

# The Florida Emergency Medical Services Communications Plan, Volume I (Fourth Edition)

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Division of Telecommunications

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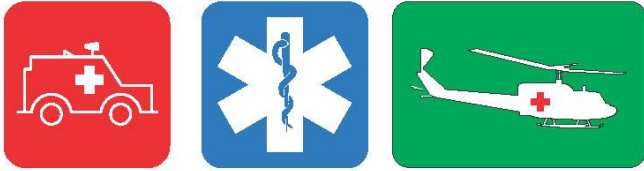
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# Emergency Medical Services Communications Plan, Volume 1

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*Submitted by the*  
Division of Telecommunications  
Public Safety Bureau

**DEPARTMENT OF MANAGEMENT SERVICES  
DIVISION OF TELECOMMUNICATIONS  
4030 ESPLANADE WAY, SUITE 180.01  
TALLAHASSEE, FLORIDA 32399-0950**

**MEMORANDUM:**

**TO:** FLORIDA EMS COMMUNICATIONS PLAN, VOLUME 1 RECIPIENTS

**FROM:** CHARLES GHINI, DIRECTOR  
DIVISION OF TELECOMMUNICATIONS

**DATE:** \_\_\_\_\_, 2011

**SUBJECT:** FLORIDA EMERGENCY MEDICAL SERVICES COMMUNICATIONS PLAN, VOLUME 1  
Fourth Edition

The Florida Emergency Medical Services Communications Plan, Volume 1 has been revised as a Fourth Edition and is now available online at:

[http://dms.myflorida.com/suncom/public\\_safety\\_bureau/radio\\_communications/radio\\_communication\\_plans](http://dms.myflorida.com/suncom/public_safety_bureau/radio_communications/radio_communication_plans)

This edition includes updates, clarifications, and new text. On each revised page, a vertical bar ("|") in the left margin identifies lines of text that have been modified since the previous issue of that page. Re-formatting or other minor irregularities corrected that resulted in no substantive change to the information are not identified. Specifically, the changes include; but are not limited to the following:

- Regionalized MEDCOM
- Updated narrowbanding deadline from 2018 to 2013
- Volume 2 hardcopy or electronic format in permitted vehicles
- Consistent reference to minimum notification distance for LMC coverage
- Incorporated APCO/NPSTC channel naming standard (ANS 1.104.1-2010)
- Incorporated references to additional communications plans and guides
- §5.2.3 added to define LMC communications coverage contour
- Re-organized §4.7.1 and §5.3 to remove duplication
- Introduced Project 25 requirements for digital radio equipment
- Deleted non-essential information in Mobile Data section
- Replaced Appendix A with Plans and Committees functional relationship chart
- Revised Appendix B to include references to multiple communications policies
- Deleted non-essential acronyms and definitions

This edition is being made available to all organizations and individuals identified per Section 1.3 of the Plan. To ensure that future revisions for Volume I and Volume II are received by you at the proper address, please verify that the name and email address on file with the Department of Health, Bureau of Emergency Medical Services is correct.

I thank the personnel in the Division of Telecommunications, the Bureau of Emergency Medical Services, the EMS Communications Committee, AHCA, and others that provided input toward this revision. More than ever, this plan is intended to meet the expectations of EMS agencies on a statewide basis.

If you have any comments or questions regarding this edition, please call Carlton Wells at (850) 922-7426 or via email at [carlton.wells@dms.myflorida.com](mailto:carlton.wells@dms.myflorida.com).

CG:cww:draft #2: EMS Comm Plan, Volume 1 Fourth Edition Final.doc

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## 1.0 INTRODUCTION

### 1.1 Executive Summary

The Division of Telecommunications (DivTel) is mandated by Chapter 401.015, Florida Statutes, (F.S.) "to develop a statewide system of regional emergency medical telecommunications." Further, Chapter 401.024, F.S., requires further that "no emergency medical telecommunications system shall be established or present systems expanded without prior approval of the Department of Management Services".

In 1975, the first Emergency Medical Services (EMS) Communications Plan (Plan) was implemented and the approval system necessary to fulfill these statutory obligations was established. In conjunction with Federal funding made available from 1973 through 1981 by the United States Congress through the EMS Systems Act, the first Plan enabled implementation of many EMS radio systems throughout the state in the Ultra High Frequency (UHF) radio frequency band. Experience gained during the intervening years, changes in technological approaches, and changes in EMS operational needs have necessitated EMS Communications Plan revisions to that end, the Plan is kept current through an active change program. Any corrections, additions, or constructive suggestions for improvement of its content should be submitted as appropriate.

By means of this Plan, and funding made available through the State EMS Grants Program, new directions and enhancements in the statewide EMS telecommunications system have been established. In an effort to maintain these improvements each user of this Plan is encouraged to send questions and comments on any matter that this Plan does or should contain to:

EMS Communications  
Division of Telecommunications  
4030 Esplanade Way  
Tallahassee, FL 32399-0950  
Phone (850) 922-7426  
FAX (850) 414-8324

The Plan is organized into two volumes. Volume I contains the general, administrative, and regulatory information needed by the managers of organizations involved in EMS operations. It further defines the broad concepts and goals of EMS communications within Florida.

Volume II contains the statewide radio frequency allocations as well as operational information for day-to-day EMS communications system operations. Volume II is formatted as a field manual to be carried as a standard reference on each permitted vehicle, either in hardcopy or electronic format.

Within Volume I, the "Administrative Information" section includes general information on DivTel, the Federal Communications Commission (FCC) rules, radio frequencies, and frequency coordination requirements; the Florida Region 9 Plan for Public Safety Radio Communications; and the DivTel EMS communications approval procedures. The "Concepts" section defines the fundamental modes of EMS communications and system capabilities referred to throughout both volumes. The "Frequency Plan" section defines the methodology controlling the use of radio frequencies within the statewide EMS system. Within the "System Requirements" and "Equipment Requirements" sections are the specific requirements by which the approval of EMS communications system implementation or expansion will be determined. Lastly, is the section pertaining to "Mobile Data Communications," this section provides information to assist in the design and/or implementation of a mobile data system employed in an EMS communications system.

Volume II includes an "Operations" section which provides FCC operational rules, recommended operating practices, a user-oriented description of radio theory with consideration in Public Safety radio bands and concepts established in EMS communications. The remainder of Volume II is devoted to the detailed radio frequencies and/or specific numerical allocations for EMS agencies or hospital Emergency Departments within Florida. Additionally, interstate allocations for adjacent counties in Georgia and Alabama are included and the geographic coordinates for hospitals within Florida.

Throughout the development of this Plan, we have attempted to keep the new editions as short and as straightforward as possible. We believe this approach will improve the usefulness of this Plan and facilitate future revisions. We have accordingly limited the statewide requirements on EMS communications systems and equipment to the minimum level that we believe necessary to ensure the effectiveness of essential modes of EMS communications.

We wish to acknowledge that preparation, publication, and distribution of this Plan has been in cooperation with the Department of Health, Bureau of Emergency Medical Services. We believe this mutual effort has been and will continue to be highly successful in improving EMS throughout Florida.

We further express our appreciation to the many individuals both within and outside the DivTel, particularly, the EMS Communications Committee, who have contributed their time, effort, and ideas toward making this Plan a meaningful and useful document. It is only through such interaction and exchange of ideas on a continuing basis that this Plan will serve to satisfy the original legislative intent "that a statewide system of regional emergency medical telecommunications be developed whereby maximum use of existing radio channels is achieved in order to more effectively and rapidly provide emergency medical service to the general population."

State of Florida  
Division of Telecommunications  
EMS Communications

## 1.2 Legislative Background

The Division of Telecommunications (DivTel), previously the State Technology Office, Department of Management Services, was established by the 1969 Florida Legislature for the purpose of planning and coordinating all telecommunications services for State agencies and political subdivisions, as specified in Section 282.702, F.S. DivTel is charged to provide the state of Florida and its operating agencies with an integrated, effective, and efficient statewide telecommunications system(s) that will satisfy operational needs. Since its inception in 1970, this office has received additional responsibilities and authority that specifically relate to Public Safety telecommunications at the local level.

Section 282.7101, Florida Statutes, originally enacted by the legislature in 1972, mandated DivTel to develop a statewide system of regional law enforcement communications "whereby maximum efficiency in the use of existing radio channels is achieved in order to more effectively deal with the apprehension of criminals and the prevention of crime generally". This statute requires approval by the DivTel prior to implementation of new systems or expansion of existing systems. This additional authority includes the law enforcement community at county and municipal levels.

In 1973, the Florida Legislature enacted Chapter 401, Part I, F.S., the EMS Telecommunications Act, relating to emergency medical service telecommunications; providing for the establishment and regulation of EMS telecommunications; mandating the DivTel to formulate and implement a Plan encompassing each medical service entity within the state; and listing those items to be included in such a plan. Like Section 282.7101, F.S., this statute requires approval by the DivTel prior to implementation of new communications systems or the expansion of existing systems.

In 1992, the Florida Legislature amended Chapter 395 (Hospital Licensing and Regulation) that created Section 395.1031, F.S. This section specifically addresses EMS communications at licensed hospitals with an emergency department. The requirements of Section 395.1031, F.S., and DivTel authority therein is consistent with that specified under Chapter 401, Part I, F.S., the EMS Telecommunications Act.

In 1974, the Florida Legislature enacted the Florida Emergency Telephone Act. The act states that "it is the intent of the legislature to establish and implement a cohesive statewide emergency telephone number 9-1-1 plan..." and directs DivTel to prepare such a plan. Included is a mandate to all public agencies to assist in the preparation of the plan and to comply with the requirements of the developed plan. Further, the act directs that no 9-1-1 systems be established or expanded without prior approval of DivTel.

Since all aspects of the 9-1-1 system development, implementation, and approval are provided for in the 9-1-1 Emergency Telephone Number Plan, this EMS Communications Plan does not include, other than conceptually, provisions for the 9-1-1 "citizen access" portion of emergency medical services operations.

### 1.3 Wording

The concept of word usage and intended meaning that has been adhered to in preparing this Plan is as follows:

- A “Shall” has been used only when application of a procedure is mandatory.
- A “Should” has been used only when application of a procedure is recommended.
- A “May” and "need not" have been used only when application of a procedure is optional.
- A “Will” has been used only to indicate futurity, never to indicate any degree of requirement for application of a procedure.

### 1.4 Plan Revision Procedure

A major goal in the development and distribution of this Plan has been to establish an effective revision procedure to ensure that all necessary information and requirements regarding EMS Communications are promptly made available to affected EMS organizations. This section defines the revision transmittal procedure, and formatting style for both new and revised pages.

A copy of Volume I and accompanying copy of Volume II is made available and/or distributed to each EMS agency licensed by the Department of Health, Bureau of Emergency Medical Services, and each hospital licensed by the Agency for Health Care Administration that has an emergency department within the state of Florida. Additionally, where appropriate other Public Safety agencies and radio vendors affecting EMS may also obtain a copy.

#### 1.4.1 Revision Transmittal Procedure

New or revised information to both Volumes I and II will be prepared by DivTel following appropriate changes to the Plan and/or affected database information. With each edition of either Volume will be transmitted with a REVISION MEMORANDUM that defines the essence of the revisions included in the new edition.

#### 1.4.2 Revision Format

- A. Cover Page: With any revision to Volume I, the cover page will be replaced with a new page showing the latest edition of the most recent revision. With any revision to Volume II, the cover page will be replaced with a new page showing the latest date of the most recent revision.
- B. Revised Pages: On each page, a vertical bar (" | ") in the left margin will be used to identify any lines of text that have been modified since the previous edition. Subsequent editions will use the vertical bar for only the most recent change affecting the new edition.

C. New Pages: Similar to revised pages; new pages will be indicated by a vertical bar (" | ") in the left margin from the top to the bottom of the page. Only on rare occasions will revising every line of an existing page cause this indication.

D. Deleted Pages: If substantive, all deleted pages or major sections will be recognized by the REVISION MEMORANDUM and will have been removed from the respective Plan completely.

**END OF SECTION 1.0**

## 2.0 ADMINISTRATIVE INFORMATION

### 2.1 Division of Telecommunications (DivTel)

In fulfilling a wide range of telecommunications services and regulatory responsibilities, DivTel is organized into several sections that encompass a multitude of disciplines associated with the telecommunications systems throughout the state. Some examples of these responsibilities are to oversee activities related to the statewide telephone system (SUNCOM), directory assistance, telephone services invoicing, the 9-1-1 emergency telephone number system, wire line data communications, and publication of the State of Florida Telephone Directory. Other areas within DivTel are primarily involved with activities related to land mobile, microwave, satellite radio systems, and radio frequency coordination, as well as closed circuit television, audio, and security/surveillance systems. These responsibilities include the overall engineering and regulation of all state agency telecommunications in the above areas, and for law enforcement telecommunications at the county, municipal and non-government organization levels.

Specifically with respect to EMS communications, DivTel is mandated in accordance with Chapter 401, Part I, F.S., with roles and responsibilities further defined by the interagency agreement with the Florida Department of Health, Bureau of Emergency Medical Services. DivTel is responsible for regulatory direction and communications engineering services to county, municipal, and non-government EMS organizations that encompass the following wide range of disciplines:

- A. Communications System Analysis: Includes the survey and analysis for new or existing communications systems to determine specific requirements in the engineering and operational aspects of system performance, system recommendations, procurement schedules, and preliminary budgetary estimates.
- B. Communications Planning: Closely related to communication system analysis, planning services include formal planning on state, regional, county, municipal and non-government levels. Within the planning framework, engineering and operational system requirements are defined and translated into present and future equipment and system needs.
- C. Grant Writing Assistance: Assistance in the preparation of grant applications is provided when requested by the EMS agency. For larger communications systems analysis and planning prior to detailed system design must be utilized before a application is submitted. Smaller and/or simpler communications systems may request a budgetary estimate. A budgetary estimate is a “quick look” at an agencies communications system. By design, it is to provide the requester with monetary figure for the grant application to meet the deadline. Without detailed system designs, these budgetary estimates may or may not meet the requester’s communications needs. Agencies should contact DivTel six (6) months prior to the grant deadlines to determine what assistance is necessary to complete its grant request.

- D. Communications System Design: Following effective analysis and planning, detailed system requirement parameters are incorporated into a formal design process to establish new or modified system configurations. This process involves the use of computerized engineering models, topographical terrain profile analysis, spectrum management database information, and other engineering tools.
- E. Procurement Specification Development: System configurations determined through the design process are developed into specifications suitable for contractual procurement, tailored to the organization's purchasing procedures, and enabling implementation of the required system equipment and services.
- F. Bid Evaluation: Responses to procurement specifications are evaluated to determine compliance with the specified requirements.
- G. Performance Verification Evaluation: After system installation and prior to system acceptance by the purchaser, evaluation of system performance tests is completed to ensure conformance to specifications.
- H. Radio Frequency Coordination and Licensing Assistance: Assistance in the preparation of radio frequency coordination forms and FCC license applications may be provided.

Timely requests for project assistance in the above areas, or for any other information or assistance that DivTel may provide should be directed in writing to:

EMS Communications  
Division of Telecommunications  
4030 Esplanade Way  
Tallahassee, FL 32399-0950

Telephone inquiries may be made to (850) 922-7426. Our FAX number is (850) 488-9837. FAX transmittal is encouraged for routine or expeditious activities. Requests for assistance will be accepted via E-mail at [carlton.wells@dms.myflorida.com](mailto:carlton.wells@dms.myflorida.com).

## **2.2 Federal Communications Commission**

### **2.2.1 General**

All non-federal government radio telecommunications systems in the United States are subject to the rules and regulations of the FCC. Such radio communications are allowed under FCC Rules and Regulations, Title 47, Code of Federal Regulations, Private Land Mobile Radio Services, (PLMR) 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.

## 2.2.2 History

FCC Report and Order of Private Radio Docket No. 91-72, effective April 2, 1993, created the Emergency Medical Radio Service (EMRS). EMS became clearly separate and independent of Special Emergency Radio Service eligibles. In summary, "this action was taken to re-address the adverse consequences on public health and safety resulting from current crowding on emergency medical channels. The rule changes established 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 EMRS as a new Public Safety Radio Service under the FCC Rules."

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 PLMR services.<sup>1</sup>

This rule-making essentially affected all PLMR services in the FCC Rules. Further rule making<sup>2</sup> as contained in FCC Report and Order 03-34 continues; as such the 3<sup>rd</sup> Edition to this Plan was determined necessary.

## 2.2.3 Radio Frequencies for EMS Communications Eligibility

The current FCC rules clearly distinguish between EMS communications and other medical and administrative health care communications. Per the FCC rule 90.20(a)(1)(iii), the eligible users of radio frequency spectrum allocated by the FCC for EMS are:

"Persons or entities engaged in the provision of basic or advanced life support services on an ongoing basis are eligible... 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."

## 2.2.4 Emergency Medical Radio Service Frequencies

For EMS, 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, intersystem use, medical coordination, vehicle coordination, or are shared with other Public Safety Radio Services. There are no 700 MHz and 800 MHz Band frequencies specifically allocated to EMS, but all EMS eligibles may license 700 MHz and 800 MHz frequencies allocated for Public Safety eligibles. Refer to current FCC Rules for actual channels, uses, and limitations for each frequency band.

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<sup>1</sup> Summary of FCC Report & Order, PR Docket No. 92-235, Federal Register, July 19, 1995, p. 37152.

<sup>2</sup> Adopted Second Report and Order and Second Further Notice of Proposed Rulemaking. (Dkt No. 99-87). Action by: the Commission. Adopted: 02/12/2003 by R&O. (FCC No. 03-34). Implementation of Sections 309(J) and 337 of the Communications Act of 1934 as amended; Promotion of Spectrum Efficient Technologies on certain Part 90 Frequencies.



## 2.2.5 UHF Radio Equipment Channelization Requirements

- A. Base Station Facilities: Under FCC Rules, all radio base stations operating on MED channels are no longer required to be equipped to operate more than one channel each. Accordingly, these frequency pairs are assigned and/or licensed in a block (MED-1 to MED-102) for shared operation. The State of Florida, EMS Communications Plan shall establish the specific channels requirements per Tables listed under “Florida Countywide MED Channel & CTCSS Allotments” and “Specific MED Channel Assignments for Florida Acute Care Facilities”.
- B. Mobile and Portable Equipment: Under FCC Rules mobile and portable radios operating on the MED channels shall be both wired and equipped for operation on each of the MED channels. However, portable radios operating with a maximum power output of 2.5 watts are exempt from this multi-channel requirement but shall as a minimum have MED-8 SMC and SSC channels.
- C. Paging and Crew Alerting: The secondary, one-way paging frequencies for EMRS are assignable only to organizations eligible under FCC Rules for the transmission of one-way tone and/or voice paging messages that are necessary for the rendition of medical services.

## 2.2.6 Radio Frequency Coordination and Licensing

All requests for radio frequency coordination and licensing must be directed to the appropriate FCC-certified frequency coordinator. Listed below are the two FCC-certified coordinators. All EMS applicants shall obtain approval of eligibility determination from DivTel that shall be included with the application submitted to the FCC-certified frequency coordinator for EMS frequencies. Historically, EMS applicants submitted their applications to IMSA/IAFC/ but, FCC rule changes opened up opportunities for other FCC-certified frequency coordinators.

Emergency Medical and Fire Service:

International Municipal Signal Association/  
International Association of Fire Chiefs (IMSA/IAFC)  
758 North Agave Way  
Ivins, UT 84738  
(401) 738-2220  
FAX (401) 738-7336

Local Government and Police Service, and 800 MHz Public Safety Services:

Associated Public-Safety Communications Officials-International, Inc. (APCO)  
Attn: Frequency Coordination Department  
2040 S. Ridgewood Avenue, Suite 200  
South Daytona, FL 32119  
(386) 322-2500  
FAX (386) 322-2502

Frequency coordination usually requires a coordination fee. Contact the appropriate coordinating organization to determine the current processing requirements and fee schedule prior to submitting applications.

### **2.2.7 Copy of FCC Rules**

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 FCC 601 Form, the applicant certifies to have access to a current copy of the applicable radio service's rules. 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. [Part 90 of these FCC Rules](#) are also available via the Internet.

## **2.3 Florida – Region 9 Plan for 800 MHz Public Safety Radio Communications**

The FCC has established a National Public Safety Plan that specifies requirements governing the Public Safety Services' use of the new 821-824/866-869 MHz band. The National Public Safety Plan was developed to satisfy the two broad objectives of interoperability between communications systems and efficient use of the spectrum. The National Public Safety Plan became effective on February 16, 1988, and established local planning regions for all parts of the United States, Puerto Rico, and the U.S. Virgin Islands. , Florida is Region 9.

The [Florida - Region 9 Plan for Public Safety Radio Communications](#) was subsequently prepared by the Florida Region and Sub-region Plan Committees, which represent a cross-section of public safety communications interests throughout the state of Florida. The first Florida - Region 9 Plan was adopted by the FCC on May 10, 1990. Requests for copies of the Florida - Region 9 Plan should be directed to the chairperson of the appropriate Sub-region Committee.

The Florida - Region 9 Plan contains procedures and criteria for the selection and assignment of, applications for, as well as utilization and protection of the 821-824/866-869 MHz frequencies. It specifies explicit channel allotments for planned and projected use throughout the state. A major component of the Florida - Region 9 Plan establishes implementation and use requirements for five new national mutual-aid channels.

## **2.4 Florida – Region 9 Plan for 700 MHz Public Safety Radio Communications**

The FCC has established rules and regulations governing the Public Safety Services' use of the new 764-776/794-806 MHz band. This frequency band was divided for generally 3 different uses – General Use, Interoperable Use, and State Use. Specifically for the “General Use” channels, the [FCC Region 9 Committee 700 MHz Plan](http://caprad.org/NlectcRm/Plans/Region09/Region%209%20Plan%20final%20v6%201-30-08.pdf) was subsequently prepared by the Florida Region Committee, which represents a cross-section of public safety communications interests throughout the state of Florida. The first plan was adopted by the FCC on April 20, 2009. Requests for copies of this plan should be directed to the chairperson of the appropriate Sub-region Committee or at:

<http://caprad.org/NlectcRm/Plans/Region09/Region%209%20Plan%20final%20v6%201-30-08.pdf>

The plan contains procedures and criteria for the selection and assignment of, applications for, as well as utilization and protection of the General Use channels. It specifies explicit channel allotments for planned and projected use throughout the state.

## **2.5 Florida 700 MHz Public Safety Interoperability Channel Plan**

The FCC has established rules and regulations governing the Public Safety Services' use of the new 764-776/794-806 MHz band. This frequency band was divided for generally 3 different uses – General Use, Interoperable Use, and State Use. Specifically for the “Interoperability Use” channels, the [Florida 700 MHz Public Safety Interoperability Channel Plan](http://dms.myflorida.com/index.php/content/download/72526/432829/version/4/file/700+IO+Plan+Final+V3+05+-+First+Edition+w-DMS+wrap.pdf) was subsequently prepared by DivTel. The plan represents a cross-section of public safety communications interests throughout the state of Florida. The first edition of the plan was completed on November 23, 2010. A copy of this plan can be downloaded at:

<http://dms.myflorida.com/index.php/content/download/72526/432829/version/4/file/700+IO+Plan+Final+V3+05+-+First+Edition+w-DMS+wrap.pdf>

The plan contains “...serves to define the method of administration and oversight for the Interoperability Tactical Channels, National Interoperability Calling Channels and the Low Speed Data Interoperability channels designated for use by Public Safety entities in the 700 MHz Band within Florida.”

## **2.6 Florida Ambulance Deployment Plan**

“To provide the best possible organized response during a major disaster, it is urgent to move forward in developing a unified system that combines the State’s many EMS resources from within the volunteer and career Emergency Medical Services, fire based ambulance services, third service based ambulance services, commercial ambulance services, and hospital based ambulance services, here to for referred to as “ambulances”. The development of the Florida

[Ambulance Deployment Plan](#) (ADP) is intended to serve as the mechanism for such a unified response.”<sup>4</sup> The plan can be found at:

<http://www.doh.state.fl.us/demo/ems/AmbulanceDeploymentPlanNoNoticeEvent.pdf>

It addresses common communications capabilities for ambulance strike teams, with a section specifically addressing communications (starting at page 8 of the plan).

## **2.7 Florida Public Health and Medical Communications Plan**

This plan “...will provide the means by which public health and medical resources can be accessed, mobilized, managed, and coordinated in both normal and adverse/disaster situation.” It “...is used to guide and direct the communications between all responders of the Public Health and State ESF 8 response systems and local ESF 8 response systems following a man made or natural disaster.”<sup>5</sup> MED-82 is specifically referenced by this plan for County Health Departments in addition to its primary use per the Federal Communications Commission’s Part 90 Rules and Regulation.

## **2.8 Florida Mutual Aid Channel (MA-FLA)**

The State of Florida has established specific requirements governing the use of the 808/853.3875 MHz channel (name MA-FLA). This makes available to eligible agencies a Public Safety mutual-aid channel authorized for use during situations requiring inter-service communications necessary toward safeguarding life, or property within the state of Florida. Refer to Appendix B.

## **2.9 Federal Aviation Administration**

Installation and operation of land mobile radio equipment on board aircraft is subject to Federal Aviation Administration (FAA) and FCC rules and regulations. For the purpose of this Plan, Appendix C is provided for implementing radio systems in aircraft that use frequencies in the land-mobile radio services.

## **2.10 NIMS, SAFECOM, Interoperability Continuum, SCIP, NIFOG, and FIFOG**

The EMS Communications Plan makes reference to NIMS, SAFECOM, Interoperability Continuum and SCIP.

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<sup>4</sup> Ambulance Deployment Plan, Nov. 26, 2007, pg. 4

<sup>5</sup> Florida Public Health and Medical Communications Plan, version 1.0, June 2009, pg. 4.

### **2.10.1 NIMS**

The State of Florida has adopted the use of the National Incident Management System (NIMS) into all facets of its operations. This includes training, exercising, mobilizing, deploying and recovery of all communications resources. Public safety personnel are expected to complete Incident Command System (ICS) and NIMS training as part of their training regimen.

### **2.10.2 SAFECOM**

The SAFECOM Statement of Requirements (SoR), envisions Public Safety Communications (PSC) operations as taking place in a networking environment that is capable of operating as a “system of systems” in order to satisfy the requirements of public safety agencies for communication systems that provide increased functionality and efficiency, in addition to built-in interoperability. That is, wireless devices, local networks, regional networks, and wider area networks are envisioned as being able to work together to pass information back and forth seamlessly. The SoR can be read in more detail in section 7.0, Concepts of Mobile Data Communications.

### **2.10.3 Interoperability Continuum**

Interoperability Continuum is developed by the Department of Homeland Security’s SAFECOM and is designed to assist emergency response agencies and policy makers to plan and implement interoperability solutions for data and voice communications. This tool identifies five critical success elements that must be addressed to achieve a sophisticated interoperability solution to include: governance, standard operating procedures (SOPs), technology, training and exercise, and usage of interoperable communications. Jurisdictions across the Nation can use the Interoperability Continuum to track progress in strengthening interoperable communications. For additional information, consult IO website at:

[http://www.safecomprogram.gov/NR/rdonlyres/54F0C2DE-FA70-48DD-A56E-3A72A8F35066/0/Interoperability\\_Continuum\\_Brochure\\_2.pdf](http://www.safecomprogram.gov/NR/rdonlyres/54F0C2DE-FA70-48DD-A56E-3A72A8F35066/0/Interoperability_Continuum_Brochure_2.pdf).

### **2.10.4 Florida’s Statewide Communications Interoperability Plan**

Florida’s Statewide Communications Interoperability Plan (SCIP) documents the existing communications resources, plans and information needed to efficiently implement interoperability communications solutions for state and local agencies. The SCIP is a secure and protected under Chapter 119.07, Florida Statute and is not subject to public records. The Law Enforcement Communications Plan enhances the SCIP. For additional information, contact Greg Holcomb (352-343-9491, or e-mail him at [GHolcomb@lakecountyfl.gov](mailto:GHolcomb@lakecountyfl.gov)) or Carlton Wells (850-922-7426, or email him at [carlton.wells@dms.myflorida.com](mailto:carlton.wells@dms.myflorida.com)), both are Statewide SCIP points of contact.

## 2.10.5 National Interoperability Filed Operations Guide

The [National Interoperability Filed Operations Guide \(NIFOG\)](#) “...is a collection of technical reference material for radio technicians responsible for radios that will be used in disaster response applications.”<sup>6</sup> It is maintained by the U.S. Department of Homeland Security, Office of Emergency Communications. Version 1.2 can be found at:

<http://www.npstc.org/documents/NIFOG%20v1.2%204-14-2008.pdf>

It provides “a pocket-sized listing of land mobile radio (LMR) frequencies that are often used in disasters or other incidents where radio interoperability is required, and other information useful to emergency communicators. It is based on the “National Interoperability Frequency Guide”.<sup>7</sup>

## 2.10.6 Florida Incident Field Operation Guide

The [Florida Incident Field Operations Guide \(FIFOG\)](#) is an all-hazard approach to incident management and is a cooperative effort by Florida’s emergency management agencies. It is maintained by the State Fire Marshal. The 2006 edition can be found at:

<http://www.myfloridacfo.com/sfm/SFM-fog-2006.htm>

In the FIFOG, [Appendix A](#) includes communications information, both generally and specific to various public safety disciplines.

## 2.11 Communications Approvals

### 2.11.1 General

Chapter 401.024, Florida Statutes, requires that “...no emergency medical services telecommunications system shall be established or present systems expanded without prior approval from the Department of Management Services.” This requirement applies to all EMS telecommunications systems, regardless of funding source. All requests for approval shall be submitted in writing to:

EMS Communications  
Division of Telecommunications  
4030 Esplanade Way  
Tallahassee, Florida 32399-0950

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<sup>6</sup> National Interoperability Field Operations Guide, ver. 1.2, Introduction page.

<sup>7</sup> National Interoperability Field Operations Guide, ver. 1.2, pg. 1.

## 2.11.2 Submittal Requirements

All submittals for approval shall comply with the following requirements:

- A. Showing of Professional Engineering: Each submittal which proposes an establishment or expansion of systems, where such establishment or expansion involves "engineering" as defined by Section 471.005(7), F.S., shall include a showing that such engineering has been accomplished by a registered individual or certified firm qualified and authorized pursuant to Chapter 471, Florida Statutes, to practice engineering within the state of Florida.

If the vendor claims exemption to Chapter 471 as specified in section 2.9.2(A), an alternative to a showing of professional engineering may be as follows:

1. A performance bond required from the firm/vendor providing "engineering" services, and/or
2. An acceptance test procedure (ATP) to demonstrate system expectations.

In the event of mobile and/or portable equipment to be purchased for use on an existing system, a statement from the requestor may be included with the submittal attesting the expected coverage reliability already being met by that existing system for associated VDR, LMC, and/or SMC communications throughout the requestor's operational area.

- B. Complete Description: Each submittal shall include a complete description of the proposed communications system compliant with Section 5.0 and/or equipment compliant with Section 6.0, to include:
1. Type of equipment (mobile, portable, base station, antenna tower, control console, switching matrix, telemetry, etc.).
  2. Frequency band, number of channels, channel frequencies, and channel descriptions (i.e., type of talk-groups such as VDR, LMC, mutual aid, etc.).
  3. Location of equipment.
  4. System diagram (if fixed station equipment is proposed).
  5. Transmitter power output, antenna height, antenna type/directivity, and coverage reliability contour(s) per Section 5.2.
  6. Special options (tone-controlled squelch, channel scan, selective call, telemetry (if required), etc.).
  7. Line item budget delineating equipment quantities and unit pricing.
  8. Any other information or documentation that the requesting organization deems pertinent to the project.
- C. Statement of Need: A statement as to how the proposed system and/or equipment will benefit the proposing organization and the intended recipients of EMS care, and whether the communications project will be integrated into an existing system of EMS communications. If an existing system is involved, indicate expected improvements and enhancements to present operations.

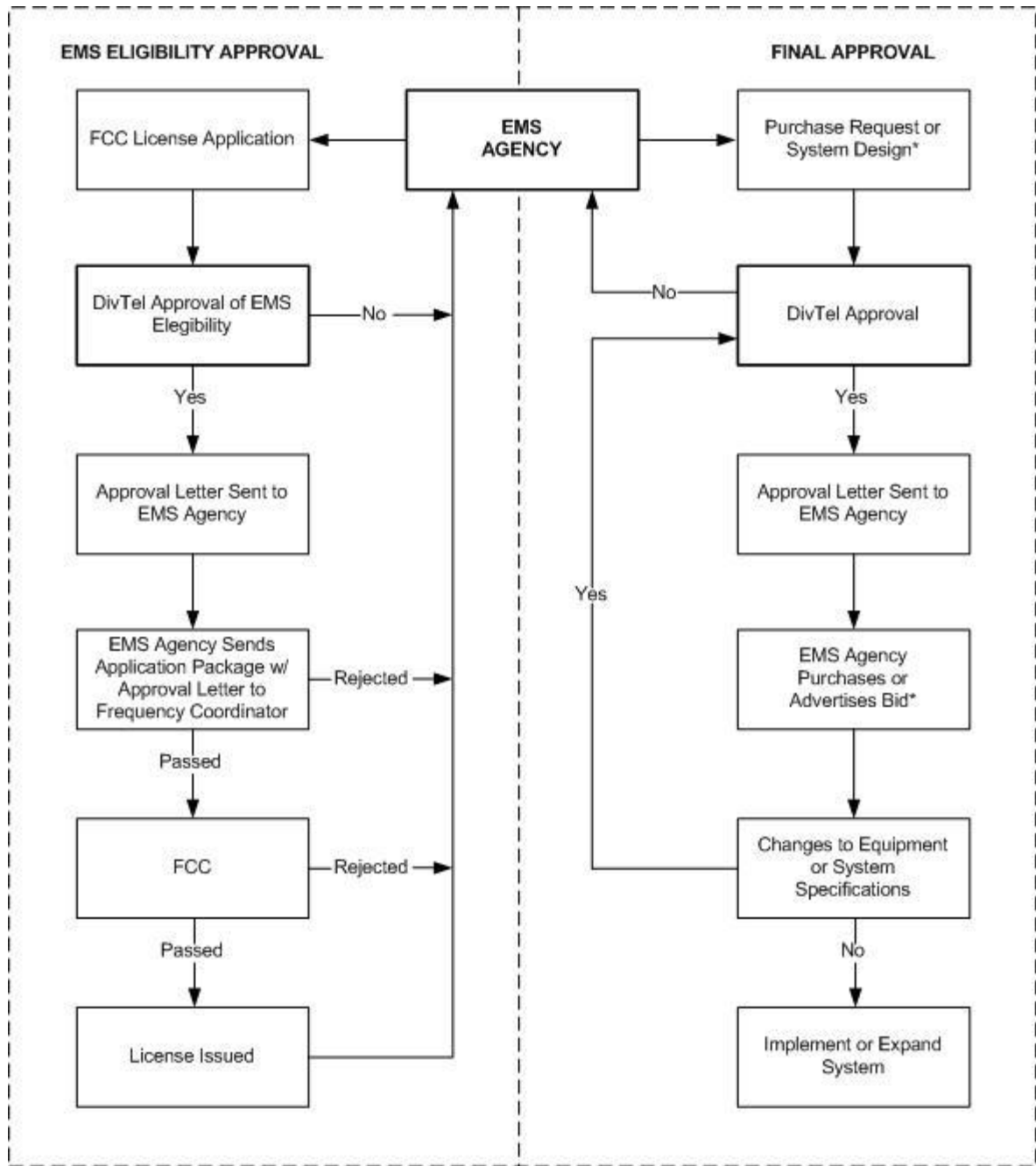
D. Copies of or Applications for FCC Licenses: Copies of FCC licenses or applications, or an indication of commitment to apply, which indicate whether the project requires radio frequency coordination, license modifications, or FCC Rule waivers. All applicants in the EMRS shall obtain an approval letter of eligibility from the DivTel that shall be included with the application submitted to the FCC-certified frequency coordinator for EMRS frequencies. Figure-1 depicts how this approval fits in the radio station license process.

### 2.11.3 Approval Procedure

A. Final Approval: Implementation of new or expansion of existing telecommunications systems, regardless of whether purchased with grant funds or not, require a written Final Approval **prior** to a commitment to purchase. Furthermore, Final Approval for EMS Grants Program projects must occur **after** the date of grant award. A commitment to purchase is considered to be a purchase order or award of a contract to purchase. It is in the best interest of each agency to obtain Final Approval prior to commencing formal or binding competitive processes such as an Invitation to Bid or Request for Proposals. Allow at least 30 days for DivTel to process the Final Approval request. Figure-1 depicts how this final approval fits in the implementation or expansion process.

B. Additional Quantities: Procurement of additional quantities of either mobile radio equipment, handheld portable radio equipment, paging receivers, and associated accessories which previously received Final Approval, shall not require a subsequent approval for the additional quantity provided that such procurement is for the same equipment, is for use by the same organization, and which is purchased within one year of the date of the original Final Approval. However, each County or Matching Grant requires a separate and associated Final Approval.





\*Assistance from DivTel may be requested.

**Figure 1 – DivTel Approval Process**

**END OF SECTION 2.0**

## **3.0 DESIGN CRITERIA FOR EMS COMMUNICATIONS**

### **3.1 General**

An EMS communications system must provide the means by which emergency medical resources can be accessed, mobilized, managed, and coordinated in both normal and adverse situations. An EMS communications system must therefore employ sufficient communications paths and operational capabilities among all participants to facilitate the functional EMS communications designs described in the remainder of this section.

### **3.2 Citizen Access**

The EMS communications system must have the ability to receive and process any incoming requests that report emergencies and/or require emergency medical assistance. Individual citizens should have the ability to summon help rapidly in an emergency situation whether for medical, police, fire, rescue, or other emergency needs. Local, statewide, and national uniformity is required to fully enable this concept.

The [State of Florida 9-1-1 Emergency Telephone Number Plan](#) 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, with an objective of reducing the response time to situations requiring law enforcement, fire, medical, rescue, and other emergency services.. The 9-1-1 Plan was developed in response to the Florida Emergency Telephone Act of 1974.

### **3.3 Vehicle Dispatch and Response (VDR)**

On notification of need for emergency medical assistance, the communications system shall provide a VDR talkgroup/channel enabling prompt dispatch of all required EMS vehicles to the location of the emergency. The communications system must further enable dispatchers to communicate with responding vehicles while en route to the scene, while at the scene, while en route to hospital emergency department facilities, and during their return to availability for further assignment.

#### **3.3.1 Automatic Vehicle Location (AVL)**

Use of AVL systems can provide real-time geographic location of vehicles to ensure the nearest available vehicle is dispatched to the scene of an incident. Additionally, an AVL system can display vehicle positions to dispatchers 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 VDR.

### **3.3.2 Crew Alert Paging**

In addition to Vehicle Dispatch and Response (VDR), some EMS communications systems may require the direct alerting of EMS personnel either individually or in groups. This can be accomplished through the use of either a monitor or paging receivers, or by means of portable radios with selective call capability. This concept is limited only to such alert paging required to facilitate the immediate response and action of personnel resulting from a request for emergency medical services.

### **3.4 Local Medical Coordination (LMC)**

The EMS communications system shall provide EMS field personnel with a communications system and/or talkgroup/channel that permit the exchange of vital information between EMS licensed providers, emergency departments and/or medical directors. Minimally, the LMC channel shall have the capability to provide communications capability to emergency department personnel from at least a 5-mile radius of the emergency department facility from an EMS transport unit en route.

#### **3.4.1 Geographical Assigned Hospital LMC**

To meet the demands associated with isolated critical situations, Mass Casualty Incidents, MCIs, and to provide a at least a virtual “stand alone” radio system, hospitals will be assigned a specific talkgroup/channel. Minimally, this geographically-assigned hospital LMC talkgroup/channel shall have the capability to provide communications capability to emergency department personnel from at least a 5-mile radius of the emergency department facility from an EMS transport unit en route. A UHF MED channel geographically-assigned to each hospital for LMC is shown in Table 5-1.

### **3.5 Countywide Medical Coordination (CMC)**

In addition to VDR and LMC talkgroup/channel capability, the EMS communications system within a county should provide a CMC communications talkgroup/channel to enable dispatch and response between EMS field personnel, hospital emergency departments and dispatch center personnel during isolated critical situations MCIs during which prolonged use of the VDR channel would not be feasible due to normal and/or other VDR communications traffic. Such uses of the CMC talkgroup/channel must be limited only to the temporary duration of such situations. Ideally this channel should provide communications while the units are at the scene of the medical emergency. In addition to LMC capability, the EMS communications system can utilize the CMC talkgroup/channel to enable medical coordination between EMS field personnel and emergency department personnel during situations in which a vehicle is unable to access an emergency department LMC talkgroup/channel in isolated critical situations during which prolonged use of the LMC talkgroup/channel would not be feasible due to other LMC communications traffic. Such uses of the CMC talkgroup/channel must be limited only to the

temporary duration of such situations. A UHF MED channel geographically-assigned to each County for CMC is shown in Table 5-1.

### **3.6 Proprietary Trunked Radio Systems**

EMS communications systems may migrate to specialized “trunked” radio systems that will shift VDR, LMC, and CMC communications to a proprietary radio infrastructure. Radio systems approved for this technology will meet those agencies requirements for LMC communications that provide EMS field personnel with a communications system that permits the exchange of vital information between EMS licensed providers, emergency departments and/or medical directors.

### **3.7 Statewide Medical Coordination (SMC)**

In addition to VDR capability, the EMS communications system shall provide a mutual aid communications channel to enable dispatch and response between EMS units and dispatch centers during situations in which a vehicle is out of its prime area and unable to access a dispatch center using the VDR talkgroup/channel of that area, and in isolated critical situations (like MCIs) during which prolonged use of the VDR talkgroup/channel would not be feasible due to other normal VDR communications traffic. Such uses of the SMC channel must be limited only to the temporary duration of such situations.

In addition to LMC and/or CMC capability, the EMS communications system must provide a communications channel to enable medical coordination between EMS field personnel and emergency department personnel during situations in which a vehicle is out of its prime area and unable to access an emergency department using the LMC or CMC talkgroup/channels of that area, and in isolated critical situations (like MCIs) during which prolonged use of the LMC or CMC talkgroup/channel would not be feasible due to other normal LMC and/or CMC communications traffic. Such uses of the SMC channel must be limited only to the temporary duration of such situations.

MED-8 is specifically assigned for SMC communications using radio equipment in the UHF band. Radio equipment in the 700 MHz and 800 MHz band have interoperability and mutual aid channels available for SMC communications when assigned for such use on a real-time basis by the communications center controlling those channels.

### **3.8 Local Scene Coordination (LSC)**

The EMS communications system should have the capability for mobile and portable radios of the same local area to communicate directly unit-to-unit while on the scene of an emergency requiring multiple vehicle response. The LSC talkgroup/channel shall be a mobile-only talkgroup or the “talk-around” channel assigned with the CMC talkgroup/channel for that county. MED

channels geographically assigned may provide this capability. The 700 MHz and 800 MHz band have interoperability and mutual aid channels available for this capability when assigned for such use on a real-time basis by the communications center controlling those channels.

### **3.9 Statewide-Scene Coordination (SSC)**

The EMS communications system should have the capability for mobile and portable radios from different local areas to communicate directly unit-to-unit while on the scene of an emergency requiring multiple vehicle response. The SSC channel within the state of Florida is the “talk-around” channel associated with MED-8, 463.1750 MHz transmit, 468.1750 MHz receive, CTCSS 167.9 Hz. “Talk-around” on other mutual aid channels are governed by the respective communications plan for direct, unit-to-unit radio communications (i.e., 700 MHz interoperability and 800 MHz mutual aid channels). The 700 MHz and 800 MHz band have interoperability and mutual aid channels available for this capability when assigned for such use on a real-time basis by the communications center controlling those channels.

### **3.10 Medical Resource Coordination (MRC)**

The EMS communications system must provide a direct 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 hurricanes, tornadoes, floods, fires, etc., when telephone lines, including cellular systems, are inoperative, or when telephone central office switching facilities are jammed or disabled. Typical MRC communications shall be provided by the SMC, MED-8 system unless otherwise approved by DivTel.

### **3.11 Biomedical Telemetry**

Biomedical telemetry is the process through which data relating to one or more biological functions of a patient are transmitted by radio or other means, and which are then remotely received, displayed and/or printed for use by emergency department personnel. Requirements for biomedical telemetry are subject to the determination of the provider's medical director in accordance with the Administrative Rules of the Florida Department of Health.

### **3.12 Interagency/Mutual Aid Coordination**

Medical emergencies often involve the response of other public safety services, most commonly police 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 the county Emergency Operations Center (EOC) is involved.

Although the various public safety agencies may operate on different radio frequencies, interagency radio communications can be provided by use of such mechanisms such as radio and/or voice over internet protocols (RoIP or VoIP) like the Florida Interoperability Network, radio frequency control stations, cross-band operations, and inter-service 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 hurricanes, tornadoes, floods, fires, etc., when telephone lines may be inoperative, or when telephone central office switching facilities are jammed or disabled. Table 4-1 provides a list of wide-area and statewide interservice and/or mutual aid frequencies currently in use.

The Florida Interoperability Network (FIN) offers an alternative for interagency/mutual aid coordination. FIN can patch disparate radio systems and allow for cross-band, interagency communications. FIN can be referred to as an Extended Area Network (EAN). EAN is addressed with other terms in section 7.2, SAFECOM Statement of Requirements.

### **3.13 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 is applied to base station or other fixed radio equipment and is to:

- A. Enable VDR communications to continue despite outage of the primary VDR radio base station.
- B. Enable CMC communications to continue despite outage of a primary CMC radio base station.
- C. Enable LMC communications to continue despite outage of the primary LMC radio base station.

In this plan, the back-up communications concept includes only fixed station radio equipment, and does not include any communications other than VDR, LMC, and CMC.

### **3.14 Telephone Interconnection**

The EMS communications system may provide interconnection with specialty information and treatment centers for hazardous material spills, burn, hyperbaric oxygen, spinal cord injury, and neonatal centers. In addition, the required level of confidentiality may exceed what is typically available within land-mobile radio systems. This concept 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.

**END OF SECTION 3.0**

## **4.0 FREQUENCY PLAN**

### **4.1 Background**

The FCC created the EMRS out of the SERS. Effective April 2, 1993, FCC Rules designated International Municipal Signal Association/International Association of Fire Chiefs (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 IMSA/IAFC is expected "...to verify that all applicants are compatible with existing regional and local emergency medical plans."

This change in FCC Rules was not intended to displace local and state planning efforts, but rather to ensure a single point of contact to the Commission for matters relating to applications for coordination and licensing as well as to provide a nationally uniform and efficient procedure for such applications.

It is apparent that any successful local or state radio frequency planning effort must be consistent with the FCC-certified coordinating organization procedures. DivTel will maintain liaison with the certified coordinators toward the mutual goal of effective and efficient use of the radio spectrum by EMS agencies within Florida.

### **4.2 Channel Allotment Principles**

Within the domain of the PLMR services, CFR 47, and the limits of frequency modulation (FM) radio technology, there are 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 method is simpler and less costly to implement, particularly for small systems in less frequency-congested areas. The Real-Time method results in considerable improvement in 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 be minimized, channels be re-assigned as closely as possible, and that traffic loading on each channel be 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.



#### 4.2.1 Harmful Interference

Two types of harmful interference are defined below – co-channel and adjacent channel:

- A. Co-channel Interference: For frequencies below 470 MHz, harmful interference is defined by this Plan as an “undesired” signal received instead of the “desired” signal. Technically, the undesired signal must have greater than a 5% probability of exceeding a power level of 12 dB, 6dB in base-to-base situations, less than a desired signal power level, when the desired signal has a 95% probability of achieving a 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 MHz, 700 MHz, and 806 MHz bands, channel allocation principles and interference criteria are governed by FCC Rules. For 700 MHz General Use channels, 821 MHz channels, and 700 MHz Interoperable Use channels, allocation principles and interference criteria are governed by the Florida - Region 9 Plan for 700 MHz Public Safety Radio Communications, the Florida - Region 9 Plan for 800 MHz Public Safety Radio Communications, and Florida’s 700 MHz Public Safety Interoperability Channel Plan, respectively.
- B. Adjacent-Channel Interference: Adjacent-channel interference is defined as "harmful" when a desired 95% reliability signal is degraded by an undesired 5% reliability adjacent channel signal by more than the criteria established by TIA/EIA standards. Channel assignments are based on an analytical showing of no harmful interference. Adjacent channel interference is not normally considered in other frequency bands except for the criteria established in the Florida - Region 9 Plan for 700 MHz Public Safety Radio Communications, and the Florida - Region 9 Plan for 800 MHz Public Safety Radio Communications, and Florida’s 700 MHz Public Safety Interoperability Channel Plan.

#### 4.2.2 Geographic Allotment

Geographic Allotment is the assignment of a channel such that a licensee has generally full-time 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/alternate 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 Florida, application of the Geographic Allotment concept presents special difficulties since the majority of the state, from the panhandle through the peninsula, is scarcely more, and often less, than 100 miles in width.

The Geographic Allotment method is normally applied on all VHF channels, both Low and High Bands, and 700/800 MHz conventional, non-trunked, channels. The 450-470 MHz (UHF) Band utilizes both Geographic and Real-Time Allotment in the case of EMS Communications.

### 4.2.3 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, 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 be capable of transmitting and receiving on all of the 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 be 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, computer-controlled trunking systems still require approximately 70-mile minimum separation between independent systems using the same frequencies.

The Real-Time Allotment method, within Florida Emergency Medical Services communications, may be applied to MED channels 1 through 7 and MED channels 12 through 72 of the UHF Band portion of the Emergency Medical Radio service.<sup>8</sup>

## 4.3 Vehicle Dispatch and Response Channels

### 4.3.1 Ground Vehicle Communications

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 (450-473 MHz, including UHF TV channel sharing frequencies in Florida), 700 MHz Band, and the 800 MHz Band, in both conventional and trunked modes.

The use of MED channels 9, 92, 10 or 102 for VDR shall be in accordance with the statewide allotment plan for these frequencies. Currently approved frequency and CTCSS tone allotments of MED-9 92, 10 or 102 are shown on Table 4-2, Florida MED Channel Allotments.

The use of any of MED channels 1 through MED channels 7 and 12 through 72 for VDR shall also be in accordance with the statewide allotment plan, and such allotments are subject to no harmful interference to LMC and/or CMC operations on these channels. MED-8 shall not be

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<sup>8</sup> MED channel sequences 1, 2, 3, ... 7 and 12, 22, 32, ... 72 are referenced for specific planning, implementation and operational use.

used for primary VDR communications except to satisfy the SMC and/or back-up requirements defined in Section 5.0.

### **4.3.2 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. Sub-part I does not allow for medical communications. These channels are associated with Air-traffic Control Centers, Airport Control Towers and "Unicom" communications systems. By design these radio systems are limited in the communications coverage capabilities they would provide for low flying rotorwing aircraft. Given the limitations associated with these radio frequencies by rule and/or design, their use by prehospital for flight following is not recommended for flight following.

Frequencies within the applicable PLMR services of FCC Rules Part 90 may be utilized for Air Ambulance Dispatch and Response and/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 Pool requires prior approval by DivTel.

DivTel has established specific radio frequency allotments both "Air Primary" and "Air Secondary" within Florida for aeromedical Dispatch and Response communications. Rotor-winged aircraft that are licensed for prehospital will be assigned specific UHF pair within the 453/458 MHz band as Air Primary for VDR. Rotor-winged aircraft, which provide inter-facility transports only, will be licensed in the VHF-Lo Band, 47 MHz. DivTel will assist these agencies with waivers to the FCC rules to increase the output power of the radio from the aircraft to facilitate the longer transports associated with these aircraft.

All licensed rotor-winged aircraft and dispatch centers within the state of Florida shall have the ability to communicate on the Air Secondary frequency 155.340 MHz, CTCSS 167.9 Hz. This provides continued flight-following with the aircraft while medical crews utilize their EMS radio to provide medical reports (LMC, CMC or SMC). Secondly, this Air Secondary frequency provides a "Statewide" radio system for MCI coordination with aircraft that would necessitate communications with the various aircraft, dispatch centers and/or landing zone management. Further, this frequency shall provide EMS helicopter personnel with continued safety of flight situations in which a vehicle is out of its prime area and unable to access its dispatch center. Such use of the Air Secondary channel shall be limited only to the temporary duration of such situations unless otherwise approved in writing by DivTel. This Air Secondary frequency is also in concert with the Mutual Aid channels "Red, White and Blue" channels.

#### **4.4 Countywide Medical Coordination Channels**

MED channels 1 through 7 and MED channels 12 through 72 may normally be used for primary CMC for both ground and air ambulance vehicles. Use of these channels shall be in accordance with the statewide allotment plan. Currently-approved frequency and CTCSS tone allotments for MED-1 through 7 and MED-12 through 72 are shown on Table 4-2, Florida MED Channel Allotments.

If the primary CMC channel to be implemented or expanded would cause harmful interference to or from the primary LMC channel of another user, then DivTel will analyze the MED channel allotments of all affected systems and establish an appropriate plan that may require the reconfiguration of existing systems.

The use of any radio frequencies other than MED-1 through MED-7 and MED-12 through 72 for primary CMC shall be only as specifically approved by DivTel.

MED-8, MED-82, MED-9, MED-92, MED-10, and MED-102 shall not be used for primary LMC except for MED-8, which may be used to satisfy the SMC and/or back-up requirements defined in Section 5.0 of this Plan.

#### **4.5 Local Medical Coordination (LMC) Channels**

The primary requirements of the EMS Communications Plan are for every EMS permitted vehicle to have the capability for two-way radio communications with a higher level of medical care “Medical Control.” Specifically, this capability shall exist for radio communications should the EMT/firefighter/paramedic need to deviate from established medical protocols and/or request additional medical assistance from the medical director and/or hospital. Accordingly, every hospital emergency department shall have the capability to reliably communicate to at least a 5-mile radius of its facility on the LMC channel approved or assigned by DivTel in accordance with Section 5.0 of this Plan.

#### **4.6 Medical Resource Coordination (MRC) Channels**

Historically, two primary channels for Medical Resource Coordination within Florida have been on MED-8, transmit and receive on 463.175 MHz with CTCSS of 167.9 Hz, and on 155.340 MHz (transmit and receive, with no CTCSS). Each of these channels is used for MRC communications in parts of the state, and each has advantages and disadvantages depending on both geographic location and technical considerations.

In northern Florida, MED-8 is generally used due to other uses of 155.340 MHz within Georgia and Alabama. MED-8 is used in many other parts of Florida where 155.340 MHz is in use for land-mobile communications.

155.340 MHz is used in some areas where MED-8 point-to-point use has been determined unfeasible. In some of the more congested areas of the state, neither channel is in use for either technical problems with interference, or simply the lack of a wireless MRC system. Microwave, 700 MHz, and 800 MHz communications are other systems that may potentially qualify as the MRC channel for a geographic region.

The establishment of a cohesive network of MRC systems within Florida is a goal of DivTel. Until such a plan is established, the implementation or expansion of MRC systems will be determined on a case-by-case basis.

#### **4.7 Statewide Medical Coordination (SMC) Channel**

MED-8, 463.175 MHz base transmit, 468.175 MHz base receive, with CTCSS of 167.9 Hz, shall be used for primary SMC in permitted vehicles with UHF radio equipment during times the vehicles are used outside their normal operating area, and LMC, CMC, or VDR talkgroups/channels are not available. MED-8 was segregated by the Plan and established as the only UHF MED channel for SMC. The capabilities of the SMC channel are designed to provide two objectives within the EMS community.

1. Primarily, every licensed EMS transport with UHF radio equipment, regardless of other frequencies radio systems employed within a region, could communicate with a hospital in any region if necessary.
2. Additionally, EMS systems in the state have established MED-8 SMC capabilities within their communications/dispatch centers to provide assistance for out-of-region EMS units with UHF radio equipment while in transit through the region and backup to the EMS VDR channel.

Simply put, MED-8 has been established to maintain UHF radio communications with emergency departments, EMS dispatch centers, and/or other EMS communications systems throughout the state while transporting patients. The intent of the Plan is to establish a common medical communications system, channel, which would provide the EMT/paramedic with UHF radio equipment the ability to communicate within a county and/or municipality regardless of that region's primary communications infrastructure.

Mutual aid channels identified for public safety (particularly 700 MHz and 800 MHz) use may be used in accordance with that respective communications plan, and during times the vehicles are used outside their normal operating area, and LMC, CMC, or VDR talkgroups/channels are not available.

##### **4.7.1 SMC (MED-8) System Standard**

- A. Design Specifications: This Plan provides for a statewide system for selective activation of regional MED-8/SMC repeater stations and selective addressing of local emergency departments and county EMS dispatch centers to satisfy the SMC requirements of the this

Plan. The end user accomplishes all necessary selective signaling. Other than the initiating party and the receiving party, no additional human intervention will be necessary to establish or maintain two-way radio communication via this addressing system.

These signaling aspects of this plan anticipate the use of Dual-Tone Multi-Frequency (DTMF) for selective access to repeaters and selective addressing of individual stations. The DTMF is an industry standard tone scheme used for audio signaling and control purposes and is generally defined as the simultaneous generation of two specific audio tones, such as when any one button of a standard DTMF keypad is depressed. DTMF is compatible with the original AT&T “Touch-Tone®” system initially used in telephone systems.

The overall architecture of the proposed MED-8 statewide radio system will provide for extended-range, vehicle-to-base communication by virtue of at least one wide-area SMC repeater in each county. Note that all SMC repeaters employ the identical MED-8 frequency pair and CTCSS tone in accordance with this Plan regardless of their geographic separation. Consequently, it is essential that all MED-8 repeaters must remain in the repeat disable mode unless actually being used to relay a communication between two radio stations. Otherwise, it is likely that nearby repeaters will interfere with one another and disrupt or altogether prevent any associated radio communications.

Another feature of the radio system is the continued ability to operate, within normal range limits, even if repeaters are not available due to equipment failure, severe weather, or other reasons. This capability applies to both mobile and radio frequency control stations, and is typically known as repeater talk-around (SSC). When operating in talk-around mode, the DTMF signaling aspects of the system are fully preserved; but, subject to the native range of the radios involved in any particular exchange. If extended talk-around range is required for any particular hospital or dispatch facility, consideration should be given for use of an omni-directional antenna for the MED-8 control station, rather than the directional antenna typically provided.

- B. Procedures: In a typical MED-8 communication in fictitious Paradise County, county code 68, a mobile radio user would activate the appropriate regional MED-8 repeater by sending DTMF codes “6”, “8” and “1”, designating the first and only repeater in county 68, immediately followed by a “\*”, wake-up, code if required. Once the repeater is activated, the mobile user would address the desired control station and these signals would be re-transmitted and heard by all monitoring MED-8 stations. If necessary, a DTMF regenerator could be installed in the repeater station to improve the purity of the re-transmitted tones.

In this example, the mobile unit would transmit selective address “6827” to activate the control station decoder at the emergency department of County General Hospital. Upon hearing the correct DTMF sequence, the control station at the hospital would decode the selective address, wake up, and the staff could hear the subsequent voice call. If desired, the hospital decoder could also activate some type of attention-getting device to ensure

that the emergency department staff is made aware of an incoming call. Once the staff answers the radio call, the radio exchange will continue until completed, at which time the staff could manually reset the decoder, or the decoder could be set to reset automatically after a pre-determined time-out period.

At the same time, the mobile unit crew would deactivate the regional repeater by sending DTMF codes “6”, “8”, and “1”, followed by a “#”, knock-down, code if required. The repeater would then revert to the repeat-disable mode and monitor the receive frequency for any subsequent calls.

NOTE: Should a regional repeater be out-of-service for whatever reason, the same basic calling procedures would apply after first switching to the repeater-talk-around, simplex, mode of operation.

Each regional MED-8 repeater station will be equipped with a DTMF decoder, set to respond to at least two groups of DTMF tones, and an internal DTMF re-generator.

C. Regional DTMF Addresses:

Each county is assigned a unique two-digit county code (example: 68). Each regional repeater will be assigned a related three-digit address (example: 681). Each control station will be assigned a unique four-digit selective address, subordinate to the county code (example: 6815).

This scheme will allow for up to 99 counties with up to nine regional repeaters and nearly 100 uniquely addressed control stations per county. In addition, all DTMF decoders will respond to a two-digit code (00) as a statewide ALL-CALL address, a four-digit common address as a countywide call (example for fictitious Paradise County would be: 6899), and a unique four-digit individual address (example: 6842).

The following list of primary county DTMF addresses was derived from an alphabetical list of Florida counties compiled by the State EMS Office for reporting purposes:

01 Alachua	19 Franklin	37 Leon	55 St. Johns
02 Baker	20 Gadsden	38 Levy	56 St. Lucie
03 Bay	21 Gilchrest	39 Liberty	57 Santa Rosa
04 Bradford	22 Glades	40 Madison	58 Sarasota
05 Brevard	23 Gulf	41 Manatee	59 Seminole
06 Broward	24 Hamilton	42 Marion	60 Sumter
07 Calhoun	25 Hardee	43 Martin	61 Suwannee
08 Charlotte	26 Hendry	44 Monroe	62 Taylor
09 Citrus	27 Hernando	45 Nassau	63 Union
10 Clay	28 Highlands	46 Okaloosa	64 Volusia
11 Collier	29 Hillsborough	47 Okeechobee	65 Wakulla
12 Columbia	30 Holmes	48 Orange	66 Walton
13 Dade	31 Indian River	49 Osceola	67 Washington
14 Desoto	32 Jackson	50 Palm Beach	70 Kennedy Space Center
15 Dixie	33 Jefferson	51 Pasco	71 Pensacola Naval Air Station
16 Duval	34 Lafayette	52 Pinellas	72 Tyndall Air Force Base
17 Escambia	35 Lake	53 Polk	73 Macdill Air Force Base
18 Flagler	36 Lee	54 Putnam	74 Patrick Air Force Base
			75 Jacksonville Naval Air Station
99 Countywide All Call Suffix			
00 Statewide All Call Suffix			

D. In-County DTMF Addresses: Each individual county will be responsible for assigning DTMF codes to repeaters and control stations within their respective area in strict accordance with the addressing scheme noted in this Plan. The following is an example addressing the scheme for “Paradise County” (county code 68):

- NORTH (primary) MED-8 repeater access – 681
- SOUTH (secondary) MED-8 repeater access – 682
- Countywide ALL-CALL code – 6899
- County EMS dispatch center – 6801
- Hospital A – 6823
- Hospital B – 6834
- Hospital C – 6838
- Hospital D – 6842
- Hospital J – 6859
- City A EMS dispatch center – 6863
- City B EMS dispatch center – 6867
- County Emergency Management/EOC – 6874
- Private ambulance dispatch center – 886

NOTE: In this example that the first two digits are always 68 or the county code, while the second two digits can be randomly assigned, but must result in a number that is not assigned to any other station within the County.

E. Equipment Considerations:

1. Mobile Units: All MED-8equipped mobile radios are essentially capable of operation on the new system. Additional programming may be required to add talk-around capability. DTMF replacement microphones are readily available from numerous sources and can be attached to most mobile radios with little difficulty.



2. Repeaters: DTMF decoding and re-generating devices are generally available for LMR fixed equipment. DivTel has identified an appropriate, readily available product that can be attached to most typical MED-8 repeater stations by local technicians.
  3. Hospitals or Dispatch Centers: If a hospital or dispatch center currently has a separate MED-8 station, it may be possible to convert the existing equipment to the new configuration. However, those medical facilities that currently operate primary or backup repeater stations that function on one or more of the standard MED channels may prefer to leave that equipment undisturbed. Rather than attempting to integrate the new MED-8 functionality into existing radio equipment, it may ultimately be more cost effective for hospitals and dispatch centers to purchase a small UHF RF control station specifically configured for remote control, talk-around, and built-in DTMF signaling.
  4. DTMF Devices: As noted above, the necessary DTMF functionality could be incorporated into the RF control station itself. Alternatively, a separate customized remote control device with DTMF encode and decode capabilities could be utilized in concert with a standard RF control station. A compatible desktop DTMF remote control device that has already been tested on a similar radio system in Florida is available from Zetron. DTMF decoding devices from other manufacturers may also be compatible with the proposed MED-8 system signaling parameters.
- F. Mobile Radio Configurations: In order to realize the most utility and flexibility for a common statewide EMS radio system, all associated mobile radios should be configured in essentially the same way – a standardized configuration and, as applicable, a standard naming convention.

#### **4.7.2 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 are summarized in Section 4.7.3 below. Contingent on eligibility or licensee concurrence, specific wide-area and statewide channels may be used for Interservice/Mutual Aid. Such operations are discussed in Section 4.7.5.

#### **4.7.3 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 Section 4.7.4. The written agreement should include the following:

1. Typed on the agency's letterhead granting the sharing agreement.
2. State the quantity 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 that ultimately could result in terminating the written agreement.

Overall, FCC Rule 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) however, provides a general rule regarding mobile unit communications such that "...frequencies assigned to licensees in the Private Land Mobile Radio service 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."

**4.7.4 Example of a written agreement**

\_\_\_\_\_ (grantor) authorizes \_\_\_\_\_ (grantee) to operate \_\_\_\_\_ (quantity) mobile (or portable) radios. Such operation shall be per the following parameters.

<u>Call Sign</u>	<u>Frequency(ies)</u>	<u>Max. Power</u>	<u>Other Technical Parameters</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

(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 §90.421. Furthermore, grantor reserves the right to effectively eliminate the possibility of unauthorized operation that ultimately could result in terminating this written agreement.

\_\_\_\_\_ (authorized signor)  
 \_\_\_\_\_ (typed signor's name)  
 \_\_\_\_\_ (authorizing agency)  
 \_\_\_\_\_ (date)

**4.7.5 Florida UHF MED Channel Allocations**

Within FCC Rules Part 90, many frequencies may be used for interservice and mutual-aid operations on a local basis by EMS organizations consistent with the FCC limitations summarized in Section 4.7.3. On a wide-area or statewide basis however, only a small number of channels are available for such use, and are listed in Table 4-1.

The use of these or any other frequencies for interservice/mutual-aid use for which the user is not directly eligible, must be in accordance with the applicable FCC Rules.

**Table 4-1 – Wide-Area and Statewide Interagency/Mutual-Aid Frequencies**

FREQUENCY Base TX/RX (MHz)	ANS Standard <sup>9</sup> Name	New-Rebanded FREQUENCY Base TX/RX (MHz)	CTCSS (Hz)	RADIO SVC	PRIMARY USE	AREA
39.10/39.10	n/a	n/a	156.7	PW	Emergency Management (Civil Defense)	Statewide
39.18/39.18	n/a	n/a	156.7	PW	Emergency Management (Civil Defense)	Statewide
45.86/45.86	LLAW3D	n/a	None	PW	Law Enforcement Emergency	Wide- Area
154.950/154.950	n/a	n/a	None	PW	Law Enforcement Emergency	Wide- Area
460.275/465.275	n/a	n/a	None	PW	Law Enforcement Emergency	Wide- Area
155.370/155.370	n/a	n/a	None	PW	Law Enforcement Intercity	Statewide
154.265/154.265	VFIRE22	n/a	None	PW	Fire Mutual-Aid "Red" (Mobile/Portable Only)	Statewide
154.280/154.280	VFIRE21	n/a	None	PW	Fire Mutual-Aid "White" (Base and Mobile)	Statewide
154.295/154.295	VFIRE23	n/a	None	PW	Fire Mutual-Aid "Blue" (Mobile/Portable Only)	Statewide
155.340/155.340	VMED28	n/a	None	PW	Air Secondary-EMS Air Transport	Statewide
463.175/468.175	n/a	n/a	167.9	PW	Statewide Medical Coordination-MED-8	Statewide
463.1875/468.1875	n/a	n/a	167.9	PW	ESF 8 Medical Coordination – MED-82	Statewide
769.24375/799.24375	7CALL50	n/a	NAC \$293	SG/SY	National Public Safety Interoperability Calling Channel <sup>10</sup>	
769.74375/799.74375	7TAC55	n/a	NAC \$293	SG/SY	National Public Safety Interoperability Tactical Channel	
770.24375/800.24375	7TAC56	n/a	NAC \$293	SG/SY	National Public Safety Interoperability Tactical Channel	
770.99375/800.99375	7GTAC57	n/a	NAC \$293	SG/SY	National Public Safety Interoperability Tactical Channel	
773.25625/803.25625	7CALL70	n/a	NAC \$293	SG/SY	National Public Safety Interoperability Calling Channel	
773.75625/803.75625	7TAC75	n/a	NAC \$293	SG/SY	National Public Safety Interoperability Tactical Channel	
774.25625/804.25625	7TAC76	n/a	NAC \$293	SG/SY	National Public Safety Interoperability Tactical Channel	
774.85625/804.85625	7GTAC77	n/a	NAC \$293	SG/SY	National Public Safety Interoperability Tactical Channel	
853.3875/808.3875	n/a	854.6375/809.6375	210.7	GE	Public Safety Mutual-Aid (FCC Channel (96 old – 256 new) <sup>11</sup>	Statewide
866.0125/821.0125	8CALL90	851.0125/806.0125	156.7	GE	National Public Safety Mutual Aid Calling (FCC Channel (601 old – 01 new) <sup>12</sup>	Nationwid e

<sup>9</sup> APCO/NPSTC ANS 1.104.1-2010 naming standard can be found at: <http://apcointl.org/new/commcenter911/documents/APCO-NPSTC-ANS1-104-1web.pdf>

<sup>10</sup> See section 2.5.

<sup>11</sup> See Section 2.8.

FREQUENCY Base TX/RX (MHz)	ANS Standard <sup>9</sup> Name	New-Rebanded FREQUENCY Base TX/RX (MHz)	CTCSS (Hz)	RADIO SVC	PRIMARY USE	AREA
866.5125/821.5125	8TAC91	851.5125/806.5125	156.7	GE	National Public Safety Mutual Aid Tactical #1 (FCC Channel 639 old – 39 new) <sup>12</sup>	Nationwid e
867.0125/822.0125	8TAC92	852.0125/807.0125	156.7	GE	National Public Safety Mutual Aid Tactical #2 (FCC Channel 677 old – 77 new) <sup>12</sup>	Nationwid e
867.5125/822.5125	8TAC93	852.5125/807.5125	156.7	GE	National Public Safety Mutual Aid Tactical # 3 (FCC Channel 715 old – 115 new) <sup>12</sup>	Nationwid e
868.0125/823.0125	8TAC94	853.0125/808.0125	156.7	GE	National Public Safety Mutual Aid Tactical # 4 (FCC Channel 753 old – 153 new) <sup>12</sup>	Nationwid e

<sup>12</sup> See Section 2.3.

**Table 4-2 – Florida Countywide MED Channel & CTCSS Allotments**

<b>MED Channel</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>9</b>	<b>92</b>	<b>10</b>	<b>102</b>
COUNTY-STATE Identifier	CTCSS (Hz)										
Alachua-ALC			118.8					118.8			
Baker-BAC	167.9										
Bay-BAO						167.9					
Bradford-BRD		94.8									
Brevard-BRV						127.3					
Broward-BRW					173.8					173.8	
Calhoun-CLN							156.7				
Charlotte-CHA			167.9					167.9			
Citrus-CIR			167.9					167.9			
Clay-CLA					167.9						
Collier-COL							192.8	192.8			
Columbia-CLA							131.8				
Dade-MDC								203.5			
Desoto-DEU							131.8				
Dixie-DIX							118.8				
Duval-DVL						146.2				146.2	
Escambia-ESC		110.9						36.5		10.9	
Flagler-FLR						136.5					
Franklin-FRN			156.7/167.9								
Gadsden-GAD						203.5		203.5			
Gilchrist-GIL										94.8	
Glades-GLA											
Gulf-GLF		167.9								167.9	
Hamilton-HLN		210.7									
Hardee-HAR					127.3						
Hendry-HEN							107.3				
Hernando-HER	146.2			146.2			146.2				
Highlands-HIG	123.0									123.0	
Hillsborough-HIC							127.3			110.9	
Holmes-HMS			167.9								
Indian River-IRC				118.8						118.8	
Jackson-JAC					146.2						
Jefferson-JEF										156.7	
Lafayette-LAF				110.9							

<b>MED Channel</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>9</b>	<b>92</b>	<b>10</b>	<b>102</b>
COUNTY-STATE Identifier	CTCSS (Hz)										
Lake-LKC			32-192.8						192.8		
Lee-LEE				110.9						110.9	
Leon-LEO		156.7						156.7			
Levy-LVY					127.3						
Liberty-LBE							156.7				
Madison-MAD			146.2								
Manatee-MNT				167.9							
Marion-MAO						127.3	127.3			127.3	
Martin-MTC							146.2			146.2	
Monroe-MON							156.7				
Nassau-NAS		136.5									
Okaloosa-OKA		156.7									
Okeechobee-OKC						167.9					
Orange-ORA							156.7			156.7	
Osceola-OSC				114.8						114.8	
Palm Beach-PBC	127.3		127.3	127.3	127.3			127.3			
Pasco-PSC				110.9							
Pinellas-PIN			203.5								
Polk-POL			103.5					203.5		203.5	
Putnam-PUT				103.5				103.5			
St. Johns-SAJ		167.9									
St. Lucie-SLU	136.5										
Santa Rosa-SRC	136.5										
Seminole-SEM		110.9									
Sumter-SUM							72-192.8		192.8		
Suwannee-SUW						110.9					
Taylor-TAY	118.8										
Union-UNC				156.7							
Volusia-VOL	136.5							136.5			
Wakulla-WAK					156.7						
Walton-WTN				167.9							
Washington-WSN		146.2									

**END OF SECTION 4.0**

## 5.0 SYSTEM REQUIREMENTS

### 5.1 General

The primary requirements of the EMS Communications Plan are for every permitted vehicle within their respective region (i.e., countywide) to have the capability for two-way radio communications with 1) its dispatch center, 2) with a higher level of medical care “Medical Control” and 3) with each other. These three capabilities make up what can be referred as the EMS triangle of communications (EMS dispatch centers, EMS facilities, and EMS providers). Without comprehensively completing the EMS triangle of communications throughout the region, EMS communications within the region is compromised. *Deviation from completing a single EMS triangle of communications by just one agency in the region may require a second set of system requirements, effectively creating a second and unwanted equipment purchase by all EMS agencies in the region.* Regionalizing EMS communications on a “per-County” basis avoids unnecessary radio equipment, particularly for every permitted vehicle, while minimizing costs for EMS dispatch centers and EMS medical care facilities – and the Counties in general.

The radio communications capability for “Medical Control” shall exist to facilitate the EMT/firefighter/paramedic needing to deviate from established medical protocols and/or request additional medical assistance from the medical director and/or hospital, in addition to announce patient information and estimated time of arrival.

The system requirements defined in the following sections are the requirements by which DivTel, EMS communications approval or disapproval will be determined for implementation of new EMS communications systems or for expansion of existing systems.

These requirements relate only to "system level" attributes of communications systems; requirements for individual equipment items are defined in Section 6.0, EQUIPMENT REQUIREMENTS.

These system requirements make reference to specific EMS communications system concepts that are defined in Section 3.0.

For aspects of system configurations not explicitly included in the following sections, their approval will be determined on a case-by-case basis by DivTel. Migrating from a statewide concept to a regional concept may require case-by-case considerations for each EMS agency within that respective region to avoid temporary compromise to existing radio communications capability making up the EMS triangle of communications.

As these system requirements are subject to change at the determination of DivTel, EMS Communications, please verify the most current requirements as may apply to a particular system application prior to a request for approval.



## **5.2 Communications Coverage Contour**

### **5.2.1 Communications Reliability**

The area of reliable communications is defined as having been engineered for a 95% probability of communications at the defined coverage contour, or 98.3% probability of communications over the defined coverage area, based on a received signal level of either 20 dB quieting or 17 dB SINAD, EIA, for the worst case of either talk-out, base to mobile, or talk-back, mobile to base. The defined contour of reliable radio coverage shall normally be the boundary of the operating area for which the provider routinely operates unless DivTel has approved a different boundary for a particular system. This provides for reliable communications at 95% of the locations along the contour, 95% of the time. The probability improves as the associated radio transmitter/receiver site is approached, thus achieving a 98.3% probability across the area within the contour.

The coverage contour shall be the normal calculated coverage recommended and/or designed by DivTel for stations established for primary use of VDR and/or LMC. Stations serving only as a back-up to the primary station, SMC and/or CMC may have a lesser coverage contour as approved by DivTel.

### **5.2.2 VDR Channels**

VDR communications is the primary responsibility of an EMS agency. As such, each EMS agency has the sole responsibility and/or liability to provide the capability to rapidly dispatch an emergency response vehicle.

Issues regarding the ability of an agency to meet the specifications associated with VDR communications will be determined based on Section 5.2.1, Communications Reliability.

At a minimum, each base and/or repeater station facility established for primary operation on VDR channels should be designed to enable reliable communications to and from mobile radio equipment. Should primary communications to and from portable radio equipment be required, then the system should be designed to enable reliable communications from inside the patient compartment.

### **5.2.3 LMC Channels**

Similar to VDR above, LMC communications is the primary responsibility of an EMS agency. As such, each EMS agency has the sole responsibility and/or liability to provide the capability to rapidly communicate with emergency response vehicles.

Issues regarding the ability of an agency to meet the specifications associated with LMC communications will be determined based on Section 5.2.1, Communications Reliability.

At a minimum, each base and/or repeater station facility established for primary operation on LMC channels should be designed to enable reliable communications to and from mobile radio

equipment. Should primary communications to and from portable radio equipment be required, then the system should be designed to enable reliable communications from inside the patient compartment.

#### **5.2.4 SMC and/or CMC Channels**

Each base or repeater station facility established for primary operation on the SMC and the CMC channel shall be designed to enable at a minimum reliable communications to and from mobile radio equipment. The defined area of reliable radio coverage shall be such that:

- A. For counties having only one primary SMC and/or CMC station, the area shall be the boundary of the county for which each station operates.
- B. For counties having more than one primary SMC and/or CMC station, each station shall have a coverage area such that, at a minimum, the combined aggregate coverage areas of all such stations provides continuous reliable coverage within the boundary of the county for which the all such stations operate.

#### **5.2.5 Radio Frequency Control Stations**

Communications reliability for Radio Frequency (RF) Control Stations shall be engineered for 99% probability of wireless communications point-to-point. This probability is based on a received signal level of either 20 dB quieting or 17 dB SINAD, EIA, for the worst case of either talk-out (Base to RF Control station) or talk-back (RF Control to Base station). If extended talk-around range is required for any particular hospital or dispatch facility, consideration may be given for use of an omni-directional antenna for the MED-8 SMC and/or CMC control station, rather than the directional antenna typically utilized.

#### **5.2.6 Automatic Vehicle Location Channel**

Each base station facility established for primary operation on an AVL system for "System Status Management" shall be designed to enable reliable communications to and from radio equipment in permitted vehicles.

### **5.3 Statewide Medical Coordination (SMC)**

This procedure described in section 4.7.1 provides for a statewide system for selective activation of regional MED-8 SMC repeater stations and selective addressing of local emergency departments and County EMS dispatch centers to satisfy the SMC and/or MRC requirements of the EMS Communications Plan. The end user accomplishes all necessary DTMF signaling. Other than the initiating party and the receiving party, no additional human intervention will be necessary to establish or maintain two-way radio communication via this addressing system. These signaling aspects of this plan shall utilize DTMF for selective access to repeaters and selective addressing of individual stations. The DTMF is an industry standard tone scheme used

for audio signaling and control purposes and is generally defined as the simultaneous generation of two specific audio tones, such as when any one button of a standard DTMF keypad is depressed. DTMF is compatible with the original AT&T “Touch-Tone®” arrangement used in telephone systems throughout the world.

The overall architecture of the MED-8 statewide radio system will provide for extended-range, vehicle-to-base communication by virtue of at least one wide-area SMC repeater in each county, per Section 5.2.3. Note that all SMC repeaters employ the identical MED-8 frequency and CTCSS tone in accordance with the state EMS communications plan regardless of their geographic separation. Consequently, it is essential that all MED-8 repeaters shall remain in the repeat disable mode unless actually being used to relay a communication between two radio stations. Otherwise, nearby repeaters will interfere with one another and disrupt or altogether prevent any associated radio communications. ***In the event of a power interruption, the fixed (mobile-relay) station repeater should return to the current state of the repeater immediately prior to the interruption (repeat enabled/disabled) if the repeater is capable of that mode of operation. If it is not capable of returning to current state, the repeater shall return to service in repeat disabled mode.***

An automatic 5-minute “no activity” timer shall be implemented to cause the repeater to deactivate after the 5-minute limit in the event the crew does not deactivate the repeater under normal procedure.

The selective addressing and/or “no activity” timer may be disabled during ongoing, large-scale events, or at the request of the incident commander at the scene. It shall only be applied to the specific station(s) for the incident area and shall be returned to normal functionality as soon as possible when the event allows.

Another feature of the radio system is the continued ability to operate, within normal range limits, even if repeaters are not available due to equipment failure, severe weather, or other reasons. This capability to both mobile and control stations, and is typically known as repeater talk-around (or “Direct” mode). When operating in talk-around mode, the DTMF signaling aspects of the system are fully preserved, subject to the range of the radios involved in any particular exchange. If extended talk-around range is required for any particular hospital or dispatch facility, consideration should be given for use of an omni-directional antenna for the MED-8 control station, rather than the directional antenna typically provided.

### **5.3.2 DTMF Signaling Requirements**

Each MED-8 capable mobile radio will be equipped with a DTMF encoder microphone.

Each regional MED-8 repeater station will be equipped with a DTMF decoder, set to respond to at least two groups of DTMF tones.

Each MED-8 control station will be equipped with a DTMF decoder, set to respond to the assigned sequences of DTMF tones, as well as a DTMF encoder keypad for addressing other SMC stations.

The necessary DTMF functionality shall be incorporated into the RF control station itself. Alternatively, a separate customized remote control device with DTMF encode and decode capabilities could be utilized in concert with a standard RF control station. A compatible desktop DTMF/remote control device, which has already been tested on a similar radio system in Florida, is available from Zetron. DTMF decoding devices from other manufacturers may also be compatible with the MED-8 system signaling parameters.

Both control stations and mobile radios will have repeater-talk-around, simplex, capabilities.

Each county will install at least one wide-area coverage MED-8 repeater, which will be kept in the repeat-disabled mode by default, until activated via the appropriate over-the-air DTMF tone sequence.

Additional MED-8 repeaters may be installed, as required, to provide adequate mobile communications access throughout the particular coverage area.

Each county has been assigned a unique two-digit county code per Section 4.7.1(C), each regional repeater will be assigned a related three-digit address, and each control station will be assigned a unique four-digit address, subordinate to the county code.

This will allow for up to 99 counties with up to nine regional repeaters and nearly 100 uniquely addressed control stations per county. In addition, all DTMF decoders will respond to a two-digit code (00) as a statewide ALL-CALL address, a four-digit common address as a countywide call (example 6899), and a unique four-digit individual address (example 6842).

### **5.3.3 UHF Mobile Radio Standard Configurations**

All associated mobile radios shall be configured in a standardized configuration. In determining which UHF channels to include in such a statewide configuration, and the applicable standardized naming convention, DivTel will consider the following:

Federal regulations relating to radio licensing, 47 CFR 90:

At a minimum, the current FCC regulations mandate that mobile radios must be wired and equipped for operation on all authorized MED channels. The original intent was to include the eight to ten original 25 kHz-wide MED channels. This now includes the newly created 12.5 kHz-wide channels as well.

*Intended usage patterns:* Since one of the EMS Communications Committee goals is to also expand the availability of simplex frequencies for statewide scene coordination (SSC), the EMS Plan has established mobile talk-around capability on at least the original 25 kHz-wide MED channels plus the 12.5 kHz-wide MED channels. This has provided a significant increase in the number of simplex SSC channels useable for on-scene coordination purposes and minimized the likelihood of direct on-channel interference with MED-8.

*Equipment capabilities:* Every EMS mobile UHF radio should be capable of DTMF encode and capable of talk-around operation. Due to the number of channels in the mobile radios, which are mandated by the FCC, the preferred approach for talk-around would be a single button for activation of the talk-around (or “Direct”) function, rather than having to duplicate all or most of the mobile MED frequencies into additional, and excessive, channel positions for talk-around operation. Mobile radios configured with the required number of channels and one-button selectable talk-around capability, and perhaps even independently-selectable CTCSS tones, EMS vehicles will be able to communicate to virtually any other EMS vehicle or EMS base station anywhere in the state, even in the event that additional UHF base stations are added in congested areas.

#### **5.4 SMC Radio Station**

Every region shall have at least one MED-8 SMC repeater base station (463.175 MHz transmit, 468.175 MHz receive, CTCSS 167.9 Hz) to provide reliable communications between EMS mobile radios and RF control stations throughout the region.

Every hospital emergency department and EMS dispatch center shall have the capability to access and reliably communicate on the MED-8, SMC channel, with similarly equipped mobile or portable radios. This can be via direct control of a repeater base station (463.175 MHz transmit/468.175 MHz receive, CTCSS of 167.9 Hz), or via direct control of an RF control station (468.175 MHz transmit/463.175 MHz receive, CTCSS of 167.9 Hz) in accordance with Section 5.2.4. Every EMS dispatch center shall have the responsibility to monitor the MED-8 SMC channel continuously, 24-hours a day.

If primary SMC communications are enabled by means of leased wireline control, then every such hospital and/or dispatch center shall have as a minimum, a backup communications capability by means of a repeater base station or RF control station equipped on the SMC channel that is not dependent on leased wireline control.

#### **5.5 SMC Mobile Radios in Permitted Vehicles**

Every permitted transport vehicle utilizing UHF mobile radios shall provide the capability for reliable two-way communications on the MED-8, SMC channel, 468.175 MHz transmit/463.175 MHz receive, CTCSS of 167.9 Hz. Mobile radio equipment shall be the minimum requirement for SMC communications.

Permitted transport vehicles approved for another frequency band of operation shall utilize the mutual aid channel identified equivalent to the intent of SMC.

## 5.6 Local Medical Coordination (LMC)

### 5.6.1 LMC Base Station Repeater Facilities

Per Chapter 395, F.S., every hospital emergency department shall have the capability to reliably communicate to at least a 5-mile radius of its facility on the LMC channel approved or assigned by DivTel for that hospital on a regional basis. This may be satisfied throughout the region by a UHF channel on a geographic allotment basis or on a real-time allocation basis, or by another frequency band approved throughout the region by DivTel.

EMS communications systems may migrate to “trunked” radio systems that will shift LMC communications to a proprietary or [Project 25](#)<sup>13</sup> standardized radio infrastructure. Radio systems that employ this technology will meet those agencies’ requirements for LMC communications that provide EMS field personnel with a communications system that permits the exchange of vital information between EMS agencies, emergency departments and/or medical directors..

## 5.7 Radios in Permitted Vehicles

### 5.7.1 Permitted Transport Vehicles

Every permitted transport vehicle shall be equipped with a radio that will provide access to each LMC, CMC and SMC channel (or equivalent each) necessary to enable reliable communications with each hospital emergency department in the county or larger area in which it primarily operates, and others with whom it can be expected to communicate under normal situations.

### 5.7.2 Permitted Non-Transport Vehicles

The requirement of this Plan is that every permitted vehicle shall have the capability for two-way radio communications with a higher level of medical care. Specifically, this capability shall exist for radio communications should the firefighter/paramedic need to deviate from established medical protocols and/or request additional medical assistance from the medical director and/or hospital. If an EMS agency has established medical control via a “Public Safety” trunked radio system per Section 5.6.1, that agency has met the requirements for “Medical Control.”.

*In effort to clarify any misunderstanding regarding UHF radio MED-8 requirements, it remains a requirement for EMS permitted within each region where the EMS triangle of communications is comprised of UHF radio systems.*

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<sup>13</sup> Project 25 (P25) represents the suite of standards for digital land mobile radio services.

## **5.8 Vehicle Dispatch and Response (VDR)**

### **5.8.1 VDR Radio Station Facilities**

Every EMS vehicle dispatch facility shall have the capability to reliably communicate on each VDR channel approved for that facility, and configured to enable continuous reception of all local mobile VDR transmissions on each of those channels.

The local VDR channel shall be a different channel than the CMC channel(s) unless specifically approved by DivTel.

### **5.8.2 Radios in EMS Vehicles**

Every permitted EMS and recognized First Responder<sup>14</sup> vehicle shall be equipped for reliable communications on at least one local VDR channel, as well as the VDR channel(s) of each facility by which it is regularly dispatched or to which it regularly responds. This can be accomplished by mobile with either 1) front & rear control heads, 2) dash mount radio front or rear and/or 3) portable radios.

### **5.8.3 Automatic Vehicle Location**

Automatic Vehicle Location systems utilized in a System Status Management configuration, intended to reduce EMS response times, shall include a statement attesting "the Polling/Update rate will not exceed the capacity of the primary functions of the radio communications system." This statement is in addition to the submittal requirements of Section 2.9.2 of this Plan. The AVL system shall demonstrate location accuracy 100 meters and comply with the minimum mobile radio requirements of Section 6.3.

## **5.9 Medical Resource Coordination (MRC)**

Every hospital emergency department and dispatch center, communicating with permitted EMS and recognized First Responder vehicles, shall be equipped with a control, base, or repeater station system dedicated to MRC communications which is not dependent on leased wireline control. Dispatch centers shall have MRC equipment configured to enable continuous, 24-hour reception of the MRC channel of that region of the state.

### **5.10 Crew Alert Paging**

A Crew Alert Paging system, where implemented to alert EMS personnel as a primary component of the EMS VDR system, may be established on any channel consistent with FCC

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<sup>14</sup> For First Responders - only if the "Memorandum of Understanding" between the EMS Provider and the First Responder requires or implies two-way radio communications to occur between the EMS Provider and the First Responder.

rules, except that crew alert paging shall not be approved for LMC channels, CMC channels the SMC channel, or MRC channels.

### **5.11 Telephone Interconnection**

EMS voice and/or data communications to and from points not accessible by means of the two-way land mobile radio communications system, and which require interconnection through the public switched telephone network by EMS field personnel, may utilize the cellular telephone system for such communications. The use of cellular telephones shall be supplementary to the other System Requirements of this Plan. The use of telephone interconnections does not meet the requirements outlined in 5.6 Local Medical Coordination.

### **5.12 Biomedical Telemetry**

Providers whose medical director has established the requirement for transmission of biomedical telemetry may utilize the cellular telephone system for such communications. The use of cellular telephones shall be supplementary to the other System Requirements of this Plan.

### **5.13 Radio Frequency Control Stations**

Radio frequency control stations, FCC Station Class FX1, shall not be approved for use on FCC designated "MED" channels except upon an acceptable submittal of all of the following:

- A. A showing of need (such as a MED-8 SMC radio system with DTMF implemented).
- B. A showing that alternative solutions within existing plans and rules are not in the best interest of the public safety and welfare.
- C. Except for MED-8 SMC radio systems, an engineering study showing no harmful interference to existing systems. Harmful interference for this study is defined in Section 4.2.1 of this Plan.

Following such acceptable submittals, any approval for operation of radio frequency control stations on "MED" channels shall have the stipulation that the *approval is continually contingent upon no substantiated complaints of interference to either present or future systems*. Upon the confirmation of any such complaints, operation of such radio frequency control stations shall be modified to mitigate the harmful interference or discontinued.



## 5.14 FCC Narrowband Mandate Below 512 MHz

The FCC issued a 3<sup>rd</sup> Memorandum Opinion & Order in 2004 accelerated public safety narrowbanding deadline from January 1, 2018 to January 1, 2013 to make it consistent with the Industrial/Business deadline. Public Safety will have until January 1, 2013, to migrate to 12.5 kHz technology. Additionally, and more urgent, new applications for frequencies below 512 MHz for bandwidths above 12.5 kHz will not be accepted 6 months after publication in the Federal Register. Below is an excerpt from the ruling. Specifically, the amended rules will:

- A. Beginning six months after publication of the 2<sup>nd</sup> Report & Order (2<sup>nd</sup> R&O) in the Federal Register, prohibit any applications for new operations using 25 kHz channels, for any system operating in the 150-174 MHz or 421-512 MHz bands.
- B. Beginning six months after publication of the 2<sup>nd</sup> R&O in the Federal Register, allow incumbent 25 kHz Part 90 licensees in the 150-174 MHz and 421-512 MHz bands to make modifications to their systems provided their respective authorized interference contours are not expanded as a result thereof.
- C. Beginning January 1, 2005, prohibit the certification of any equipment capable of operating at one voice path per 25 kHz of spectrum, i.e., multi-mode equipment that includes a 25 kHz mode.
- D. Beginning January 1, 2008, prohibit the manufacture and importation of any 25 kHz equipment, including multi-mode equipment that can operate on a 25 kHz bandwidth.
- E. Beginning January 1, 2013, require public safety licensees using channels in these bands to deploy technology that achieves the equivalent of one voice path per 12.5 kHz of spectrum. After January 1, 2005, the FCC will prohibit the certification of new equipment that includes a 25 kHz mode. Equipment certified at a previous date will continue to be available, allowing system users to amortize their investment in existing wideband equipment.
- F. Additional information can be found at: <http://www.fcc.gov/pshs/public-safety-spectrum/narrowbanding.html>

## 5.15 MED Channel Frequencies

As a result of the FCC issued ruling regarding narrowband applications; MED Channel numbers 1 through 103 are prescribed by FCC Rules, as corresponding to the following radio transmit frequencies in MHz.

NOTE: The 6.25 KHz channels, MED 11, 13, 21, 23, 31, 33, etc. will not be utilized at this time. The 12.5 kHz channels, MED1, 12, 2, 22, 3, 33, etc. are **bolded** for easy reference below.

<u>MED CHANNEL</u>	<u>FREQUENCY (Base &amp; Mobile)</u>	<u>FREQUENCY (Mobile Only)</u>	<u>MED CHANNEL</u>	<u>FREQUENCY (Base &amp; Mobile)</u>	<u>FREQUENCY (Mobile Only)</u>
<b>1</b>	<b>463.000</b>	<b>468.000</b>	<b>6</b>	<b>463.125</b>	<b>468.125</b>
11	463.00625		61	463.13125	
<b>12</b>	<b>463.0125</b>	<b>468.0125</b>	<b>62</b>	<b>463.1375</b>	<b>468.1375</b>
13	463.01875		63	463.1437	
<b>2</b>	<b>463.025</b>	<b>468.025</b>	<b>7</b>	<b>463.150</b>	<b>468.150</b>
21	463.03125		71	463.15625	
<b>22</b>	<b>463.0375</b>	<b>468.0375</b>	<b>72</b>	<b>463.1625</b>	<b>468.1625</b>
23	463.04375		73	463.16875	
<b>3</b>	<b>463.050</b>	<b>468.050</b>	<b>8</b>	<b>463.175</b>	<b>468.175</b>
31	463.05625		81	463.18125	
<b>32</b>	<b>463.0625</b>	<b>468.0625</b>	<b>82</b>	<b>463.1875</b>	<b>468.1875</b>
33	463.06875		83	463.19375	
<b>4</b>	<b>463.075</b>	<b>468.075</b>	<b>9</b>	<b>462.950</b>	<b>467.950</b>
41	463.08125		91	462.95625	
<b>42</b>	<b>463.0875</b>	<b>468.0875</b>	<b>92</b>	<b>462.9625</b>	<b>467.9625</b>
43	463.09375		93	462.96875	
<b>5</b>	<b>463.100</b>	<b>468.100</b>	<b>10</b>	<b>462.975</b>	<b>467.975</b>
51	463.10625		101	462.98125	
<b>52</b>	<b>463.1125</b>	<b>468.1125</b>	<b>102</b>	<b>462.9875</b>	<b>467.9875</b>
53	463.11875		103	462.99375	

### 5.15.1 CTCSS Frequencies

Continuous Tone-Controlled Squelch Systems (CTCSS) provide a reduction of nuisance interference in FM radio systems by incorporating a sub-audible tone onto the radio carrier information such that only a similarly equipped radio receiver will open its squelch circuit to receive the transmission. Systems equipped with CTCSS will eliminate much interference from distant sources, although CTCSS by itself cannot prevent undesired "FM capture" from occurring due to nearby simultaneous co-channel transmissions. The TIA/EIA Standard 603 designates CTCSS frequencies. Volume II contains a table that is a portion of those CTCSS frequencies above 90 Hz and below 211 Hz that are approved for EMS radio communications in Florida.

**Table 5-1 – Specific MED Channel Assignments for Florida Acute Care Facilities**

<b>FACILITY NAME</b>	<b>STREET ADDRESS</b>	<b>CITY, STATE</b>	<b>COUNTY</b>	<b>CMC</b>	<b>LMC</b>
North Florida Regional Medical Center	6500 Newberry Road	Gainesville, FL	Alachua	3-118.8	42-118.8
Shands at AGH	801 SW 2nd Avenue	Gainesville, FL	Alachua	3-118.8	32-118.8
Shands Hospital at University of Florida	1600 SW Archer Road	Gainesville, FL	Alachua	3-118.8	62-118.8
Ed Fraser Memorial Hospital	159 N Third Street	Maccleddy, FL	Baker	1-156.7	12-156.7
Bay Medical Center	615 N Bonita Avenue	Panama City, FL	Bay	6-167.9	12-167.9
Gulf Coast Medical Center	449 West 23rd Street	Panama City, FL	Bay	6-167.9	52-167.9
Tyndall AFB		Panama City, FL	Bay	6-167.9	42-127.3
Shands at Starke	922 East Call Street	Starke, FL	Bradford	2-94.8	72-94.8
Cape Canaveral Hospital	701 W Cocoa Beach Causeway	Cocoa Beach, FL	Brevard	6-127.3	22-173.8

FACILITY NAME	STREET ADDRESS	CITY, STATE	COUNTY	CMC	LMC
Holmes Regional Medical Center	1350 S Hickory Street	Melbourne, FL	Brevard	6-127.3	52-131.8
Kennedy Space Center (KSC)			Brevard	6-127.3	62-146.2
Palm Bay Community Hospital	1425 Malabar Road, NE	Melbourne, FL	Brevard	6-127.3	12-173.8
Parrish Medical Center	951 N Washington Avenue	Titusville, FL	Brevard	6-127.3	42-127.3
Wuesthoff Medical Center/Melbourne	250 N Wickham Road	Melbourne, FL	Brevard	6-127.3	72-146.2
Wuesthoff Memorial Hospital	110 Longwood Avenue	Rockledge, FL	Brevard	6-127.3	32-146.2
Broward General Medical Center	1600 S Andrews Avenue	Fort Lauderdale, FL	Broward	5-173.8	72-167.9
Cleveland Clinic Hospital	3100 Weston Road	Weston, FL	Broward	5-173.8	72-107.2
Coral Springs Medical Center	3000 Coral Hills Drive	Coral Springs, FL	Broward	5-173.8	52-192.8
Florida Medical Center	5000 West Oakland Park Blvd.	Lauderdale Lakes, FL	Broward	5-173.8	52-110.9
Hollywood Memorial Center	3600 Washington Street	Hollywood, FL	Broward	5-173.8	22-107.2
Holy Cross Hospital, Inc	4725 N Federal Highway	Fort Lauderdale, FL	Broward	5-173.8	72-192.8
Imperial Point Medical Center	6401 N Federal Highway	Fort Lauderdale, FL	Broward	5-173.8	72-156.7
Memorial Hospital Pembroke	7800 Sheridan Street	Pembroke Pines, FL	Broward	5-173.8	22-103.5
Memorial Hospital West	703 N Flamingo Road	Pembroke Pines, FL	Broward	5-173.8	62-123.0
Memorial Regional Hospital	3501 Johnson Street	Hollywood, FL	Broward	5-173.8	52-103.5
North Broward Medical Center	201 East Sample Road	Pompano Beach, FL	Broward	5-173.8	72-103.5
North Ridge Medical Center	5757 North Dixie Highway	Fort Lauderdale, FL	Broward	5-173.8	72-110.9
Northwest Medical Center	2801 N State Road 7	Margate, FL	Broward	5-173.8	22-110.9
Plantation General Hospital	401 NW 42nd Avenue	Plantation FL	Broward	5-173.8	52-107.2
University Hospital and Medical Center	7201 N University Drive	Tamarac, FL	Broward	5-173.8	22-192.8
Westside Regional Medical Center.	8201 W Broward Blvd	Plantation, FL	Broward	5-173.8	52-167.9
Calhoun Liberty Hospital	20370 NE Burns Avenue	Blountstown, FL	Calhoun	7-156.7	72-156.7
Bon Secours/St. Joseph Hospital	2500 Harbour Blvd.	Port Charlotte, FL	Charlotte	3-167.9	52-167.9
Charlotte Regional Medical Center	809 E Marion Avenue	Punta Gorda, FL	Charlotte	3-167.9	62-167.9
Fawcett Memorial Hospital	21298 Olean Blvd.	Port Charlotte, FL	Charlotte	3-167.9	72-167.9
Citrus Memorial Hospital	502 Highland Blvd.	Inverness, FL	Citrus	3-167.9	12-167.9
Seven Rivers Community Hospital	6201 N Suncoast Blvd.	Crystal River, FL	Citrus	3-167.9	72-167.9
Orange Park Medical Center	2001 Kingsley Avenue	Orange Park, FL	Clay	5-167.9	12-167.9
Cleveland Clinic Florida Hospital/Naples	855 Napa Blvd.	Naples, FL	Collier	7-192.8	12-192.8
Naples Community Hospital	350 7th Street	North Naples, FL	Collier	7-192.8	22-192.8
North Collier Hospital	11190 Healthpark Blvd	Naples, FL	Collier	7-192.8	32-192.8
Lake City Medical Center	340 NW Commerce Blvd. L	Lake City, F	Columbia	7-131.8	52-131.8
Shands at Lake Shore	560 E Franklin Street	Lake City, FL	Columbia	7-131.8	72-131.8
Lake City Veterans Hospital			Columbia	7-131.8	42-131.8
Aventura Hospital and Medical Center	20900 Biscayne Blvd	Aventura, FL	Dade	2-210.7	12-107.2
Baptist Hospital of Miami	8900 North Kendall Drive	Miami, FL	Dade	6-210.7	32-167.9
Cedars Medical Center	1400 NW 12th Avenue	Miami, FL	Dade	4-210.7	3-114.8
Coral Gables Hospital	3100 Douglas Road	Coral Gables, FL	Dade	4-210.7	62-123.0
Healthsouth Doctors' Hospital	5000 University Drive	Coral Gables, FL	Dade	6-210.7	22-131.8
Hialeah Hospital	651 East 25th Street	Hialeah, FL	Dade	2-210.7	72-141.3
Homestead Hospital	160 NW 13th Street	Homestead, FL	Dade	6-210.7	12-151.4
Jackson Memorial Hospital	1611 NW. 12th Avenue	Miami, FL	Dade	4-210.7	42-162.2
Jackson Nouth Community Hospital	9333 SW. 152nd Street	Miami, FL	Dade	2-210.7	1-173.8
Kendall Medical Center	11750 Bird Road	Miami, FL	Dade	6-210.7	1-186.2
Larkin Community Hospital	7031 SW 62nd Avenue	South Miami, FL	Dade	6-210.7	3-203.5
Mercy Hospital Inc	3663 South Miami Avenue	Miami, FL	Dade	4-210.7	5-103.5
Miami Children's Hospital	3100 SW 62nd Avenue	Miami, FL	Dade	4-210.7	7-110.9
Mount Sinai Medical Center	4300 Alton Road	Miami Beach, FL	Dade	2-210.7	32-127.3

FACILITY NAME	STREET ADDRESS	CITY, STATE	COUNTY	CMC	LMC
Mount Sinai Medical Ctr/Miami Heart Institute	4701 North Meridian Avenue	Miami Beach, FL	Dade	2-210.7	22-136.5
North Shore Medical Center	1100 NW 95th Street	Miami, FL	Dade	2-210.7	52-146.2
Palm Springs General Hospital	1475 West 49th Street	Hialeah, FL	Dade	2-210.7	12-156.7
Palmetto General Hospital	2001 W 68th Street	Hialeah, FL	Dade	2-210.7	22-192.8
Pan American Hospital	5959 NW 7th Street	Miami, FL	Dade	4-210.7	52-107.2
Parkway Regional Medical Center	160 NW 170th Street	North Miami Beach, FL	Dade	2-210.7	62-114.8
South Miami Hospital	6200 S.W. 73rd Street	South Miami, FL	Dade	6-210.7	72-123.0
Veterans Hospital			Dade	4-210.7	12-131.8
South Shore Hospital and Medical Center	630 Alton Road	Miami Beach, FL	Dade	4-210.7	72-192.8
Desoto Memorial Hospital	900 North Robert Avenue	Arcadia, FL	Desoto	7-131.8	72-131.8
No Hospital facilities			Dixie		
Baptist Medical Center	800 Prudential Drive	Jacksonville, FL	Duval	6-146.2	32-151.4
Baptist Medical Center/Beaches	1350 13th Avenue South	Jacksonville Beach, FL	Duval	6-146.2	42-162.2
Baptist Medical Center South		Jacksonville, FL	Duval	6-146.2	62-173.8
Memorial Hospital Jacksonville	3625 University Blvd South	Jacksonville, FL	Duval	6-146.2	52-186.2
Naval Air Station (NAS) JAX Medical Center	NAS Jax	Jacksonville, FL	Duval	6-146.2	7-203.5
Saint Luke's Hospital	4201 Belfort Road	Jacksonville, FL	Duval	6-146.2	72-103.5
Saint Vincent's Medical Center	1800 Barrs Street	Jacksonville, FL	Duval	6-146.2	22-110.9
Shands Jacksonville Medical Center	655 West 8th Street	Jacksonville, FL	Duval	6-146.2	4-127.3
Wolfsan's/Baptist Children's Hospital	4901 Richard Street	Jacksonville, FL	Duval	6-146.2	12-136.5
Baptist Hospital	1000 West Moreno Street	Pensacola, FL	Escambia	2-110.9	72-110.9
Medical Clinic NAS Pensacola	NAS Pensacola	Pensacola, FL	Escambia	2-110.9	12-110.9
Sacred Heart Hospital	5151 N 9th Avenue	Pensacola, FL	Escambia	2-110.9	32-110.9
West Florida Hospital	8383 North Davis Highway	Pensacola, FL	Escambia	2-110.9	62-110.9
Florida Hospital/Flagler	60 Memorial Medical Parkway	Palm Coast, FL	Flagler	6-136.5	62-136.5
George E. Weems Memorial Hospital	135 Avenue G	Apalachicola, FL	Franklin	3-156.7	72-156.7
Gadsden Community Hospital	90 East US Highway	Quincy, FL	Gadsden	6-203.5	12-203.5
No Hospital facilities			Gilchrist		
No Hospital facilities			Glades		
Gulf Pines Hospital	102 20th Street	Port St Joe, FL	Gulf	2-167.9	62-167.9
Trinity Community Hospital	506 NW 4th Street	Jasper, FL	Hamilton	2-210.7	52-210.7
Florida Hospital/Wauchula	533 West Carlton Street	Wauchula, FL	Hardee	5-127.3	12-127.3
Hendry Regional Medical Center	500 West Sugarland Highway	Clewiston, FL	Hendry	7-107.3	22-107.3
Brooksville Regional Hospital	55 Ponce De Leon Blvd.	Brooksville, FL	Hernando	4-146.2	32-146.2
Oak Hill Hospital	11375 Cortez Blvd.	Spring Hill, FL	Hernando	4-146.2	12-146.2
Spring Hill Regional Hospital	10461 Quality Drive	Spring Hill, FL	Hernando	4-146.2	72-146.2
Florida Hospital Heartland Medical Center	4200 Sun 'N Lake Blvd	Sebring, FL	Highlands	1-123.0	22-123.0
Florida Hospital-Lake Placid	1210 US 27 North	Lake Placid, FL	Highlands	1-123.0	72-123.0
Highlands Regional Medical Center	3600 S Highlands Avenue	Sebring, FL	Highlands	1-123.0	62-123.0
Brandon Regional Hospital	119 Oakfield Drive	Brandon, FL	Hillsborough	7-127.3	1-127.3
H. Lee Moffitt Cancer Ctr/Research Institute Hospital	12902 Magnolia Drive	Tampa, FL	Hillsborough	7-127.3	3-127.3
Kindred Hospital-Bay Area/Tampa	4555 S Manhattan Avenue	Tampa, FL	Hillsborough	7-127.3	4-127.3
Kindred Hospital/Central Tampa	4801 N Howard Avenue	Tampa, FL	Hillsborough	7-127.3	42-127.3
Memorial Hospital/Tampa	2901 Swann Avenue	Tampa, FL	Hillsborough	7-127.3	5-127.3
Saint Joseph's Hospital	3001 Martin Luther King Blvd	Tampa, FL	Hillsborough	7-127.3	2-127.3
South Bay Hospital	4016 State Road 674	Sun City Center, FL	Hillsborough	7-127.3	12-127.3
South Florida Baptist Hospital	301 N Alexander Street	Plant City, FL	Hillsborough	7-127.3	52-127.3
Tampa General Hospital The	2 Columbia Drive	Tampa, FL	Hillsborough	7-127.3	72-127.3

FACILITY NAME	STREET ADDRESS	CITY, STATE	COUNTY	CMC	LMC
Town & Country Hospital	6001 Webb Road	Tampa, FL	Hillsborough	7-127.3	62-127.3
University Community Hospital	3100 E Fletcher Avenue	Tampa, FL	Hillsborough	7-127.3	12-127.3
University Community Hospital/Carrollwood	7171 North Dale Mabry	Tampa, FL	Hillsborough	7-127.3	6-127.3
Doctor's Memorial Hospital/Bonifay	401 East Byrd	Bonifay, FL	Holmes	3-167.9	22-167.9
Indian River Memorial Hospital	1000 36th Street	Vero Beach, FL	Indian River	4-118.8	42-118.8
Sebastian River Medical Center	13695 US Highway 1	Sebastian, FL	Indian River	4-118.8	72-118.8
Campbellton/Graceville Hospital	5429 College Drive	Graceville, FL	Jackson	5-146.2	12-146.2
Jackson Hospital	4250 Hospital Drive	Marianna, FL	Jackson	5-146.2	52-146.2
No Hospital facilities			Jefferson		
No Hospital facilities			Lafayette		
Florida Hospital Waterman	201 North Eustis Street	Eustis, FL	Lake	32-192.8	12-192.8
Leesburg Regional Medical Center	600 East Dixie Avenue	Leesburg, FL	Lake	32-192.8	22-192.8
South Lake Hospital	1099 Citrus Tower Blvd	Clermont, FL	Lake	32-192.8	62-192.8
Cape Coral Hospital	636 Del Prado Blvd	Cape Coral, FL	Lee	4-110.9	32-110.9
Gulf Coast Hospital	13681 Doctor's Way	Fort Myers, FL	Lee	4-110.9	62-110.9
Healthpark Medical Ctr/Lee Memorial Hospital	9981 Healthpark Circle	Fort Myers, FL	Lee	4-110.9	3-110.9
Lee Memorial Hospital	2776 Cleveland Avenue	Fort Myers, FL	Lee	4-110.9	42-110.9
Lehigh Regional Medical Center	1500 Lee Blvd	Lehigh Acres, FL	Lee	4-110.9	52-110.9
Southwest Florida Regional Medical Center	2727 Winkler Avenue	Fort Myers, FL	Lee	4-110.9	6-110.9
Capital Regional Medical Center	2626 Capital Medical Blvd	Tallahassee, FL	Leon	2-156.7	42-156.7
Tallahassee Memorial Hospital	1300 Miccosukee Road	Tallahassee, FL	Leon	2-156.7	22-156.7
Nature Coast Regional Hospital	125 SW 7th Street	Williston, FL	Levy	5-127.3	52-127.3
No Hospital facilities			Liberty		
Madison County Memorial Hospital	201 East Marion Street	Madison, FL	Madison	3-146.2	32-146.2
Blake Medical Center	2020 59th Street West	Bradenton, FL	Manatee	4-167.9	42-167.9
Manatee Memorial Hospital	206 2nd Street E	Bradenton, FL	Manatee	4-167.9	22-167.9
Munroe Regional Medical Center	131 SW 15th Street	Ocala, FL	Marion	7-127.3	12-127.3
Ocala Regional Medical Center	1431 SW 1st Avenue	Ocala, FL	Marion	7-127.3	32-127.3
West Marion Community Hospital	4600 SW 46th Court	Ocala, FL	Marion	7-127.3	22-127.3
Timber Ridge Medical Center	State Road 200	Ocala, FL	Marion	7-127.3	62-127.3
Martin Memorial Hospital South	2100 SE Salerno Blvd	Stuart, FL	Martin	7-146.2	42-146.2
Martin Memorial Medical Center	300 Hospital Avenue	Stuart, FL	Martin	7-146.2	72-146.2
Fishermen's Hospital	3301 Overseas Highway	Marathon, FL	Monroe	7-156.7	62-156.7
Lower Keys Medical Center	5900 College Road	Key West, FL	Monroe	7-156.7	72-156.7
Mariners Hospital	91500 Overseas Highway	Tavernier, FL	Monroe	7-156.7	42-156.7
Baptist Medical Center/Nassau	1250 South 18th Street	Fernandina Beach, FL	Nassau	2-136.7	32-136.5
Eglin Air Force Base	Air Force Sys Comnd Reg Hosp	Valparaiso, FL	Okaloosa	2-156.7	32-156.7
Fort Walton Beach Medical Center	1000 Mar-Walt Drive	Fort Walton Beach, FL	Okaloosa	2-156.7	52-156.7
North Okaloosa Medical Center	151 Redstone Avenue SE	Crestview, FL	Okaloosa	2-156.7	22-156.7
Twin Cities Hospital	2190 Highway 85 North	Niceville, FL	Okaloosa	2-156.7	72-156.7
Raulerson Hospital	1796 Highway 441 North	Okeechobee, FL	Okeechobee	6-167.9	72-167.9
Arnold Palmer Hospital (NO E/R)	92 West Miller Street	Orlando, FL	Orange	7-156.7	12-107.2
Florida Hospital	601 East Rollins	Orlando, FL	Orange	7-156.7	22-123.0
Florida Hospital/Apopka	201 North Park Avenue	Apopka, FL	Orange	7-156.7	52-131.8
Florida Hospital/East Orlando	7727 Lake Underhill Road	Orlando, FL	Orange	7-156.7	42-141.3
Health Central	10000 West Colonial Drive	Ocoee, FL	Orange	7-156.7	52-151.4
Orlando Regional Medical Center	1414 Kuhl Avenue	Orlando, FL	Orange	7-156.7	72-173.8
Sand Lake Hospital	9400 Turkey Lake Road	Orlando, FL	Orange	7-156.7	32-186.2
Florida Hospital Winter	200 N Lakemont Avenue	Winter Park, FL	Orange	7-156.7	62-123.0

<b>FACILITY NAME</b>	<b>STREET ADDRESS</b>	<b>CITY, STATE</b>	<b>COUNTY</b>	<b>CMC</b>	<b>LMC</b>
Florida Hospital/Celebration Health	400 Celebration Place	Celebration, FL	Osceola	4-114.8	22-114.8
Florida Hospital/Kissimmee	2450 N Orange Blossom Trail	Kissimmee, FL	Osceola	4-114.8	5-114.8
Osceola Regional Medical Center	700 W Oak Street	Kissimmee, FL	Osceola	4-114.8	52-114.8
St Cloud Hospital	2906 17th Street	Saint Cloud, FL	Osceola	4-114.8	42-114.8
A.G. Holley State Hospital	1199 W Lantana Road	Lantana, FL	Palm Beach	3-127.3	52-146.2
Bethesda Memorial Hospital	2815 S Seacrest Blvd	Boynton Beach, FL	Palm Beach	3-127.3	5-114.8
Boca Raton Community Hospital	800 Meadows Road	Boca Raton, FL	Palm Beach	3-127.3	12-131.8
Columbia Hospital	2201 45th Street	West Palm Beach, FL	Palm Beach	1-127.3	42-151.4
Delray Medical Center	5352 Linton Blvd	Delray Beach, FL	Palm Beach	3-127.	6-173.8
Glades General Hospital	1201 S Main Street	Belle Glade, FL	Palm Beach	4-127.3	3-203.5
Good Samaritan Medical Center	1300 North Flagler Drive	West Palm Beach, FL	Palm Beach	1-127.3	62-103.5
JFK Medical Center	5301 S Congress Avenue	Atlantis, FL	Palm Beach	3-127.3	5-146.2
Jupiter Medical Center	1210 South Old Dixie Highway	Jupiter, FL	Palm Beach	1-127.3	22-210.7
Palm Beach Gardens Medical Center	3360 Burns Road	Palm Beach Gardens, FL	Palm Beach	1-127.3	32-107.2
Palms West Hospital	13001 State Road 80	Loxahatchee, FL	Palm Beach	1-127.3	1-123.0
Saint Mary's Medical Center	901 45th Street	West Palm Beach, FL	Palm Beach	4-127.3	52-141.3
V.A. Medical Center	7305 North Military Trail	West Palm Beach, FL	Palm Beach	1-127.3	7-162.2
Wellington Regional Medical Center	10101 Forest Hill Blvd	West Palm Beach, FL	Palm Beach	4-127.3	2-186.2
West Boca Medical Center	21644 State Road 7	Boca Raton, FL	Palm Beach	3-127.3	7-192.8
Pasco Regional Medical Center	13100 Fort King Road	Dade City, FL	Pasco	4-110.9	42-103.5
Community Hospital	5637 Marine Parkway	New Port Richey, FL	Pasco	4-110.9	32-127.3
East Pasco Medical Center Inc	7050 Gall Blvd	Zephyrhills, FL	Pasco	4-110.9	52-136.5
North Bay Hospital	6600 Madison Street	New Port Richey, FL	Pasco	4-110.9	22-146.2
Regional Medical Center/Bayonet Point	14000 Fivay Road	Hudson, FL	Pasco	4-110.9	12-156.7
All Children's Hospital	801 Sixth Street South	Saint Petersburg, FL	Pinellas	3-203.5	1-203.5
Bayfront Medical Center	701 Sixth Street South	Saint Petersburg, FL	Pinellas	3-203.5	7-203.5
Edward White Hospital	2323 9th Avenue North	Saint Petersburg, FL	Pinellas	3-203.5	5-203.5
Helen Ellis Memorial Hospital	1395 South Pinellas Avenue	Tarpon Springs, FL	Pinellas	3-203.5	4-203.5
Kindred Hospital/Bay Area-St Petersburg	3030 6th Street South	Saint Petersburg, FL	Pinellas	3-203.5	22-203.5
Largo Medical Center	201 14th Street, SW	Largo, FL	Pinellas	3-203.5	6-203.5
Mease Hospital/Dunedin	601 Main Street	Dunedin, FL	Pinellas	3-203.5	52-203.5
Mease Hospital/Countryside	3231 McMullen Booth Road	Safety Harbor, FL	Pinellas	3-203.5	32-203.5
Morton Plant Hospital	300 Pinellas Street	Clearwater, FL	Pinellas	3-203.5	72-203.5
Northside Hospital	6000 49th Street North	Saint Petersburg, FL	Pinellas	3-203.5	62-203.5
Palms/Pasadena Hospital	1501 Pasadena Avenue South	Saint Petersburg, FL	Pinellas	3-203.5	42-203.5
Saint Anthony's Hospital	1200 7th Avenue North	Saint Petersburg, FL	Pinellas	3-203.5	12-123.0
St Petersburg General Hospital	6500 38th Avenue North	Saint Petersburg, FL	Pinellas	3-203.5	2-203.5
Sun Coast Hospital	2025 Indian Rocks Road	Largo, FL	Pinellas	3-203.5	12-203.5
Bartow Memorial Hospital	2200 Osprey Blvd	Bartow, FL	Polk	3-103.5	72-103.5
Heart of Florida Regional Medical Center	1615 U S Highway 27 North	Davenport, FL	Polk	3-103.5	7-103.5
Lake Wales Medical Center	410 South 11th Street	Lake Wales, FL	Polk	3-103.5	32-103.5
Lakeland Regional Medical Center	1324 Lakeland Hills Blvd	Lakeland, FL	Polk	3-103.5	52-103.5
Winter Haven Hospital	200 Avenue F NE	Winter Haven, FL	Polk	3-103.5	42-103.5
Winter Haven Hospital/Regency	101 Avenue O, Southeast	Winter Haven, FL	Polk	3-103.5	62-167.9
Putnam Community Medical Center	20 West, PO Box 778	Palatka, FL	Putnam	4-167.9	42-167.9
Gulf Breeze Hospital	1110 Gulf Breeze Parkway	Gulf Breeze, FL	Santa Rosa	1-136.5	42-110.9
Jay Hospital	221 South Alabama Street	Jay, FL	Santa Rosa	1-136.5	22-136.5
Santa Rosa Medical Center	6002 Berryhill Road	Milton, FL	Santa Rosa	1-136.5	32-136.5
Bon Secours/Venice Hospital	540 The Rialto	Venice, FL	Sarasota	6-110.9	12-110.9

FACILITY NAME	STREET ADDRESS	CITY, STATE	COUNTY	CMC	LMC
Doctors Hospital/Sarasota	5731 Bee Ridge Road	Sarasota, FL	Sarasota	6-110.9	42-110.9
Englewood Community Hospital	700 Medical Blvd	Englewood, FL	Sarasota	6-110.9	52-110.9
Sarasota Memorial Hospital	1700 S Tamiami Trail	Sarasota, FL	Sarasota	6-110.9	1-110.9
Central Florida Regional Hospital	1401 W Seminole Blvd	Sanford, FL	Seminole	2-110.9	32-110.9
Florida Hospital-Altamonte	601 East Altamonte Drive	Altamonte Springs, FL	Seminole	2-110.9	22-110.9
South Seminole Hospital	555 W State Road 434	Longwood, FL	Seminole	2-110.9	52-110.9
Flagler Hospital	400 Health Park Blvd	Saint Augustine, FL	St Johns	2-167.9	32-167.9
Lawnwood Regional Medical Center	1700 S. 23rd Street	Fort Pierce, FL	St Lucie	1-136.5	12-136.5
Saint Lucie Medical Center	1800 SE Tiffany Avenue	Port Saint Lucie, FL	St Lucie	1-136.5	62-136.5
Villages Regional Hospital The	1451 El Camino Real	The Villages, FL	Sumter	72-192.8	52-192.8
Shands/Live Oak	1100 SW 11th Street	Live Oak, FL	Suwannee	6-156.7	72-156.7
Doctors' Memorial Hospital Inc	407 East Ash Street	Perry, FL	Taylor	1-118.8	12-118.8
North Florida Reception Center Hospital	231 State Road South	Lake Butler, FL	Union	2-94.8	22-94.8
Ramadan Hand Institute/Lake Butler Hospital	850 East Main Street	Lake Butler, FL	Union	4-94.8	32-94.8
Bert Fish Medical Center	401 Palmetto Street	New Smyrna Beach, FL	Volusia	1-136.5	22-136.5
Florida Hospital/Oceanside	264 South Atlantic Avenue	Ormond Beach, FL	Volusia	1-136.5	42-136.5
Florida Hospital/Ormond Memorial	875 Sterthous Avenue	Ormond Beach, FL	Volusia	1-136.5	52-136.5
Florida Hospital/Deland	701 W Plymouth Avenue	Deland, FL	Volusia	1-136.5	2-136.5
Florida Hospital Fish Memorial	1055 Saxon Blvd	Orange City, FL	Volusia	1-136.5	4-136.5
Halifax Medical Center	303 N Clyde Morris Blvd	Daytona Beach, FL	Volusia	1-136.5	5-136.5
No Hospital facilities			Wakulla		
Healthmark Regional Medical Center	4413 US Highway 331 S	Defuniak Springs, FL	Walton	4-167.9	1-167.9
Sacred Heart Hospital	7800 US 98 West	San Destin, FL	Walton	4-167.9	12-167.9
Northwest Florida Community Hospital	1360 Brickyard Road	Chipley, FL	Washington	2-146.2	22-146.2

**END OF SECTION 6.0**

## **6.0 EQUIPMENT REQUIREMENTS**

### **6.1 Minimum Performance Standards**

The minimum performance standards defined in the following sections are the standards by which DivTel approval or disapproval will be determined for individual equipment items for use within EMS communications systems. These minimum performance standards apply to equipment type-accepted for 12.5 kHz operational bandwidths unless noted otherwise.

These standards have been developed by DivTel through research, engineering modeling, and analysis of communications equipment parameters that affect radio coverage, interference, audio quality, channel capacity and environmental performance. Development of these standards has been with the objectives of ensuring that radio equipment used for EMS communications is competitively available, enables necessary system performance, and achieves certain technical standards necessary to spectrum effectiveness and efficiency within the overall radio environment of the state of Florida.

For all other equipment items not explicitly included in the following sections, their approval will be determined on a case-by-case basis by DivTel.

### **6.2 Base/Repeater Station Radio Equipment – Analog**

#### **6.2.1 TIA/EIA Standards**

The radio equipment shall meet or exceed the following standards and test procedures of the current issue on the date of this revision. In the event of inconsistencies between the specifications in this Plan and the publications and standards listed below, the requirements of this Plan shall take precedence.

#### Telecommunications Industry Association/Electronics Industries Association Standards

##### TIA/EIA-603

Land Mobile FM or PM Communications Equipment Measurement and Performance Standards. (NOTE: EIA-152, EIA/TIA-204, EIA-220, and EIA/TIA-316 are rescinded by TIA/EIA-603.)



**MINIMUM PERFORMANCE STANDARDS**  
**Analog Base/Repeater Station Equipment**

**6.2.2 Transmitter Parameters**

	<u>VHF-LB</u> 25 KHz	<u>VHF-HB</u> 25 KHz	<u>VHF-HB</u> 12.5 KHz	<u>UHF</u> 25 KHz	<u>UHF</u> 12.5 KHz	<u>700</u>	<u>800</u>
Power Output (Watts) <sup>15</sup>	90	90	60	90	50	tbd	75
FM Hum and Noise (dB)	50	50	45	50	45	tbd	45
Continuous Duty Cycle	Yes	Yes	Yes	Yes	Yes	tbd	Yes

**6.2.3 Receiver Parameters**

	<u>VHF-LB</u> 25 KHz	<u>VHF-HB</u> 25 KHz	<u>VHF-HB</u> 12.5 KHz	<u>UHF</u> 25 KHz	<u>UHF</u> 12.5 KHz	<u>700</u>	<u>800</u>
Usable Sensitivity, 12 dB SINAD (uV)	.35	.35	.35	.35	.35	tbd	.35
Adjacent Channel Selectivity (dB)	80	85	80	80	70	tbd	70 <sup>16</sup>
Intermodulation Spurious Response Attenuation (dB)	75	85	75	80	75	tbd	70
Spurious Response Attenuation (dB)	90	90	100	90	100	tbd	90

**6.3 Mobile Radio Equipment – Analog**

The mobile radio shall be state-of-the-art and all RF frequencies and CTCSS tones shall be generated electronically (synthesized).

**6.3.1 TIA/EIA and Military Standards**

The radio equipment shall meet or exceed the following standards and test procedures of the current issue on the date of this revision. In the event of inconsistencies between the specifications in this Plan and the publications and standards listed below, the requirements of this Plan shall take precedence.

<sup>15</sup> Transmitter power output is a minimum standard unless demonstrated otherwise by system engineering and/or Federal Communications Commission (FCC) Rules.

<sup>16</sup> -70 dB @ 25KHz and -20 dB @ 12.5 KHz.

Telecommunications Industry Association/Electronics Industries Association Standards

TIA/EIA-603

Land Mobile FM or PM Communications Equipment Measurement and Performance Standards. (NOTE: EIA-152, EIA/TIA-204, EIA-220, and EIA/TIA-316 are rescinded by TIA/EIA-603.)

Military Standard

MIL-STD-810

The transmitter/receiver unit shall meet or exceed MIL-STD-810D, 810E or 810F utilizing the following test methods and procedures:

<u>D</u>	<u>E</u>	<u>F</u>	
506.2	506.3	506.4	Rain, Procedure I, (blowing rain)
509.2	509.3	509.4	Salt Fog, Procedure I (aggravated screening)
510.2	510.3	510.4	Sand and Dust, Procedure I (blowing dust)
514.3	514.4	514.5	Vibration, Procedure I, Category 1 (3 Axes)
516.3	516.4	516.5	Shock, Procedure I, (functional)

**MINIMUM PERFORMANCE STANDARDS  
Analog Mobile Radio Equipment**

**6.3.2 Transmitter Parameters**

	<u>VHF-LB</u> 25 KHz	<u>VHF-HB</u> 25 KHz	<u>VHF-HB</u> 12.5 KHz	<u>UHF</u> 25 KHz	<u>UHF</u> 12.5 KHz	<u>700</u>	<u>800</u>
Number of Channels	A/N <sup>17</sup>	A/N <sup>9</sup>	A/N <sup>17</sup>	20 <sup>18</sup>	32 <sup>18</sup>	tbd	15 <sup>19</sup>
Frequency Separation (MHz)	1	17	24	10	20	tbd	18 <sup>20</sup>
Power Output (Watts) <sup>21</sup>	90	90	50	90	50	tbd	30
FM Hum and Noise (dB)	45	45	44	40	39	tbd	40

<sup>17</sup> A/N = As Needed.

<sup>18</sup> The 20 or 32-channel requirement is for UHF mobile radios equipped with any of the first 16 MED channels, plus talk-around; otherwise as needed.

<sup>19</sup> This requirement allows for VDR, LMC, CMC, SMC, and/or applicable mobile-only talkgroups/channels and applicable mutual aid channel(s), plus talk-around; otherwise, as needed.

<sup>20</sup> No degradation, simultaneously for 806-824 MHz and 851-869 MHz Band.

<sup>21</sup> Transmitter power output is a minimum standard unless demonstrated otherwise by system engineering (for VDR, CMC, SMC and LMC) and/or FCC Rules.

### 6.3.3 Receiver Parameters

	<u>VHF-LB</u> 25 KHz	<u>VHF-HB</u> 25 KHz	<u>VHF-HB</u> 12.5 KHz	<u>UHF</u> 25 KHz	<u>UHF</u> 12.5 KHz	<u>700</u>	<u>800</u>
Number of Channels	A/N <sup>22</sup>	A/N <sup>22</sup>	A/N <sup>22</sup>	20 <sup>23</sup>	32 <sup>23</sup>	tbd	15 <sup>24</sup>
Frequency Separation	A/N <sup>22</sup>	A/N <sup>22</sup>	A/N <sup>22</sup>	10	20	tbd	18 <sup>25</sup>
Usable Sensitivity, 12 dB SINAD (uV)	.35	.35	.35	.35	.35	tbd	.35
Adjacent Channel Selectivity (dB)	80	85	65	80	65	tbd	70 <sup>26</sup>
Intermodulation Spurious Response Attenuation (dB)	80	85	70	80	70	tbd	70
Spurious Response Attenuation (dB)	80	85 <sup>27</sup>	75	85 <sup>15</sup>	70	tbd	75
Audio Power Output (Watts)	10	10	10	10	10	tbd	10
Audio Distortion (%)	5	5	5	5	5	tbd	5

## 6.4 Portable Radio Equipment – Analog

The portable radio shall be state-of-the-art and all RF frequencies and CTCSS tones shall be generated electronically, synthesized. The portable radio shall be equipped with a battery of sufficient capacity to provide a 5% transmit, 5% receive, and 90% standby (5/5/90) duty cycle over at least an 8-hour period.

### 6.4.1 TIA/EIA and Military Standards

The radio equipment shall meet or exceed the following standards and test procedures of the current issue on the date of this revision. In the event of inconsistencies between the specifications in this Plan and the publications and standards listed below, the requirements of this Plan shall take precedence.

<sup>22</sup> As Needed.

<sup>23</sup> The 20 or 32-channel requirement is for UHF mobile radios equipped with any of the first 16 MED channels; plus talk-around; otherwise as needed.

<sup>24</sup> This requirement allows for a minimum VDR, LMC, CMC, SMC, and/or applicable mobile-only talkgroups/channels and applicable mutual aid channel(s), plus talk-around; otherwise, as needed.

<sup>25</sup> No degradation, simultaneously for 806-824 MHz and 851-869 MHz Band.

<sup>26</sup> -70 dB @ 25 KHz and, mutual-aid channels exempted, -20 dB @ 12.5 KHz.

<sup>27</sup> Except one (1) spurious response at -80 dB allowed.

Telecommunications Industry Association/Electronics Industries Association Standards

TIA/EIA-603

Land Mobile FM or PM Communications Equipment Measurement and Performance Standards (NOTE: EIA-152, EIA/TIA-204, EIA-220, and EIA/TIA-316 are rescinded by TIA/EIA-603.)

Military Standard

MIL-STD-810

The transmitter/receiver unit shall meet or exceed MIL-STD-810D, 810E or 810F utilizing the following test methods and procedures:

<u>D</u>	<u>E</u>	<u>F</u>	
506.2	506.3	506.4	Rain, Procedure I, (blowing rain)
509.2	509.3	509.4	Salt Fog, Procedure I (aggravated screening)
510.2	510.3	510.4	Sand and Dust, Procedure I (blowing dust)
514.3	514.4	514.5	Vibration, Procedure I, Category 1 (3 Axes)
516.3	516.4	516.5	Shock, Procedure I, (functional)

MINIMUM PERFORMANCE STANDARDS

**Analog Portable Radio Equipment**

**6.4.2 Transmitter Parameters**

	<u>VHF-LB</u> 25 KHz	<u>VHF-HB</u> 25 KHz	<u>VHF-HB</u> 12.5 KHz	<u>UHF</u> 25 KHz	<u>UHF</u> 12.5 KHz	<u>700</u>	<u>800</u>
Number of Channels	A/N <sup>28</sup>	A/N <sup>28</sup>	A/N <sup>28</sup>	20 <sup>29</sup>	32 <sup>29</sup>	tbd	15 <sup>30</sup>
Frequency Separation (MHz)	A/N <sup>28</sup>	A/N <sup>28</sup>	A/N <sup>28</sup>	8	20	tbd	18 <sup>31</sup>
Power Output (Watts) <sup>32</sup>	4	4	4	4	4	tbd	3
FM Hum and Noise (dB)	45	45	38	40	38	tbd	40

<sup>28</sup> As Needed.

<sup>29</sup> The 20 or 32-channel requirement is for UHF portable radios equipped with any of the first 16 MED channels, plus talk-around; otherwise as needed.

<sup>30</sup> This requirement allows for VDR, LMC, CMC, SMC and/or applicable mobile-only talkgroups/channels and applicable mutual aid channel(s), plus talk-around; otherwise, as needed.

<sup>31</sup> No degradation, simultaneously for 806-824 MHz and 851-869 MHz Band.

<sup>32</sup> Transmitter power output is a minimum standard unless demonstrated otherwise by system engineering (for VDR, CMC, SMC and LMC) and/or FCC Rules.

### 6.4.3 Receiver Parameters

	<u>VHF-LB</u> 25 KHz	<u>VHF-HB</u> 25 KHz	<u>VHF-HB</u> 12.5 KHz	<u>UHF</u> 25 KHz	<u>UHF</u> 12.5 KHz	<u>700</u>	<u>800</u>
Number of Channels	A/N <sup>33</sup>	A/N <sup>33</sup>	A/N <sup>33</sup>	20 <sup>34</sup>	32 <sup>34</sup>	tbd	15 <sup>35</sup>
Frequency Separation	A/N <sup>33</sup>	A/N <sup>33</sup>	A/N <sup>33</sup>	8	20	tbd	18 <sup>36</sup>
Usable Sensitivity, 12 dB SINAD (uV)	.35	.35	.35	.35	.35	tbd	.35
Adjacent Channel Selectivity (dB)	70	70	70	70	70	tbd	65 <sup>37</sup>
Intermodulation Spurious Response Attenuation (dB)	70	70	70	70	70	tbd	60
Spurious Response Attenuation (dB)	70	65	65	70	65	tbd	60
Audio Power Output (Watts)	0.5	0.5	0.5	0.5	0.5	tbd	0.5
Audio Distortion (%)	5	5	5	5	5	tbd	5

### 6.5 Base/Repeater Station Radio Equipment – Digital

The base/repeater station radio equipment shall be state-of-the-art, all RF frequencies shall be generated electronically (synthesized), and shall comply with Project 25 digital standards.

#### 6.5.1 TIA/EIA Standards

The radio equipment shall meet or exceed the following standards and test procedures of the current issue on the date of this revision. In the event of inconsistencies between the specifications in this Plan and the publications and standards listed below, the requirements of this Plan shall take precedence.

<sup>33</sup> As Needed.

<sup>34</sup> The 20-channel requirement is for UHF portable radios equipped with any of the first 16 MED channels; otherwise as needed.

<sup>35</sup> This requirement allows for a minimum of one agency-specific channel and applicable mutual aid channel(s) for that band of operation; otherwise, as needed.

<sup>36</sup> No degradation, simultaneously for 806-824 MHz and 851-869 MHz Band.

<sup>37</sup> -65 dB @ "25 KHz and, mutual-aid channels exempted, -20 dB @ "12.5 KHz.

Telecommunications Industry Association/Electronics Industries Association Standards

TIA/EIA-603

Land Mobile FM or PM Communications Equipment Measurement and Performance Standards. (NOTE: EIA-152, EIA/TIA-204, EIA-220, and EIA/TIA-316 are rescinded by TIA/EIA-603.)

**MINIMUM PERFORMANCE STANDARDS  
Digital Base/Repeater Station Equipment**

**6.5.2 Transmitter Parameters**

	<u>VHF-HB</u>	<u>UHF</u>	<u>700</u>	<u>800</u>
Power Output (Watts) <sup>38</sup>	90-45	90-45	tbd	75-45
FM Hum and Noise (dB)	-45	-45	tbd	-45
Continuous Duty Cycle	Yes	Yes	tbd	Yes

**6.5.2 Receiver Parameters**

	<u>VHF-HB</u>	<u>UHF</u>	<u>700</u>	<u>800</u>
Digital Sensitivity, 5% BER uV	.35	.35	tbd	.35
Adjacent Channel Selectivity (dB)	60	60	tbd	60
Intermodulation Spurious			tbd	
Response Attenuation (dB)	80	80	tbd	75
Spurious Response			tbd	
Attenuation (dB)	90	90	tbd	100

**6.6 Mobile Radio Equipment – Digital**

The mobile radio equipment shall be state-of-the-art, all RF frequencies shall be generated electronically (synthesized), and shall comply with Project 25 digital standards.

**6.3.1 TIA/EIA and Military Standards**

The radio equipment shall meet or exceed the following standards and test procedures of the current issue on the date of this revision. In the event of inconsistencies between the

<sup>38</sup> Transmitter power output is a minimum standard unless demonstrated otherwise by system engineering and/or Federal Communications Commission (FCC) Rules.

specifications in this Plan and the publications and standards listed below, the requirements of this Plan shall take precedence.

Telecommunications Industry Association/Electronics Industries Association Standards

TIA/EIA-603

Land Mobile FM or PM Communications Equipment Measurement and Performance Standards. (NOTE: EIA-152, EIA/TIA-204, EIA-220, and EIA/TIA-316 are rescinded by TIA/EIA-603.)

Military Standard

MIL-STD-810

The transmitter/receiver unit shall meet or exceed MIL-STD-810D, 810E or 810F utilizing the following test methods and procedures:

<u>D</u>	<u>E</u>	<u>F</u>	
506.2	506.3	506.4	Rain, Procedure I, (blowing rain)
509.2	509.3	509.4	Salt Fog, Procedure I (aggravated screening)
510.2	510.3	510.4	Sand and Dust, Procedure I (blowing dust)
514.3	514.4	514.5	Vibration, Procedure I, Category 1 (3 Axes)
516.3	516.4	516.5	Shock, Procedure I, (functional)

**MINIMUM PERFORMANCE STANDARDS  
Digital Mobile Radio Equipment**

**6.6.1 Transmitter Parameters**

	<u>VHF-HB</u>	<u>UHF</u>	<u>700</u>	<u>800</u>
Number of Channels <sup>39</sup>	3	32	tbd	15
Frequency Separation (MHz)	17	10	tbd	18
Power Output (Watts) <sup>40</sup>	50	40	tbd	40
FM Hum and Noise (dB)	40	40	tbd	40

<sup>39</sup> This requirement allows for VDR, LMC, CMC, SMC, and/or applicable mobile-only talkgroup/channels and applicable Mutual Aid channels, plus talk-around; otherwise, as needed. The 32-channel requirement is for UHF mobile radios equipped with any of the first 16 MED channels, plus talk-around; otherwise as needed.

<sup>40</sup> Transmitter power output is a minimum standard unless demonstrated otherwise by system engineering and/or FCC Rules.

## 6.6.2 Receiver Parameters

	<u>VHF-HB</u>	<u>UHF</u>	<u>700</u>	<u>800</u>
Number of Channels <sup>41</sup>	3	32	tbd	15
Frequency Separation	17	10	tbd	10
Digital Sensitivity, 5% BER uV	.35	.35	tbd	.35
Adjacent Channel Selectivity (dB)	60	60	tbd	60
Intermodulation Spurious Response Attenuation (dB)	75	85	tbd	65
Spurious Response Attenuation (dB)	75	85	tbd	65
Audio Power Output (Watts)	10	10	tbd	10
Audio Distortion (%)	5	5	tbd	5

## 6.7 Portable Radio Equipment – Digital

The portable radio equipment shall be state-of-the-art, all RF frequencies shall be generated electronically (synthesized), and shall comply with Project 25 digital standards. The portable radio equipment shall be equipped with a battery of sufficient capacity to provide a 5% transmit, 5% receive, and 90% standby (5/5/90) duty cycle over at least an 8-hour period.

### 6.4.1 TIA/EIA and Military Standards

The radio equipment shall meet or exceed the following standards and test procedures of the current issue on the date of this revision. In the event of inconsistencies between the specifications in this Plan and the publications and standards listed below, the requirements of this Plan shall take precedence.

#### Telecommunications Industry Association/Electronics Industries Association Standards

##### TIA/EIA-603

Land Mobile FM or PM Communications Equipment Measurement and Performance Standards (NOTE: EIA-152, EIA/TIA-204, EIA-220, and EIA/TIA-316 are rescinded by TIA/EIA-603.)

<sup>41</sup> This requirement allows for VDR, LMC, CMC, SMC, and/or applicable mobile-only talkgroup/channels and applicable Mutual Aid channels, plus talk-around; otherwise, as needed. The 32-channel requirement is for UHF mobile radios equipped with any of the first 16 MED channels, plus talk-around; otherwise as needed.



## Military Standard

### MIL-STD-810

The transmitter/receiver unit shall meet or exceed MIL-STD-810D, 810E or 810F utilizing the following test methods and procedures:

<u>D</u>	<u>E</u>	<u>F</u>	
506.2	506.3	506.4	Rain, Procedure I, (blowing rain)
509.2	509.3	509.4	Salt Fog, Procedure I (aggravated screening)
510.2	510.3	510.4	Sand and Dust, Procedure I (blowing dust)
514.3	514.4	514.5	Vibration, Procedure I, Category 1 (3 Axes)
516.3	516.4	516.5	Shock, Procedure I, (functional)

## **MINIMUM PERFORMANCE STANDARDS Digital Portable Radio Equipment**

### **6.7.1 Transmitter Parameters**

	<u>VHF-HB</u>	<u>UHF</u>	<u>700</u>	<u>800</u>
Number of Channels <sup>42</sup>	3	34	tbd	15
Frequency Separation (MHz)	17	10	tbd	18
Power Output (Watts) <sup>43</sup>	5	4	tbd	3
FM Hum and Noise (dB)	42	42	tbd	42

### **6.7.2 Receiver Parameters**

	<u>VHF-HB</u>	<u>UHF</u>	<u>700</u>	<u>800</u>
Number of Channels <sup>44</sup>	3	34	tbd	15
Frequency Separation	17	10	tbd	18
Digital Sensitivity 5% BER uV	.28	.25	tbd	.3
Adjacent Channel Selectivity (dB)	60	68	tbd	63

<sup>42</sup> This requirement allows for VDR, LMC, CMC, SMC, and/or applicable mobile-only talkgroup/channels and applicable Mutual Aid channels, plus talk-around; otherwise, as needed. The 34-channel requirement is for UHF mobile radios equipped with any of the first 16 MED channels, plus talk-around, and digital and analog operation for SMC, otherwise as needed.

<sup>43</sup> Transmitter power output is a minimum standard unless demonstrated otherwise by system engineering and/or FCC Rules.

<sup>44</sup> This requirement allows for VDR, LMC, CMC, SMC, and/or applicable mobile-only talkgroup/channels and applicable Mutual Aid channels, plus talk-around; otherwise, as needed. The 34-channel requirement is for UHF mobile radios equipped with any of the first 16 MED channels, plus talk-around; and digital and analog operation for SMC, otherwise as needed.

Intermodulation Spurious			tbd	
Response Attenuation (dB)	74	775	tbd	75
Spurious Response			tbd	
Attenuation (dB)	75	75	tbd	75
Audio Power Output (Watts)	.5	.5	tbd	.5
Audio Distortion (%)	3	3	tbd	3

## 6.8 Mobile/Portable Channelization

### 6.8.1 UHF Band

- A. FCC Requirements: FCC Rules and Regulations require that all mobile radios, and portable radios exceeding 2.5 watts transmitter power output, which operate on MED channels, must employ equipment which is both wired and equipped to transmit/receive, respectively, on each of the frequency pairs designated as MED-1 through MED-8 and MED-12 through MED-82.
- B. MED-8 Statewide Medical Coordination (SMC) Channel: All UHF EMS mobile and portable radios shall be configured with frequencies 468.175 MHz transmit, 463.175 MHz receive, CTCSS of 167.9 Hz. Digital radios shall use Project 25 NAC \$293 (identified equivalent to CTCSS of 167.9 Hz) This frequency pair is designated as MED-8 by the FCC and is utilized throughout Florida as the SMC Channel, and shall include analog operation in addition to the Project 25 digital programming for this equipment until which time MED-8 is completely migrated to Project 25 digital operation statewide.
- C. MED-8 Statewide-Scene Coordination (SSC) Channel: A MED-8 "talk-around" channel shall be incorporated into all UHF mobile radios, and all portable radios having transmitter power output exceeding 2.5 watts. This simplex channel, operating as 463.175 MHz transmit and receive, CTCSS of 167.9 Hz, will provide intra- and inter-agency "scene of action" communications on a statewide basis. Digital radios shall use Project 25 NAC \$293 (identified equivalent to CTCSS of 167.9 Hz), and shall include analog operation in addition to the Project 25 digital programming for this equipment until which time MED-8 is completely migrated to Project 25 digital operation statewide.
- D. Project 25 (P25) Digital Operating Parameters: Common channel access parameters for MED-8, digital operation shall utilize the default values provided in every radio regardless of manufacturer. Any common channel access parameters not provided shall be programmed accordingly. These parameters include the following:
- a. P25 Network Access Code - \$293 (default value)
  - b. P25 Manufacturers ID - \$00 (default value)
  - c. P25 Designation ID - \$FFFFFF (designates everyone)

- d. P25 Talkgroup ID - \$0001 (default value)
- e. P25 Message Indicator \$00000000000000000000 (unencrypted)
- f. P25 Key ID - \$0000 (default value)
- g. P25 Algorithm ID - \$80 (unencrypted)

### **6.8.2 800 MHz Band**

EMS mobile and portable radio equipment operating in the 800 MHz band shall be equipped with the National Public Safety Calling Channel with analog operation in the duplex mode and the four National Public Safety Tactical Channels for analog operation in both the duplex and "talk-around" mode.

Additionally, the radio equipment may be equipped with the Florida Public Safety/Special Emergency Mutual-Aid Channel, 853.3875 MHz transmit, 808.3875 MHz receive, and statewide CTCSS of 210.7 Hz, for analog operation in both the duplex and "talk-around" mode. See Appendix B.

### **6.8.3 700 MHz Band**

EMS mobile and portable radio equipment operating in the 700 MHz band shall be equipped with the two interoperability Calling Channels operating in the duplex mode and, minimally, the four interoperability Tactical Channels for both duplex and "talk-around" digital operation per the [700 MHz Public Safety Interoperability Channel Plan](#).

**END OF SECTION 6.0**

## 7.0 CONCEPTS OF MOBILE DATA COMMUNICATIONS

### 7.1 General

Voice communications remains the primary means of coordinating EMS activities. Mobile data would be considered as an upgrade and/or expansion, in a secondary or adjunct role, to voice communications systems. EMS agencies may operate mobile data systems over current voice networks, such as 150, 450, 700 and 800 MHz frequency bands, on a secondary basis, subject to bandwidth constraints, or over data networks with frequencies dedicated for that use. The use of the term “mobile data” means packet-switched or Internet Protocol (IP) networks as outlined in this section. Mobile data systems provide a means for EMS personnel to instantly access local, state and national databases, locator mapping, and record management.

### 7.2 SAFECOM Statement of Requirements

[Department of Homeland Security’s SAFECOM](#) program published a Statement of Requirements (SoR), for public safety communications interoperability. “This statement [of requirements] defines future requirements for crucial voice and data communications in day-to-day, task force, and mutual aid operations. ... The SoR helps the emergency response community convey a shared vision that ultimately will help private industry better align research and development efforts with critical interoperable communication needs.

The SoR is currently a two-volume set. Volume I explains the qualitative requirements and identifies the applications and services critical for public safety communications. Volume II describes the quantitative requirements and provides detailed quality of service methods of measurement for the applications and services identified in Volume I, along with network parameters to specify the minimum acceptable performance of public safety communications systems carrying these services”<sup>45</sup>

1. [Statement of Requirements Volume 1, Version 1.2](#)
2. [Statement of Requirements Volume 2, Version 1.2](#)

The statement of requirements includes references to Extended Area Networks (EAN), Jurisdictional Area Networks (JAN), Incident Area Networks (IAN), and Personal Area Networks (PAN).

- Personal Area Networks (PANs), which permit wireless data sharing among PSC devices and sensors attached to an individual first responder, including data on the location, environment, and physical condition of that individual. Bluetooth is an example of wireless PAN technologies. In the voice radio field, talk around channels and vehicular repeaters are examples of voice PAN technologies. From

<sup>45</sup> Excerpts taken from [http://www.safecomprogram.gov/SAFECOM/library/technology/1258\\_statementof.htm](http://www.safecomprogram.gov/SAFECOM/library/technology/1258_statementof.htm).

a technology perspective, the PAN aligns with current industry technology that utilized the “[Bluetooth](#)” short-range wireless connectivity standard.

- Jurisdictional Area Networks (JANs), which are the permanent network infrastructure in particular cities or areas that are dedicated to PSC, capable of connecting to larger area networks. The wireless technologies that are likely to implement component of JAN include IEEE 802.16e mobile broadband wireless networking and mesh networking technologies. JAN is also applicable to radio systems such as Statewide Law Enforcement Radio Systems (SLERS), county or city radio systems, and nationwide radio systems.
- Incident Area Networks (IANs), which are temporary network infrastructures brought to the scene of an incident or otherwise configured for an incident. The wireless technologies that are likely to implement component of the system IAN include IEEE 802.11 wireless local area networks and wireless ad hoc networking technologies. IAN is also applicable to transportable radio systems such as the EDICS, EDWARDS or MARC units.
- Extended Area Networks (EANs), which consist of regional, state, and national network resources, particularly those dedicated to public safety communications. EAN is also applicable to the Florida Interoperability Network (FIN) because it connects jurisdictional systems.

Wireless data technologies have progressed through second-generation (2G) to third-generation (3G) digital standards, and now transitioning into LTE and 4G standards.

### **7.3 Mobile Data Communication Coverage Reliability**

It is recommended that the minimum system design for a mobile data system (MDS) be engineered at 90% area coverage reliability for -116 dBm at 5% bit error rate (BER) if the local agency is building its own Mobile Data System (MDS). However, if the agency is relying on a wireless data service provider, it will be prudent to check the coverage area of the MDS service provider for acceptable coverage reliability before subscribing to the network.

### **7.4 Mobile Data Security**

A minimum standard of end-to-end encryption methods and authentication procedures is required for wireless data network access, authentication, and authorization. The encryption should be at least a 128-bit encryption scheme. Because mobile data security is evolving, EMS agencies should integrate the latest developments in security technology. The approved encryption algorithms are Data Encryption Standard (DES), Triple DES, and Advanced Encryption Standard (AES). The latter is recommended.

## **7.5 Mobile Data Computer Minimum Recommended Specifications**

Although an off-the-shelf mobile computer will work, a ruggedized mobile data computer (MDC) is recommended for EMS. The ruggedized MDC should be in compliance with RS-374/EIA 204 or Military Standard-810F standards for salt, fog, temperature, dust/sand, rain, vibration, humidity and shock based on the following test methods and procedures:

- Rain, Procedure I (blowing rain)
- Salt Fog, Procedure I (aggravated screening)
- Sand and Dust, Procedure I (blowing dust)
- Vibration, Procedure I, Category 10 (3 Axes)
- Shock, Procedure I (functional) NOTE: Altitude testing is not required.

## **7.6 Wireless LAN Technologies & Standards**

### **7.6.1 General**

The WLAN should comply with the latest minimum requirements of the Institute of Electrical and Electronic Engineers (IEEE) 802.11, which is the standard for WLANs. The future holds LTE (Long-Term Evolution) as a potential public safety interoperable communications standard.

### **7.6.2 Overview of Technologies**

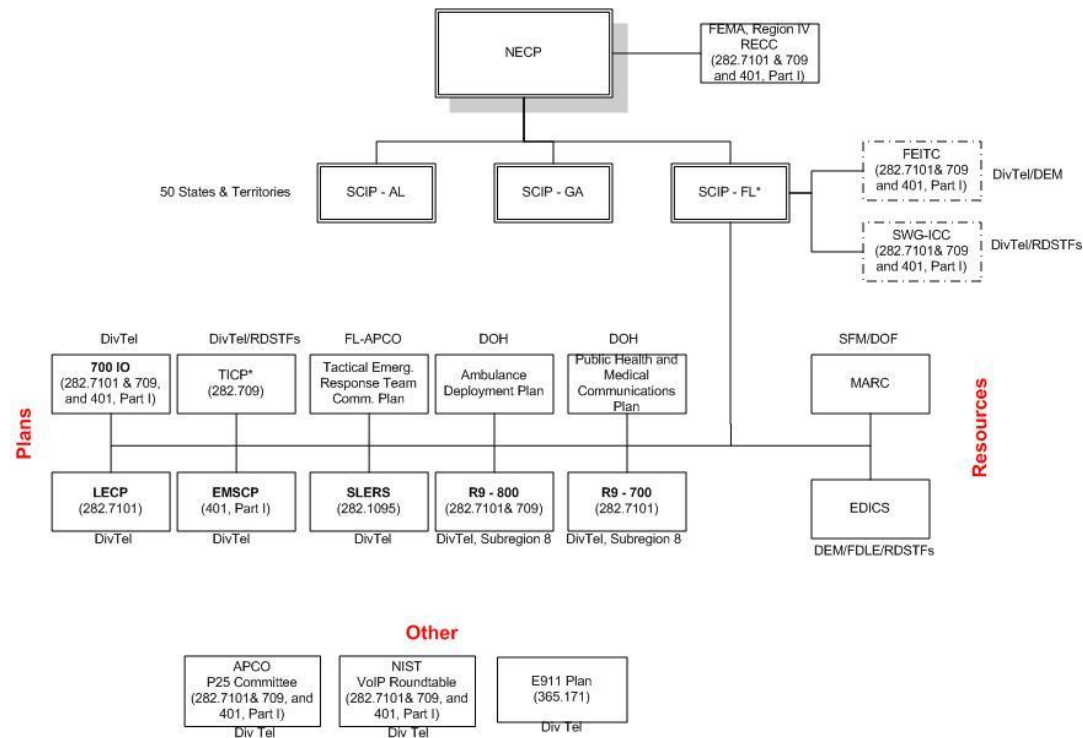
As newer 802.11 standards and LTE are adopted, it is recommended that the new standard be backward compatible with the standard currently used by the EMS agency. For planning purposes, as standards change and these new standards should be adopted, and components in your extended WLAN may have to be replaced.

LTE (Long-Term Evolution) technology is the latest technology offering public safety agencies may utilize as an option for interoperable mobile data communications. A migration plan will be necessary to promote a smooth transition from 802.11-based technology to LTE technology that minimizes or avoids potential negative impacts to response times and patient care.

### **END OF SECTION 7.0**

## APPENDIX A – FUNCTIONAL RELATIONSHIPS WITH PLANS AND COMMITTEES

The chart below shows the functional relationship between this Plan and other plans. It also references various committees associated with various plans for interoperable communications.



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\*Protected from public records act per Chapter 119, F.S.

**END OF APPENDIX A**

## **APPENDIX B – STATE AGENCIES AND LOCAL EMS POLICIES**

Communications policies contained within this appendix include:

1. Public Safety Mutual Aid Channel (MA-FLA)
2. Minimizing Risk of Obsolescence for Radio Equipment
3. Radio Equipment Replacement Policy
4. Radio Frequency *Buy Out* Policy
5. Capitol Building Rooftop Antenna Policy
6. New and Existing State Owned Facilities Rooftop Antenna Policy



## **1.0 PUBLIC SAFETY MUTUAL AID CHANNEL (MA-FLA)**

The State of Florida, through an application filed by the Department of Management Services (the Department), holds authorization from the Federal Communications Commission (FCC) to utilize the radio frequencies 854.6375/809.6375 MHz (formerly 853.3875/808.3875 MHz) as a mutual aid channel in the Public Safety Radio Service within the State of Florida, without regard to channel loading. This makes available to eligible public safety agencies an inter-service radio channel authorized for use during situations requiring interagency communications necessary toward safeguarding life, health, or property within the State of Florida. This channel is referred to as *Mutual Aid-Florida* or *MA-FLA*, the label specified as the common display abbreviation. Applicants that meet the eligibility requirements for frequencies in the public safety pool, specified in Part 90 of General Category frequency, may apply to license stations on this channel.

### **A. APPLICATION PROCEDURES**

Applications for mobile-relay stations, mobile stations, or both, must be submitted to the Department and must include the required eligibility showings and written mutual agreement, as to the technical and operational standards defined below.

Following a favorable determination by the Department, a letter of concurrence signed by the Director of Telecommunications, Chief of the Public Safety Bureau or a designee will be prepared and attached as an exhibit to the application. In addition, a copy of the State of Florida's waiver of FCC General Category Freeze (DA 97-1631) should also be attached to the application. A copy can be located at the web site <http://www.fcc.gov/Bureaus/Wireless/Orders/1997/da971631.txt>. The entire application will then be returned for submission to the appropriate FCC-certified frequency coordinating organization for further processing, as specified by FCC rules.

### **B. TECHNICAL STANDARDS**

#### **(1) System Configuration**

Fixed stations are to be configured for mobile-relay operation, such that the repeater function (repeat enable/disable) may be enabled or disabled from the associated supervisory control point. Fixed station transmitters must operate on 854.6375 MHz (formerly 853.3875 MHz). Fixed station receivers must operate on 809.6375 MHz (formerly 808.3875 MHz) for mobile relay purposes.

Vehicular mobile units and hand-held portable units are to be configured for repeater operation on one channel (809.6375 MHz transmit, 854.6375 MHz receive) and for direct *talk-around* operation on a second channel (854.6375

MHz transmit and receive). These channels may be in addition to any other trunked or conventional 800 MHz channels available in the same unit.

For each fixed station established, one supervisory control point must be designated by the Department of Management Services (the Department). A control point may be designated as supervisory for multiple fixed stations. Each supervisory control point, in addition to having the control functions of associated non-supervisory control points, must have an override function, enabling supervisory control of the repeat enable/disable function of supervised fixed stations.

Supervisory control points must be staffed 24 hours per day, year-round, and must have means for immediate contact with law enforcement, rescue, fire fighting, and emergency medical services agencies in the coverage area of the station controlled.

Radio frequency control stations transmitting on 809.6375 MHz must not be authorized for supervisory control points. Radio frequency control stations for non-supervisory control points will be granted upon an exhibition of need.

Any supervisory or non-supervisory control points may alternatively operate via either local or remote (leased) wireline links, or on radio frequencies that may be authorized for such use.

## **(2) Communications Coverage Plan**

The intent of the coverage plan is to establish, on a zone-by-zone basis, statewide coverage for vehicular-mobile units and urban-metropolitan area coverage for hand-held portable units.

Communications reliability for system design purposes is defined as having been engineered for a 95% probability of communications (Option A radio standard) at the defined coverage contour (or 98.3% probability of communications over the defined coverage area). This is based on a received signal level of either 20 dB quieting or 17 dB SINAD (TIA/EIA) for the worst case of either talk-out (base to mobile) or talk-back (mobile to base).

A radio zone for vehicular mobile units is defined to be one county unless otherwise approved by the Department. A radio zone for hand-held portable units is defined to be a specific urban metropolitan area, as agreed to by the Department.

Any application submitted to the Department for authorization of a Fixed (Mobile-Relay), station must include detailed plans for the establishment of either a county-wide vehicular mobile system or an urban-metropolitan area

hand-held portable system, or both. Such applications must also define the radio frequency control station communications paths to be established with agencies in adjacent counties and/or metropolitan areas.

(3) Minimum Performance Standards

As mentioned in Section 6.1 of the plan, the minimum performance standards defined for new equipment in the following sections are the standards by which the Department approval or disapproval will be determined for individual equipment items for use within the communications systems. These minimum performance standards apply to analog and digital equipment type-accepted for 25 kHz and/or 12.5 kHz operational bandwidths.

These standards have been developed by the Department research, engineering modeling, and analysis of communications equipment parameters which affect radio coverage, interference, audio quality, channel capacity and environmental performance. Development of these standards has been with the objectives of insuring that radio equipment used for communications is competitively available, enables necessary system performance, and achieves certain technical standards necessary to spectrum effectiveness and efficiency within the overall radio environment of the State of Florida.

For all other equipment items not explicitly included in the following sections, their approval will be determined on a case-by-case basis by the Department.

**C. OPERATIONAL STANDARDS**

**(1) Control Requirements**

During times of emergency, communications protocol and procedures for use of the channel must be coordinated with the Department of Emergency Management (DEM).

Regardless of ownership or licensee responsibility of the equipment comprising a station on this channel, any eligible entity may apply for and be granted authorization to operate a parallel control point for purposes of remotely controlling any existing fixed station. This applies where a showing of need has been demonstrated to the Division of Telecommunications. No owner or licensee of a fixed station shall claim exclusive rights to the control of that station.

The supervisory control point must normally maintain the associated fixed (mobile-relay) station in repeat-disabled mode. The supervisory control point will affect the repeat-enable mode only upon the specific request of a mobile (vehicular or hand-held) or radio frequency control station user. Upon completion

of mobile-relay communications, the fixed station must be switched to the repeat-disabled mode.

Should a local MA-FLA radio repeater site be established within the coverage of the proposed wide-area MA-FLA system, the local agency shall acknowledge the wide-area MA-FLA coverage and the local system enhances the wide-area MA-FLA channel.

**(2) Usage Requirements**

Usage of this channel is limited to situations in which radio communications between otherwise separate entities is essential for safeguarding life, health, or property within the State of Florida. Regardless of the ownership or licensee responsibility of the equipment comprising a station on this channel, use of this channel will be available on a non-exclusive basis to any eligible entity. No owner or licensee has claim to exclusive use of a fixed station on this channel. It is the policy of the Department to continue to use and specify the standards and criteria listed above for the design and implementations of public safety mutual aid channels.

## **2.0 MINIMIZING RISK OF OBSOLESCENCE FOR RADIO EQUIPMENT**

The Department of Management Services (the Department) will consider purchases of new radio equipment and may recommend equipment with additional capacity and/or features beyond what is immediately necessary, in order to minimize the economic risk of obsolescence for the purchased equipment, in the event additional capacity and/or features are later required. As a minimum, the Department will consider the following recommendations for the purchase of new equipment.

### **A. Mobile and Portable Radios**

One additional blank channel per radio is recommended.

### **B. Frequency/Tone Synthesis**

Electronic generation of RF frequencies and CTCSS tones (synthesized) are recommended to be able to change RF frequencies and/or CTCSS tones simply and inexpensively.

### **C. Control Consoles**

One additional blank channel port and control-module space is recommended for every three equipped channels.

### **D. Paging Encoders**

Universal format paging encoders are to include a digital numeric format with reserve capacity for system expansion.

### **E. Antenna Towers**

All antenna towers, either new or existing, are to be certified by a Professional Engineer licensed by the State of Florida to conform to the current EIA/TIA wind speed survivability of the towers location and should be submitted with the required radio system approval. All towers shall be inspected annually for corrosion, feeding/waveguide damage, and if required by the FAA/FCC its tower lighting operation.

#### **(1) Distributed Loads**

The minimum recommended design load capacity is one square foot of flat-plate equivalent area per ten feet of tower height. This loading is to be distributed in five square-foot (nominal) increments centered at 25-foot intervals, beginning at the tower top. This loading represents normal land-mobile antenna loads. Two additional five square-foot equivalent loads, in

addition to the planned loading, should be considered for growth capacity. This spare capacity should be designed at a minimum of 66% and 75% of the tower height. For each of these antenna loads, there will be an associated transmission line with required mounting hardware from the tower base to the antenna load point. The transmission line will be 1- 5/8" diameter, Andrew Type LDF7-50A, or 7/8" diameter, Andrew Type LDF5-50A, or equivalent.

## **(2) Concentrated Loads**

In addition to the distributed loads, growth capacity for two eight-foot diameter solid microwave antennas is recommended for towers exceeding 150 feet in height. These loads should be positioned within the top 30% of the tower. For these antenna loads, there will be an associated transmission line with required mounting hardware from the tower base to the antenna load point. The transmission line will be elliptical wave-guide equivalent to Andrew type EW63 series, or Andrew LDF7-50A 1-5/8" diameter coaxial cable.

## **(3) Roof Top Installation**

All Roof Top Installation are to be certified by licensed a professional Engineer licensed by the State of Florida to conform to the current EIA\TIA wind speed survivability of the buildings location and should be submitted with the required radio system approval. In addition all installations are to conform to FCC Exposure Rules found on the FCC webpage <http://www.fcc.gov/oet/rfsafety>.

## **(4) Equipment Shelters**

Equipment shelters should have sufficient spare space, air conditioning, power service, uninterruptible power supply (UPS) and communications cable conduits for two additional Electrical Industries Association standard (EIA 310-D) equipment racks requiring 5 kW total power and 17,000 BTU per hour of cooling (2.5 kW and 8,500 BTU/hour, per rack). Emergency power generators should be sized for a minimum of 10% excess continuous KVA capacity over planned loads, including start-up capacity for rotating equipment.

## **(5) Buried Transmission Lines and Control Cables**

Metallic or polyvinyl chloride raceway should be used for mechanical protection. It is recommended that at least one spare raceway be provided with capacity for two lines/cables of equal size to those initially installed. Furthermore, a nylon pull cord should be left in place for future use.

## **F. Microwave and Other Carrier Facilities**

Where possible, the Department recommends sharing the use of carrier facilities with other agencies, including the procurement by an agency of additional capacity for the needs of other agencies. Present and future capacity requirements will be included.

### **(1) Digital versus Analog Microwave**

Digital microwave will be chosen for design, unless otherwise justified.

#### **(i) Cable Right-of-Way**

Normally, not relinquishing present or potential government owned or leased right-of-way is recommended. Where there is cable right-of-way that can support a planned carrier facility, the cost effectiveness of fiber optics versus other cable systems will be considered. When cost estimates are comparable, fiber-optic cable will be chosen for design. When proven to be in the best interest of the agency, right-of-way may be shared in return for the use of transmission facilities.

#### **(ii) System Signal Level Design Margins**

Microwave systems will be designed for a minimum bit error rate of  $10^{-6}$  and/or a two-way path availability of greater than 99.999 percent per year. Fiber optics and RF-carrier cable systems will have a minimum of 1 dB/mile design margin to allow for future splices and taps. Fiber optics and RF-carrier cable systems will also have an additional 5 dB design margin for system aging.

## **G. Communications Control Centers**

Communications Control Centers (dispatch rooms) will be sized from actual floor plan drawings, showing all required consoles with chair space and all other required furniture and equipment. In the event this information is not available, there should be an allowance for a range of 100 to 120 square feet for each position. Allocation includes room for chair movement and access to the console electronics.

The Department recommends that new radio communications equipment or facilities be purchased with additional capacity and/or features in order to minimize obsolescence. With the universal utilization of computers, CRT consoles with modular furniture are recommended for their potential to save space and add to the overall efficiency of the dispatch environment.

## **H. Communications Equipment Life Cycle**

Communications equipment should be in an environmental controlled facility unless the equipment is rated for outside operations.



### 3.0 RADIO EQUIPMENT REPLACEMENT POLICY

The Department of Management Services (the Department) has established guidelines for the replacement of communications equipment. Specific situations that warrant equipment replacement (with proper maintenance) are listed below:

- A. Equipment has reached the age listed below although it may not have been in continuous use:

Type of Equipment	Age (Years)
Mobile Radios	8
Portable Radios	6
Base and Control Station Radios	10
Transmitter combiners	10
Antennas and Transmission Lines	
Within 10 miles of bodies of salt water	10
Other locations	12
Antenna Towers	
Within 10 miles of bodies of salt water	15
Other locations	20
Antenna Tower Lighting Systems	10
Control consoles	10
Logging Recorders	10
Instant Recall Recorders	6
Prefabricated Equipment Shelters	15
Standby Emergency Power Generators	
Within 10 miles of bodies of salt water	8
Other locations	12
Microwave Equipment	15

- B. Based on an investigation by the Department or a written statement of need from an agency, the Department may recommend an earlier than normal

replacement schedule in situations where equipment is damaged, abnormally worn, or technically obsolete.

- C.** The Department recognizes that adequate preventative maintenance programs will extend the usable life of equipment beyond the times schedules above and therefore encourages agencies to develop and implement such programs. In such cases longer replacement schedules will be considered.
- D.** For large systems, phased replacement schedules may be necessary for economic reasons. Thus, the Department will consider earlier replacement schedules for a portion of the system equipment such that the last equipment to be replaced will not be older than three years beyond the normal replacement schedule.

#### **4.0 RADIO FREQUENCY *BUY OUT* POLICY**

When an agency needs to implement a new radio system or to expand an existing one in certain situations, the shortage of available radio channels may preclude a straightforward implementation or expansion. In such cases, the most economical alternative may be the relocation of an existing radio user from one channel to another, in order to free up a channel for the agency planning to implement or expand. When feasible, The Department of Management Services will support such an arrangement and may recommend that the agency purchase new radio equipment for the user being relocated, in exchange for the user's current radio channels and radio equipment.

## **5.0 CAPITOL BUILDING ROOFTOP ANTENNA POLICY**

Based on the intent of the architect and the Capitol Planning Commission to maintain the aesthetic beauty of the State Capitol Building and the DivTel's responsibility to minimize radio interference between users, the number of antennas on the Capitol rooftop is limited to those currently authorized and in place. This includes four-land mobile antennas owned by the State Attorney's office; the Department of Law Enforcement; the Capitol Police (FDLE), and the Leon County Sheriff's Office. There are also two microwave antennas owned by the Department of Education and one Master Antenna TV (MATV) antenna owned by the Department of Management Services (Division of Facilities Management). Additional antennas permitted on the State Capitol building will be assigned for state agency use only. The Division of Telecommunications and Department of Management Services, Division of Facilities Management, must approve configuration changes to radio hardware associated with rooftop antennas.

## **6.0 NEW AND EXISTING STATE OWNED FACILITIES ROOFTOP ANTENNA POLICY**

Based on the responsibility of the Division of Telecommunications to minimize radio interference between users, the number of antennas on state owned building rooftops are normally limited to three. These antennas will normally be attached to the antenna mounting supports provided as part of the building. Antennas required on State-owned buildings will be assigned for State Agency use only and must be approved by the Division of Telecommunications and the Department of Management Services, Division of Facilities Management.

**END OF APPENDIX B**

## **APPENDIX C – PUBLIC SAFETY RADIOS FOR AIRCRAFT UTILIZATION**

This appendix is developed from the experiences of the Joint Task Force of State Law Enforcement Agencies, with the Federal Aviation Regulations, and with the Federal Communications Commission. In the event of inconsistencies between this Plan, the Federal Aviation Regulations, and the FCC Rules and Regulations, the Federal Aviation Regulations and FCC Rules and Regulations shall take precedence as applicable.

## Public Safety Radios for Aircraft Utilization

With regard to public safety radios for utilization in aircraft, the Federal Aviation Regulations (FAR) and the Federal Communications Commission (FCC) have established standards that require radios to meet certain design criteria for aircraft installation. Some of these standards are incorporated by reference to standards of the Radio Technical Commission for Aeronautics (RTCA). Selection of a radio system for public safety use may be accomplished by Scenario A, Aircraft radio equipment, Scenario B, Mobile radio equipment, or Scenario C, Hand-held portable radio equipment, as follows:

Scenario A: Install a radio system specifically designed for aircraft service.

Scenario B: Install a mobile radio such that the radio is compliant with current FAA-FARs and FCC rules. Specifically, a licensed avionics technician would modify the mobile radio and aircraft for installation. These modifications may include the following:

1. The installation of a 28VDC to 12VDC converter with the rated amperage and duty cycle required by the radio.
2. The installation of a universal interface apparatus that will provide the radio with the ability to generate "side tone." Further, this interface device would allow audio access (transmit and receive) to the radio via the aircraft's existing internal communications system (ICS). Additionally, this component will provide:
  - a. Isolated transmitter keying PTT (Push-to-Talk),
  - b. Isolated receiver audio input (balanced or matching)
  - c. Isolated receiver audio output (balanced or matching),
  - d. Microphone impedance output adapter (balanced or matching) with adjustable output, and
  - e. Internal receiver/side-tone audio amplifier.
3. Control of background lights on the radio control head, so as to not disturb or interfere with the pilot's ability to view the flight control instruments of the aircraft. (FAR 23.1381, instrument lights for aircraft)
4. When designing a mounting bracket configuration for the radio equipment, consider environmental parameters which would include installation of the system such that in the event of an aircraft mishap or accident, the radio and radio control head would remain secured. (FAR 43 & FAR 23.561)
5. Revise the mobile radio control head harness to include additional cable length as required for the aircraft installation. Replace the wiring harness provided for the radio control head with a wiring harness that is flame resistant and will not emit toxic fumes if burned. (FAR Part 23.1365)
6. Modification of the mobile radio control head advisory lights to eliminate red transmit light and yellow channel-busy light so as not to indicate an aircraft malfunction to the pilot. (FAR Part 23.1322)

7. Reduce the RF output power of the radio to 10 watts (FCC Rule section Part 90.423(a)(2)) or request modification of FCC license(s) for approval of an exception to the 10-watt RF power output limitation on board aircraft (if necessary) in accordance with FCC Rules.

Scenario C: Install a hand-held portable radio with a "vehicular adapter" such that the radio is compliant with current FAA-FARs and FCC rules. Specifically, a licensed avionics technician would modify the portable radio, "covert-a-com" and aircraft for installation. While similar, these modifications are listed separately from Scenario B and may include the following:

1. The "pilot in command" is ultimately responsible for the safe operation of the aircraft. If the portable radio is operated in a "hand-held" fashion, it should be done so as the "pilot in command" is allowed to perform their duties without unreasonable concentration or fatigue. This provision may limit the utilization of a hand-held portable radio on board the aircraft to an ancillary crew-member or the co-pilot, provided the radio had no effect on other aircraft components. Speaker/microphone or speaker/microphone/antenna (SMA) use on a portable radio may be acceptable with the aforementioned understanding. Unless the portable radio is used in conjunction with a "covert-a-com," the remaining steps in this scenario do not apply.
2. The installation of a 28VDC to 12VDC converter with the rated amperage and duty cycle required by the radio and its associated "vehicular adapter."
3. The installation of a universal interface apparatus that will provide the radio with the ability to generate "side tone." Further, this interface device would allow audio access (transmit and receive) to the radio via the aircraft's existing internal communications system (ICS). Additionally, this component will provide:
  - a. Isolated transmitter keying PTT (Push-to-Talk),
  - b. Isolated receiver audio input (balanced or matching),
  - c. Isolated receiver audio output (balanced or matching),
  - d. Microphone impedance output adapter (balanced or matching) with adjustable output, and
  - e. Internal receiver/side-tone audio amplifier.
4. Control of background lights on the portable radio and vehicular adapter, so as to not disturb or interfere with the pilot's ability to view the flight control instruments of the aircraft. (FAR 23.1381, instrument lights for aircraft)
5. When designing a mounting bracket configuration for the vehicular adapter and portable radio equipment, consider environmental parameters which would include installation of the system such that in the event of an aircraft mishap or accident, the vehicular adapter and portable radio equipment would remain secured. (FAR 43 & FAR 23.561)
6. Revise the vehicular adapter wiring harness to include additional cable length as required for the aircraft installation. Replace the wiring harness provided for the vehicular adapter with a wiring harness that is flame resistant and will not emit toxic fumes if burned. (FAR Part 23.1365)
7. Modification of the portable and vehicular adapter advisory lights to eliminate red transmit light and yellow channel-busy light so as not to indicate an aircraft malfunction to the pilot. (FAR Part 23.1322)



8. Limit the RF output power of the portable radio/vehicular adapter to 10 watts (FCC Rule section Part 90.423(a)(2)) or request modification of FCC license(s) for approval of an exception to the 10-watt RF power output limitation on board aircraft (if necessary) in accordance with FCC Rules.
9. When utilizing a "covert-a-com" device, the battery must be restricted from recharging. It should be removed before inserting the portable radio into the vehicular adapter; or else, the charging circuit should be disabled in the vehicular adapter. This restriction is for compliance with FAR 23.1353.

*The essence of this portable installation guideline is to prevent distractions to the "pilot in command." These guidelines are also intended to prevent the portable radio battery from charging and potentially discharging dangerous gasses into the cockpit of the aircraft. Safety to the aircraft and its crew is paramount.*

Completing the aircraft installation in any of the above scenarios would also require:

- A. Installation of an aircraft antenna with regard to wind loading at high speeds, in excess of 150 knots, constant vibration, limited ground plane, and potential interference to or from the aircraft's existing communications or navigational equipment, RTCA 160 C.
- B. Appraising cost estimates for the radio equipment and installation as well as the cost associated with modifying the aircraft and for providing a new weight and balance on the aircraft, FAR Part 91.
- C. Submitting FAA Form 337 received from an FAA-licensed repair station to apply for FAA approval of each completed aircraft installation in accordance with FAR Part 43.34-2a.

Per FCC Rule Section 90.423, any aircraft flying at an altitude of 1.6 km, 1 mile, or more shall not be permitted to communicate on any frequencies within the applicable Private Land Mobile Radio Service. Any aircraft communications on frequencies in the Private Land Mobile Radio Service operate on a secondary basis to land-based systems. "Secondary basis" means that any aircraft radio communications causing/receiving interference to/from land-based radio stations must correct the interference or cease operations on the suspect frequencies in the aircraft. This affects most, if not all, fixed-wing aircraft. There are phone systems available such as "Flightphone7," "Airphone7," "Flightlink7," and "Air-to-Ground7", not Cellular phones, that may provide alternative means of communications. With the potential for land-based radio interference and the aforementioned secondary basis to which aircraft communications is subjected, aircraft radios that operate in the Private Land Mobile Radio Service should have a label or placard to read, "maximum operation of this radio is 5,280' AGL by regulation of FCC."

**End of Appendix C**

## **APPENDIX D – ACRONYMS FOR EMERGENCY MEDICAL SERVICES COMMUNICATIONS**

The following list of acronyms provides a sample of those used in communications technology and engineering. For the purpose of this Plan, any acronyms that may coincide with medical or other meanings shall be understood to represent the communications aspect herein.

## Acronyms for Emergency Medical Services Communications

### - A -

AAT - above average terrain

AC - alternating current

AGL - above ground level

ALI - automatic location identification

ALS - Advanced Life Support

AMSL - above mean sea level

APCO - Associated Public-Safety Communications Officials-International, Inc.

ASTM - ASTM, formerly the American Society of Testing and Materials

AVL - automatic vehicle location

### - B -

BLS - Basic Life Support

BPS - bits per second

### - C -

CAD - computer-aided dispatch

CTCSS - continuous tone-controlled squelch system

### - D -

dB – decibel

dBm - decibel referenced to one milliwatt

dBv - decibel referenced to one volt

dBw - decibel referenced to one watt

DC - direct current

DGPS - Differential Global Positioning Satellite, Differential Global Positioning System

DTMF - dual-tone multi-frequency (touch tone)

### - E -

E & M - the receive and transmit leads of signaling system

EMS - emergency medical services

EMT - emergency medical technician

EOC - emergency operations center

ERP - effective radiated power

ETA - Estimated Time of Arrival

**- F -**

| FAA - Federal Aviation Administration  
FAR - Federal Aviation Regulation  
FCC - U.S. Federal Communications Commission  
| FEMA - Federal Emergency Management Agency  
FM - frequency modulation  
|

**- G -**

GHz - gigahertz (1000 MHz)  
GPS - Global Positioning Satellite, Global Positioning System

**- H -**

HAAT - height above average terrain  
HEAR - Hospital Emergency Administrative Radio (Motorola trademark)  
| Hz - hertz (cycles per second)

**- I -**

IAFC - International Association of Fire Chiefs  
IACP - International Association of Chiefs of Police  
| IEEE - Institute of Electrical and Electronics Engineers  
| IMSA - International Municipal Signal Association

**- J -**

**- K -**

kbps - kilobits per second kHz – kilohertz

**- L -**

| LMR - land mobile radio  
| LOS - line of sight or loss of signal

**- M -**

| MSL - Mean Sea Level  
| MHz - Megahertz

**- N -**

| NTIA - National Telecommunications & Information Administration

**- O -**

- P -

PSAP - public safety answering point  
| PTT - press to transmit, or push to talk

- Q -

- R -

RCU - Remote Control Unit  
RF - radio frequency  
RX - receive

- S -

| SLERS – Statewide Law Enforcement Radio System

- T -

| TX – transmit  
TIA - Telecommunication Industry Association

- U -

UHF - ultra high frequency (300-3000 MHz)  
| UPS - uninterruptable power supply

- V -

V – volts  
VAC - volts, alternating current  
VDC - volts, direct current  
VHF - very high frequency (30 - 300 MHz)  
| VSWR - voltage standing wave ratio

- W -

- X -

- Y -

- Z -

| **End of Appendix D**

## **APPENDIX E – GLOSSARY OF COMMUNICATIONS TERMS**

This glossary provide definitions commonly used in communications technology and engineering. They have been abridged specifically for EMS communications aspects of this Plan.

## Glossary of Communications Terms

### - A -

**Adapter:** A device used for changing the terminal connections of a circuit or part to connect to another circuit or part with unlike connections.

**Alphabet, phonetic:** A method of passing alphabetic information over a poor communication path with word substitution for letters. A widely accepted phonetic alphabet is: Alfa; Bravo; Charlie; Delta; Echo; Foxtrot; Golf; Hotel; India; Juliett; Kilo; Lima; Mike; November; Oscar; Papa; Quebec; Romeo; Sierra; Tango; Uniform; Victor; Whiskey; X-ray; Yankee; Zulu.

**American Standard Code for Information Interchange (ASCII):** An eight level code for data transfer adopted by the American Standards Association to achieve compatibility between data devices.

**Amplitude Compandored Single-Sideband:** A form of sideband modulation used for narrow channel transmission that incorporates a guide tone.

**Amplitude modulation (AM):** Modulation in which the amplitude of the carrier-frequency current is varied above and below its normal value in accordance with the audio, picture, or other intelligence signal to be transmitted.

**Analog:** Physical representation of information such that the representation bears an exact relationship to the original information. Pertaining to data in the form of continuously variable physical qualities.

**Analog Communication:** System of telecommunications used to transmit information other than voice that is sometimes used in telemetry.

**Antenna:** A system of wires or electrical conductors employed for reception or transmission of radio waves. Specifically, a radiator that couples the transmission line or lead-in to space for transmission or reception of electromagnetic radio waves. It changes electrical currents into electromagnetic radio waves and vice versa.

**Antenna Gain:** The effectiveness of a directional antenna expressed as the ratio of the power of a directional antenna to the power of the isotropic antenna to produce the same field strength in the same direction.

**Antenna, isotropic:** A hypothetical, lossless antenna having equal radiation intensity in all directions. (ANSI/IEEE Std 100-1988)

**Attack time:** The interval required after a sudden increase in input signal to a transducer, transmitter, receiver, etc., to attain a percentage of final output level due to this increase.

**Attenuation:** The decrease in amplitude of a signal during its transmission from one point to another. It may be expressed as a ratio or, by extension of the term, in decibels.

**Attenuator:** A device for reducing the energy of a wave without introducing distortion. Also called a pad, gain control, level adjuster, volume control, etc.

**Audible signal:** A buzzer, bell, or other audible sound device that indicates an incoming call.

**Audio:** Pertaining to frequencies corresponding to normally audible sound waves. These frequencies range from 15 to 20,000 hertz.

**Automatic gain control (AGC):** A receiver circuit that maintains the output constant with wide variations in the receiver input level.

**Automatic number identification (ANI):** Equipment for recording the calling party's number without operator intervention.

**Automatic volume control (AVC):** A self-acting gain control which maintains the output of a receiver constant despite variations in received signal strength.

**Antenna, parabolic:** A directional antenna with a radiating, or receiving, element, and a parabolic reflector that concentrates the power into a beam.

- B -

**Back bone:** A point-to-point wireless communications system utilizing several fixed stations.

**Back-to-back repeater:** A repeater consisting of a receiver and transmitter with the output of the receiver connected directly to the input of the transmitter.

**Band (radio frequency):** A range of frequencies between two definite limits. By international agreement, the radio spectrum is divided into nine bands. For example, the very high frequency (VHF) band extends from 30 MHz to 300 MHz.

**Bandpass filter:** Passes frequencies within a specified band, and attenuates all frequencies outside that band.

**Bandwidth:** (1) The width of a band of frequencies used for a particular purpose. (2) The range of frequencies within which a performance characteristic of a device is above specified limits. For filters, attenuators, and amplifiers these limits are generally taken to be 3 dB, half-power, below the average level.

**Baseband:** For microwave systems, the available frequency band that the RF equipment is capable of transmitting.

**Base station:** An item of fixed radio hardware consisting of a transmitter and a receiver.



**Baud:** A term used to define the operating speed of a printing telegraph or data system. It is the total number of discrete conditions or signal events per second.

| **Beacon:** A radio transmitter or lights designed to indicate exact geographical location or direction.

**Beam:** A configuration of radiated energy whose rays are sharply directional and parallel.

**Beat:** A regularly recurring pulsation from the combination of two-tone or frequency waves of different frequencies.

**Beat frequency:** The frequency produced when signals of two different frequencies are combined and refracted. The beat frequency is equal in value to the difference between the original frequencies.

**Beeper:** A pocket paging receiver that emits a beeping sound upon receiving a page specifically directed to it.

**Bel:** A unit of relative power, named after Alexander Graham Bell, and used to express differences in power.

**Biomedical telemetry (biotelemetry):** The technique of monitoring or measuring vital biological parameters and transmitting data to a receiving point at a remote location.

**Bit:** A unit of digital information (abbreviation of "Binary digit").

**Boom microphone:** A microphone arranged on an arm type mechanical support to permit better placement on the microphone.

**Boost:** To amplify; amplification.

| **Broadcast:** Radio or television transmission intended for general reception.

| **Busy indicator:** An indicator provided at a control point to indicate the in use condition of a circuit or channel.

- C -

**Cable:** One or more insulated or non-insulated wires used to conduct electrical current or impulses. Grouped insulated wires are called a multi-conductor cable.

**Calibrate:** (1) to adjust a measuring device so that it reads correctly. (2) To determine error by comparison with a known standard.

**Call, all:** The alerting of all decoder equipped units in a system by the transmission of a single coded signal.

**Call, group:** The alerting of subdivided selective call groups by function, type of vehicle, location, etc. by sending a single coded signal.

**Call, individual:** The alerting of a specific coded decoder unit by sending a single coded signal.

**Call sign:** Federal Communications Commission assigned identifying letters and numbers used for identification of a radio station, transmitter, or transmission.

**Call taker (complaint taker):** An individual who is responsible for staffing an appropriately equipped answering position that receives incoming 9-1-1 calls.

**Capture effect:** An effect occurring in FM reception when the stronger of two stations on the same frequency suppresses the weaker station.

**Cardioid microphone:** A microphone having a heart-shaped space response pattern of 180 degrees in front, and minimum response in the rear.

**Carrier:** A radio signal generally without voice or other information.

| **Carrier frequency:** The frequency of an unmodulated electromagnetic wave produced by the transmitter.

**Cellular radio:** A commercially available mobile or portable radio telephone service.

| **Central office:** Sometimes called a wire center; the smallest subdivision within the telephone system which has relatively permanent geographic boundaries.

**Change out:** To replace.

**Channel element:** A temperature-compensated crystal oscillator.

**Channel, point-to-point:** A radio channel used for radio communications between two definite fixed stations.

**Channel, radio:** An assigned band of radio frequencies of sufficient width to permit its use for radio communication. The necessary width of a channel depends on the type of transmission and the tolerance for the frequency of emission.

| **Channelization:** The assignment of circuits to channels, and the arrangement of those channels into groups.

**Charge:** To replenish the electrical potential in battery or capacitor.

**Charge, fast or quick:** A method of quickly recharging nickel-cadmium batteries under controlled conditions.

**Charge, trickle:** The continuous charge of a battery at a slow rate.

**Chart, 4/3 earth's radius:** A radio profile chart whose horizontal lines are curved to correspond to an earth having a radius  $4/3$  times larger than actual earth radius.

**Circuit merit:** A rating of overall circuit quality. Circuit merit '5' is clear circuit. Merit '3' is readable with noise. Any rating below '3' is not readable and generally unacceptable.

**Coaxial cable:** A transmission line in which one conductor completely surrounds the other, the two being coaxial and separated by a continuous solid dielectric or by dielectric spacers.

**Code dialing:** A method of signaling or encoding and decoding address codes by the use of standard telephone dial.

**Command and control center (dispatch center):** A system which is responsible for establishing communications channels and identifying the necessary equipment and facilities to permit immediate management and control of an EMS patient. This operation must provide access and availability to public safety resources essential to the effective and efficient EMS management of the immediate EMS problem.

**Communications:** The transmission of information from one point to another by means of electromagnetic waves (ANSI/IEEE Std. 100-1988). Also, see Telecommunications.

**Communications subsystems:** Comprises 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.

**Communications system:** A collection of individual communication networks, transmission system, relay stations, control and base stations, capable of interconnection and inter-operations that are designed for form an integral whole. The individual components must serve a common purpose, be technically compatible, employ common procedures, respond to control, and operate in unison.

**Complaint taker:** See call taker.

**Computer:** An electrical device which can accept information, process it mathematically in accordance with previous instructions and provide the results of this processing.

**Console:** A cabinet housing electronic circuitry normally used in controlling other equipment such as transmitters and receivers installed at a remote location.

**Continuous duty:** (1) an unending transmission. (2) Operating 100% of the time. (3) EIA - full load output under the manufacturer's normal loading conditions for this class of service for twenty-four hours.

**Continuous tone-controlled squelch system (CTCSS):** 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 (General Electric Mobile Radio Department), or Quiet Channel (RCA).

**Control console:** A desk-mounted, enclosed piece of equipment which contains a number of controls or circuits used to operate a radio station.

**Control head:** A device with appropriate controls, microphone, volume, squelch, on/off, etc., generally mounted in a vehicle, from which control of the radio or mobile unit is performed.

**Control, local:** A control system packaged with the control unit (hard wired) wired directly to the base station.

**Control point:** A position from which a radio system is controlled and supervised.

**Control, remote:** A control scheme for a radio system where all control functions are performed remotely via telephone lines or other transmission media.

| **Coordination:** That process by which something is arranged to happen in a good acceptable way in contrast to random occurrence.

**Coordination, frequency:** The cooperative selection and allocation of radio frequencies such that all systems can operate with minimum interference.

**Coverage area:** In a radio communications system, the geographic area where reliable communications exist; usually expressed in terms of square miles surrounding a fixed radio station.

**Coverage contour:** In a radio communications system, the boundary at which reliable communications exist; usually expressed in terms of miles extending readily from a fixed radio station.

| **Cut over:** To transfer from one system to another.

**Cycle:** One complete reversal of an alternating current, including a rise to the maximum level in one direction and a return to zero. The number of cycles occurring in one second is the frequency of the current. The word cycle is commonly used to mean cycles per second (now call hertz).

- D -

**DC control:** A remote base station control scheme that requires metallic conductors and currents of different values to control the station's various functions.

**Data base:** A collection of basic and factual information organized for rapid search and retrieval.

**Decibel (dB):** A unit that expresses the level of power value relative to a reference power value. Specifically, the level of power value P relative to a reference value PR in decibels is defined as  $10 \log (P/PR)$ .

**Decoding:** The conversion and recognition by the addressed (receiving) unit of numerical address codes that have been transmitted through a communications system.

**Dedicated telephone line:** A telephone wire pair, originating at one point, and terminating at another point, operating in a closed circuit. Also called Private Line or RT circuit.

**Digital:** Data represented in discrete, discontinuous form, as contrasted with analog data represented in continuous form.

**Digital dial code:** A signaling technique generally used in EMS VHF radio systems to bypass a receiver CTCSS system.

**Direct:** In terms of communications circuits, means a dedicated, instant method of communications. A dial telephone is not direct, a radio or ring down line are direct.

**Direct leased land lines:** Dedicated or designated point-to-point wire circuits (telephone) used in transmitting voice or data communications. See: dedicated telephone line.

**Directional antenna:** An antenna which radiates radio waves more effectively in some directions than in others.

**Directivity:** The value of the directive gain of an antenna in the direction of its maximum value.

**Dish:** A type of antenna. A parabolic reflector used in microwave systems.

**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 such request (10D-66).

**Dispatch center:** A location where coordination of resources is facilitated through radio communications.

**Dispatch point:** A position from which a radio system is used but not a supervision or control point. Dispatch points are not usually listed on a station radio license.

**Distortion:** Unfaithful reproduction of audio or video signals due to change occurring in the wave form of the original signal, somewhere in the course of its transmission or reception. The lower the percentage of distortion, the more distortion free the system is and the more intelligible the message.

**Diversity:** A method of radio transmission and/or reception which counteracts the effects of fading by combining several signals all bearing the same information.

**Doctor-interrupt:** The ability of a physician or hospital-based communicator to interrupt the voice or telemetry transmission from a radio in the field.

**Dual-tone, multi-frequency (DTMF):** The simultaneous generation of two audio tones generally compatible to AT&T's standard "Touch-Tone" Frequencies. Used for control or signaling purposes. A method of sending numerical information from an encoder by sending specific pairs of audio tones for each digit.

**Duplex:** Pertaining to a simultaneous two-way independent transmission in both directions.

**Duplexed/multiplexed telemetry unit:** A radio device capable of simultaneous transmission and reception and concurrent transmission of both voice and EKG information.

**Duplexer:** A device that is used in radio equipment to provide simultaneous transmit and receive capabilities on a single antenna.

**Duplex operation:** (a) the operation of transmitting and receiving apparatus at one location in conjunction with associated transmitting and receiving equipment at another location; the process of transmission and reception being concurrent. (b) the operation utilizing two radio-frequency channels, one for each direction of transmission, in such a manner that intelligence may be transmitted concurrently in both directions. For comparison see Simplex operation.

- E -

**E & M signaling:** An arrangement by which signaling between two points on a radio or carrier path is accomplished. An M lead is associated with the transmitter (or mouth) while the E lead is associated with the receiver (or ear).

**EACOM:** Emergency and Administrative Communications for hospitals established by General Electric Mobile Radio. A VHF radio system operating on standard frequencies with a selective calling system between stations. The system is similar to Motorola Communications HEAR radio system.

**Effective height:** The true electrical height of an antenna corresponding to a "perfect" antenna that will produce the same field strength. The height of its center of radiation above the effective ground level.

**Effective radiated power (ERP):** The calculated power output from an antenna system which incorporates all the gains and losses in the antenna system. ERP is calculated as follows: (1) convert power output of transmitter to dB referenced to one watt (dBw); (2) subtract all transmission line losses including losses in equipment between the transmitter and antenna (filter, diplexers, circulators, duplexers, etc.) expressed in dB; (3) add the antenna's power gain (expressed in dB reference to half-wave dipole); and (4) convert the results into watts.

**Effective signal radiated:** The rating basis for licensing radio transmitters. Equal to the square root of the effective radiated power times the antenna height in feet above ground level.

| **Electrocardiogram (ECG or EKG):** A visual or hard copy trace of a patient's electrical heartbeat information.

| **Electromagnetic radiation:** Radiation associated with a periodical varying electric and magnetic field that is traveling at the speed of light, including radio waves, light waves, X-rays, and gamma radiation.

**Electromagnetic wave:** A wave of electromagnetic radiation, characterized by variations of electric and magnetic fields.

**Emergency call:** A call that requires immediate action.

**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 designed and operated by a community or within a geographic area for a combination of emergency resources, such as police, fire, and EMS.

| **EMS region:** The geographic area (i.e., countywide area) served by a given EMS system.

| **Encoding:** The conversion of numerical address codes, such as telephone number or message codes, into a format of tone or on-off pulses of audio tones for transmission over a communications system, usually for individual or group addressing, such as for paging or selective calling.

| - F -

**Facility, communications:** A communications facility is anything used or available for use in the furnishing of communications service.

**Fade margin:** The number of decibels of attenuation which can be added to a specified radio frequency propagation path before the signal-to-noise ratio of the channel falls below a specified minimum.

**Fading:** The variation of radio field strength caused by a gradual change in the transmission medium.

**FCC Part 90, 47 CFR:** The part of Federal Communications Commission (FCC), Title 47 of the Code of Federal Regulations (CFR) that affects most EMS communications.

**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.

**Field strength:** The strength of an electric, magnetic or electromagnetic field. Electromagnetic (radio) field strength is expressed in microvolts per meter or millivolts per meter.

**First responder, EMS-recognized:** Any individual or organized group that has a valid Memorandum of Understanding between themselves and an EMS licensee within the same jurisdictional area.

**Fixed relay station:** An operational fixed station established for the automatic retransmission of radio communications received from either one or more fixed stations or from a combination of fixed and mobile stations and directed to a specified location.

**Fixed service:** A service or radio communication between specified fixed points. Fixed station - (1) a radio which is not mobile; (2) a station which is permanently installed; (3) a base station in a mobile radio system.

**FM transmitter:** A radio transmitter that emits or radiates a frequency modulated wave.

**Folded dipole:** A receiving or transmitting antenna composed of two parallel dipoles, connected at the ends. The connection to the receiver or transmitter is made at the center of one of the poles.

**Four-wire operation:** Telephone operation in which the inbound audio signal is carried on one pair of wires and the outbound signal on another pair.

**Free space loss:** The theoretical radiation loss that would occur in transmission if all variable factors were disregarded. Free space loss depends only on the frequency and the distance between antennas.

**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 1000 Hz). One hertz is equivalent to one cycle per second.

**Frequency band:** A continuous range of frequencies extending between two limiting frequencies. Frequency bands that are involved in two-way radio are 25-50 MHz (VHF-low band), 150-174 MHz (VHF-high band), 450-512 and 890-960 MHz (UHF band).



**Frequency deviation:** Frequency deviation of an FM signal is the change in the carrier frequency produced by the modulating signal. The frequency deviation is proportional to the instantaneous amplitude of the modulating signal.

**Frequency modulation (FM):** A method of modulating a carrier-frequency signal by causing the frequency to vary above and below the unmodulated value in accordance with the intelligence signal to be transmitted. The amount of deviation in frequency above and below the resting frequency is at each instant proportional to the amplitude of the intelligence signal being transmitted. The number of complete deviations per second above and below the resting frequency corresponds at each instant to the frequency of the intelligence signal being transmitted.

**Frequency response:** The transmission loss or gain of a system, measured over the useful bandwidths, compared to the loss or gain at some reference frequency (generally 1000 Hz).

**Frequency separation:** The frequency displacement between a receive frequency and transmit frequency to insure that the signal-to-interference ratio does not fall below a specified value in order to function satisfactorily.

**Full-duplex operation:** A method of operation of a radio system which provides simultaneous two-way communications between two points. In EMS radio systems, provides for mutual interrupt capabilities between the field technician and the physician or medical direction at a hospital location.

- G -

**Gain, of an antenna:** The effectiveness of a directional antenna in a particular direction, compared against a standard (usually an isotropic antenna). The ratio of standard antenna power to the directional antenna power that will produce the same field strength in the desired direction.

**Generator, standby power:** A device that develops electrical voltage from mechanical energy. An AC electrical power source held in reserve and used to supply the necessary AC power when commercial power fails.

**Geographical assignment:** The assignment and use of communications channels on a dedicated use basis within a given geographical area.

**Gigahertz (GHz):** One billion hertz or 1000 MHz.

**Goal:** A statement of broad direction, general purpose, or intent. A goal is general and timeless and is not concerned with a particular achievement with a specified time period. (See also: Objective).

**Guard band:** A narrow band of frequencies provided between adjacent channels in certain portions of the radio spectrum to prevent interference between stations.

- H -

**Half-duplex operation:** Operation of a duplex system arranged to permit operation in either direction but not in both directions simultaneously.

**Half-wave dipole antenna:** A straight, ungrounded antenna having an electrical length equal to half the wave length of the signal being transmitted or received. Mounted vertically, it has a donut-shaped pattern, circular in the horizontal plane.

**HAM:** A term applied to an amateur radio operator, as opposed to business or commercial operators. A person that makes amateur radio operation a hobby.

**Hand microphone:** A microphone designed to be held in the hand. Sometimes called a "palm" microphone.

**Handset:** A device similar to a telephone handset used in place of a hand microphone.

**Hardware:** The screws, nuts, clamps, anchors, connectors, etc. used in the installation and maintenance of communications systems.

**Hardwire:** To wire or cable directly between units of equipment without passing through other media.

**Harmful interference:** Any emission, radiation, or induction which endangers the functioning of a radio service or seriously degrades, obstructs, or repeatedly interrupts a radio communication service.

**Harmonic:** An integral multiple of fundamental frequency. The third harmonic of 20 Hz is 60 Hz. The fifth harmonic of 40 Hz is 200 Hz.

**Headphone:** A device which can be placed on the head to allow individual listening to messages.

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

**Heliac:** Andrew Corporation trade name for semi-rigid coaxial transmission line.

**Helicopter landing site:** A location used for helicopter take-offs and landings on a one-time, a temporary, or an infrequent basis. (FAR-Aviation Circular 150/5390-1B)

**Heliport:** A designated landing area used primarily for the operation and basing of rotorcraft. (Florida Statute 14-60)

**Helistop:** A designated landing area used for the operation of rotorcraft where no basing facilities are provided. (Florida Statute 14-60)

**Helix:** A single layer, spiral wound coil usually having air or foamed polyethylene core.

**Heterodyne:** (1) pertaining to the production of difference in frequencies (beat frequencies) by the combination of the two frequencies. (2) To shift an incoming radio signal to a different frequency, often to a lower intermediate frequency.

**Heterodyne frequency:** The beat frequency, which is the sum or difference between two frequency signals.

**Hertz (Hz):** International unit of frequency, which replaced "cycles-per-second".

**High band, VHF:** A portion of the radio frequency spectrum from 150 to 174 MHz in which two-way radio operates.

**Hot standby operation:** A method of achieving reliable operation by energizing two identical equipments fed by and to a switchable input and output circuits when a failure is indicated.

**Hum:** Audio frequency interference which is at the frequency of the power supply or its harmonics.

- I -

**Image:** One of the two groups of sidebands generated in the process of modulation, so called because one is the reverse (mirror image) of the other with respect to operating frequency.

**Image frequency:** In heterodyne frequency converters, an undesired input frequency which can beat with the local oscillator to produce the intermediate frequency and thus appear in the receiver output.

**Image rejection:** The action of a receiver in suppressing the image frequency.

**In-band signaling:** The transmission of signaling tones within the frequency band of the channel.

**Indicator:** A device used to inform of a condition or change in condition.

**Induced:** Produced as a result of exposure to a changing electric or magnetic field.

**Insertion loss:** The loss introduced when a device or line section is interposed between two elements of a circuit.

**Interface:** A concept involving the specification of the interconnection between two equipments or systems. The specification includes the type, 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 which 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.

**Intermittent:** Not continuously present; disappearing and reappearing.

**Intermittent duty cycle:** A duty cycle of 1 minute on, 4 minutes off, or 20% per Electronic Industries Association (EIA).

**Intermodulation:** The combination of two signals beating together to form a third unusable signal which interferes with reception of the desired signal. In a radio receiver the method of expressing in dB below the desired signal, the receiver's rejection of the unwanted signal to its acceptance of correct signals.

**Intrinsically safe:** A laboratory (UL) rating for equipment considered approved to operate in areas in which hazardous concentrations of flammable gases exist.

| **Itinerant:** Traveling from place to place.

- J -

**Jack:** A connecting device ordinarily used to make an electrical contact with mating contacts of a plug.

| **Jamming:** The deliberate radiation, re-radiation or reflection of electromagnetic energy with the object of impairing the use of electronic devices, equipment or systems.

| - K -

**Key:** A push-to-operate switch used for operating a transmitting circuit in a radio system.

| **Kilo:** A prefix meaning one thousand.

**Kilohertz (kHz):** Equal to one thousand cycles per second. Replaces the term kilocycle.

- L -

**Land line:** A generic term which refers to the public-switched telephone system.

**Land-mobile:** An abbreviation for land to mobile communications such as between base stations and mobile radios, or from mobile radio to mobile radio.

**Land Mobile Radio Service:** A mobile radio service defined by the Federal Communications Commission - FCC Rules and Regulations Part 90.

**Leased wire line:** A pair of wires or a circuit, usually leased or rented from a telephone company, designed for exclusive use between two fixed points for various communication control functions.

**Life cycle:** A test performed on a material device to determine the length of time before failure.

**Life, service:** The life expectancy under normal conditions of use.

**Line:** A transmission line or power line. A system of one or more wires.

| **Line of sight:** An unobstructed path between two points. Radio waves at those frequencies where signals travel in a straight line and are not reflected by the ionosphere.

| **Link:** The portion of a radio relay system between adjacent radio stations.

| **Load:** (1) A device that receives power from a transmission system. (2) The amount of electric power drawn by an electric or electronic device.

| **Loop:** (1) A short transmission line that connects a subscriber to a switchboard. (2) A closed path in which a signal may circulate. This path may be within a piece of equipment, such as a repeater or carrier terminal, or may be a complete carrier circuit.

**Loss:** A decrease in power suffered by a signal as it is transmitted from one point to another, usually expressed in decibels. Energy dissipated without accomplishing useful work.

| **Loss, path:** The reduction or attenuation of signal strength that occurs between the transmitted signal strength and the received signal strength.

**Low band, VHF:** A section of the radio frequency spectrum from 25-50 MHz in which mobile radio equipment is licensed to operate.

| - M -

**Marginal:** Operating at the borderline of permissible limits.

| **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 telephonic communication for on-site and transit, Basic and Advanced Life Support Services given by field personnel such as EMT's or Paramedics.

| **Medical emergency:** An unforeseen event affecting an individual in such a manner that a need for immediate medical care (physiological or psychological) is created.

**Microwave:** A term applied to radio waves in the frequency range of 1,000 megahertz and upward. Microwave radio generally performs the same functions as telephone cables, and may be used for radio remote control purposes.

**Mobile:** Term used to describe equipment designed for vehicular installation.

**Mobile command unit:** Temporary dispatch center.

| **Mobile relay station:** A fixed station established for the automatic retransmission of mobile service radio communications which originate on the transmitting frequency of the mobile stations and which are retransmitted on the receiving frequency of the mobile stations.

**Mobile repeater station:** A mobile station in the mobile service authorized to retransmit automatically on a mobile service frequency communications originated by hand-held or portable units or by other mobile or base stations directed to such hand-carried units.

**Mobile service:** A service of radio communication between mobile and land stations, or between mobile stations.

**Mobile station:** A two-way radio station in the mobile service intended to be used while in motion or during halts at unspecified points.

**Mobile transmitter:** A radio transmitter designed for installation in a vehicle, vessel, or aircraft and normally operated while in motion.

**Mobile unit:** A two-way radio equipped vehicle or person. Also, sometimes the two-way radio itself, when associated with a vehicle or person.

| **Modulate:** To vary the amplitude (am), frequency (fm), or phase (pm) of a high frequency wave or carrier in step with amplitude variations of another wave (the modulating wave). The carrier is usually a sine wave while the modulating wave is often a complex voice or EKG signal.

**Modulator:** The electronic circuit that combines the modulating wave with the carrier wave. In radio transmitters the audio-frequency stage which mates the audio signal with the carrier signal. In EKG telemetry, the circuit that combines the amplified EKG signal with the subcarrier (audio) signal for transmission by radio or telephone.

| **Multicoupler, receiver:** A device which permits several radio receivers to use the same antenna. Usually a broadband amplifier with several output ports.

| **Multi-jurisdictional system:** A system covering more than one political boundary or agency.

**Multipath:** The propagation phenomenon which results in signals reaching a radio receiving antenna by two or more paths usually resulting in a degradation of the original signal.

**Multiplex:** Transmitting two or more signals over the same medium. In EKG telemetry equipment, the ability to transmit electrocardiograph (EKG) signals and voice signals concurrently over the same transmitter.

| **Multi-tone:** A method of signaling that involves two or more tone signals produced simultaneously or sequentially.

**Mute:** To silence or reduce sound level.

- N -

| **Network:** An orderly arrangement of stations interconnected through communications channels in order to form a coordinated entity.

**Nine-one-one (9-1-1):** A three digit emergency telephone number accepted and promulgated nationally and by Florida Statutes as the statewide emergency telephone number.

**Noise:** Interference characterized by undesirable random voltages caused by an internal circuit defect or from some external source. Any extraneous signal tending to interfere with the proper and easy perception of those signals, which are intended to be received.

**Noise blanker:** A device used in mobile radio applications which senses the presence of undesired noise on the desired channel and causes the desired signal to be interrupted for the time period that the undesired noise signal is present. The time period is controlled and measured in milliseconds so that the interruption of the desired signal is not audible.

**Noise level:** Volume of noise usually expressed in decibels.

| - O -

**Objective:** A desired accomplishment that can be measured within a given time frame and under specifiable conditions. The attainment of the objective advances a system toward a corresponding goal.

**Omnidirectional:** Equally effective in all directions.

| **Outage:** A disruption of communications from any cause, whether planned or accidental.

| **Overload:** A load greater than a device is designed to handle.

- P -

**Paging:** A one-way communications service from a base station to mobile or fixed receivers that provides selective signaling or information transfer by such means as tone, tone-voice, tactile, optical readout, etc.

| **Passive repeater:** A device intentionally interposed in a microwave transmission path to redirect or reflect energy.

**Patch:** A means of connecting one system to another. A patch may be between radio systems, or radio to telephone, as in a radio/phone patch.

**Path, signal:** The route by which intelligence is conveyed from transmitter to receiver or through a circuit.

**Personal radio:** A small portable radio intended to be carried by hand or on the person of the user.

| **Phone patch:** An interconnection between radio and telephone communications circuits which permits direct voice interchange between telephone lines and radio system.

| **Portable:** An easily transportable radio.

**Primary power:** A reliable source of electrical power normally serving as the principle source of energy to equipment, such as the commercial 120 volt AC power main.

| **Propagation, electromagnetic:** The travel of electromagnetic waves through a medium, or the travel of a sudden electric disturbance along a transmission line. Also called wave propagation.

**Protect:** To equip with devices for safeguarding from damage by excessive voltages, current or physical abuse.

**Public safety agency:** A functional division of a public agency which provides fire fighting, police, ambulance, emergency medical, or other emergency services.

| **Push-to-talk or press-to-talk (PTT):** In radio or telephone systems, that method of communication over a speech circuit in which transmission occurs from only on station at a time, the talker being required to keep a switch operated while he is talking. The keying button used to operate a radiotelephone transmitter.

- Q -

**Quarter-wave antenna:** An antenna electrically equal to one-fourth of the wavelength of the signal to be transmitted or received.

**Quieting:** Reduction of system noise.

- R -

**Rack mounting:** A method of mounting equipment in which metal panels supporting the equipment are attached to pre-drilled steel channel rails or racks. The dimensions of the panels, the spacing of the rails and the size of the mounting screws are standardized.

| **Radio:** The transmission and reception of signals by means of electromagnetic waves without a connecting wire.



**Radio-frequency power:** The power associated with any signal consisting of electromagnetic radiation which is used for telecommunications.

**Radio interference:** Undesired disturbance of radio reception. Man-made interference is generated by electric devices, with the resulting interference signals either being radiated through space as electromagnetic waves or traveling over power lines or other conducting media. Radio interference is also due to natural sources such as atmospheric phenomena such as lightning. Radio transmitters themselves may additionally interfere with each other.

**Radio network:** A number of radio stations, fixed and mobile, in a given geographical area which are jointly administered or which communicate with each other by sharing the same radio channel or channels.

**Radio receiver:** An instrument which amplifies radio frequency signals, separates the intelligence signal from the RF carrier, amplifies the intelligence signal additionally, and converts the intelligence signal to its original form.

**Radio relay system (radio relay):** A point-to-point radio transmission system in which the signals are received and retransmitted by one or more intermediate radio stations.

**Radio station:** A complete assemblage of equipment for radio transmission or reception, or both.

**Radio transmitter:** A radio-frequency power source which generates radio waves for transmission through space.

**Range:** Distance over which a radio signal can be transmitted for effective reception or the distance at which a usable signal can be received.

**Receiver:** An electronic device used to detect and amplify transmitted radio signals.

**Receiver, paging:** A small, light, pocket sized receiver used for alerting individuals when they are away from their normal communication instruments.

**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.

**Relay:** Transmission forwarded through an intermediate station.

**Relay station:** Radio stations that rebroadcast signals the instant they are received, so that the signal can be passed on to another station outside the range of the originating transmitter.

**Reliability:** The ability of an item to perform a required function under stated conditions for a stated period of time.

**Remote base station:** A base station located away from the operating console, to take advantage of improved coverage offered by a better geographical location.

**Remote control:** The operation of a device from a distance either electrically or by radio waves.

**Remote control equipment:** The apparatus used for performing monitoring, controlling, supervisory control, or a combination of these functions at a distance by electrical means.

**Repeater:** A combination of apparatus for receiving either one-way or two-way communication signals and delivering corresponding signals which are either amplified or reshaped or both.

**Repeater station:** An operational fixed station established for the automatic re-transmission of radio communications received from any station in the mobile service.

**Repeater station, re-modulating:** A microwave repeater station in which the signal is demodulated to the original baseband frequencies and re-injected onto the modulator for transmission to the distant station.

| **Revision:** A change or modification.

| - S -

| **Selective call:** A system for alerting individual or groups of stations by means of coded signals.

**Selectivity:** The ability to select one particular signal from other signals at nearby frequencies. This specification is important in urban areas where radio spectrum congestion exists. The more negative the dB rating, the better the specification.

**Sensitivity:** The characteristic of a radio receiver which determines the minimum input signal strength required for a given signal output. In FM, sensitivity is the signal level required to produce a given ratio of signal to noise. The more sensitive a receiver is, the weaker the signal it can receive.

| **Signal:** The form of a radio wave in relation to the frequency serving to convey intelligence in communication.

**Signal-to-noise ratio:** The ratio of the intensity of the desired signal to that of the undesired noise signal, usually expressed in decibels.

**Signal strength:** A measure of the field intensity caused by a radio transmitter at a particular location within its operating range. Usually expressed as microvolts, or millivolts of signal.

**Simplex:** (1) single frequency operation whereby all base stations and mobiles operate on one common frequency. (2) Operation on two different frequencies in a system that can

communicate in two directions, but not simultaneously, such as when a base station and a mobile radio operate on reversed pairs of frequencies without duplexing.

**Simplex channel:** A communication channel providing transmission in one direction only at any given time. For comparison, see duplex channel.

**Simplex operation:** A method of radio operation in which communication between two stations takes place in only one direction at a time. This includes ordinary transmit-receive operation, press-to-talk operation, voice-operated transmit, and other forms of manual or automatic switching from transmit to receive. Also call simplex.

**SINAD:** The ratio of signal plus noise, plus distortion to the noise, plus distortion; expressed in decibels. An EIA standard method of measuring receiver sensitivity. Basically a measure of RF signal strength that will result in a readable signal.

**Software:** The programs or instructions required to use a computer or data processing device.

| **Spectrum:** A continuous range of frequencies arranged in order of wavelength or frequency within which waves have some common characteristics, such as audio spectrum, radio spectrum, etc. The entire range of electromagnetic radiation extending from the longest known radio waves to the shortest known cosmic rays.

**Spurious response:** The response of a radio receiver to an undesired frequency.

**Squelch:** A circuit function that acts to suppress the audio output of a receiver when noise power exceeding a predetermined level is present.

**Squelch, carrier:** A squelch system that responds to the presence of an RF carrier signal.

**Squelch circuit:** A circuit that reduces or lowers the noise that would otherwise be heard in a radio receiver between transmissions.

| **Statewide EMS system:** A network of EMS systems, integrated and coordinated at the state level.

**Station, radio:** A fixed installation or mobile unit that is equipped to transmit and receive radio signals.

| **Synthesizer, frequency:** A highly precise crystal oscillator with frequency dividers used to provide the precise radio frequency. A typical synthesizer can be set to small frequency increments and have an accurate output at the desired output frequency.

| - T -

| **Telemetry:** The sensing and measuring of information at some remote location and transmitting the data to a convenient location to be read and recorded.

**Telephone line:** A telephone line from a telephone company central office that is connected to key or non-key telephone equipment.

| **Third harmonic:** A frequency wave having three times the fundamental frequency value.

**Threshold:** In an FM receiver, the point at which the peaks of the incoming RF signal exactly equal the peaks of the internally generated thermal noise power or the point above which increasing the input signal strength provides only a dB for dB improvement in the output signal-to-noise ratio.

**Tone:** An audio or carrier of controlled amplitude and frequency used in a selective signaling system, or for equipment control purposes.

| **Tone-controlled squelch:** A system whereby a superimposed tone is transmitted with the radio carrier to protect against nuisance type interference.

| **Touch pad:** A method of signaling or encoding and decoding address codes by the use of a simple numerical push button keyboard.

**Tower, antenna:** A tall antenna support structure used to support one or more antennas or when an antenna must be mounted high above the ground or other support formation such as a building.

| **Transceiver:** The combination of radio transmitting and receiving equipment in a common housing, usually for portable or mobile use, and employing common circuit components for both transmitting and receiving.

| **Transmission line:** A waveguide, coaxial line, or other system of conductors used to transfer signal energy efficiently from one location to another. In communications systems, the coaxial line between the base station and the antenna.

**Transmitter:** Apparatus for the production and modulation of radio frequency energy for the purpose of radio communication.

| **Two-way radio:** A radio that is able to transmit and to receive.

**Two-wire operation:** Uses a single pair (two wires) for both transmitting and receiving.

- U -

**Ultra High Frequency (UHF):** Frequencies between 300 and 3000 MHz.

| **Unmodulated:** Without modulation; the RF carrier signal alone as it exists during phases in conversations.

- V -

**Vehicular repeater station:** A mobile station in the mobile services authorized to retransmit automatically on a mobile service frequency, communications originated by hand carried portable units or by other mobile or base stations directed to such hand-carried units.

**Vertical antenna:** A vertical steel tower, rod, or shaft used as an antenna.

**Very High Frequency (VHF):** Frequencies between 30 and 300 MHz.

**Voice:** Referring to the sounds uttered by human beings.

**Voice grade:** A communications circuit which is nominally 300 to 3000 hertz.

**Volume:** The strength of loudness.

- W -

**Watt:** The unit of power.

**Wave, radio:** An electro-magnetic wave which travels through space at the speed of light.

- X -

- Y -

- Z -

**End of Appendix E**

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People First

FIN **SUNCOM** PRIVATE PRISONS

*Fleet* State Group Insurance

*Human Resource Management*

*Office of Supplier Diversity*