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Interoperable Communications at Risk with Budget Reductions

In light of the State of Alaska FY16 reductions to the ALMR/SATS budget, the following article by Andrew Seybold, taken from his September 11, 2015, Public Safety Advocate Weekly News Summary, seemed an appropriate reminder regarding the critical need for interoperability among public safety first responders.

"September 11, 2015. The anniversary of the worst terrorist attack on the United States since Pearl Harbor. Most of us remember exactly where we were on that day and what we were doing when we heard the news. In addition to it being one of the worst days in history that I am old enough to remember, it marked the start of a true campaign for Public Safety interoperable communications. The sad part is that interoperability, or the lack thereof, was actually a 30-year-old problem even in 2001.

My own first experience with the interoperability issue was in the summer of 1969, when I was a volunteer fireman for Swarthmore Fire Department outside of Philadelphia. We were called in on a third alarm for a row house fire that was spreading to other row homes near Chester, an industrial community. When we arrived we were told that we were needed as a tandem pumper to boost the pressure on a fire hydrant feed that was about 400 yards from the fire. We took our position, attached the hose from the pumper at the hydrant and then fed the water to another pumper closer to the scene. We were on low band, 46.52 MHz, Chester, the first pumper in line, was on VHF (150 MHz). The Chester Heights pumper at the fire was also on Low Band, but on 33.96 with no other channels available.

Everything worked great until the on-scene pumper had to shut down for a problem. Our pumper kept pushing water up the line and we watched as a 50-foot section of hose ruptured and our water was heading straight up in the air, not onto the fire. After-action reports showed the pumper at the fire had radioed it was having a problem, but we did not hear them nor did the pumper at the hydrant, because we were all on different channels. This was not the only incident I was involved in, but it had a lasting effect on me. I have spent a lot of time trying to find out why this was happening, not just in our county, but everywhere in the US.

Can FirstNet solve this problem? NO! It can and should offer video and data services that are fully interoperable between every Public Safety agency in the US, its territories and its tribal nations. However, it cannot, in my estimation, fix the 40-year-old voice interoperability issues. Some LTE advocates seem to believe LTE can be all things to all Public Safety agencies, but I do not believe this is true, at least not for the next 10+ years. Land mobile radio (LMR) has made strides toward better interoperability since 9/11 and Hurricane Katerina, but more needs to be done. To assume that FirstNet is the ultimate solution for voice and data services for all of the Public Safety community is naive at the worst and dangerous at the best."

As stated in the article, LTE is still in the infant stage of development with an uncertain timeframe for a nationwide implementation strategy and even greater uncertainty regarding its funding. States, including Alaska, should not assume they no longer need to fund their LMR systems and let them fall into disrepair. ALMR operates exactly as designed and public safety responders rely on it day to day. Recent budget cuts, and continued threat of even more reductions, jeopardize the System's viability and the interoperable communications it provides.

(Article by Mr. Del Smith, ALMR Operations Manager)

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Card Street/Sockeye Wild Land Fires - ALMR Performance Audit

In July, a question was raised by a Legislator, which was forwarded to the ALMR Operations Manager, regarding the performance of ALMR in providing critical communications support during the responses to the Card Street and Sockeye wild land fires.

As part of his review of ALMR System performance, the Operations Manager contacted key personnel from several agencies using the System during the response to the fires.

An audit of ALMR site utilization, at sites that would have been accessible by radios in the area of the two fires, was also conducted to determine usage and System performance. The audit covered the period from May 31 through June 20, 2015, in order to allow a comparison of normal daily System/site usage prior to the fires with the System/site usage during the fires.

The generated usage reports indicated the ALMR System performed, as designed. Interviews with involved agency points of contact also revealed no issues with ALMR performance during the response to the fires.

(Article by Mr. Del Smith, ALMR Operations Manager)

Subscriber Radio Preventive Maintenance

As is proven in every emergency incident, communications play a major role in how incidents are handled and what the outcome will be. If there is a communications failure during any part of the incident response, it can change the final results. When we are dealing with public safety, this failure could be a matter of life and death.

For this reason, it is essential that communications devices be in proper working condition prior to being utilized. The assumption that the portable radio in the charger is ready to go when picked up could be the start of a bad day for you and those you serve. Just like weapons, your vehicle, fire hoses and medical equipment, your radio equipment needs a regular checkup.

During operational use when a radio fails, the user usually doesn't know if it is a radio issue or a system issue, and in most cases the system is blamed. In an effort to maintain optimum equipment performance, agencies should develop, and adhere to, a schedule for regular preventive maintenance and testing for all their radio equipment.

If/when a problem is experienced, the agency should try to determine if the problem is with their radio or a System issue. If it can't be determine which end the problem is on, agencies can contact the ALMR Help Desk and have them see if the System is experiencing any issues near your location. If the System is determined to be functioning properly, it is time for the agency to get its radio looked at by a qualified original equipment manufacturer (OEM) certified technician. If there is no OEM-certified radio technician within your organization, there is a list of qualified service providers on the ALMR web site (www.alaskalandmobileradio.org/radios.htm).

Some issues can be detected and corrected prior to a total failure by having preventive maintenance performed on a regular schedule, either annual or bi-annual. Maintenance for the technology in today's radios doesn't consist of a few tweaking adjustments. Everything is software driven and you have to know what you are doing or you will be left holding what amounts to a brick in your hand. Granted, preventive maintenance can be a time-consuming hassle and does come with associated costs, but it can save you some headaches down the road.

The following listed parameters should be performed at the beginning of each shift, or at least on a daily basis.

Visual check of all accessories:
- Battery contact and condition
- Antenna condition
- Speaker mic, connections and cord
- Option connector on side of radio

Manual Check:
- Knobs
- Switches
- Keypad, volume control and all switches
- Connections are tight

A prime example of why regular maintenance is crucial happened just recently. One of the ALMR sites was experiencing intermittent RF interference on the control channel, rendering the site nearly useless. This happened to occur just prior to the Presidential visit to Alaska, when radio use would be critical and System traffic was expected to be high. When the interference was active, it forced all the site traffic onto other sites with less channel capacity, causing a large number of busies on the System and frustration for the users.

When the interference became constant, an ALMR System Technologist was able to track down the offending radio using a spectrum analyzer and then shut the radio down. As it turned out, the offending unit was part of a active doomsday radio setup that had been placed in a closet. Everyone at the organization had forgotten about it, or were unaware it was even there. This radio had not had any recent preventive maintenance, if ever.

These types of situations become more prevalent as subscriber equipment maintenance begins to slip, or isn't scheduled at all. The ALMR System can only function, as designed, when the subscriber equipment utilizing it is maintained to manufacturer's specifications.

(Article by Mr. Rich Leber, ALMR Technical Advisor)

Technical Corner: Passive Intermodulation Interference

In our continuing discussion on types of interference, we will be addressing Passive Intermodulation Interference (PMI), also called the "Rusty Bolt Effect." It is caused when two or more strong radio frequency (RF) signals combine in some sort of non-linear device, such as a transistor, diode or even the crystals found in corrosion or rust. This corrosion may even be outside the radio system and can be caused by rusty bolts, rooftop mounted air conditioners, a rusty fence or even a rusty metal barn roof. Of course, it's also possible that loose connectors in the antenna system or poorly configured transmitters can be the cause.

PMI requires at least two strong RF signals and a non-linear device of some sort. Once generated, PMI frequencies are very predictable. If you have two original frequencies, F1 and F2, the third, fifth and seventh order intermodulation products will be found equally spaced above and below the original signals. For instance, if the two original signals are at 900 and 910 MHz, other PMI products will be at 920, 930 and 940 MHz; they also will be at 890, 880 and 870 MHz.

There are many cases where legitimate transmitters can produce PMI that falls into another radio's receive band. There are calculations available on-line that help predict where PMI might fall, given two or more source signals.

As the ALMR Operations Management Office Technical Advisor, I can personally attest to the rusty fence effect. When I used to work with one of the Federal "acronym" agencies, one of my peers and I were dispatched to Boston, Massachusetts, to hunt down an intermittent interference problem they were having with their radio site on the John Hancock Building.

After two days of staring at a spectrum analyzer watching a multitude of signals, we were able to determine which two signals were transmitting when we experienced the interference on our agency frequency. We determined that the two transmitting frequencies were clean, so we had to determine where the mixing was taking place. We found the interference bi-product coming from a rusty chain link fence that was 15 feet outside of the elevator equipment room. When we flexed the fence, we could actually watch the interfering signal disappear and then reappear on the analyzer.

One or more of the rusty joints in the fence was acting as a diode and emitting the interfering signal. As you can imagine, there were many strong RF signals both on the building and in the downtown Boston area. We contacted the building manager and he agreed to have the fence removed as it wasn't needed any longer, thereby solving the issue.

(Article by Mr. Rich Leber, ALMR Technical Advisor with excerpts taken from Anritsu White Paper, Mission Critical Transmission Weekly News, February 15, 2015)

Continuing Improvement of the SATS Network

The continuing improvement of the State of Alaska Telecommunications System, often referred to as "SATS," has reached another milestone.

The capital funds appropriated for deferred maintenance over the prior five years has enabled SATS to replace several end-of-life devices with modern technology, greatly improving the system's reliability.

The updated microwave and multiplex equipment now have "fast reroute" implemented. The benefit is that critical services like the trunked radio ALMR System, Positive Train Control (PTC) system, Power Transmission Line Supervisory Control and Data Acquisition (SCADA) and other services will be automatically and almost instantly rerouted in the event of a link failure.

The SATS topology has been augmented through partnerships with the Alaska Railroad, the Department of Defense and several power utilities to create "rings," which provide the opportunity to reroute traffic for all of the partners.

The new Multi-protocol Label Switching (MPLS) equipment, now installed in almost the entire SATS network, provides this ability and has been configured to prioritize and automatically reroute traffic in the event of a failure anywhere on a ring. This fast reroute also improves the ability to update and maintain communications links and sites without service interruptions.

The SATS network architects are continuing to develop ways to "close the rings" for the sites that are still on "spokes" with only one way into or out of the network, as well as extend coverage beyond the existing network.

There is a need for continued deferred maintenance funding to operate and maintain the $200+ million SATS system. We understand how important SATS service is to our various customers and the vital services they provide to the people of Alaska.

We will be requesting additional funds during future budget cycles in order to continue to improve the resiliency of the SATS system. Everyone's support on those budget requests will be very important in the current fiscal environment.

(Article by Mr. John Lynn, Enterprise Technology Services Engineer)

Expansion of ALMR to Sitka

Sitka was originally chosen as a location for the Southeast expansion of the Alaska Land Mobile Radio (ALMR) Communications System. Due to a lack of funds, the State of Alaska (SOA) was unable to complete the build out and install a site there.

In 2008, Daniels Electronics (now CODAN), seeking a location to demonstrate their portable five-channel trunking repeater site, approached the SOA and an agreement was reached to install the site in Sitka.

Although the Daniels site was a trunking site, it was incompatible with the Motorola™ infrastructure and therefore, could not be connected to ALMR. The site operated for several years providing communication capability to a limited number of agencies in Sitka. In 2014, the Daniels repeater developed a number of technical problems and was no longer operational.

At the November 2014 User Council (UC) meeting, Mr. Max McGrath, ETS SATS/ALMR Manager at the time, advised the UC that the Daniels repeater site was no longer functional. Rather than attempt to repair and update the repeater, which was cost prohibitive, he suggested making it a five-channel VHF ALMR site by utilizing the surplus Quantars® left over from the conversion of the Rabbit Creek site to GTR8000® repeaters. The UC fully supported this action.

With the continued diligence of ETS and Mr. Scott Stormo, the current ETS SATS/ALMR Manager, and the support of the ALMR System Management Office, the Sitka ALMR site was established and is currently operating in site trunking mode, pending resolution of bandwidth/connectivity issues. When those issues are resolved, the site will be fully functional on ALMR, providing system-wide communications capability to local, State and Federal agencies in the Sitka area.

(Article by Ms. Sherry Shafer, ALMR Documentation Specialist)

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