch position or both that may receive incoming 9-1-1 calls, dispatch resources or do both and is trained and oriented to that position.

tone-controlled squelch – a system whereby a superimposed tone is transmitted with the radio carrier to protect against nuisance type interference. (See CTCSS)

Ultra High Frequency (UHF) – frequencies between 300 and 3000 MHz.

Universal Licensing System (ULS) – a new consolidated approach used by the FCC for licensing frequencies to all providers.

Very High Frequency (VHF) – frequencies between 30 and 300 MHz.

APPENDIX B

FCC REGULATIONS

APPENDIX B – FCC Regulations

A. Overview

All non-Federal Government radio telecommunications systems in the United States are subject to the Rules and Regulations of the Federal Communications Commission (FCC). Such radio communications are allowed under FCC Rules and Regulations (Title 47, Code of Federal Regulations) Part 90, Private Land Mobile Radio Services, Subpart B, Public Safety Radio Services. In the event of inconsistencies between this Plan and the FCC Rules and Regulations, the FCC Rules and Regulations shall take precedence. With new equipment continuously being developed, radio users growing in numbers, and with the communications needs constantly changing, the FCC attempts to keep pace by implementing changes to its rules.

The FCC rules govern who is eligible to license a transmitter and the specific frequencies and equipment configurations allowed for each frequency or service group. Licensees are required to have a current copy of the Commission's Land Mobile Rules governing the radio service in which authorization is granted. By signing the FCC 601 Form, the applicant certifies to have access to a current copy of the applicable radio service's rules (i.e., Part 90). Rules for the Part 90 Private Land Mobile Radio Services are contained in a paperback volume entitled "Code of Federal Regulations, Title 47, Part 80 to END", published after October 1 of each year. Since prices are subject to change without notice, contact:

U.S. Government Printing Office
Washington, DC 20402
Telephone (202) 512-0000

The FCC rules are printed as part of the Code of Federal Regulations (CFR), Title 47. You may order "Part 80 to END" which includes FCC Telecommunications Rules Parts 81, 83, 87, 90, 95, 97, 100 and 101. This contains Maritime, Aviation Services, Private Land Mobile Radio Services, Personal Radio Services, Amateur Radio Service, Direct Broadcast Satellite Service and Fixed Microwave Services.

B. Application Process

As of March 1998, Report and Order WT Docket No. 98-20 facilitated the development and use of the Universal Licensing System (ULS) in the Wireless Telecommunications Services[2]. The ULS is being developed and implemented incrementally starting January 1999 and is scheduled to be fully functional for all wireless communications by the end of 1999. The FTC's Wireless Telecommunications Bureau (WTB) developed this electronic ULS to integrates 11 separate licensing databases and systems, saving time and money for both customers and the federal government. In a rapidly expanding telecommunications marketplace, WTB processes hundreds of thousands of license applications annually. Prior to the launch of ULS in December 1997, there were over 40 different WTB licensing application forms in use for different services. With ULS, there are only four, as filers use the same basic forms for all wireless services. With this new universal licensing system, all agencies submit Form 601 for licensing and frequency coordination. The innovation of ULS goes far beyond paperless application filing. The system also provides a powerful search engine that enables applicants to view applications and licenses currently on file with WTB. Prior to filing applications in ULS, licensees must register their Taxpayer Identification Numbers (TINs), the nine digit numbers the Internal Revenue

[2] FCC Report & Order, WT Docket No. 98-20, March 18, 1998, a Biennial Regulatory Review

Service requires of all individuals and businesses/employers to identify tax accounts, and obtain a self-assigned password. (To register on-line and go to WTB's ULS Internet homepage, http://www.fcc.gov/wtb/uls, click on the "TIN/Call Sign Registration" button and provide the information as prompted.)

Other ways to obtain Form 601 "Long Form Application for Authorization" is to call the Forms Distribution Center, (800) 418-3676 and from the FCC's copy contractor, International Transcription Services Inc. (202) 857-3800. The form 601 can also be obtained as a fax from the FCC's "Fax on Demand" service. To obtain the document as a fax, dial (202) 418-0177.

C. Radio Frequencies for EMS Communications Eligibility

The current FCC Rules clearly distinguish between EMS communications and other medical and administrative health care communications. Per §90.27 of the FCC Rules, the eligible users of radio frequency spectrum allocated by the FCC for the Emergency Medical Radio Service (EMRS) are:

> *"Persons or entities engaged in the provision of basic or advanced life support services on an ongoing basis are eligible to hold authorization to operate stations for transmission of communications essential for the delivery or rendition of emergency medical services for the provisions of basic or advanced life support." (§90.w0(3),(1), (iii))*
>
> *EMRS applicants are also eligible for frequencies in the Special Emergency Radio Service (SERS) "…in order to interface with other entities using SERS channels and to conduct necessary non-emergency communications."[2] (§90.20 (c))*

Emergency Medical Radio Service

In the EMRS, there are several VHF High Band frequencies, 220 MHz Band frequency pairs, and UHF Band frequency pairs. Many of these frequencies are restricted for specific uses such as crew alert paging, inter-system use, medical coordination, vehicle coordination, or are shared with other Public Safety Radio Services. There are no 800 MHz Band frequencies specifically allocated to EMS, but all EMS eligibles may license 800 MHz frequencies allocated for Public Safety eligibles. Refer to current FCC Rules (i.e., §90.20) for actual channels, uses, and limitations for each frequency band.

UHF Radio Equipment Channelization Requirements

1. Base Station Facilities

Under FCC Rules §90.20 (c) (13), all radio base stations operating on MED channels are no longer required to be equipped to operate more than one channel each. The 32 frequency pairs (MED 1 - MED 8) are assigned in a block for shared operation.

2. Mobile and Portable Equipment

Under FCC Rules (§90.20 (2), (bb), (ii&iii)) mobile and portable radios operating on the MED channels shall be both wired and equipped for operation on each of MED 1 through MED 8.

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[2] Summary of FCC Report & Order, PR Docket No. 91-72, Federal Register, March 3, 1993, p. 12177

However, portable radios operating with a maximum power output of 2.5 watts are exempt from this multi-channel requirement.

3. Paging and Crew Alerting

The secondary, one-way paging frequencies for EMRS are assignable only to organizations eligible under FCC Rules (§90.20 (d), (38)) for the transmission of one-way tone and/or voice paging messages that are necessary for the rendition of medical service

D. FCC Certified Organizations

After Form 601 is completed and sent to the State EMS Authority for approval, the application and letter of support are submitted to the FCC-certified frequency coordinator for EMRS frequencies. There are two FCC-certified frequency coordinators with the EMS planner or user will commonly be involved. They are the International Municipal Signal Association/International Association of Fire Chiefs (IMSA/IAFC) and the Associated Public-Safety Communications Officials International, Inc. (APCO).

APCO is the certified FCC frequency coordinator responsible for Police Radio Service frequency coordination. Additionally, APCO provides coordination for all Public Safety of the 800 MHz radio spectrum[4]. Applicants are assessed fees to defray the costs incurred in frequency coordination. Applications on frequencies shared with other public safety radio services may be subject to additional fees. IMSA/IAFC has a minimum fee of $100. All coordination fees apply on a per license application basis.

For additional information, contact:

APCO-International Headquarters
2040 S. Ridgewood Avenue
South Daytona, Florida 32119-8437
Telephone (904) 322-2500
Fax (904) 322-2502

IMSA/IAFC is recognized by the FCC to be the certified providers of nationwide frequency coordination for entities eligible to hold license in the Fire Radio Service, EMRS, or SERS. Emergency Medical and Fire Radio Services, except 800 MHz:

IMSA/IAFC
P.O. Box. 1513
Providence, RI 02901
(401) 738-2220
Fax (401) 738-7336

Special Emergency Radio Service, except 800 MHz:

[4] The 821 to 824 MHz and 866 to 869 MHz spectrum (channel numbers 601 to 830) is subject to the "FCC Regional Planning Process" prior to submittal to APCO.

International Municipal Signal Association/ International Association of Fire Chiefs IMSA/IAFC) and Personal Communications Industry Association (PCIA)

For school districts	For other (government or non-government) agencies
PCIA Attn: Frequency Coordination 500 Montgomery St., Suite 700 Alexandria, VA 22314-1515 (703) 739-0300 or (800) 759-0300	IMSA/IAFC P.O. Box 1513 Providence, RI 02901 (401) 738-2220 Fax (401) 738-7336

Business Radio Service:

Personal Communications Industry Association (PCIA)
Attn: Frequency Coordination
500 Montgomery St., Suite 700
Alexandria, VA 22314-1516
Telephone (703) 739-0300 or (800) 759-0300

E. Federal Aviation Administration Regulations

Installation and operation of land mobile radio equipment on board aircraft is subject to Federal Aviation Administration (FAA) and FCC Rules and Regulations.

F. Communications Approval

For radio license applications in the EMRS, FCC Rules (§90.20 (a), (1), (iii)) requires that the State EMS Authority Medical Director approves an applicant's request before the request be sent to the FCC-certified organization for further approval and licensing. The essential components of the Authority's letter of support attest that:

- the applicant provides ongoing basic or advanced life support services,
- the application is in conformance with (or not in conflict with) the state's EMS communications plan,
- the application is supported by the government agency responsible for the state's EMS communications plan,
- the statement is supported by an authorized signature.

All requests for approval shall be submitted in writing to:

Medical Director
Emergency Medical Services Authority
1930 9th Street
Sacramento, CA 95814
(916)322-4336

(916) 324-2875 (f)

APPENDIX C

FREQUENCY PLAN

APPENDIX C

Frequency Plan

A. Background

Since 1968, the number of licensed Private Land Mobile Radio (PLMR) stations has increased by more than 400 percent. In 1983, the FCC issued a report entitled "Future Private Land Mobile Telecommunications Requirements." This study projected significant frequency spectrum shortages in at least 21 markets (metropolitan areas) by the year 1990, with significantly larger shortages by the year 2000.

On July 2, 1991, the FCC issued a Notice of Inquiry to try to address the frequency congestion in the PLMR Service. This inquiry's purpose was to explore options to promote more effective and efficient use of the bands below 470 MHz in the PLMR service and provide users the same flexibility and licensing options available at 800 MHz and above.

Although there was no disagreement that congestion was a major problem and the need for allowing innovations within the PLMR was essential, there was disagreement as to the methodologies to be employed and time frames in which this should be achieved.

FCC Report and Order of Private Radio Docket No. 91-72, effective April 2, 1993, created the Emergency Medical Radio Service. EMS is now clearly separate and independent of Special Radio Service eligibles. In summary, "this action was taken to redress the adverse consequences on public health and safety resulting from current crowding on emergency medical channels. The rule changes will establish a discrete radio service category dedicated strictly to eligibles providing *basic or advanced life support* services on an ongoing basis and thereby ensure the reliability of emergency medical communications. "…In this Report and Order, we establish the Emergency Medical Radio Service (EMRS) as a new Public Safety Radio Service under subpart B of Part 90 of our [the FCC] Rules." FCC Rules designated IMSA/IAFC as the certified frequency coordinator for EMRS. The FCC concluded with their discussion in the Report & Order of PR Docket No. 91-72 that the International Municipal Signal Association/ International Association of Fire Chiefs (IMSA/IAFC) is expected "…to verify that all applicants are compatible with existing regional and local emergency medical plans."

FCC Report and Order of Private Radio Docket No. 92-235, effective August 18, 1995, affected the 150-170 MHz VHF band and the 421-430, 450-470, and 470-512 MHz UHF bands. It established a new channeling plan, provided technical flexibility, and mandated consolidation and suggested an initial framework for Public Land Mobile Radio (PLMR) services.[5] This rule making essentially affected all PLMR services in Part 90.

These changes in FCC Rules were not intended to displace local and State planning efforts, but rather to ensure a single point of contact to the FCC for matters relating to applicants for coordination and licensing as well as to provide a nationally uniform and efficient procedure for such applications.

[5] Summary of FCC Report & Order, PR Docket No. 92-235, Federal Register, July 19, 1995, p. 37152

In view of these FCC requirements, it is apparent that any successful local or State radio frequency planning effort must be consistent with the FCC-certified coordinating organization procedures. The State EMS Authority will maintain liaison with the certified coordinator toward the mutual goal of effective and efficient use of the radio spectrum by EMS agencies within California.

B. Channel Allotment Principles

Within the domain of the PLMR Services (FCC Rules Part 90) and the limits of frequency modulation (FM) radio technology, there exist only two basic approaches to the assignment of radio channels consistent with the principles of spectrum efficiency and effectiveness. They are the Geographic Allotment method and the Real-Time Allotment method. Of these, the Geographic Allotment method is simpler and less costly to implement, particularly for small systems in less frequency-congested areas; however, the Real-Time Allotment method results in considerably greater spectrum efficiency and freedom from harmful interference in more congested areas.

Spectrum efficiency is the extent to which radio traffic occupies radio channels over a large geographic area. Greater spectrum efficiency demands that channel bandwidth is minimized, channels are re-assigned as closely as possible, and that traffic loading on each channel is maximized. Application of this principle is of critical importance in most areas of the State.

Spectrum effectiveness, on the other hand, is the extent to which the necessary channel is available when and where needed, and is free from harmful interference. The fundamental goal in any radio channel allotment scheme is therefore to achieve the necessary effectiveness, while maintaining the greatest efficiency.

Harmful Interference

Co-channel Interference

For frequencies below 470 MHz, harmful interference is defined by this State EMS Communications Plan as an “undesired” signal received instead of the “desired” signal. Technically, the undesired signal must have greater than a five percent probability of exceeding a power level of 12 dB (6 dB in base-to-base situations) less than a desired signal power level required to produce either 20 dB quieting or 17 dB SINAD per the Telecommunications Industry Association/Electronics Industries Association (TIA/EIA). For channels in the 470 and 806 MHz bands, channel allocation principles and interference criteria are governed by FCC Rules.

Adjacent-Channel Interference

Adjacent-channel interference is defined as “harmful” when a desired 95 percent reliability signal is degraded by an undesired five percent reliability adjacent-channel signal by more than the criteria established by TIA/EIA standards. Channel assignments are supposed to be based on an analytical showing of no harmful interference.

Geographic Allotment

Geographic Allotment is the assignment of a channel such that a licensee has generally fulltime and exclusive use of that channel within an agreed geographic area. Once assigned, the

channel is dedicated to that user and is not available for others even when the channel is not in use. In practice, channel sharing agreements, or primary/alternative schemes, will further improve channel efficiency in such a system, but only to a limited extent. As channel loading for any user increases, the benefits of channel sharing and alternate channel agreements decrease.

The Geographic Allotment method is both successful and practical in those areas where the radio traffic is either sufficiently low, and/or that the available spectrum satisfies all user needs within a "channel re-use distance" of roughly 70 miles. Within the State of California, application of the Geographic Allotment concept presents special difficulties in populous areas experiencing high call volumes.

The Geographic Allotment method is normally applied on 470-512 MHz, and 800 MHz conventional (non-trunked) channels. The 450-470 MHz (UHF) Band utilizes both Geographic and Real-Time Allotment in the case of Emergency Medical Services communications.

Real-Time Allotment

Real-Time Allotment is the process through which each available radio channel is assigned to a particular communications path by the dispatch center (mobile/base link). This occurs on an as-needed incident-by-incident basis, and such that the same channel may be assigned to many different users, at different times, all within the same geographic area. The Real-Time Allotment method requires that each mobile radio and the base station system is capable of transmitting and receiving on all radio channels to be allocated.

In practice, mobile radios are normally equipped with all necessary channels, while fixed control points operate via direct control, wireline or other link through a central base station facility which is also equipped to transmit and receive on all necessary channels. A fundamental requirement for fully successful operation of a Real-Time Allotment system is that the reliable radio coverage area of each base station channel is very nearly the same.

The trunking concept is similar to Real-Time Allotment in that channel assignments vary with respect to time rather than with respect to geography. However, depending on the size of the system, computer-controlled trunking systems still require approximately 70-mile minimum separation between systems using the same frequencies, whereas Real-Time Allotment systems when properly designed and dispatcher-controlled, normally do not. This difference is due to the ability of the Real-Time system to acknowledge channel usage in adjacent systems, whereas trunking technology to date does not provide this capability.

C. Dispatch and Response Channels

Ground Vehicle Communications

Any radio frequency or frequencies for which the applicant is eligible under FCC Rules, and meets the requirements of this Plan and FCC limitations, may be used for Dispatch and Response communications with EMS ground vehicles. This includes VHF Low Band (30-50 MHz), VHF High Band (150-160 MHz), 220 MHz Band, UHF Band (450-512 MHz), and the 800 MHz Band, in both conventional and trunked modes.

Air Ambulance Communications

Communications for Aeromedical services may utilize certain radio frequencies within the Aviation Services of FCC Rules Part 87, “Aeronautical Enroute and Aeronautical Fixed Stations." ”The scope for Aeronautical Enroute stations is limited to the necessities of safety and primary operation of the aircraft. Subpart I does not allow for medical communications.

Frequencies within the applicable PLMR Services of FCC Rules Part 90 may be utilized for Air Ambulance Dispatch and Response or Medical Coordination on a secondary basis to land-based systems.

Licensing for implementation or expansion of air ambulance communications on any frequencies within the Public Safety or Special Emergency Radio services requires prior approval by the State EMS Authority and the FCC-certified frequency coordination organization.

D. Local Medical Coordination Channels

If the primary Local Medical Coordination channel to be implemented or expanded would cause harmful interference to or from the primary Local Medical Coordination channels of another user, then a first alternate channel shall also be implemented so as to enable continuous monitoring of each. If the best first alternate channel selected would similarly cause or receive harmful interference, then a second alternate channel shall be implemented in the same manner.

If a system proposing to employ primary, first alternate, and second alternate channels in accordance with the above procedure is such that harmful interference would be caused on all three, the State EMS Authority will analyze the channels of all affected systems and establish an appropriate plan which may require the reconfiguration of existing systems from Geographic to Real-Time Allotment.

E. Statewide Medical Coordination (SMC) Channels

EMS personnel shall have the ability for medical coordination any time it is needed. Therefore, the communications infrastructure needs to be available. A communications channel is needed for Statewide Medical Coordination to permitted vehicles during times the vehicles are outside their normal operating area, and LMC or Dispatch and Response channels are not available.

F. Interservice/Mutual-Aid Channels

Radio channels for interservice and mutual-aid operations may be utilized only within the provisions of FCC Rules and Regulations, Part 90, “Operating Requirements.” The portions of those Rules applicable to EMS organizations. Contingent on eligibility or licensee concurrence, specific nationwide channels may be used for Interservice/Mutual Aid.

FCC Rules

FCC Rules relating to interservice and mutual aid communications can be classified into the following General Rules, and rules for Base Station Communications, and Mobile Unit Communications:

A. General Rules are established for:

(1) Interstation Communications in Part 90.417(a) & (b).

(2) Civil Defense Communications in Part 90.411.

B. Base Station Communications are established for:

(1) Frequencies below 450 MHz in Part 90.419 (a).

(2) Frequencies above 450 MHz in 90.419 (b).

C. Mobile Unit Communications are established in Part 90.421 for the operation of mobile units in vehicles not under the control of the licensee. Arrangements for such use are normally made by means of written agreement between the licensee and user. Refer to the sample sharing agreement in Figure 1. The written agreement should include the following:

(1) Typed on the agency's letterhead granting the sharing agreement.

(2) State the quality of mobile (or portable) radios covered in the agreement.

(3) State the call sign, frequency(ies), and maximum power output associated with the written agreement, and other technical parameters authorized on the granting agency's radio station license.

(4) State the written agreement applies to operations in cooperation and coordination with the activities of the licensee per FCC Rule Part 90.421.

(5) State the granting agency's reserved right to effectively eliminate the possibility of unauthorized operation, which ultimately could result in terminating the written agreement.

Overall, FCC Rules §90.421 does not specifically provide for interservice mobile operation by Emergency Medical eligibles on frequencies in the Fire, Highway Maintenance, or Forestry-Conservation Radio Services, or on any non-Public Safety frequencies. Part §90.421(c), and §90.421 (a), (2), (iii), & (c), however, provides a general rule regarding mobile unit communications such that "…frequencies assigned to licensees in the Private Land Mobile Radio Services may be installed in the facilities of those who assist the licensee in emergencies and with whom the licensee must communicate in situations involving imminent safety to life or property."

_____(Grantor) authorizes_____ (Grantee) to operate_____ (quantity) mobile (or portable) radios. Such operation shall be per the following parameters.

Call Sign	Frequency(ies)	Max Power	Other Technical Parameters
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

(Use additional attachments as necessary for more frequencies/channels)

This written agreement applies to operations in cooperation and coordination with activities of the licensee per FCC Rule Part 90.421. Furthermore, grantor reserves the right to effectively eliminate the possibility of unauthorized operation, which ultimately could result in terminating this written agreement.

_____(Authorized signor)

_____(Typed signor's name)

_____(Authorizing agency)

_____(Date)