

**DEPARTMENT OF MANAGEMENT SERVICES**

# **Law Enforcement Communications Plan**

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**July, 2009**



DEPARTMENT OF MANAGEMENT  
**SERVICES**


We serve those who serve Florida.

Governor Charlie Crist

Secretary Linda H. South

**MEMORANDUM**

**TO:** Law Enforcement Communications Plan Recipients

**FROM:** Charles Ghini, Director   
Division of Telecommunications

**DATE:** July 7, 2009

**SUBJECT:** Revised Law Enforcement Communications Plan

The State Law Enforcement Communications Plan has been revised and is now available online at [http://dms.myflorida.com/suncom/public\\_safety/radio\\_communications/radio\\_communication\\_plans](http://dms.myflorida.com/suncom/public_safety/radio_communications/radio_communication_plans). This revision includes updates and new text. On each revised page, a vertical bar (“|”) in the left margin identifies lines of text which have been modified since the previous issue of that page. Substantive changes contained within this revised Plan include:

- Made the Plan applicable to State and local agencies (Section 1.1)
- Incorporated reference to NIMS, SAFECOM, Interoperability Continuum and SCIP in the Plan (Section 1.4)
- Included SLERS Partners in the Plan (Section 2.4)
- Made reference to the Mobile Command Post Standardized Radio (Section 3.4)
- Modified Section 3.6 (Interagency/Mutual Aid Communications) with Florida Interoperability Network (FIN) mutual aid capabilities
- Added 700/800 MHz P25 dual band capable radios requirement along with 700 MHz band segment (Section 5.5.2 D and E)
- Addressed Mutual Aid Repeater Default mode requirement (Section 5.5.3)
- Included two options for public safety radio standards (Section 5 and Section 6)
- Added two appendices, Appendix B (State Agencies and Local Law Enforcement Policies) and Appendix C (Narrowbanding Migration Plan)

If you have any comments or questions regarding these revisions, please call Charles Hadley at (850) 922-7505 or via email at [charles.hadley@dms.myflorida.com](mailto:charles.hadley@dms.myflorida.com).

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## **1.0 INTRODUCTION**

### **1.1 Scope**

The scope of this plan encompasses State agencies and local law enforcement agencies' land mobile radio (LMR) systems.

### **1.2 Executive Summary**

The Department of Management Services (the Department), is mandated by Section 282.7101(2), Florida Statutes, "to develop and maintain a statewide system of regional law enforcement communications." Section 282.7101(5) requires further that "A law enforcement communications system may not be established or expanded without the prior approval of the department."

In 1973, the Division of Communications (Division) prepared the first Law Enforcement Communications Plan and implemented the approval system necessary to fulfill these statutory obligations. In conjunction with Federal funding that was made available by the United States Congress through the Law Enforcement Assistance Administration, the first Communications Plan enabled implementation of many law enforcement radio systems throughout the state. Since then, a shortage of funding for new equipment, experience gained during the intervening years, changes in technological approaches, changes in Federal Communications Commission Rules and changes in law enforcement operational needs have necessitated a new plan. Each user of this plan is encouraged to send to the Department of Management Services, questions and comments on any matter which this plan does or should contain. The plan will be a more flexible document over time than its predecessor, enabling necessary changes to be periodically incorporated.

The plan contains the general, administrative, and regulatory information needed by the managers of organizations involved in law enforcement operations. It further defines the broad concepts and goals of law enforcement communications within Florida. Additionally, this plan contains the statewide radio frequency allotments as well as operational information for day-to-day law enforcement communications system operations.

The "Administrative Information" section includes general information on the Department of Management Services; the Federal Communications Commission Rules, radio frequencies, and frequency coordination requirements; the Florida - Region 9 Plan for Public Safety Radio Communications; and the Division's law enforcement communications approval procedures. The "Concepts" section defines the fundamental modes of law enforcement communications and system capabilities referred to throughout the plan. The "Frequency Plan" section defines the methodology controlling the allotment and use of radio frequencies within the statewide system of regional law enforcement communications system. Lastly, the "System Requirements" and "Equipment Requirements" sections give requirements for the high reliability needed in law enforcement communications. These requirements are used in determining the approval for the implementation or expansion of a law enforcement communications system.

We strive to keep this plan clear and concise for a more useable reference that facilitates future revisions when necessary. We have accordingly limited the statewide requirements on law enforcement communications systems and equipment to the minimum level to effect all essential modes of law enforcement communications.

We wish to express our appreciation to the many individuals both within and outside the Department 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 law enforcement communications be developed whereby maximum efficiency in the use of existing radio channels is achieved in order to deal more effectively with the apprehension of criminals and the prevention of crime generally."

### **1.3 Legislative Background**

The Department's role in radio communications planning can be traced back to the 1969 Florida Legislature. This role is for the purpose of planning and coordinating all telecommunications services for state agencies and political subdivisions, as specified in Florida Statutes, Section 282.102. The Department is 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, the Department has received additional responsibilities and authority which specifically relate to Public Safety telecommunications at the local level.

Florida Statutes, Section 282.7101(1), originally enacted by the Legislature in 1972, mandated the Department of Management Services 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 deal more effectively with the apprehension of criminals and the prevention of crime." This Statute requires law enforcement agencies to obtain approval from the Department before establishing or expanding their communications systems. This additional authority includes the law enforcement communications at the State and local levels.

In 1973, the Florida Legislature enacted Chapter 401, Part I, the Emergency Medical Services Telecommunications Act, relating to emergency medical service telecommunications; providing for the establishment and regulation of emergency medical telecommunications; mandating the Department to formulate and implement an Emergency Medical Services Communications Plan encompassing each medical service entity within the state; and listing those items to be included in such a plan. Like Section 282.7101, this Statute requires Emergency Medical Services agencies to obtain approval from the Department of Management Services before establishing or expanding their communications systems.

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 '911' plan..." (hereinafter referred to as 9-1-1) and directs the Department 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 system be established or expanded without prior approval of the Department.

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

In 1996, Florida Legislature created Section 318.21 (9), Florida Statutes. This section specifically authorizes counties which participate in an approved intergovernmental radio communications program to use \$ 12.50 from moving traffic violations for the purpose of funding such a program. This statute requires the program be approved by the Department.

#### **1.4 NIMS, SAFECOM, Interoperability Continuum and SCIP**

The Law Enforcement Communications Plan includes reference to NIMS, SAFECOM, Interoperability Continuum and SCIP.

1. 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. 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 lists the following system elements:
  - A. Personal Area Networks (PANs) 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.
  - B. Jurisdictional Area Networks (JANs) are the permanent network infrastructure in cities that are 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.
  - C. Incident Area Networks (IANs) 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.

- D. Extended Area Networks (EANs) 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 all jurisdictional systems.

The SAFECOM requirements can be found at:

<http://www.antd.nist.gov/wctg/manet/docs/WirelessAndSoR060206.pdf>.

- 3. Interoperability Continuum (IO) is developed by the Department of Homeland Security's SAFECOM and is designed to assist emergency response agencies and policymakers 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%20Continuum%20Brochure%202.pdf).

- 4. 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 the Statewide SCIP point of contact, or e-mail at [carlton.wells@dms.myflorida.com](mailto:carlton.wells@dms.myflorida.com).

## **1.5 Plan Revision Procedure**

A major goal in the development and distribution of this Law Enforcement Communications Plan has been to establish an effective revision procedure to ensure that all necessary information and requirements regarding law enforcement communications are promptly made available to affected law enforcement organizations. On each new or revised page of the associated edition, a vertical bar (" | ") in the left margin will be used to identify any lines of text which have been modified since the previous edition. Subsequent revisions of the same page will use the vertical bar for only the most recent change. 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.

An e-mail notification will be sent to public safety agencies each time the plan is revised. Distribution of the plan is via the Internet on an individual-agency basis.



### **1.5.1 Revision Publication Procedures**

When necessary, the Department of Management Services (the Department) will update the appropriate sections of this plan with new information. The Department will send out a Revision Memorandum for each new edition. This Revision Memorandum will define the essence of the revisions included in the new edition. The Revision Memorandum will be e-mailed to public safety agencies and posted on the Local Public Safety Services section website at:

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

**END OF SECTION 1.0**

## **2.0 ADMINISTRATIVE INFORMATION**

### **2.1 Division of Telecommunications**

The Division of Telecommunications (DIVTEL) is under the Department of Management Services (the Department). In fulfilling a wide range of telecommunications services and regulatory responsibilities, DIVTEL is organized into four bureaus to include Public Safety, Engineering, Financial Operations, and Customer Services. These four Bureaus are further subdivided into sections and other functional groupings.

The Department is involved with the 9-1-1 emergency telephone number system planning and implementation.

The Department also handles activities related to land mobile, microwave, satellite radio systems, and radio-frequency coordination. The Department's responsibilities include the overall engineering and regulation of all state agency telecommunications in the above areas, and for Emergency Medical Services and Law Enforcement telecommunications at the State and local levels.

In addition, the Department is responsible for regulatory direction and technical assistance to State Agencies and local law enforcement agencies to include the following wide range of disciplines:

- **Communications System Analysis**

Communications System Analysis includes the survey and analysis for new or existing communications systems to determine specific requirements in the technical and operational aspects of system performance, system recommendations, procurement schedules, and preliminary budgetary estimates.

- **Communications Planning**

Closely related to communication system analysis, planning services include formal planning on State, regional, County, and local levels. Within the planning framework, technical assistance and operational system requirements are defined and translated into present and future equipment and system needs.

- **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.

- **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.

- **Bid Evaluation**

Responses to procurement specifications are evaluated to determine compliance with the specified requirements.

- **Performance Verification Evaluation**

After system installation and prior to system acceptance by the purchaser or leaser, evaluation of system performance tests is completed to insure conformance to specifications.

- **Radio Frequency Coordination and Licensing Assistance**

Assistance in the preparation of radio frequency coordination forms and Federal Communications Commission license applications, and Federal Aviation Administration (FAA) licensing assistance for tower clearance is provided.

Timely requests for project assistance in the above areas, or for any other information or assistance which the Department of Management Services may provide, should be directed in writing to:

Director, Division of Telecommunications  
4030 Esplanade Way, Suite 115  
Tallahassee, Florida 32399-0950

Telephone inquiries may be made to (850) 922-7435 . Our FAX number is (850) 488-9837. FAX transmittal is not encouraged for routine or non-expeditious activities, or documents comprised of 10 or more pages.

## **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 Federal Communications Commission (FCC). There are radio frequencies nationally allocated for public safety communications, which includes dispatch of law enforcement ground vehicles and other law enforcement-related communications. Such radio communications are allowed under FCC Rules and Regulations (Title 47, Code of Federal Regulations) Part 90, Private Land Mobile Radio Services, Subpart B, Public Safety Radio Pool. In the event of inconsistencies between this plan and the FCC Rules and Regulations, the FCC Rules and Regulations shall take precedence.

On April 3, 1986, the Federal Communications Commission certified one nationwide frequency coordinator in each radio service and required that (nearly) all license applications be coordinated by these entities or categories of services. This was to insure 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. The Association of Public-Safety

Communications Officials-International, Inc. (APCO) was made the certified coordinator for the Local Government and Police Radio Service.

Effective October of 1997, a single Public Safety Pool was established by the FCC Rules. This pool is comprised of frequencies from all the previous allocations to the various Public Safety Radio Services. Though Law Enforcement now shares many frequencies with all other Public Safety Radio Services, APCO must approve the coordination of all frequencies that are designated for Law Enforcement. The "Radio Service Code" to enter on the FCC Application Form for all public safety agencies below 800 MHz is now PW for conventional operation and YW for trunking operation.

Within the former Division of Communications, the Bureau of Public Safety functioned as APCO's local frequency advisor in the Local Government, Police, and Special Emergency Radio Services until January 7, 1992. The Department of Management Services (the Department) maintains liaison with the certified coordinator toward the mutual goal of effective and efficient use of the radio spectrum by law enforcement organizations within Florida. The Department coordinates 800 MHz in cooperation with the Florida - Region 9 Plan for Public Safety Radio Communications.

### **2.2.2 Radio Frequencies for Law Enforcement Eligibility**

The current FCC Rules clearly state the eligibility of law enforcement for frequencies in the Public Safety Pool. Per Section 90.20 (a) (1) and 90.20 (a) (1) (ii) respectively of the FCC Rules, the eligible users of radio frequency spectrum allocated by the FCC for the Public Safety Pool are:

"Any territory, possession, state, city, county, town or similar governmental entity is eligible to hold authorizations in the Public Safety Pool to operate radio stations for transmission of communications essential to official activities of the licensee, including:"

"A governmental institution authorized by law to provide its own police protection;"

The assignment limitations and designated frequency coordinator for each frequency in the Public Safety Pool is specified in the frequency table of §90.20 (c)(3) of the FCC Rules.

FCC Rules §0.459 describes a means to request materials or information submitted to the Federal Communications Commission be withheld from public inspection. This may be useful to thwart eavesdropping on official law enforcement activities referenced above during radio communications. Essentially, a law enforcement agency may obtain FCC authorization to operate a frequency on a primary basis and with protection from harmful interference without the frequency readily becoming public information. Refer to the FCC Rule for additional details.

### **2.2.3 Radio Frequency Coordination and Licensing**

All requests for radio frequency coordination and licensing must be directed to the appropriate FCC-certified frequency coordinator as specified in the FCC Rules §90.20 (c) or Region Committee (see section 2.3 of this plan), appropriately. Contact information for the FCC-certified coordinators for the Public Safety Pool can be viewed at: <http://www.fcc.gov/pshs/public-safety-spectrum/coord.html>

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

#### **2.2.4 Copy of FCC Rules**

Licenses are required to have (at least access to) a current copy of the Commission's Land Mobile Rules governing the radio service in which authorization is granted. By signing the FCC 601 Form, the applicant certifies to have access to a current copy of the applicable radio service's rules (i.e., Part 90). Rules for the Part 90 Private Land Mobile Radio Services are contained in a paperback volume entitled "Code of Federal Regulations, Title 47, Part 80 to END", published after October 1 of each year. Since prices are subject to change without notice, contact the United States Government Printing Office, 710 North Capital Street, Washington, DC 20402, telephone (202) 512-1800, FAX (202) 512-2250 for the current price, or within Florida, the U.S. Government Bookstore, 100 W. Bay Street, Suite 100, Jacksonville, FL 32202, telephone (904) 353-0569, FAX (904) 353-1280. These rules are also available on the internet at <http://www.access.gpo.gov/nara/cfr/cfr-table-search.html> (CFR 47 Part 90).

#### **2.3 Florida - Region 9 Plan For Public Safety Radio Communications**

The Federal Communications Commission (FCC) has established a National Public Safety Plan which specifies requirements governing the Public Safety Radio Service's use of the 806-809/851-854 MHz Band (formerly 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 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, of which Florida is Region 9.

The Florida - Region 9 Plan for Public Safety Radio Communications was subsequently prepared by the Florida Region and Subregion Plan Committees, which represent a cross-section of public safety communications interests throughout the State of Florida. The Florida - Region 9 Plan was adopted by the FCC on May 10, 1990.

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 806-809/851-854 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 requirements for the implementation and use of the five national mutual-aid channels within the 806-809/851-854 MHz band.

To view or download a copy of the Florida Region 9 Plan, visit our web site for Florida – Region 9 at:[http://dms.myflorida.com/suncom/public\\_safety/radio\\_communications/radio\\_communication\\_plan/florida\\_region\\_9\\_plan\\_for\\_public\\_safety\\_radio\\_communications](http://dms.myflorida.com/suncom/public_safety/radio_communications/radio_communication_plan/florida_region_9_plan_for_public_safety_radio_communications). For those without access to the internet, request copies of the plan from the chairperson of the appropriate Subregion Committee or Mr. Carlton Wells at (850) 922-7426.

## **2.4 Statewide Law Enforcement Radio System (SLERS) Partners**

### **2.4.1 SLERS Overview**

The Florida Legislature authorized the Department of Management Services to acquire and implement a statewide radio communications system to serve law enforcement units of State agencies and to serve local law enforcement agencies through a mutual aid channel. This shared radio system provides a statewide solution to facilitate communications among State law enforcement entities.

The goal of the Statewide Law Enforcement Radio System (SLERS) is to provide State law enforcement officers with a shared 800 MHz radio system. This digital system serves over 6,500 users with 14,000 radios in patrol cars, boats, motorcycles, and aircraft, wherever they may be located in the state.

### **2.4.2 SLERS Partners**

Public safety entities, which are eligible under Part 90 of the Federal Communications Commission's rules to use spectrum allocated for public safety use, can apply to join SLERS as interoperability users and use SLERS as a primary or auxiliary system for direct communications with other SLERS users on interagency and inter-local talk groups. A SLERS partner can join the statewide system with minimum capital investment and at a fraction of the cost of installing a new local system.

To become a SLERS partner, interested parties should contact David Plezbert at (630) 442-2340 to discuss communications needs and to complete the SLERS Partner Application and Agreement. The administrative rule governing this process is ([Chapter 60FF-4](#)), Florida Administrative Code.

## **2.5 State Agencies and Law Enforcement Policies (formerly SUNCOM Portfolio of Services)**

The State of Florida has established a policy related to the Public Safety agencies' (including Emergency Medical Services) use of the 809/854.6375 channel (formerly 808/853.3875 MHz channel). This makes available to eligible agencies a public safety mutual-aid channel authorized for use during situations requiring interagency communications necessary toward safeguarding life, or property within the state of Florida.

The State of Florida has also established policies related to equipment replacement standards, radio interoperability and other subjects. These policies are found at Appendix B of this plan.

## **2.6 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 A is provided as a guideline for implementing radio systems in aircraft which use frequencies allocated for land-mobile radio.

## **2.7 Communications Approvals**

### **2.7.1 General**

Florida Statute, Section 282.7101(5) requires that "No law enforcement communications system may not be established or expanded without the prior approval of the department." This requirement applies to all State and local law enforcement communications systems within Florida, regardless of funding source. All requests for approval shall be submitted in writing to the Director, at the address shown in section 2.1.

### **2.7.2 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), Florida Statutes, 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.

The first paragraph of this section (2.7.2 A) will be waived from the submittal requirements when the following is included within the contract.

The Contractor shall successfully accomplish a Performance Period (including radio coverage tests, as applicable) witnessed by the Purchaser or Leaseholder prior to system acceptance to guarantee system performance meeting minimum requirements of this plan and any additional requirements of the Purchaser or Leaseholder (for example, in-building portable coverage). The Contractor shall furnish a Performance Bond in the amount of 100 percent (100%) of the total contract price to insure full and complete performance of the contract.

- B.** System Requirements of this plan (Section 5.0).
- C.** Equipment Requirements of this plan (Section 6.0).
- D.** Include copies of Federal Communications Commission (FCC) licenses (or FCC applications and appropriate Frequency Coordination Forms) which indicate whether the project requires radio frequency coordination, license modifications, or FCC Rule waivers.
- E.** Include a frequency plan describing current and planned use of each frequency in your system(s).
- F.** Agencies implementing Mobile Data Systems should consider the recommendations of Section 7.0. The below information is helpful for the approval process.
  1. Provide a formal request letter.

2. Provide information on the type of network (i.e., voice, mobile-data system, integrated voice & data systems, or extended WLAN).
3. Provide a design diagram and proposed coverage reliability (i.e., 95%, 90% area reliability, etc.).
4. For mobile-data networks, provide the type and specifications of mobile data or WLAN system.
5. Provide an itemized costs estimate for the system and installation, including mobile data computer (MDC), routers, modems, software, base stations, etc.

### **2.7.3 Approval Procedure**

#### **A. Approval**

Implementation of new systems or expansion of existing communications systems require a written approval prior to a commitment to purchase. 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 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 the Department of Management Services to process the approval request. If disapproved, the requester will be provided with a detailed explanation and possible alternatives.

Approval is also required for those law enforcement agencies planning to lease communications equipment or system service for their primary communications (refer to the concept in Section 3.3 of this plan). Examples of this kind of lease include: cellular, PCS, SMR, and satellite communications.

#### **B. Additional Quantities**

Procurement of additional quantities of mobile radio equipment, hand-held portable radio equipment, paging receivers, and associated accessories which previously received 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 is purchased within one year of the date of the original approval.

**END OF SECTION 2.0**



## **3.0 CONCEPTS OF LAW ENFORCEMENT COMMUNICATIONS**

### **3.1 General**

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

### **3.2 Public Access**

The law enforcement communications system must have the ability to receive and process any incoming requests which report emergencies and require law enforcement assistance. The public must be able to summon help rapidly in an emergency situation whether for police, medical, fire, rescue, or other emergency need. 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. The 9-1-1 Plan was developed in response to the Florida Emergency Telephone Act of 1974.

### **3.3 Primary Dispatch Communications**

On notification of need for law enforcement assistance, the communications system must enable prompt dispatch of law enforcement personnel within the jurisdictional boundaries of the agency. The communications system must further enable dispatchers to communicate with responding personnel while en route to the scene, at the scene, and returning to availability for further assignment.

A primary dispatch channel is utilized for law enforcement communications between the dispatcher and the field units, (mobile or portable radio-equipped officers). Small law enforcement agencies with few radio units may need to share a dispatch channel with neighboring law enforcement agencies while those with large quantities of radio units may need more than one dispatch channel. In light of the current shortage of radio frequencies available to all Public Safety, this kind of sharing is prudent. In a trunked radio system, talkgroups may effectively alleviate the need for shared channels.

### **3.4 Tactical Communications**

When necessary, an agency may temporarily dedicate channels for tactical communications. Every agency should establish the criteria under which a channel is so dedicated. During the tactical situation, all routine traffic on that channel should be suspended until it is restored for routine use. In a trunked system, tactical communications may have talkgroups assigned which would make this procedure unnecessary. Agencies may also use the standard package of VHF high-band, UHF and 700/800 MHz radios in the mobile command posts for tactical communications. A future MCP website will be created for templates and software upgrade.

### **3.5 Police Alert Paging**

As a sub-concept to Primary Dispatch, some law enforcement communications systems, as determined by local procedure, may require the direct alerting of law enforcement personnel either individually or in groups, through the use of either monitor or paging receivers, or by means of two-way, hand-held portable radios with a 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 law enforcement services.

### **3.6 Interagency/Mutual-Aid Communications**

Law enforcement emergencies often involve the response of other public safety agencies, most commonly medical, fire and other law enforcement agencies. Interagency/mutual-aid communications are needed to support daily law enforcement 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. Where different agencies normally operate on different radio frequencies, interagency/mutual-aid radio communications can be enabled through mobile relay control stations, cross-band interface devices, or the use of radio frequencies common to the different agencies. For law enforcement agencies that operate on “shared use” radio systems, there should be a number of interoperability talk-groups that allow for seamless communications within the coverage of the radio system. Telephone lines between communications control centers can be used for interagency/mutual-aid communications during normal operations, however radio communications are needed during disaster situations following hurricanes, tornadoes, floods, fires, etc., when telephone lines are inoperative, or when telephone central office switching facilities are jammed or disabled.

In addition, the Florida Interoperability Network (FIN) provides secure interagency and interoperable communications for Florida’s entire community of public safety users with dissimilar systems. The network supports all radio system installed in the State, whether VHF, UHF or 700/800 MHz and includes many mutual aid channels in the State. A summary of FIN capabilities includes: law enforcement agencies can patch two or more radio talk groups/channels; dispatch centers may conference up to seven other dispatch centers; and dispatch centers can access radios at other sites on the network. Should an agency desire to add a patch to connect multiple users or radio bands, contact your regional communications center to include Fort Myers, Jacksonville, Miami, Orlando, Pensacola, Tallahassee and Tampa Bay. Additional information on FIN may be obtained from the FIN website: [http://dms.myflorida.com/suncom/public\\_safety/radio\\_communications/florida\\_interoperability\\_network\\_fin](http://dms.myflorida.com/suncom/public_safety/radio_communications/florida_interoperability_network_fin).

### **3.7 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 other means. With regard to law enforcement communications specifically, the concept of back-up communications as applied to base station or other fixed radio equipment is to:

- A. Enable Primary Dispatch Communications to continue despite outage of the primary dispatch radio base station.

- B. Enable Tactical Communications to continue despite outage of the tactical 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 Primary Dispatch and Tactical.

### **3.8 Telephone Interconnection**

The law enforcement communications system must provide interconnection with specialty information centers, such as the Florida Crime Information Center (FCIC) and National Crime Information Center (NCIC)<sup>1</sup> for criminal information. In addition, the required level of confidentiality may exceed what is typically available within land mobile radio systems. This concept includes the requirement for law enforcement personnel to exchange voice and/or data directly with sources located outside their law enforcement communications system and at diverse locations only accessible via the public switched telephone network.

### **3.9 Communications Reliability**

The "communications reliability" is a specified minimum probability to achieve a specified minimum level of performance in communications. Law Enforcement and other Public Safety agencies require communications reliability to be high when compared with most non-Public Safety services.

#### **3.9.1 Communications Coverage Reliability**

"Communications coverage reliability" is a system design goal to achieve a minimum probability for a minimum level of performance in system-level communications with mobiles and portables within the required area of operation. Besides those parameters that can be controlled by the designer, there are several environmental factors that influence the communications coverage reliability of a system. Examples of these include terrain features (such as hills), foliage (trees and shrubs), and buildings. Communications coverage reliability increases with the number of properly located base-station sites within a system. The communications coverage reliability also improves as the distance from the base-station sites decreases (inversely proportional). Though 100% reliability throughout the required area of operation is an impractical goal, the communications coverage in the system of a law enforcement agency demands a level of reliability that is usually higher than most non-public safety systems. The minimum requirements for communications coverage reliability in law enforcement systems is given in Section 5.2 of this plan.

#### **3.9.2 Point-to-Point Communications Reliability**

Communications systems for law enforcement may employ one or more RF Control Stations for point-to-point RF communications between mobile-relay stations and a fixed location such as an office. Within such a system, RF Control Stations are held to a higher minimum level of reliability than mobiles and portables. The minimum level of reliability for RF Control Stations is specified in Section 5.3 of this plan.

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<sup>1</sup> NCIC was upgraded to a new system that was made fully operational on July 11, 1999, see the National Crime Information Center website for more information @ <http://www.fas.org/irp/agency/doj/fbi/is/ncic.htm> on the Internet.

### **3.10 Interference between Systems**

#### **3.10.1 Harmful Interference**

Harmful interference is the prevention or interruption of the desired communications within a land-mobile radio communications system by undesired signals from another system. In a law enforcement communications system, this level of interference can result in life-threatening delays in responses to calls for assistance.

##### **A. Co-channel Interference**

For the purposes of engineering analysis in frequencies below 470 MHz, harmful interference is defined as an undesired received signal having greater than 5% probability of exceeding a power level of 12 dB (6 dB in base-to-base situations) less than a desired analog signal power level, when the desired analog signal has a 95% probability of achieving a power level required to produce either 20 dB quieting or 17 dB SINAD (TIA/EIA). For channels in the 470 and the General Category 809 MHz band (formerly 806 MHz band), channel allocation principles and interference criteria are governed by FCC Rules. For channels in the 806-809 MHz band (formerly 821-824 MHz band), channel allocation principles and interference criteria are governed by the Florida-Region 9 Plan for Public Safety Radio Communications.

##### **B. Adjacent-Channel Interference**

Adjacent-channel interference is defined as "harmful" when a desired signal (at 95% probability) is degraded by an undesired adjacent channel signal (at 5% probability) 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 Public Safety Radio Communications.

#### **3.10.2 Nuisance Interference**

Nuisance interference is the reception of signals from another system that does not cause harmful interference but is annoying to the users of the system receiving it. This level of interference can be eliminated by utilizing a continuous tone-controlled squelch system (CTCSS) or Digital Coded Squelch System (DCS) which is available in most new equipment today.

**END OF SECTION 3.0**

## 4.0 FREQUENCY PLAN

### 4.1 Police Radio Frequencies

Frequencies available to police agencies are described with associated special assignment limitations in FCC Rule 90.20 (c) and (d). Some frequencies are shared with Public Safety agencies other than police.

Very High Frequency-Highband (VHF-HB) frequency pairs have been established and are included in Table 4-1, "Statewide VHF Highband Law Enforcement Frequency Pairs." For frequencies above 470 MHz, channel allocation principles are governed by FCC Rules. As frequencies are vacated, they should be reassigned to conform to the lists of Statewide channels as shown in Table 4-1. In this table, the base station transmit frequency is shown first, followed by the mobile transmit frequency. This convention only takes effect when filing for a licensed VHF-HB channel pair.

There are no 700/800 MHz Band frequencies specifically allocated to Law Enforcement, but all Law Enforcement eligibles may license 700/800 MHz frequencies allocated for Public Safety eligibles.

**TABLE 4-1- STATEWIDE VHF-HB LAW ENFORCEMENT FREQUENCY PAIRS**

| <b>Frequency Pair<br/>Base<sup>2</sup>/Mobile<sup>3</sup> (MHz)</b> | <b>Frequency Pair<br/>Base/Mobile (MHz)</b> | <b>Frequency Pair<br/>Base/Mobile (MHz)</b> | <b>Frequency Pair<br/>Base/Mobile (MHz)</b> | <b>Frequency Pair<br/>Base/Mobile (MHz)</b> | <b>Frequency Pair<br/>Base/Mobile (MHz)</b> |
|---|---|---|---|---|---|
| 154.6500/155.1900   | 154.7625/155.4375                           | 154.8300/155.5650                           | 154.8975/155.6325                           | 155.7000/158.9700                           | 155.9175/156.2175                           |
| 154.6575/155.1975   | 154.7700/155.4900                           | 154.8375/155.5725                           | 155.0100/155.6550                           | 155.7075/158.9775                           | 158.7300/159.0300                           |
| 154.7100/155.2500   | 154.7775/155.4975                           | 154.8450/155.5800                           | 155.0175/155.6625                           | 155.7300/156.0300                           | 158.7375/159.0375                           |
| 154.7175/155.2575   | 154.7850/155.5200                           | 154.8525/155.5875                           | 155.0700/155.6700                           | 155.7375/156.0375                           | 158.7900/159.0900                           |
| 154.7250/155.3100   | 154.7925/155.5275                           | 154.8600/155.5950                           | 155.0775/155.6775                           | 155.7900/156.0900                           | 158.7975/159.0975                           |
| 154.7325/155.3175   | 154.8000/155.5350                           | 154.8675/155.6025                           | 155.1300/155.6850                           | 155.7975/156.0975                           | 158.8500/159.1500                           |
| 154.7400/155.4150   | 154.8075/155.5425                           | 154.8750/155.6100                           | 155.1375/155.6925                           | 155.8500/156.1500                           | 158.8575/159.1575                           |
| 154.7475/155.4225   | 154.8150/155.5500                           | 154.8825/155.6175                           | 155.6400/155.9700                           | 155.8575/156.1575                           | 158.9100/159.2100                           |
| 154.7550/155.4300   | 154.8225/155.5575                           | 154.8900/155.6250                           | 155.6475/155.9775                           | 155.9100/156.2100                           | 158.9175/159.2175                           |

<sup>2</sup> Base Transmit Frequency and Base Operation Secondary to Mobile use.

<sup>3</sup> Mobile/Portable Transmit Frequency

## **4.2 Interagency/Mutual-Aid Channels**

Radio channels for interagency and mutual-aid operations may be utilized only within the provisions of FCC Rules and Regulations, Part 90, "Subpart N - Operating Requirements". A portion of those Rules are applicable to law enforcement organizations. Contingent on eligibility or licensee concurrence, specific wide-area and statewide channels may be used for Interagency/Mutual-Aid. These channels are listed in Table 4-2. As frequencies are vacated, they should be reassigned to conform to the list of statewide channels as shown in Table 4-2. In this table, the base station transmit frequency is shown first, followed by the mobile transmit frequency.

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

The document "Mutual-Aid Channels in Transportable Equipment Matrix" lists the mutual-aid channels that are operational in transportable equipment (B-Base and P-Portable) potentially available from each respective county. This document is also available in other plans and policies which are at: [http://dms.myflorida.com/suncom/public\\_safety/radio\\_communications/radio\\_communication\\_plans](http://dms.myflorida.com/suncom/public_safety/radio_communications/radio_communication_plans).

**TABLE 4-2- WIDE-AREA AND STATEWIDE INTERAGENCY/MUTUAL-AID FREQUENCIES**

| <b>FREQUENCY<br/>Base TX/RX (MHz)</b> | <b>NPSTC<br/>Name</b> | <b>New-Rebanded<br/>FREQUENCY<br/>Base TX/RX (MHz)</b> | <b>CTCSS<br/>(Hz)</b> | <b>RADIO<br/>SVC</b> | <b>PRIMARY USE</b>   | <b>AREA</b> |
|---------------------------------------|-----------------------|--|-----------------------|----------------------|--|-------------|
| 39.10/39.10                           |                       | -  | 156.7                 | PW                   | Emergency Management<br>(Civil Defense)  | Statewide   |
| 39.18/39.18                           |                       | -  | 156.7                 | PW                   | Emergency Management<br>(Civil Defense)  | Statewide   |
| 45.86/45.86                           | LLAW3D                | -  | None                  | PW                   | Law Enforcement<br>Emergency   | Wide-Area   |
| 154.950/154.950                       |                       | -  | None                  | PW                   | Law Enforcement<br>Emergency   | Wide-Area   |
| 465.275/460.275                       |                       | -  | None                  | PW                   | Law Enforcement<br>Emergency   | Wide-Area   |
| 155.370/155.370                       |                       | -  | None                  | PW                   | Law Enforcement<br>Intercity   | Statewide   |
| 154.265/154.265                       | VFIRE22               | -  | None                  | PW                   | Fire Mutual-Aid "Red"<br>(Mobile/Portable Only)  | Statewide   |
| 154.280/154.280                       | VFIRE21               | -  | None                  | PW                   | Fire Mutual-Aid "White"<br>(Base and Mobile)   | Statewide   |
| 154.295/154.295                       | VFIRE23               | -  | None                  | PW                   | Fire Mutual-Aid "Blue"<br>(Mobile/Portable Only)   | Statewide   |
| 155.340/155.340                       | VMED28                | -  | None                  | PW                   | Air Secondary-EMS<br>Air Transport   | Statewide   |
| 468.175/463.175                       |                       | -  | 167.9                 | PW                   | Statewide Medical<br>Coordination-MED8   | Statewide   |
| 468.1875/463.1875                     |                       | -  | 167.9                 | PW                   | ESF 8 Medical<br>Coordination – MED 82   | Statewide   |
| 853.3875/808.3875                     |                       | 854.6375/809.6375                                      | 210.7                 | GE                   | Public Safety Mutual-Aid<br>(FCC Channel<br>(96 old) – (256 new)) <sup>4</sup>                     | Statewide   |
| 866.0125/821.0125                     | 8CALL90               | 851.0125/806.0125                                      | 156.7                 | GE                   | National Public Safety<br>Mutual Aid Calling<br>(FCC Channel<br>(601 old) – (01 new)) <sup>5</sup> | Nationwide  |
| 866.5125/821.5125                     | 8TAC91                | 851.5125/806.5125                                      | 156.7                 | GE                   | National Public Safety<br>Mutual Aid Tactical #1<br>(FCC Channel<br>(639 old) – (39 new))          | Nationwide  |
| 867.0125/822.0125                     | 8TAC92                | 852.0125/807.0125                                      | 156.7                 | GE                   | National Public Safety<br>Mutual Aid Tactical #2<br>(FCC Channel<br>(677 old) – (77 new))          | Nationwide  |
| 867.5125/822.5125                     | 8TAC93                | 852.5125/807.5125                                      | 156.7                 | GE                   | National Public Safety<br>Mutual Aid Tactical #3<br>(FCC Channel<br>(715 old) – (115 new))         | Nationwide  |
| 868.0125/823.0125                     | 8TAC94                | 853.0125/808.0125                                      | 156.7                 | GE                   | National Public Safety<br>Mutual Aid Tactical #4<br>(FCC Channel<br>(753 old) – (153 new))         | Nationwide  |

<sup>4</sup> See Section 4.2.

<sup>5</sup> See Section 4.2.3.

#### **4.2.1 Police Emergency Communications**

The Police Emergency Channel (45.86, 154.950, or 460/465.275 MHz) is assigned for base station and mobile radio use during emergency situations in which a vehicle is out of its prime area and unable to access the local dispatch center using the Primary Dispatch Communications channel/talkgroup of that area (mutual-aid communications), and in isolated critical situations during which prolonged use of the Primary Dispatch Communications channel/talkgroup would not be feasible due to other primary dispatch communications traffic. The Police Emergency Channel also provides a common emergency channel for base/mobile and mobile/mobile communications among agencies in a region or in an adjacent region. In addition to the above uses, the Police Emergency Channel may be used in the following situations:

- Multi-agency involvement in an emergency situation such as riots, civil unrest, hot pursuits, etc. for coordination, command and control via a single dispatch center.
- Individual agency loss of the primary dispatch channel.
- Limited portable radio use for surveillance and stake-out operations such that it does not cause interference to other agencies.
- Tactical communications in the event secondary use of a channel compromises its primary function for an extended duration.

#### **4.2.2 Police Intercity (Point-to-Point) Communications**

The primary purpose of the Police Intercity channel (155.370 MHz) is to provide a point-to-point communications channel between law enforcement dispatch centers. Telephone lines between communications control 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 are inoperative, or when telephone central office switching facilities are jammed or disabled.

Primary mobile and portable radio operation on this channel is restricted to those units that routinely travel beyond agency boundaries such as police executive vehicles and prisoner transfer vehicles. However, during times of natural or man-made disasters, and during non-routine travel, mobile and portable radio operation for mutual-aid communications is allowable from any law enforcement unit.

The secondary purpose of this channel is that in the event the Police Emergency Communications channel is not available and a backup channel is needed for applications as indicated in Section 4.2.1 of this plan, the Police Intercity Communications channel may be used for such applications until the Emergency channel is available.



### **4.2.3 700/800 MHz Mutual-Aid Communications**

Mutual-aid communications in the 700/800 MHz band serves a purpose similar to Police Emergency Communications (Section 4.2.1); however, these frequencies are available to all Public Safety agencies. The use of these frequencies are set forth by plans other than the Law Enforcement Communications Plan.

The State Agencies and Law Enforcement Policies (formerly SUNCOM Portfolio of Services) provide the requirements for the "Public Safety Mutual-Aid Channel" (854.6375/809.6375 MHz) (formerly 853.3875/808.3875 MHz). Section 6.2 of the Florida-Region 9 Plan for Public Safety Radio Communications describes the implementation requirements for the five National Mutual Aid Channels to include Calling, Tactical 1, Tactical 2, Tactical 3 and Tactical 4 Channels. These documents are available on the web as previously mentioned.

**END OF SECTION 4.0**

## **5.0 SYSTEM REQUIREMENTS**

### **5.1 General (Public Safety Option A and Option B Radio Standards)**

The system requirements defined in the following sections are the requirements by which the Department of Management Services (the Department) approval or disapproval will be determined for implementation of law enforcement 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 law enforcement communications system concepts which are explained in Section 3.0. Communications coverage reliability shall meet the minimum requirements described in Section 5.2 below. Two options for public safety radio standard are part of the plan. Option A is the original minimum performance standards listed under Option A in section 6.2 of the plan (meets or exceeds TIA 603-C). This option is for public safety personnel who operate in a fully public, expansive environment while responding to imminent threat to life and/or protection of property situations.

Option B standard radio is for public safety personnel that operate in a contained environment, such as found in a correctional institution. These personnel respond to imminent threat to life and/or protection of property, are augmented by relatively close proximity of other officers, and have secondary means of communications. Option B radio shall meet TIA-603 standards.

Additionally, at the option of agencies (Option B), military standards in Section 6.3.1 or 6.4.1 may be selected to match the environment in which the radio will be used. For example, an agency which operates in an outside environment may consider blowing rain (Procedure I) standards or may consider vibration/shock standard (Procedure I). The following additional technical requirements are related to Option B radios:

1. The radio can either be analog or digital, conventional or trunked that is type-accepted for wideband and/or narrowband operational bandwidths.
2. The minimum power output for radios (at least 90% duty cycle) includes: (a) portable radios– 3 watts, (b) mobile radios- 30 watts and (c) base station repeater radios- 50 watts.
3. Communications coverage reliability for mobiles and portables is designed for 90% contour probability.

For aspects of system configurations not explicitly included in the following sections, their approval will be determined on a case-by-case basis by the Department . As these system requirements are subject to change at the determination of the Department, please verify the most current requirements as may apply to a particular system application prior to a request for approval.

## **5.2 Communications Coverage Reliability for Mobiles and Portables**

As previously stated, two options for public radio safety standard are part of the plan. Reliable communications coverage in an Option A land-mobile radio system for law enforcement is defined as having been engineered for a 95% minimum probability of communications at and along the legal jurisdictional boundaries (defined contour) of the agency. This 95% contour probability equates to a 98.3% probability of communications within the agency's area of operation. This minimum required probability is for a minimum received analog signal level of either 20 dB quieting or 17 dB SINAD (TIA/EIA) for the worst case of either talk-out or talk-back for mobile or portable radios, whichever is predominant (user-defined). The defined contour of reliable radio coverage shall normally be the boundary of the agency's legal jurisdiction unless the Department has approved a different boundary for a particular system. This provides for reliable communications at 95% of the locations along the defined coverage contour, 95% of the time. This coverage contour applies to stations established for primary use; stations serving only as a back-up to the primary station may have a lesser coverage area. In Option B radio, communications coverage reliability for mobiles and portables is 90% contour probability. This provides for reliable probability of communications at 90% of locations within the defined coverage contour, 90% of the time.

## **5.3 Point-to-Point Communications Reliability for RF Control Stations**

Option A reliable point-to-point communications for RF Control Stations in a land-mobile radio system for law enforcement is engineered for 99% probability of communications. This probability is based on a received analog signal level of either 20 dB quieting or 17 dB SINAD (TIA/EIA) for the worst case of either talk-out (Base to RF Control station) or talk-back (RF Control to Base station). Option B reliable point to point communications for RF Control Stations is engineered for 95% probability of communications within the agency's area of operation.

## **5.4 Primary Dispatch Communications**

The primary law enforcement Dispatch Communications systems shall be designed to meet the minimum communications coverage requirements defined in this section (refer to this concept in section 3.9) for vehicular mobile or portable communications (Option A radio).

Every law enforcement dispatch center shall have the capability of Primary Dispatch Communications designated for that facility, and configured to enable continuous reception of all local mobile transmissions on each primary dispatch channel. In the event Primary Dispatch Communications is compromised by an outage or excessive traffic, the mutual-aid communications system may be used to provide back-up communications for the duration of the unexpected events.

When electronic display screens are utilized for radio dispatch functions and 9-1-1 call-taker functions at the same communications console, a separate dedicated screen is highly recommended for each of these functions.

## **5.5 Mutual-Aid Communications**

### **5.5.1 Dispatch Center**

Each Law Enforcement Dispatch Center shall have the capability for mutual-aid communications on the Intercity Channel (155.370 MHz) and an Emergency Channel (45.86 MHz; 154.950 MHz; 460/465.275 MHz; 854.6375/809.6375 MHz (formerly 853/808.3875 MHz); or Region 9 Calling Channel (8Call90) and Tactical Channel #1 or 2 (8TAC91 or 8TAC92); as appropriate for the band of operation in the associated area) and shall consist of, as a minimum, the mutual-aid channel(s) established within the county such that applicable base-to-base, base-to-mobile, and mobile-to-mobile communications on those channels can occur. Mutual-aid channels that may be established within the State of Florida are included in Table 4-2, "Wide-Area and Statewide Interagency/Mutual-Aid Frequencies." Leased wireline control of primary base or repeater station equipment is recommended to be backed up at every dispatch center by means of a locally-controlled Police Emergency Communications Channel, except for use in IP-Based Network with a Network Operations Center (NOC) monitoring the network for alarms.

### **5.5.2 Mobile and Portable Equipment**

#### **A. VHF-Low Band**

##### **Wide-Area Emergency Communications (E-Channel)**

All new VHF-low band law enforcement mobile and portable radios shall be configured with the frequency 45.86 MHz transmit and receive with no CTCSS tone. This frequency is designated as the E-Channel and is utilized in areas of Florida for Police Emergency Communications in the VHF-low band.

#### **B. VHF-High Band**

##### **Wide-Area Emergency Communications (E-Channel)**

All new VHF-high band law enforcement mobile and portable radios shall be configured with the frequency 154.950 MHz transmit and receive with no CTCSS tone. This frequency is designated as the E-Channel and is utilized in areas of Florida for Police Emergency Communications in the VHF-high band. Note: This channel is currently a 25 kHz (wideband) channel and is mandated by the FCC to become a narrowband (12.5 kHz) channel by 2013 (see Appendix C, Narrowbanding Migration Plan).

##### **Statewide Intercity Communications**

All new VHF-high band mobile and portable radios in units shall be configured with the frequency 155.370 MHz transmit and receive with no CTCSS tone. This frequency is designated as the Intercity Channel and is utilized throughout Florida for Police Intercity Communications in the VHF-high band. Note: This channel is currently a 25 kHz (wideband) channel and is

mandated by the FCC to become a narrowband (12.5 kHz) channel by 2013 (see Appendix C, Narrowbanding Migration Plan).

### **C. UHF Band**

#### **Wide-Area Emergency Communications (E-Channel)**

All new UHF law enforcement mobile and portable radios shall be configured with frequencies 465.275 MHz, transmit; 460.275 MHz receive with no CTCSS tone. This frequency pair is designated as the E-Channel and is utilized in areas of Florida for Police Emergency Communications in the UHF Band. A "talk-around" channel shall be incorporated into all UHF non-duplex mobile and portable radios. This simplex channel (operating as 460.275 MHz transmit and receive, with no CTCSS tone) will provide intra- and inter-agency "tactical" communications on a wide-area basis in the UHF Band. Note: This channel is currently a 25 kHz (wideband) channel and is mandated by the FCC to become a narrowband (12.5 kHz) channel by 2013 (see Appendix C, Narrowbanding Migration Plan).

### **D. 700 / 800 MHz Band**

All new law enforcement mobile and portable radio equipment operating in the 800 MHz Band shall be equipped with the National Public Safety Calling Channel operating in the duplex mode and the four National Public Safety Tactical Channels for both duplex and "talk-around" operation. Refer to the Florida - Region 9 Plan for Public Safety Radio Communications (described in Section 2.3) for complete operating requirements on the five 800 MHz channels. The 700 MHz Band Mutual Aid Channels shall be addressed in another plan. The 700/800 MHz radios must be P25 dual band capable.

Additionally, and at the option of the agency, the radio equipment may be equipped with the Florida Public Safety Mutual-Aid Channel (854.6375 MHz, formerly 853.3875 MHz) for duplex and "talk-around" operation. Refer to the State Agencies and Law Enforcement Policies (formerly, SUNCOM Portfolio of Services) for complete licensing and operating requirements on this channel.

### **E. 700 MHz Band**

There are multiple categories of 700 MHz frequency. Four categories are included in this plan, including general, State, interoperability and broadband frequencies.

- (1) First, the "general use" frequency plan will be developed by the Florida - Region 9 700 MHz Committee and once developed, public safety agencies may view the "general use" frequencies plan at a future 700 MHz Plan website.
- (2) Second, the Department of Management Services (the Department), is the lead on the State frequencies.

- (3) Third, the “interoperability use” frequencies are nationwide resources allocated by the Federal Communications Commission (FCC) similar to the NPSPAC mutual aid channels. The Florida Executive Interoperable Technology Committee (FEITC) or Statewide Executive Interoperable Technology Committee (SEITC) is responsible for these 700 MHz interoperability frequencies. Once the “interoperability use” frequency plan is developed, the Law Enforcement Communications Plan will be revised to incorporate the 700 MHz “interoperability use” channels.
- (4) Fourth, the “broadband use” frequencies are currently under consideration for a nationwide data network.

### **5.5.3 Mutual Aid Repeater Default Mode**

All mutual *aid repeater radios shall default to the “repeat disable”* mode upon power up. Should an agency use the mutual aid repeater for an operation, the repeater must be disabled after the operation. The agency must also call the repeater’s Network Control Center (NCC) and advise them that the repeater is in the disabled mode.

**END OF SECTION 5.0**

## **6.0 EQUIPMENT REQUIREMENTS**

### **6.1 Minimum Performance Standards**

The minimum performance standards defined for new equipment in the following sections are the standards by which the Department of Management Services (the Department) approval or disapproval will be determined for individual equipment items for use within the law enforcement communications systems. These minimum performance standards apply to analog and digital equipment type-accepted for 25 kHz and/or 12.5 kHz operational bandwidths. As previously discussed in section 5.1 of the plan, two options for public safety standard are contained within this plan: (1) Option A, which meets or exceeds TIA-603-C, and (2) Option B which meets TIA-603-C standards.

These standards have been developed by the Department through 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 law enforcement 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.

#### **6.1.1 TIA/EIA Standards**

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

#### **Telecommunications/Electronics Industries Association Standards**

|             |  |
|-------------|--|
| TIA/EIA-603 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards. |
|-------------|--|

## 6.2 Analog Standards for Base/Repeater Stations

### MINIMUM PERFORMANCE STANDARDS

#### 6.2.1 TRANSMITTER PARAMETERS (Base/Repeater Stations)

|  | VHF-LB   |                  | VHF-HB   |          |                  |          | UHF      |          |                  |          | 700/800 MHz |                  |
|--|----------|------------------|----------|----------|------------------|----------|----------|----------|------------------|----------|-------------|------------------|
|  | Option A | Option B (603-C) | Option A |          | Option B (603-C) |          | Option A |          | Option B (603-C) |          | Option A    | Option B (603-C) |
| <b>Channel bandwidth</b>                 | 25 kHz   |                  | 25 kHz   | 12.5 kHz | 25 kHz           | 12.5 kHz | 25 kHz   | 12.5 kHz | 25 kHz           | 12.5 kHz | 25 kHz      |                  |
| <b>Power Output (Watts) <sup>6</sup></b> | 90       | N/A              | 90       | 60       | N/A              | N/A      | 90       | 50       | N/A              | N/A      | 75          | N/A              |
| <b>FM Hum and Noise (dB)</b>             | 50       | 40               | 50       | 45       | 40               | 34       | 50       | 45       | 40               | 34       | 45          | 35               |
| <b>Continuous Duty Cycle</b>             | Yes      | N/A              | Yes      | Yes      | N/A              | N/A      | Yes      | Yes      | N/A              | N/A      | Yes         | N/A              |

#### 6.2.2 RECEIVER PARAMETERS (Base/Repeater Stations)

|  | VHF-LB   |                  | VHF-HB   |          |                  |          | UHF      |          |                  |          | 700/800 MHz     |                  |
|--|----------|------------------|----------|----------|------------------|----------|----------|----------|------------------|----------|-----------------|------------------|
|  | Option A | Option B (603-C) | Option A |          | Option B (603-C) |          | Option A |          | Option B (603-C) |          | Option A        | Option B (603-C) |
| <b>Channel bandwidth</b>                                   | 25 kHz   |                  | 25 kHz   | 12.5 kHz | 25 kHz           | 12.5 kHz | 25 kHz   | 12.5 kHz | 25 kHz           | 12.5 kHz | 25 kHz          |                  |
| <b>Usable Sensitivity, 12 dB SINAD (<math>\mu</math>V)</b> | 0.35     | 0.35             | 0.35     | 0.35     | 0.35             | 0.35     | 0.35     | 0.35     | 0.35             | 0.35     | 0.35            | 0.35             |
| <b>Adjacent Channel Rejection (dB)</b>                     | 80       | 75               | 85       | 80       | 75               | 45       | 80       | 70       | 75               | 45       | 75 <sup>7</sup> | 75               |
| <b>Intermodulation Rejection (dB)</b>                      | 75       | 75               | 85       | 75       | 75               | 75       | 80       | 75       | 75               | 75       | 75              | 75               |
| <b>Spurious Response Rejection (dB)</b>                    | 90       | 75               | 90       | 100      | 75               | 75       | 90       | 100      | 75               | 75       | 90              | 75               |

<sup>6</sup> Transmitter power output is a minimum standard unless demonstrated otherwise by system engineering and/or FCC Rules.

<sup>7</sup> 75 dB is required within 806-851 MHz (channels spaced 25 kHz), and 20 dB is required within 851-854 MHz (channels spaced 12.5 kHz).



### **6.3 Analog Standards for Mobile (vehicular) Radios**

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

#### **6.3.1 Military Standards**

MIL- STD-810D, 810E or 810F

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

D      E      F

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 10 (3 Axes)

516.3 516.4 516.5 Shock, Procedure I, (functional)

## MINIMUM PERFORMANCE STANDARDS

### 6.3.2 TRANSMITTER PARAMETERS (Mobile)

|   | VHF-LB   |                  | VHF-HB   |          |                  |          | UHF      |          |                  |          | 700/800 MHz     |                  |
|---|----------|------------------|----------|----------|------------------|----------|----------|----------|------------------|----------|-----------------|------------------|
|   | Option A | Option B (603-C) | Option A |          | Option B (603-C) |          | Option A |          | Option B (603-C) |          | Option A        | Option B (603-C) |
| <b>Channel bandwidth</b>                  | 25 kHz   |                  | 25 kHz   | 12.5 kHz | 25 kHz           | 12.5 kHz | 25 kHz   | 12.5 kHz | 25 kHz           | 12.5 kHz | 25 kHz          |                  |
| <b>Number of Channels</b> <sup>8</sup>    | 2        | 2                | 3        | 6        | 2                | 2        | 3        | 3        | 2                | 2        | 20              | 20               |
| <b>Freq. Separation (MHz)</b>             | 1        | N/A              | 17       | 24       | N/A              | N/A      | 10       | 20       | N/A              | N/A      | 18 <sup>9</sup> | N/A              |
| <b>Power Output (Watts)</b> <sup>10</sup> | 90       | N/A              | 90       | 50       | N/A              | N/A      | 90       | 50       | N/A              | N/A      | 30              | 30               |
| <b>FM Hum and Noise (dB)</b>              | 45       | 34               | 45       | 44       | 40               | 34       | 40       | 39       | 34               | 34       | 40              | 35               |

<sup>8</sup> This requirement includes a minimum of one Primary Dispatch Channel and applicable mutual aid channel(s) for the specific band of operation; otherwise, the number of channels is as needed. Also, see Section 5.3.<sup>9</sup> No degradation, simultaneously for 806-851 MHz and 851-854 MHz Band.<sup>10</sup> Transmitter power output is a minimum standard unless demonstrated otherwise by system engineering and/or FCC Rules.

### 6.3.3 RECEIVER PARAMETERS (Mobile)

|  | VHF-LB   |                  | VHF-HB           |          |                  |          | UHF      |          |                  |          | 700/800 MHz      |                  |
|--|----------|------------------|------------------|----------|------------------|----------|----------|----------|------------------|----------|------------------|------------------|
|  | Option A | Option B (603-C) | Option A         |          | Option B (603-C) |          | Option A |          | Option B (603-C) |          | Option A         | Option B (603-C) |
| <b>Channel bandwidth</b>                               | 25 kHz   |                  | 25 kHz           | 12.5 kHz | 25 kHz           | 12.5 kHz | 25 kHz   | 12.5 kHz | 25 kHz           | 12.5 kHz | 25 kHz           |                  |
| <b>Number of Channels</b> <sup>11</sup>                | 2        | 2                | 3                | 6        | 2                | 2        | 3        | 3        | 2                | 2        | 20               | 20               |
| <b>Freq. Separation (MHz)</b>                          | 1        | N/A              | 17               | 24       | N/A              | N/A      | 10       | 20       | N/A              | N/A      | 18 <sup>12</sup> | N/A              |
| <b>Usable Sensitivity, dB SINAD (µV)</b> <sup>12</sup> | 0.35     | 0.35             | 0.35             | 0.35     | 0.35             | 0.35     | 0.35     | 0.35     | 0.35             | 0.35     | 0.35             | 0.35             |
| <b>Adjacent Channel Rejection (dB)</b>                 | 80       | 75               | 85               | 63       | 75               | 45       | 80       | 65       | 75               | 45       | 75 <sup>13</sup> | 75               |
| <b>Intermodulation Rejection (dB)</b>                  | 80       | 75               | 85               | 75       | 75               | 75       | 80       | 75       | 75               | 75       | 75               | 75               |
| <b>Spurious Response Rejection (dB)</b>                | 80       | 75               | 85 <sup>14</sup> | 75       | 75               | 75       | 85       | 75       | 75               | 75       | 75               | 75               |
| <b>Audio Power Output (watts)</b>                      | 10       | 10               | 10               | 10       | 10               | 10       | 10       | 10       | 10               | 10       | 10               | 10               |
| <b>Audio Distortion (%)</b>                            | 5        | 10               | 5                | 5        | 10               | 10       | 5        | 5        | 10               | 10       | 5                | 10               |

<sup>11</sup> This requirement includes a minimum of one Primary Dispatch Channel and applicable mutual aid channel(s) for the specific band of operation; otherwise, the number of channels is as needed. Also, see Section 5.3.

<sup>12</sup> There shall be no degradation, simultaneously for 806-809 MHz and 851-854 MHz Band.

<sup>13</sup> 75dB is required within 806-809 MHz (channels spaced 25 kHz), and 20 dB is required within 851-854 MHz (channels spaced 12.5 kHz).

<sup>14</sup> Except one (1) spurious response at -75 dB is allowed.

## **6.4 Analog Standards for Portable (hand-held) Radios**

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 for at least an 8 hour period.

### **6.4.1 Military Standards**

MIL-STD-810D, 810E or 810F

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

D      E      F

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 10 (3 Axes)

516.3   516.4   516.5   Shock, Procedure I, (functional)

## MINIMUM PERFORMANCE STANDARDS

### 6.4.2 TRANSMITTER PARAMETERS (Portable \ hand-held)

|  | VHF-LB   |                  | VHF-HB   |          |                  |          | UHF      |          |                  |          | 700/800 MHz      |                  |
|--|----------|------------------|----------|----------|------------------|----------|----------|----------|------------------|----------|------------------|------------------|
|  | Option A | Option B (603-C) | Option A |          | Option B (603-C) |          | Option A |          | Option B (603-C) |          | Option A         | Option B (603-C) |
| <b>Channel bandwidth</b>                 | 25 kHz   |                  | 25 kHz   | 12.5 kHz | 25 kHz           | 12.5 kHz | 25 kHz   | 12.5 kHz | 25 kHz           | 12.5 kHz | 25 kHz           |                  |
| <b>Number of Channels<sup>15</sup></b>   | 2        | 2                | 3        | 6        | 2                | 2        | 3        | 3        | 2                | 2        | 20               | 20               |
| <b>Freq. Separation (MHz)</b>            | 1        | N/A              | 12       | 24       | N/A              | N/A      | 8        | 20       | N/A              | N/A      | 18 <sup>16</sup> | N/A              |
| <b>Power Output (Watts)<sup>17</sup></b> | 4        | N/A              | 4        | 4        | N/A              | N/A      | 4        | 4        | N/A              | N/A      | 3                | 3                |
| <b>FM Hum and Noise (dB)</b>             | 45       | N/A              | 45       | 34       | N/A              | N/A      | 45       | 38       | 34               | 34       | 40               | 35               |

<sup>15</sup> This requirement includes a minimum of one Primary Dispatch Channel and applicable mutual aid channel(s) for the specific band of operation; otherwise, the number of channels is as needed. Also, see Section 5.3.

<sup>16</sup> No degradation, simultaneously for 806-851 MHz and 851-854 MHz Band.

<sup>17</sup> Transmitter power output is a minimum standard unless demonstrated otherwise by system engineering and/or FCC Rules.

### 6.4.3 RECEIVER PARAMETERS (Portable \ hand-held)

|   | VHF-LB   |                  | VHF-HB           |          |                  |          | UHF      |          |                  |          | 700/800 MHz      |                  |
|---|----------|------------------|------------------|----------|------------------|----------|----------|----------|------------------|----------|------------------|------------------|
|   | Option A | Option B (603-C) | Option A         |          | Option B (603-C) |          | Option A |          | Option B (603-C) |          | Option A         | Option B (603-C) |
| <b>Channel bandwidth</b>                    | 25 kHz   |                  | 25 kHz           | 12.5 kHz | 25 kHz           | 12.5 kHz | 25 kHz   | 12.5 kHz | 25 kHz           | 12.5 kHz | 25 kHz           |                  |
| <b>Number of Channels<sup>18</sup></b>      | 2        | 2                | 3                | 6        | 2                | 2        | 3        | 3        | 2                | 2        | 20               | 20               |
| <b>Freq. Separation (MHz)</b>               | 1        | N/A              | 12               | 24       | N/A              | N/A      | 8        | 20       | N/A              | N/A      | 18 <sup>19</sup> | N/A              |
| <b>Usable Sensitivity, 12 dB SINAD (µV)</b> | 0.35     | N/A              | 0.35             | 0.35     | N/A              | N/A      | 0.35     | 0.35     | N/A              | N/A      | 0.35             | N/A              |
| <b>Adjacent Channel Rejection (dB)</b>      | 70       | 70               | 70               | 70       | 70               | 45       | 70       | 70       | 70               | 45       | 70               | 70               |
| <b>Intermodulation Rejection (dB)</b>       | 70       | 70               | 70               | 70       | 70               | 70       | 70       | 70       | 70               | 70       | 70               | 70               |
| <b>Spurious Response Rejection (dB)</b>     | 70       | 70               | 65 <sup>20</sup> | 65       | 70               | 70       | 70       | 70       | 70               | 70       | 70               | 70               |
| <b>Audio Power Output (watts)</b>           | 0.5      | 10               | 0.5              | 0.5      | 10               | 10       | 0.5      | 0.5      | 10               | 10       | 0.5              | 10               |
| <b>Audio Distortion (%)</b>                 | 5        | 10               | 5                | 5        | 10               | 10       | 5        | 5        | 10               | 10       | 5                | 10               |

<sup>18</sup> This requirement includes a minimum of one Primary Dispatch Channel and applicable mutual aid channel(s) for the specific band of operation; otherwise, the number of channels is as needed. Also, see Section 5.3

<sup>19</sup> There shall be no degradation, simultaneously for 806-851 MHz and 851-854 MHz Band.

## 6.5 Digital Standards for Base/Repeater Stations

The base/repeater stations radio shall be state-of-the-art and all RF frequencies and Digital Coded Squelch System (DCS) tones shall be generated electronically (synthesized). The below minimum performance standards shall apply to digital equipment type-accepted for 25 kHz and/or 12.5 kHz operational bandwidths.

### 6.5.1 TRANSMITTER PARAMETERS

|                                     | VHF-HB | UHF | 700/800<br>MHZ |
|-------------------------------------|--------|-----|----------------|
| Power Output, (watts) <sup>21</sup> | 90     | 90  | 75             |
| FM Hum and Noise (dB)               | 45     | 40  | 45             |
| Continuous Duty Cycle (100%)        | Yes    | Yes | Yes            |

### 6.5.2 RECEIVER PARAMETERS

|   | VHF-HB | UHF  | 700/800<br>MHZ |
|---|--------|------|----------------|
| Digital Sensitivity 5% BER <sup>22</sup> ( $\mu$ V) | 0.35   | 0.35 | 0.35           |
| Adjacent Channel Rejection (dB)                     | 60     | 60   | 60             |
| Intermodulation Rejection (dB)                      | 80     | 80   | 85             |
| Spurious Response Rejection (dB)                    | 90     | 90   | 100            |

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<sup>21</sup> Transmitter power output is a minimum standard unless demonstrated by system engineering and/or FCC Rules.

<sup>22</sup> BER – Bit Error Rate

## 6.6 Digital Standards for Mobile (vehicular) Radios

The mobile radio shall be state-of-the-art and all RF frequencies and Digital Coded Squelch System (DCS) tones shall be generated electronically (synthesized). The below minimum performance standards shall apply to digital equipment type-accepted for 25 kHz and/or 12.5 kHz operational bandwidths.

### 6.6.1 Military Standards

The Military testing requirements shall be the same as for analog mobiles (Option A radios). At the option of agencies (Option B), military standards may be selected to match the environment in which the radio will be used. For example, an agency which operates in an outside environment may consider blowing rain (Procedure I) standards or may consider vibration/shock standard (Procedure I), as listed in Section 6.3.1.

### 6.6.2 TRANSMITTER PARAMETERS

|                                     | VHF-HB | UHF | 700/800 MHZ |
|-------------------------------------|--------|-----|-------------|
| Number of Channels <sup>23</sup>    | 3      | 3   | 10          |
| Freq. Separation (MHz)              | 17     | 10  | 18          |
| Power Output, (watts) <sup>24</sup> | 50     | 50  | 30          |
| FM Hum and Noise (dB)               | 45     | 40  | 45          |

### 6.6.3 RECEIVER PARAMETERS

|  | VHF-HB | UHF  | 700/800 MHZ |
|--|--------|------|-------------|
| Number of Channels                                     | 3      | 3    | 10          |
| Freq. Separation (MHz)                                 | 17     | 10   | 18          |
| Digital Sensitivity 5% BER <sup>25</sup><br>( $\mu$ V) | 0.35   | 0.35 | 0.35        |
| Adjacent Channel Rejection<br>(dB)                     | 70     | 75   | 65          |
| Intermodulation Rejection (dB)                         | 75     | 85   | 75          |
| Spurious Response Rejection<br>(dB)                    | 75     | 83   | 75          |
| Audio Power Output (watts)                             | 10     | 10   | 10          |
| Audio Distortion (%)                                   | 5      | 5    | 5           |

<sup>23</sup> This requirement allows for a minimum of dispatch channels and applicable Mutual Aid channels for the particular band of operation; otherwise, as needed. Also, see Section 5.3.

<sup>24</sup> Transmitter power output is a minimum standard unless demonstrated by system engineering and/or FCC Rules.

<sup>25</sup> BER – Bit Error Rate



## 6.7 Digital Standards for Portable (hand-held) Radios

The below minimum performance standards shall apply to digital equipment type-accepted for 25 kHz and/or 12.5 kHz operational bandwidths. 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 for at least an 8 hour period.

### 6.7.1 Military Standards

The military testing requirements shall be the same as for analog portables (Option A radios). At the option of agencies (Option B), military standards may be selected to match the environment in which the radio will be used. For example, an agency which operates in an outside environment may consider blowing rain (Procedure I) standards or may consider vibration/shock standard (Procedure I), as listed in Section 6.4.1.

### 6.7.2 TRANSMITTER PARAMETERS

|                                     | VHF-HB | UHF | 700/800 MHZ |
|-------------------------------------|--------|-----|-------------|
| Number of Channels <sup>26</sup>    | 3      | 3   | 10          |
| Freq. Separation (MHz)              | 17     | 10  | 18          |
| Power Output, (watts) <sup>27</sup> | 5      | 4   | 3           |
| FM Hum and Noise (dB)               | 42     | 42  | 40          |

### 6.7.3 RECEIVER PARAMETERS

|   | VHF-HB | UHF | 700/800 MHZ |
|---|--------|-----|-------------|
| Number of Channels                            | 3      | 3   | 10          |
| Freq. Separation (MHz)                        | 17     | 10  | 18          |
| Digital Sensitivity 5% BER <sup>28</sup> (µV) | .28    | .25 | .3          |
| Adjacent Channel Rejection (dB)               | 60     | 68  | 63          |
| Intermodulation Rejection (dB)                | 74     | 77  | 75          |
| Spurious Response Rejection (dB)              | 75     | 75  | 75          |
| Audio Power Output (watts)                    | .5     | .5  | .5          |
| Audio Distortion (%)                          | 3      | 3   | 3           |

## END OF SECTION 6.0

<sup>26</sup> This requirement allows for a minimum of dispatch channels and applicable Mutual Aid channels for the particular band of operation; otherwise, as needed. Also, see Section 5.3.

<sup>27</sup> Transmitter power output is a minimum standard unless demonstrated by system engineering and/or FCC Rules.

<sup>28</sup> BER – Bit Error Rate.

## **7.0 MOBILE DATA COMMUNICATIONS**

### **7.1 General**

The use of mobile data communications can simplify and expedite the access of information that is invaluable to efficient law enforcement activities. Typically, mobile-data technology is used by law enforcement officers to securely access the National Crime Information Center (NCIC) and the Florida Crime Information Center (FCIC) records directly from a mobile-data computer (MDC) or terminal (MDT) within individual patrol vehicles. Prior to the application of mobile-data technology to law enforcement, this kind of information was obtained through the dispatcher, by verbally relaying it to the inquiring officers in the field using the established radio communications system. Mobile data is also being used evermore frequently to send text messages for reports and queries, and enhanced capabilities such as the ability to transmit still images, video, and fingerprints are highly desired.<sup>29</sup> Though voice communications remains the predominate means of coordinating law enforcement activities, an increasing number of agencies are realizing the benefits of mobile data for improving law enforcement efficiency, and can reduce the level of voice traffic.

Even with the many capabilities and benefits of mobile data, it is important to realize its limitations. For example, mobile data is less appropriate than voice for communicating certain urgent messages requiring immediate acknowledgment and response, such as in an emergency. During many other situations, however, law enforcement officers can communicate more efficiently with their dispatchers or other law enforcement officers using mobile data. A law enforcement agency may implement a private mobile-data system over a pre-existing voice network, such as might be implemented in VHF, UHF and the 700/800 MHz frequency bands; however, in such a shared system, all mobile data traffic shall defer to critical voice traffic in the event of competition for the same bandwidth.

The use of the term “mobile data” means packet-switched networks as listed in Section 7.2.1. Mobile data systems provide a means for law enforcement officers to instantly access local, state and national databases, including vehicle identification and locator, mapping, Florida Statutes, policies, record management, and warrants. Important considerations in establishing wireless access and bridging in a LAN - Wireless Local Area Network (WLAN) – is discussed in Section 7.3.3.

### **7.2 Mobile Data Design**

#### **7.2.1 General**

Wireless data technologies are evolving from second-generation (2G) to third-generation (3G) digital standards. A summary of the evolving technologies is listed below.

- A. General Packet Radio Service (GPRS):** GPRS is also a second-generation (digital) network based on Global System for Mobile Communications (GSM) networks. Users have typically experienced downstream data rates up to 80 Kbps. It is the standards-based packet overlay for

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<sup>29</sup> U.S. Department of Justice, National Institute of Justice, Research Report entitled “State and Local Law Enforcement Wireless Communications and Interoperability: A Quantitative Analysis”, page 35 (January 1998).

existing GSM, and it enables the deployment of next-generation mobile data applications, including enhanced Voice-over-IP (VoIP) and video communications and continuous (always-on) connection to the Internet. GPRS was superseded by EDGE, which changed the modulation method to increase speed.

- B. Enhanced Data for GSM Evolution (EDGE):** EDGE is a third-generation data system, and it will deliver data rates up to 384 Kbps on a broadband.
- C. Universal Mobile Telecommunications System (UMTS):** UMTS is also a third-generation data system, and it will deliver broadband information at speeds up to 2-million bits per second (Mbps). Besides voice and data, UMTS will deliver audio and video to wireless devices anywhere in the world through fixed, wireless and satellite systems.
- D. Wideband Code-Division Multiple Access (WCDMA):** WCDMA is a third-generation mobile wireless technology that supports mobile/portable voice, images, data, and video communications at up to 2 Mbps (local area access) or 384 Kbps (wide area access).
- E. Code-Division Multiple Access 2000 (CDMA2000):** Another mobile data system is CDMA2000, which is similar in UMTS and WCDMA data speeds. CDMA2000 is a hybrid 2.5G / 3G protocol of mobile telecommunications standards that use CDMA, a multiple access scheme for digital radio, to send voice, data, and signaling data such as dialed considered 2.5G protocol in 1xRTT (1x stands for a single carrier and RTT stands for Radio Transmission Technology), and the network features between 115-307 Kbps data transmission speed. Other CDMA initiatives include CDMA 1xEV-DO and CDMA 1xEV-DV. 1xEV-DO stands for one carrier Evolution-Data Optimized (up to 2.4 Mbps), while 1xEV-DV stands for one carrier Evolution-Data and Voice (up to 2.4 Mbps).

## **7.2.2 Mobile Data Design Modules**

A mobile data network design consists of three basic modules.

### **A. Mobile Data Computer (MDC) System**

A mobile data network design consists of three basic modules. The first module in the design is the MDCs or dismounted wireless devices, including wireless laptops or PDAs capable of communicating with the vehicles wireless systems. The MDC system contains the computer module, power supply, keyboard, monitor, modem, RF amplifier, software, and antenna. Section 7.2.5 of this plan provides the recommended specifications of the MDC. A ruggedized mobile computer is recommended for law enforcement. Section 7.2.4 addresses the security recommendations of the MDC.

## **B. Wireless Data Base Station**

- (1) Non-GPRS Base Station: The wireless data base station is the second module in the mobile data network design. The base station includes the radio, antenna, router/modem, authentication server, and leased communications lines. The coverage reliability of the radio system is discussed in Section 7.2.3, and the security recommendations are listed in Section 7.2.4.
- (2) GPRS Base Station: In a GPRS network, the base station is known as Base Station Subsystem (BSS). This normally includes a software upgrade to the radio transceivers and base station control nodes. A Packet Control Unit (PCU) is also added to the BSS to manage the packet data transfer between user devices and the GPRS core network. In addition, GPRS would have two more components to the network: the Serving GPRS Support Node (SGSN) and the Gateway GPRS Support Node (GGSN). These nodes interact with the Home Location Register (HLR) node to obtain subscriber profile and authentication. The SGSN is connected directly to the base station network and controls access, tracks user mobility, and implements various security functions. The GGSN is a gateway to external data networks and provides services such as authenticating external network access, quality of service (QoS), and tunneling. External networks may include the Internet, private Intranets, or legacy X.25 networks. The GGSN also supports roaming by routing incoming traffic to the appropriate SGSN where the user is located.
- (3) Authentication Server: An authentication server is located either at the base station, law enforcement building or at both locations.

## **C. Mobile Data Ethernet LAN Connectivity**

The third module in the mobile data network design is the Ethernet LAN at the law enforcement agency, including a terminal server, computer-aided dispatch (CAD) system, information network, voice and message switches, data radio controller or multi-site controller, authentication server, and Internet access. Section 7.3.3 presents information to assist in planning for a Wireless LAN (WLAN) including 802.11 standards, access points, network protocols, design concerns, and security.

### **7.2.3 Mobile Data Communication Coverage Reliability**

For a local law enforcement agency establishing its own MDS, The Department of Management Services recommends a minimum of 90% area probability (in 90% of locations for 90% of the time) for a BER of 5% or better throughout the legal jurisdiction. It is prudent for those agencies planning to rely on a wireless data service provider, to check the coverage area of the MDS service provider before subscribing.

#### **7.2.4 Mobile Data Security**

If an agency uses a mobile data system (i.e., GPRS, EDGE, UMTS, WCDMA, CDMA2000 or a proprietary system), a minimum standard of end-to-end encryption and authentication are recommended. Digital data networks access (authentication and authorization) to the network is controlled at the SGSN or similar node. The encryption should be at least a 128-bit encryption scheme with an extensible authentication protocol (EAP). A Subscriber Identity Module (SIM) is recommended at the user's terminal, which connects with HLR Network Node to validate a subscriber. Additional authentication is also recommended by use of a Remote Authentication Dial In User Service (RADIUS) server. Because mobile data security is evolving, law enforcement agencies should integrate the latest developments in security technology.

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

The Department of Management Services recommends a ruggedized MDC for law enforcement. The ruggedized MDC should comply with RS-374/EIA 204 or the Military Standard-810F, for temperature, rain, salt fog, sand and dust, vibration, and shock based on the following test methods and procedures:

501.4 High Temperature, Procedure I (Storage) and Procedure II (Operation)

506.4 Rain, Procedure I (blowing rain)

509.4 Salt Fog, Procedure I (aggravated screening)

510.4 Sand and Dust, Procedure I (blowing dust)

514.5 Vibration, Procedure I, Category 10 (3 Axes)

516.5 Shock, Procedure I (functional)

Note: Altitude testing is not specifically recommended.

#### **Minimum Specifications**

|           |  |
|-----------|--|
| Processor | Pentium-class/equivalent with 2 GB RAM or higher, 1 GB DRAM, 80 GB hard drive or higher-Shock Mounted, an RS-232 serial port, a USB port, RJ-11, RJ-45 10\100\1000 Base Ethernet Network, Integrated 802.11 a/b/g/n wireless networking and GPS Receiver |
| Software  | Windows-based (XP Prof, Vista), mobile data software or equivalent   |
| Display   | XGA, WSVGA, LCD Display with touchscreen and sunlight viewable, Drop Shock and vibration resistant   |

Keyboard Backlit, Detachable, 82-key QWERTY layout, integrated glide pad and water-resistant

|                       |  |
|-----------------------|--|
| Operating Temperature | -32 to 150 degrees Fahrenheit  |
| Power Supply          | 12-volt system (regulated) with protection against reboots due to low power spikes |
| Battery Life          | 3 hours (minimum)  |
| Mount                 | Moveable and user-friendly   |
| Options               | Fingerprint scanning station, Barcode and magnetic strip-Readers, printer          |

Although PDAs or handheld computers specifications are not listed, ruggedized PDAs and handheld computers are recommended in compliance with RS-374/EIA 204 standards.

### **7.2.6 Network Connectivity Service, Privacy, and Security**

State and local government agencies can establish privacy on public or shared networks with any of several protocol methods including, but not necessarily limited to, the following: Secured Socket Layer (SSL), Transport Layer Security (TLS), and Virtual Private Network (VPN), which is used on the SUNCOM MyFlorida network. Additional information for VPN services is now available at: [http://dms.myflorida.com/suncom/suncom\\_products\\_and\\_pricing](http://dms.myflorida.com/suncom/suncom_products_and_pricing). In addition to the privacy protocol, The Department of Management Services (The Department) recommends that encryption be employed from end to end. The encryption algorithms that are approved by the Federal Government are Data Encryption Standard (DES), Triple DES, and Advanced Encryption Standard (AES). As AES is the latest, the Department recommends AES over the other two.

### **7.3 Wireless LAN Technologies & Standards**

#### **7.3.1 General**

An agency planning to establish wireless access and/or bridging in its Local Area Network (LAN) should consider a technology which complies with one of a growing variety of standards by the Institute of Electrical and Electronic Engineers (IEEE) - 802.11. The 802.11 standard specifies the unlicensed spectrum in the 2.4 GHz Industry, Scientific, and Medical (ISM) band, including infrared and spread spectrum. The 802.11a standard uses the 5 GHz unlicensed National Information Infrastructure (U-NII) band and transfers data up to five times faster than 802.11b. However, 802.11a is not backward compatible to 802.11b. 801.11b offers high-speed RF data communications (up to 11 Mbps) in the same unlicensed band as 802.11 - ISM band. 802.11b is backward compatible to 802.11. 802.11g (multimode) uses the same technologies as 802.11a and is backward compatible with 802.11b.

In the case where a local government agency desires to access the State of Florida network through a media of wireless data connectivity (i.e. Wireless LAN or WLAN), it is preferred that the local agency refers to the Department policy on security. Call the Department of Information Security at: (850) 414-0152.

### **7.3.2 Overview of 802.11 Technologies**

802.11 technologies are evolving. As newer 802.11 standards are adopted, the Department recommends that agencies consider backward compatibility in planning upgrades. An agency should be aware that in order to implement the latest standards, components in an existing Wireless LAN (WLAN) may have to be replaced. The key is to ensure that the new change is 802.11-compliant, including access points, etc. In summary, 802.11 supports speeds up to 2 Mbps in 2.4 GHz radio range (unlicensed). 802.11a supports higher speed up to 54 Mbps and works in unlicensed 5 GHz radio band, but is not backward compatible to the older 802.11b standard. 802.11b is backward compatible to 802.11, and supports up to 11 Mbps in unlicensed 2.4 GHz radio band. 802.11g is backward compatible to the 802.11b standard, and with the same modulation as 802.11a, is capable of providing the higher data speeds of the 802.11a standard; however, 802.11g is not compatible with 802.11a as they operate in different frequency bands. A more detailed summary of the specific technology associated with each of the 802.11 standards follows.

#### **A. Frequency Hopping Spread Spectrum (FHSS) – 802.11**

FHSS is a technology under the 802.11 standard for WLANs. FHSS operates primarily at 2.4 GHz with a throughput of 1-2 Mbps. The physical layer, which actually handles the transmission of data between nodes, can use either direct sequence spread spectrum, frequency-hopping spread spectrum, or infrared (IR) pulse position modulation. 802.11 makes provisions for data rates of either 1 Mbps or 2 Mbps, and calls for operation in the 2.4 - 2.4835 GHz frequency band (in the case of spread-spectrum transmission), which is an unlicensed band for ISM applications.

#### **B. Orthogonal Frequency Division Multiplexing (OFDM) – 802.11a**

802.11a standard specifies an OFDM physical layer that splits an information signal across 52 separate subcarriers to provide transmission of data with eight non-overlapping channels at a rate of 6, 9, 12, 18, 24, 36, 48, or 54 Mbps. In the 802.11a standard the 6, 12, and 24 Mbps data rates are mandatory, and the standard requires receivers to have a minimum sensitivity ranging from -82 to -65 dBm, depending on the chosen data rate. Operating frequencies for the 802.11a OFDM layer fall into the following three 100 MHz unlicensed U-NII bands: 5.15 to 5.25 GHz, 5.25 to 5.35 GHz, and 5.725 to 5.825 GHz. The first 100 MHz is the lower section and is restricted to a maximum power output of 50 milliwatts (mW). The second 100 MHz is limited to 250 mW, and the third 100 MHz is delegated for outdoor applications with a maximum of 1-watt power output. Note: The 802.11a, which operates in the 5 GHz frequency range, will enable shorter transmission distances as compared to 802.11b, which operates in the 2.4 GHz frequency range.

### **C. Direct Sequence Spread Spectrum (DSSS) - 802-11b**

DSSS technology operates under 802.11b. This 802.11b specification allows DSSS to operate at 2.4 GHz with three non-overlapping channels at variable throughput of 1, 2, 5.5 and 11 Mbps. The benefit of the DSSS 802.11b is higher bandwidth capabilities than offered by 802.11. Most WLANs use spread spectrum technology, which operate in unlicensed radio bands to include: 902-928 MHz, 2.4 GHz and 5.725-5.85 GHz.

### **D. 802.11g (Multimode)**

802.11g standard uses the same technologies as 802.11a and is backward compatible with 802.11b. For 802.11b compatibility, 802.11g incorporates 802.11b's Complementary Code Keying (CCK) to achieve bit transfer rates of 5.5 and 11 Mbps in the 2.4 GHz band. In addition, 802.11g adopts 802.11a's OFDM for 54 Mbps speeds in the 2.4 GHz range. Please note that users in the 2.4 GHz band will have to deal with interference from satellites to microwave ovens to high-end wireless phones. This can result in lower throughput.

### **E. 802.11n**

802.11n is a new standard that increases transmission speeds to 100 Mbps and beyond. The final standard is expected in 2009. Because 802.11n works in the 2.4 and 5.0 GHz frequency band, it is compatible with legacy 802.11a and 802.11b/g users.

## **7.3.3 Infrastructure Mode WLAN Systems and Access Points (APs)**

There are two basic modes of WLAN specified in 802.11: infrastructure mode and ad hoc mode. The infrastructure mode involves access points (one or more) connected to a wired network. The access points bridge the wired network to wireless end stations. A wireless end station is typically a Personal Computer that is equipped with a wireless network interface card.

### **A. Access Points (APs) and Bridges**

To establish a WLAN in a wired LAN, a network of fixed APs is established over a designated area. Each access point operates as a fixed base station to bridge the network wirelessly to one or more wireless end station, which constitutes a basic service set. An AP usually consists of a radio, a wired network interface, and bridging software (in 802.11, the bridging software is 802.1d bridging standard). Each AP may use either directional or omnidirectional antennas as appropriate for the application. Separate wired LANs can also be bridged together wirelessly. The two basic configurations for bridging separate LANs include point-to-point and point-to-multipoint. The planning range of wireless bridges varies with manufacturers (1,000 feet to 25 miles), but most installations are less than 3 miles. The wireless bridges should also be at least Ethernet Category 5 cabled to the sites "wired" network hub, switch, or router for connectivity into the WLAN infrastructure. It is recommended that the wireless bridges broadcast Service Set Identifiers (SSIDs) be disabled, and the default password be changed.



## **B. External Antenna Systems**

An antenna system that is external to a building may consist of a Bi-directional Programmable Amplifier (1-Watt maximum) with DC-Injector mode, a low-loss antenna cable, an antenna mast assembly, and an omnidirectional antenna for each fixed AP site. The antenna system should be TIA/EIA 607 grounded and provided with lightning arrestor protection. In addition, the antenna signal strength must comply with the FCC rules and regulations. The FCC defines power limitations for WLANs in Part 15.247 of the FCC rules.

## **C. Roaming**

Roaming is the dynamic re-association of a wireless end station with a different AP. The APs enable wireless access with laptops, personal digital assistants (PDAs), tablets, or pocket personal computer (pocket PC) with wireless capabilities to operate within the designed coverage area. The law enforcement agency may want to consider equipping vehicles with workgroup bridge units, which would allow dismounted wireless devices to communicate with the vehicles' wireless systems.

## **D. Data Rate Throughput Limits**

For planning purposes, wireless data transmission speeds decrease as distance increases; that is, the farther the coverage distance, the slower the speed. In addition, the overall throughput is limited by the slowest link in the network. Note: 802.11b wireless bridges are half-duplex, meaning they only transmit in one direction at a time.

## **E. Severe Weather/Interference**

Severe weather, such as torrential rains, can adversely affect signal transmission and temporarily disable the WLAN. Similarly, the wireless link is susceptible to interference from other wireless sources. Unlicensed band users have no protection against interference, and if their networks affect licensed users in the same band, then the WLAN would have to cease operation. Out of band emissions from high-power paging stations co-located or near one of the wireless data base stations or access points could also affect the reliability of the network. In addition, a growing number of users within the unlicensed band could potentially raise noise and interference in the future.

### **7.3.4 Network Layer Protocol**

In the Open Systems Interconnect (OSI) communications mode, the network layer protocol should be IP-based (TCP/IP stack).

### **7.3.5 WLAN Security**

An agency planning to establish a WLAN should understand the potential security risks and requirements of WLANs, APs, vehicle wireless laptops, and dismounted wireless devices. These systems should have the minimum standard of encryption methods and authentication procedures to include firmware that uses the Temporal Key Integrity Protocol (TKIP); Advanced Encryption Standard (AES) of at least 128-bit

encryption; and Extensible Authentication Protocol (EAP) that is enabled. To ensure only authorized users have access to the WLAN, it is also recommended that user IDs and passwords be used for authentication and double security. In addition, access points installed within firewalls are not recommended. All APs should be outside firewalls so as to avoid compromising the wired segments of the network. Wireless laptops are also recommended to have a firewall, such as device management software, to help prevent rogue access to your data. The management software also allows host server to deploy virus fixes and patches, to enforce machine settings, and to remove unauthorized software to protect wireless laptops or PDAs. Because security requirements are evolving, law enforcement agencies should integrate the latest developments in security technology based on 802.11 series.

**END OF SECTION 7.0**

## **APPENDIX A**

### **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.

## 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 which 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 "convert-a-com" device such that the radio is compliant with current FAA-FARs and FCC rules. Specifically, a licensed avionics technician would modify the portable radio, "convert-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 "convert-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 "convert-a-com."

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 convert-a-com, 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 convert-a-com 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 convert-a-com and portable radio equipment would remain secured. (FAR 43 & FAR 23.561)

6) Revise the convert-a-com wiring harness to include additional cable length as required for the aircraft installation. Replace the wiring harness provided for the convert-a-com 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 convert-a-com 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/convert-a-com 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 "convert-a-com" device, the battery must be restricted from recharging. It should be removed before inserting the portable radio into the convert-a-com; or else, the charging circuit should be disabled in the convert-a-com. 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:

1) 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)

2) 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).

3) 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 A**

## **APPENDIX B**

### **STATE AGENCIES AND LOCAL LAW ENFORCEMENT POLICIES**

State Agencies and local law enforcement policies contained within this plan include:

- 1.0 Public Safety Mutual Aid Channel (MA-FLA)
- 2.0 Minimizing Risk of Obsolescence for Radio Equipment
- 3.0 Radio Equipment Replacement Policy
- 4.0 Radio Frequency *Buy Out* Policy
- 5.0 Capitol Building Rooftop Antenna Policy
- 6.0 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 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, the Deputy Director of 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 located at the web site <http://www.fcc.gov/Bureaus/Wireless/Orders/1997/da971631.txt>) should also be attached to the application. 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 law enforcement 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 law enforcement 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.

### **B. Paging Encoders**

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

## **C. 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 windspeed 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 waveguide 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 windspeed 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.

### **D. 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.

### **E. Digital versus Analog Microwave**

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

### **F. 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.

### **G. 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.

### **H. 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.

**I. 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:

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

| <i>Type of Equipment</i>                | <i>Age (Years)</i> |
|---|--------------------|
| 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                 |

| <i>Type of Equipment</i>                | <i>Age (Years)</i> |
|---|--------------------|
| 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                 |

2. 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.
3. 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.
4. 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 Communication and Information Services 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**

### **Narrowbanding Migration Plan (Between 150-174 MHz and 421-512 MHz)**

#### **1.0 General**

The Federal Communications Commission (FCC) has adopted a rule concerning narrowbanding. The rule is a mandatory reconfiguration for users of frequencies between 150-174 and 421-512 MHz using older, wideband equipment (25 kHz channels). The FCC has created channels with available bandwidths of 12.5 kHz and 6.25 kHz and has allowed licensees to use existing channels with smaller bandwidth to relieve spectrum congestion.

In 2004, the FCC set January 1, 2013 as the deadline to transition from 25 kHz channels (wideband) to 12.5 kHz channels (narrowband). Although a deadline has not been set for transition to 6.25 kHz, the FCC encourages licensees to migrate directly from 25 kHz to 6.25 kHz if suitable equipment is available. Once the 6.25 kHz technology matures to sufficient available equipment, the FCC will set a transition date to the 6.5 kHz technology. The 6.25 kHz equivalent technology exists now, and the Project 25 Phase II technologies are on a development path for availability in the near future. Given this, all public safety licensees should give consideration to their eventual transition to 6.25 kHz technologies especially given the long and fixed budget cycles that typically constrain public safety system deployments.

#### **2.0 Narrowbanding Migration Plan**

The Department of Management Services (the Department) provides the following planning criteria to State Agencies and law enforcement personnel concerning narrowbanding:

- 1) Do not purchase any VHF-HB or UHF radio equipment that is not FCC-narrowband compliant. A narrowband-compliant radio has FCC emission designator 11K0F3E for voice and 11K0F1D or 11K0F2D for data.
- 2) Inventory your current equipment and make a determination on narrowband-compliant radios, including portables, mobiles, control stations, base stations and repeaters. For radio equipment that is not already FCC narrowband-compliant, request cost estimates to replace the equipment and request replacement in the next budget.
- 3) Review your FCC license, and if necessary, request modification of the license with frequency modulated voice 12.5 kHz, emission designator 11K0F3E for voice. Since the narrowband modification must be submitted through a frequency coordinator, public safety agencies should make this modification by January 1, 2011. There is a frequency coordinator fee to modify your license. The Department can provide FCC licensing assistance to local public safety and state agencies.

- 4) If applying for a new frequency, implement the system as narrowband-compliant.
- 5) The FCC has mandated five VHF-HB interoperability channels, including 151.13750, 154.45250, 155.75250, 158.73750 and 159.47250, as well as 7.5 kHz adjacent channels before and after the interoperability channels. Determine whether your normal operational radio is on an interoperability channel, and if so, request another radio frequency. In addition, if you are operating wideband and are on an adjacent channel to the interoperability channels, request a new radio frequency. The interoperability channels have primary interference protection, and wideband users (emission designator 20K0F3E) only have secondary interference protection on these channels. Secondary protection means you do not have interference protection and could be required to cease operation if you interfere with interoperability operations.
- 6) Make use of Appendix B, Section 3.0 (Radio Equipment Replacement Policy) as additional justification to replace the older equipment.
- 7) Review your Intergovernmental Communications Program (ICP) for equipment eligibility replacement. If required, request the Department to revise your ICP to cover radio-related equipment that supports two or more agencies within your county (see ICP website): [http://dms.myflorida.com/trs/public\\_safety/radio\\_communications/local\\_and\\_state\\_radio\\_services/intergovernmental\\_radio\\_communications\\_program\\_icp](http://dms.myflorida.com/trs/public_safety/radio_communications/local_and_state_radio_services/intergovernmental_radio_communications_program_icp)
- 8) Implement Project 25 digital radios (P25) Phase I and Phase II.

### **3.0 Operational Planning Considerations**

Agencies must carefully plan the migration from wideband to narrowband. Without proper planning and coordination, public safety agencies may not be able to communicate effectively if one has migrated to narrowband and the other is still operating on 25 kHz channels (wideband). Therefore, agencies should avoid mixing wideband and narrowband operations, and should fully plan and coordinate their migration to narrowband.

When migrating from wideband to narrowband, you may experience the following differences during and after transition:

- 1) The current predicted radio coverage area of the narrowband channel may be slightly less than the radio coverage area of the 25 kHz channel.
- 2) The audio quality of the narrowband channel may be clear and understanding, but may not be as loud as the 25 kHz channels during transition.
- 3) Interference will occur between narrowband channel and older 25 kHz adjacent channels. During the migration (from wideband to narrowband), separation of the older 25 kHz radio

and 12.5 kHz radio may minimize the effects of adjacent channel interference between narrowband and wideband receivers.

#### **4.0 Narrowbanding Deadlines**

| <b>Milestone</b>   | <b>Date</b>               |
|--|---------------------------|
| No new wideband (25 kilohertz) applications or major modifications to existing systems to increase coverage will be accepted | January 1, 2011           |
| End of manufacturing or import of wideband equipment   | January 1, 2011           |
| Mandatory certification of equipment capable of 6.25 kHz operation   | January 1, 2011           |
| Modify your FCC license with frequency modulated voice 12.5 kHz emission designator  | January 1, 2011           |
| Mandatory migration to 12.5 kHz technology   | January 1, 2013           |
| Mandatory migration to 6.25 kHz technology   | FCC to determine deadline |

**END OF APPENDIX C**

## APPENDIX D - Glossary of Communications Terms

### GLOSSARY OF COMMUNICATIONS TERMS

This glossary provides definitions commonly used in communications technology and engineering. They have been abridged specifically for Law Enforcement communications.

#### - A -

**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.

**audio** - pertaining to frequencies corresponding to normally audible sound waves. These frequencies range from 15 to 20,000 hertz.

#### - B -

**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.

**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.

**base station** - an item of fixed radio hardware consisting of a transmitter and a receiver.

**base-to-mobile communications** -two-way radio communications between a fixed radio stations (base) and a mobile station. Typically, base-to-mobile communications is referred to as "talk-out." "Talk-back" represents mobile-to-base.

**BER** – Bit error rate is the percentage of error bits relative to the total number of bits received in a transmission. Bit error rates that are too high may indicate that a slower data rate may actually speed overall transmission time.

**Business Radio Service** - a subpart of the Industrial Radio Services section of the FCC rules.

- C -

**central office** - sometimes called a wire center; the smallest subdivision within the telephone system which has relatively permanent geographic boundaries.

**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.

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

**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.

**communications control center** - a location where coordination of resources is facilitated through radio communications.

**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 manufacturers 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 point** - a position from which a radio system is controlled and supervised.

**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 radially from a fixed radio station.

**coverage tests, radio** - Tests performed on the system to verify radio communications within the required or predicted service area for the reliability specified by the purchaser. The tests are based upon measurements taken within a number of grids representing the service areas with at least one measurement per grid, and at additional locations specified within each grid (i.e. in building portable coverage, as applicable).

**- D -**

**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.

**dispatch** - the process of receiving a request for emergency medical assistance and the act of sending a vehicle or aircraft in response to each such request.

**dispatch center** - a location where coordination of resources is facilitated through radio communications.

**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.

**duplex** - pertaining to a simultaneous two-way independent transmission in both directions.

**- E -**

**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.

**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.

**engineering** - is defined by Florida Statutes, Chapter 471.005(7).

**- F -**

**facility, communications** - a communications facility is anything used or available for use in the furnishing of communications service.

**FCC Part 90** - The section of Federal Communications Commissions Rules and Regulations that affects most Law Enforcement and 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.

**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 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 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.

**- 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.

**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).

**ground** - a reference point. Also a connection, intentional or accidental, between an electrical circuit and the earth or its equivalent.

**- H -**

**hardware** - the screws, nuts, clamps, anchors, connectors, etc. used in the installation and maintenance of communications systems.

**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.

**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.

**- I -**

**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.

**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.

**- K -**

**kilohertz (kHz)** - equal to one thousand cycles per second. Replaces the term kilocycle.

**kilobits per second (Kbps)** - a thousand bits per second which is used to specify data transfer rates.

**- L -**

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



**LAN** - or local area network is a network established by a number of computers and associated devices having a common communications link (wired or wireless or both) and sharing the resources of a single processor or server within a limited geographic area.

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

**line** - a transmission line or power line. A system of one or more wires.

**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, free space** - the theoretical transmission loss between two radio antennas dependent only upon distance and frequency.

**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 -

**matrix** - an array of horizontal and vertical input or output leads with cross points at the intersections, used as a means of switching from any input to any output.

**mean** - the arithmetic middle point of a range of values, obtained by adding the highest and lowest values and dividing by two.

**megabits per second** - a million bits per second, which is used to specify data transfer speeds

**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.

**MDC** - mobile data computer.

- N -

**narrow-banding** - Frequency-modulated broadcasting system used primarily for two-way voice communication, typically having a maximum 4 KHz deviation of 15 kilohertz bandwidth or less.

**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.

**- 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.

**- 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.

**pair** - two wires of a signal circuit generally applied to telephone wherein one wire is designated "tip" and the second wire "ring".

**point** - a physical or geographic location.

**portable** - an easily transportable radio.

**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 one 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 -**

**quieting** - reduction of system noise.

**- R -**

**radio** - the transmission and reception of signals by means of electromagnetic waves without a connecting wire.

**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 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 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.

**radome** - a dome shaped cover for a parabolic antenna which protects the antenna from the elements and their attenuating effects.

**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.

**region** - the area encompassed by the jurisdictional boundary of each County within the State of Florida.

**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.

**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.

**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.

**Special Emergency Radio Service (SERS)** - that portion of radio communications frequency resources authorized by the FCC for use in the alleviation of emergency situations endangering life or property. See FCC Part 90.

**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.

**spectrum management** - the procedure whereby the frequency spectrum, consisting of the limited available radio channels is managed in such a manner as to ensure maximum utilization of the available channels, to ensure reliable interference-free radio communications between the various users of radio service.

**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 law enforcement system** - a network of law enforcement systems, integrated and coordinated at the state level.

**station, radio** - a fixed installation or mobile unit which is equipped to transmit and receive radio signals.

**system** - a combination of two or more stations in such a way as to provide communications.

**- T -**

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

**tone** - an audio or carrier of controlled amplitude and frequency used in a selective signalling 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.

**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.

**traffic** - a term used for messages handled by a radio communications system.

**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.

- U -

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

- V -

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

**voice** - referring to the sounds uttered by human beings.

**voltage standing wave ratio (VSWR)** - the ratio of the maximum voltage to the minimum voltage along a transmission line. It is the measure of the mismatch between the load and the line.

**volume** - the strength of loudness.

- W -

**watt** - the unit of power.

**wave** - a propagated periodic disturbance such as a radio, light, or sound wave.

**wavelength** - the distance measured along the direction of propagation between two points that are in phase on adjacent waves. A wavelength is the distance traveled by a wave in the time of one cycle. Electromagnetic waves include both light and radio waves and travel in space at approximately 300,000,000 meters per second. To determine the exact length of a wave, divide 300,000,000 meters by the frequency in hertz.

**wave, radio** - an electro-magnetic wave which travels through space at the speed of light.

**wire** - a single metallic conductor.

**WLAN** – wireless local area network.

- X -

- Y -

- Z -

**END OF APPENDIX D**