



Oakland County Wireless Integrated Network



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User's Guide



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INTRODUCTION

CLEMIS Public Safety Radio System Overview

This User's Guide is designed to combine the operating policy of the CLEMIS Radio Oversight Subcommittee with a manual of the 800 MHz radio system. The intent was to provide a document that was easily referred to and could be utilized by the diverse public safety professionals on the radio system. It was designed to allow updates to be easily incorporated as the system changes with technology improvements. The document as a whole may appear repetitive; this is by design so that sections for different public safety sectors may stand alone.

Part I – History

The CLEMIS (Court and Law Enforcement Management Information Systems) consortium has constructed a new Public Safety Radio System. The purpose of this system is to provide countywide interoperable radio communications for all law enforcement, fire, and emergency medical services throughout Oakland County. The specifications for this system have been designed by the public safety user community.

The need for this project was identified in the mid-1990's when several public safety emergency situations occurred and the lack of interoperable communication systems impeded the ability of the responders to coordinate effectively. An example is the 1996 shootings at the Wixom Ford plant, during which numerous public safety agencies responded but could not communicate with each other while attempting to locate and subdue an armed subject.

In 1998, the CLEMIS leadership group developed a survey of all law enforcement, fire, and emergency medical services in Oakland County to determine how many agencies would join an interoperable system. This information was used to develop a proposed budget and an estimate of the number of frequencies that would be necessary. The CLEMIS leadership group then approached the Oakland County Board of Commissioners to request funding for a countywide interoperable public safety radio system. The funding

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for this project, in the form of a 911 telephone surcharge, was approved by the Oakland County Board of Commissioners under Miscellaneous Resolution No. 99-279. This Resolution also created a Radio Oversight Subcommittee, under the CLEMIS Advisory Board, to develop and manage the new system. Essentially, management of the new system is under the leadership of the local police and fire representatives.

CLEMIS applied for and received sufficient frequencies to provide the necessary capacity, based upon the surveys.

The CLEMIS Radio Oversight Subcommittee researched the available technology, developed specifications, drafted a request for proposal, diligently evaluated the proposals, and made a recommendation to the CLEMIS Advisory Board regarding a vendor for the new system. On January 17, 2002, the CLEMIS Advisory Board voted to adopt the recommendation of the Radio Oversight Subcommittee to select M/A-COM (now Harris Corporation) as the vendor for the system. At the CLEMIS Advisory Board meeting on July 18, 2002, the contract with Harris Corporation was signed.

Part II – System Design

The design of the new system is intended to provide a high level of portable radio coverage from within substantial buildings and throughout the challenging Oakland County terrain. In order to achieve this level of coverage, the system design requires over 50 radio tower sites. It is essential for officer and firefighter safety that the radio system provides communications from within buildings such as shopping centers, schools, senior apartments, day care centers, and so forth. It would be fairly simple to design a system on which the radios only needed to work out of doors; such a system would require only eight tower sites. It is the need for public safety officers to communicate from within buildings that drives the need for over 40 tower sites. The height and design of the towers varies with the terrain and the type of buildings in the immediate area.

To provide state of the art connectivity between the sites, the system design utilizes the existing OAKNet fiber wherever possible to connect the dispatch centers and tower sites to the system. At tower sites where OAKNet is not available, T1 lines provide the primary connectivity. Both fiber and T1 sites have ISDN back up for redundancy.

The Harris Corporation radio system, known as Open Sky, offers many advantages. It is a trunked radio system, which means that many users are able



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to share the same frequencies efficiently. Open Sky also utilizes TDMA, or Time Division Multiple Access, which allows four simultaneous conversations to occur on one channel, virtually multiplying the number of channels by four and providing for increased capacity. This is very significant for a system that will support over 5,000 public safety radios.

Open Sky also utilizes Voice over Internet Protocol, or VoIP, which enables the system to send both voice and data, and to utilize the existing OAKNet fiber effectively. The system also offers considerable over-the-air programming, so that features and functionality can be added without having to bring the radios physically to a radio shop to be reprogrammed.

Part III - Trunked Radio

Trunking is a method of sharing radio channels among multiple users in order to distribute the load evenly among the channels. A radio system can support many more users on a trunked system than a conventional system with an equal number of channels.

As an example, on a conventional system, a municipality might have separate, dedicated frequencies for Police, Fire, Local Government, and Public Works. The Police and Fire channels might be extremely busy, while at the same time the others are relatively unused. If these channels were trunked, the load would be distributed equally among the four frequencies. This reduction in wasted resources allows more users to share the four channels.

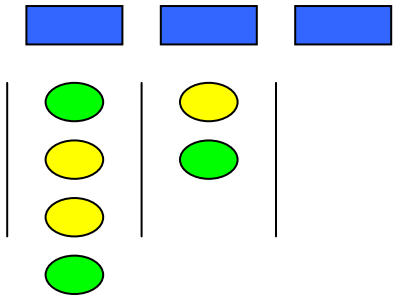
On a trunked system, the user does not always operate on the same channel or frequency, and the user is not even aware of which frequency has been assigned to the transmission. The user is switched, or trunked, to the first available channel in the system. Therefore, with a trunking system, the users do not refer to the "channels" or "frequencies", but instead refer to "talk groups".

Trunking and conventional systems are often compared to waiting in line at a grocery store for an available cashier (a "channel" in this analogy), as illustrated in the following diagram:

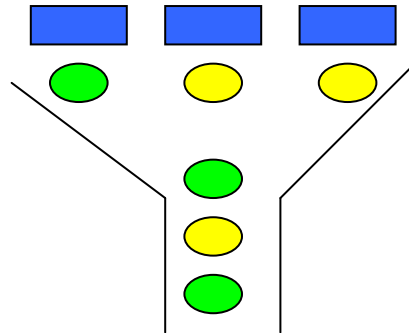


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CONVENTIONAL



TRUNKED



Cashier



Customer with a full cart



Customer with a few items

The "trunked" method is more efficient. No customer is in the "wrong line" since each customer is in queue to be served by the next available cashier. Users with only a "few items" (i.e., a short transmission) will clear the channel for the next user within seconds. On a conventional system, one of the channels may be unused (i.e., the "DPW" channel) while multiple users are waiting for the "police" and "fire" channels. physically to a radio shop to be reprogrammed.

Part IV - Tower Sites

The OakWIN system includes over 40 radio transmitter and receiver sites. Most of these sites are on towers, except for the two in Troy, which are building rooftops.

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Each site is linked back to the Network Controllers by at least two forms of connectivity through the network. The sites are alarmed for a variety of purposes, including open doors, low fuel in the generator, electrical failures, radio equipment problems, and the status of the tower lights for those towers requiring lighting. CLEMIS staff monitors the network and the alarm conditions 24/7.

Most alarm conditions at radio sites are handled by CLEMIS radio technicians. However, there may be occasions when it is necessary to have the local public safety agency check the status of the tower. For example, if CLEMIS should receive a fire alarm or an intrusion alarm at a site, the staff would contact the local PSAP to have appropriate units dispatched. Therefore, public safety agencies should make certain that their responders are aware of the location of the towers within their jurisdiction. Some of these towers are new construction specifically for this project, but others are pre-existing commercial towers that have been in place for many years. The newly constructed towers are owned by either Oakland County or, in most cases, by the local municipality.

Some of the towers are lit, as mandated by the FAA. These are generally the sites that are over 200 feet tall, or that are in the proximity of an airport. The FAA requires that either the lights are monitored electronically, via an alarm system, or that the lights are inspected visually every twenty-four hours. If the lighting on these towers were to fail, the tower owner is required to notify the FAA immediately. If the alarm system that monitors these lights were to fail, even if the lights were working properly, the tower owner would be required to do a visual inspection every twenty-four hours. In that event, CLEMIS would notify the PSAP with jurisdiction for the tower location and request a visual confirmation that the light is working, until such time as the alarm system could be restored.

Public safety communication towers are also sites that could become targets for MDOP, or during civil unrest or terrorism activities. Public Safety agencies with OakWIN sites in their communities should be aware of this, and heighten patrol around the tower sites during times of elevated alert status.