

White paper defining current communications status and potential options for the future:

## **Intent**

The intent of this paper is to define upcoming FCC radio requirements to transition Private Land Mobile Radio users from wideband to narrowband channels through the application of spectrum efficient technologies. This Federal action is similar to the ongoing Digital TV (DTV) transition in that the transition to narrowband radio channels is mandated, and not optional on the part of licensees.

Upcoming requirements will require upgrades and/or replacement of the County's radio communications equipment. As we investigate these requirements further, it is important that we study the potential alternatives to the County's current systems, assuring that we continue to utilize equipment that meets the needs of our public safety personnel and our citizens. This paper defines the alternative systems that have currently been identified and reviewed by County response agencies. It in no way suggests that these are the only available systems. As new systems and solutions are identified, they will also be evaluated.

**Federal Communications Commission (FCC) Narrowbanding requirement for January 1, 2013.** <http://www.ojp.usdoj.gov/nij/topics/technology/communication/fcc-narrowbanding.htm> - key

Private land mobile radio (LMR) systems—including municipal government and State and local public safety systems—use blocks of radio spectrum called channels. (See Radio Spectrum9766.) Historically, LMR systems have used 25 kHz-wide channels. In December 2004, the Federal Communications Commission mandated that all private LMR users operating below 512 MHz move to 12.5 kHz narrowband voice channels and highly efficient data channel operations by January 1, 2013. This migration complements a National Telecommunications and Information Administration mandate for more rapid Federal agency migration to 12.5 kHz narrowband operation by January 1, 2008. The earlier Federal deadline affects State and local FCC licensees that interface or share frequencies with Federal radio systems.

## **Deadlines**

To phase in the migration deadline of January 1, 2013, the FCC has established interim deadlines. The first important deadline is January 1, 2011, after which:

- The FCC will not grant applications for new voice operations or applications to expand the authorized contour of existing stations that use 25 kHz channels. Only narrowband authorizations will be granted.
- The FCC will prohibit manufacture or importation of new equipment that operates on 25 kHz channels. This will reduce the availability of new equipment for legacy

radio systems and will affect how agencies maintain and upgrade older systems. However, maintenance of older systems operating on 25 kHz channels will be permitted until January 1, 2013.

- The mandated move to narrowband channel operation does not necessarily stop at 12.5 kHz channels and it is the FCC's intent to migrate licensees to 6.25 kHz equivalent technology at some time in the future. The current FCC Rules actually provide for 6.25 kHz channels but permits operation on 12.5 kHz channels as an interim measure. Noting that the technology available in the LMR industry to achieve 6.25 kHz equivalency may not be mature for a few years, the FCC will permit operation to the extent of one voice channel per 12.5 kHz on January 1, 2013. Moreover, the FCC states that those licensees already engaged in deploying 12.5 kHz should continue on their current path and not be dissuaded from doing so. However, the Commission goes on to say that 12.5 kHz technology is a transitional step in the eventual migration of PLMR systems to 6.25 kHz technology, and it stated,

*When that technology matures to the point that sufficient equipment is available for testing, we will expeditiously establish a transition date for users to convert to that more spectrum-efficient technology. . . . Given that the Commission will adopt a date by which users must migrate to 6.25 kHz technology, we strongly urge licensees to consider the feasibility of migrating directly from 25 kHz technology to 6.25 kHz technology prior to January 1, 2013. Such a course could be more efficient and economical than first migrating to 12.5 kHz technology by 2013, then further migrating to 6.25 kHz technology thereafter.*

While it is reasonable to expect that 12.5 kHz systems will be permitted to operate for several years, its future is likely to be short-lived compared to the period of time the County has enjoyed operation of its current system. Consequently, there is risk of obsolescence associated with a 12.5 kHz system deployed on or before January 1, 2013, if that system cannot readily migrate to 6.25 kHz equivalent technology. The 6.25 kHz equivalency may be satisfied by a single voice path per 6.25 kHz channel, two voice paths per 12.5 kHz channel, and four voice paths per 25 kHz channel. The FCC permits the aggregation of bandwidth to comply with the 6.25 kHz Rule. Today, the County operates one voice path per 25 kHz channel.

## **Implications**

This change in FCC rules will require the County to make changes to the current system. It is important to begin studying the current system to determine the solution that will best serve the Citizens of Wakulla County in the future.

## **Current System**

The Current System utilizes a 400-foot Tower located at the Sheriff's Office. Radio signals are boosted or repeated throughout the county via FCC licensed repeaters. The Sheriff's Office utilizes two repeated channels (UHF), EMS utilizes two repeated channels (UHF) and Fire utilizes one repeated channel (VHF). The system also utilizes two 100-foot receive only towers located in St. Marks and Sopchoppy. These receive only sites receive the licensed radio signals and transport them via microwave to the Sheriff's Office where the signal strength is assessed/voted, the stronger signal is then broadcasted through the repeater system. The current system has poor coverage in Smith Creek and along the extreme North East and North Central parts of the county. When narrowbanding is implemented, these problems will only increase, requiring a coverage study and additional solutions (i.e. new transmit and receive sites).

### **Positives of the system:**

- While the system has been upgraded in recent years, it is time tested and has served the county well for more than 30 years. The system has been fairly reliable with few maintenance issues.
- The system has decent coverage with a few areas that need improvement.
- The system seems to penetrate the vegetation and older buildings well.

### **Negatives of the system:**

- The system is not interoperable. County agencies are not able to communicate directly with each other. Communications must be relayed through Dispatch. The county also has no interoperability with outside agencies offering mutual aid.
- Lack of redundancy in the system. The system currently relies on one location for repeaters and the main tower. If the site becomes inoperable, all emergency communications within the county will be lost. Depending on the nature of the problem, communications could be lost for weeks at a time. Fire has the greatest vulnerability since they are only licensed for one repeated channel. A loss of this single repeater will render their radio communications inoperable until a replacement can be found. The County does not currently have replacement repeaters for any or the emergency repeaters (Fire, EMS, Law Enforcement).
- Many of the radios currently owned by County Emergency Response agencies are not compatible with Narrowbanding. All non-narrowband compatible radios will have to be replaced with Narrowband capable radios.
- Narrowbanding will decrease the current coverage area, requiring additional transmit/receive sites or alternate solutions.
- The current system has a problem penetrating many new buildings.

## Potential replacement systems

### “P25” Communications System (700MHz RDSTF Grant)

In the spring of 2008, the North Florida Regional Domestic Security Task Force (RDSTF) was notified that our Region (Region 2) had been awarded a \$3,850,000 grant to enhance radio interoperability in North Florida. The grant was written by our partners at the North Florida Regional Domestic Security Task Force and is intended to enhance radio interoperability within Region 2 (Columbia, Dixie, Franklin, Gadsden, Hamilton, Jefferson, Lafayette, Leon, Liberty, Madison, Suwannee, Taylor, and Wakulla Counties). A summary of the proposed system has been attached to this document. The value of the equipment to be located in Wakulla County as part of this grant is \$260,000. If Wakulla County accepts one of the 700MHz fixed sites associated with this grant, they will need to fund sustainment costs for this site in the amount of \$20,420 annually, beginning in budget year 2012. The annual sustainment costs cover telephone line connectivity to Leon County, maintenance and technology refreshes. The single 700MHz site equipment provided by the RDSTF grant will not be sufficient to cover communications for the entire county. The 3 provided channels on the single site result in only 2 working channels and will need to be supplemented at an additional cost if used for day-to-day use. At least two and possibly three more tower sites and equipment would be required at an additional up front and ongoing cost to provide radio coverage over the entire county. Representatives from Fire, EMS, and Law Enforcement have met on several occasions to discuss the potential and are recommending that the county accept the equipment in order to test and evaluate the system.

**To summarize, the following MAJOR equipment will be located at each 700MHz Site**

Single 7.5' Expandable Site System (ESS) 19" Rack with the following Equipment:

- (3) 100 Watt Trunked 700MHz GTR8000 Repeaters
- (2) Site Controllers
- (1) Receiver Multi-coupler
- (1) TTA Control /Monitoring Unit
- (1) Six (6) port 700 MHz Transmitter Combiner
- (1) Site Router w/T1 interface & 4 port analog interface
- (2) 3KVA Liebert Rack Mounted UPS units

Antenna/Transmission Line Network:

- (1) 700/800 MHz Transmit Antenna 9.0 dB omni gain w/ 1 ¼" LDF coax
- (1) 700/800 MHz Receive Antenna 9.0 dB omni gain w/ 7/8" LDF coax
- (1) 700/800 Tower Top Amplifier w/1/2" LDF coax test line
- (3) PolyPhaser coax protectors

### **Positives of the 700-MHZ system offered in the RDSTF Grant:**

- The system is fully interoperable, allowing all local emergency agencies to communicate with each other, as well as many outside mutual aid agencies.
- The system is fully compliant with the Federal Department of Homeland Security standard for radios communications, namely APCO Project. 25.
- Once the system is in place the only reoccurring costs are those associated with the maintenance of the system and telephone line connectivity to Leon County.
- The system will come with a cache of radios (the number is unknown at this time)
- If P25 radios that are compatible with SLERS are provided (M/A-COM P25 radios) then they can be used both on P25 systems and Statewide on SLERS.

### **Negatives of the system:**

- The state Division of Forestry does not utilize this system. Local Fire responders will still have to monitor VHF frequencies for Mutual Aid
- The Grant will only provide equipment for one system/tower. If the County decides to replace the current system with the 700-MHz system, at least two and possibly three additional tower sites will need to be located and equipment will need to be purchased for these sites. In the Future, the County may be able to place equipment on a tower at the Purdom Generating station in St. Marks and a FDOT tower in Sopchoppy. These are only possibilities at this point, it should be assumed that the County would have to lease space or construct towers to support equipment in these areas.
- The other sites needed for adequate coverage will have a substantial initial equipment cost and will require additional tower sites, plus 10% maintenance plus other ongoing expenses such as fuel, electric, microwave, etc.
- 700-MHz has problems penetrating heavy vegetation and buildings, requiring more tower and equipment sites to overcome this challenge.
- Requires the replacement of all radios.

NOTE: The State of Florida was contacted by the Region 2 Committee to provide an alternative to the proposed RDSTF regional 700MHz interoperability overlay network. Region 2 has had very few agencies agree to support or fund the ongoing expense of the proposed 700MHz network due to the lack of coverage within each county and the expense to expand and maintain the system for day to day use. The State of Florida has agreed to provide the matching grant dollars to keep the grant for Region 2. It would go towards building out 700MHz interoperability infrastructure for all users (not just SLERS subscribers) on SLERS sites. If Wakulla County decides not to move forward with the RDSTF 700MHz interoperability system the grant dollars will likely be used for the State's alternative which will ultimately provide better coverage in Wakulla County with no required investment. The undetermined amount of radios we hoped were allocated for Wakulla County are still possible with the State alternative.

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

The Florida Legislature authorized the Department of Management Services to acquire and implement a statewide radio communications system to serve law enforcement and public safety units of state agencies and to serve local law enforcement and public safety agencies. Mutual aid channels supplement the SLERS trunking system and provide interoperable communications with 800 MHz licensees who do not use SLERS as a primary communications system. This shared radio system provides a statewide solution to facilitate interoperability communications among State and local public safety and law enforcement entities.

The goal of the Statewide Law Enforcement Radio System (SLERS) is to provide State and local law enforcement, and public safety officers with a shared 800 MHz radio system. This digital system serves over 7,500 users with 16,000 radios in patrol cars, boats, motorcycles, and aircraft, wherever they may be located in the state.

Local agencies throughout the State utilize SLERS as their primary radio system. They have joined SLERS as SLERS partners (formerly termed third parties). Counties such as Franklin, Levy, Okaloosa, and Walton leveraged the State's investment to provide a complete, digital trunked 700/800MHz radio system at substantially less than the cost of building a stand alone system. When an agency becomes a third party subscriber to SLERS, the service is similar to entering into a cell service agreement. The agency is only responsible for the radio and dispatching equipment. Towers, tower equipment, and backhaul microwave circuits are maintained by the SLERS provider. The system has multiple towers and repeaters allowing for some redundancy. The subscriber agency pays a monthly fee for each radio on the system.

One primary advantage of SLERS is that it provides day-to-day coverage region wide and roaming coverage statewide. SLERS would allow our public safety users to use it throughout all adjoining counties for any day-to-day use rather than just interoperability or mutual aid use. They can use the system the same way in the County and throughout the region which would eliminate training and coverage issues operating outside the County. If our users need to travel statewide they will have coverage and be monitored by the State's regional dispatch centers.

[http://dms.myflorida.com/trs/public\\_safety/radio\\_communications/statewide\\_law\\_enforcement\\_radio\\_system\\_slers](http://dms.myflorida.com/trs/public_safety/radio_communications/statewide_law_enforcement_radio_system_slers)

### **Positives of the system:**

- The system is fully interoperable (with agencies on the system) allowing agencies to communicate with each other, as well as many outside mutual aid agencies.
- The system is currently secure (encrypted - it is not able to be scanned). This keeps law enforcement and patient information confidential.

- Dual-band SLERS radios can also operate on the RDSTF Grant 700 MHz System when equipped with P25 software.
- SLERS Coverage today offers a significant improvement over what the proposed RTSDF single site can provide. We are currently served by 3 SLERS sites within plus 6 SLERS sites surrounding Wakulla County.
- Up front costs are significantly lower than buying a stand alone 700/800MHz system, or expanding the proposed RTSDF 700MHz system for day-to-day use.
- Maintenance costs are reduced to zero; the County would incur a user fee of approximately \$9/month per user which includes all infrastructure, towers, microwave, fuel, insurance, etc.
- SLERS can be tested at no cost to the County using radios on loan for an extended period and the existing infrastructure.

**Negatives of the system:**

- The state Division of Forestry does not utilize this system. Local Fire responders will still have to monitor VHF frequencies for Mutual Aid.
- 800-MHz has problems penetrating heavy vegetation and buildings, requiring more tower and equipment sites to overcome this challenge. This has been rectified in other regions by utilizing the regional PSIC grant to increase the SLERS radio capability within the county. This could be rectified by adding additional SLERS sites; other regions have utilized the PSIC funds to cover the costs of improving SLERS coverage (this has not been a solution offered by our region to date).
- Based on County requirements, the SLERS provider may add and maintain sites, the cost of which may be reflected in the monthly radio fee.
- The system requires the replacement of all radios.
- The system has a reoccurring cost of \$9/radio to maintain the subscription.
- Although the more populated areas of Wakulla County fall into the SLERS area of coverage where 98% portable outdoor coverage is provided, in building coverage is not guaranteed.

#### Current Recommendation:

A Public Safety Communications Committee consisting of county radio communications users was developed to discuss the status of the current system, 2013 narrowband requirements, and the RDSTF 700-MHz grant opportunity. The group agreed to recommend the BOCC to consider accepting the RDSTF 700-MHz grant opportunity. It is believed that if the grant is accepted with stipulations making it clear that once the grant cycle ends and the County receives ownership of the equipment, we will determine if the system will be maintained. This will be done based on the system's capability and budget appropriations. This will give us the ability to test and evaluate this equipment in order to determine if completing the build out of equipment for countywide use will be a viable option. The group will also continue to look at other options including SLERS and narrowband replacement of the current system. We are currently considering utilizing free assessment resources to assist in this evaluation. We may also recommend to the BOCC that we hire an independent firm to evaluate all options to make sure that the direction the county takes will continue to meet the needs of responders and our citizens over the next several years.

While this paper defines potential options, the RDSTF, PSIC (700-MHz) grant provides the County with the opportunity to evaluate and test one of these systems while we further investigate and determine the real costs and performance of the various options. The process is just beginning; the County must accept or reject the current grant opportunity. However, over the next 1-2 years, the County must evaluate and consider all potentials and define with the best solution that can be maintained given current and projected budget constraints. We know that we will be forced at a minimum to update our current equipment and radios by 2013 to be compliant with FCC narrowbanding requirements. Several viable options exist, including new antenna and repeater technology utilizing our current frequencies. The Committee will continue to review and study potential options in an effort to ensure that all Public Safety agencies continue to improve communications in an effort to assure the needs of our Citizens are met in an efficient manner.