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ALMR Real-world Performance Review

The Alaska Land Mobile Radio Communications System (ALMR) was designed, built and implemented to provide mission-critical, day-to-day emergency response communications for its 124 DOD, Non-DOD Federal, state and local member agencies. The ALMR System's infrastructure is built to "Public Safety Standards" with generator and battery back-up at each of the sites. The following sites utilized their emergency power during the earthquake: Cottonwood, Alcantra, Bailey Hill, Willow Creek, Portage, Site Summit and Whittier. It is because of this standard that during and after the earthquake on November 30, 2018, the ALMR System performed exactly as it was intended to do.

At approximately 8:30 a.m. on November 30, a 7.0 magnitude earthquake struck the Anchorage and Wasilla area. Three ALMR sites located in the Wasilla area - New Knik, Alcantra and Cottonwood - were momentarily in site trunking, apparently due to the temporary loss of microwave connectivity to the ALMR Master Site Zone Controller at Tudor Road in Anchorage. According to the ALMR System Management Office (SMO) staff who were monitoring the System, the three sites immediately returned to wide area trunking when the tremors ended. No further loss of connectivity to any ALMR site occurred despite continued aftershocks. The SMO staff continued to monitor the System throughout the day, in case any changes at the System level needed to be implemented.

The initial System assessment by the SMO staff revealed that all ALMR sites, with the exception of the Goose Creek Correctional Center (GCCC), were fully operational and apparently had not suffered any damage affecting their operational status.

The GCCC site is connected to the ALMR System by a "leased circuit" from Matanuska Telephone Association (MTA). That circuit failed and full connectivity to the site was not restored by MTA until two hours after the earthquake. The GCCC site remained in site trunking during the two-hour period, and no impact to communications within the facility was experienced. The SMO reached out to GCCC personnel within the first hour of the earthquake to verify they could still communicate in site trunking and to see if they needed any additional support.

Two alternate dispatch consoles on Joint Base Elmendorf-Richardson (JBER) lost connectivity due to power failure to both locations. Additionally, the buildings were evacuated during the incident due to possible structural damage. All primary dispatch locations were up and operational throughout the incident.

No other reports of impacts to the System's operational capability were received and no loss of service was experienced. As would be expected, usage of ALMR by public safety agencies in the area immediately and dramatically increased and the volume of push to talks (PTTs) created busies on some sites within the Anchorage and Wasilla areas.

As previously stated, the ALMR System performed well during and after the earthquake. However, an earthquake that caused substantially more damage to the infrastructure and involved injuries, fires, gas leaks, etc. would have greatly increased the number of agencies actively engaged in responding, thereby increasing the number of PTTs. The addition of channel capacity at all current sites, particularly, three-channel sites, would provide additional airtime access for users in future events of this type. Continued training on radio usage for all ALMR users would also likely reduce the number and frequency of busies during extraordinary circumstances, such as the earthquake.

No changes to current ALMR policies or procedures appear necessary at this time.

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

Subscriber Maintenance is Critical to Communications Success

Although proper subscriber radio maintenance practices have been addressed previously in the *Insider*, it is a subject, in our opinion, that cannot be overemphasized with regard to a system that supports public safety responders.

The ALMR System infrastructure is monitored by Motorola 24/7 to ensure that any system performance issues are immediately detected and addressed by system technicians. Additionally, preventive maintenance is conducted at each site annually to ensure all equipment is fully functional and operating correctly. However, some ALMR member agencies do not appear to put the same level of attention on subscriber maintenance as is applied to the System.

Over the past year, some subscriber units from ALMR member agencies have been found by the System Management Office staff to be out of alignment with regard to frequencies and have duplicate system IDs. Both of these issues prevent proper transmission and receive activities, prompting the agency to contact the ALMR Help Desk regarding System performance. In these situations, the System was functioning as designed and the issue lay with the subscriber. A subscriber maintenance plan would have detected and corrected these issues.

Proper subscriber maintenance can ensure connectivity to the network, maximizing the radio's effective range and prolong its life. The best way to ensure this is to have preventive maintenance conducted on an annual basis or per the manufacturer's recommended intervals.

A blind survey was recently conducted to identify the trends among public safety and government agencies with regard to providing annual radio maintenance for their fleets. Some of the results were surprising. Of 300 respondents surveyed 53 percent indicated their agency currently has a preventative radio maintenance plan in place, where 47 percent do not.

Another question asked to survey participants was how often their radios were brought in for maintenance. 32 percent are using an annual maintenance program, while 63 percent do not have one and choose to take a fix it when it fails approach

The best way to guarantee peak performance of a radio is to keep it well maintained, much like you would do with a regular oil change for your car to help the engine run with optimum efficiency.

Interoperability depends on having radios that work properly when the time comes. Agencies are responsible for performing regular radio maintenance to ensure optimum performance. State agencies should contact the Office of Information Technology for radio maintenance. All other agencies should use their own technicians or their normal vendor.

Article by Mr. Del Smith, ALMR Operations Manager with excerpts from Locus USA White Paper, undated)

How P25 Coverage Can Benefit FirstNet

Now that the First Responder Network Authority (FirstNet) is a reality, many new questions arise when considering legacy system expansions and new buildouts. In a perfect world, the new nationwide public-safety broadband network (NPSBN) would accommodate both voice and data with reliable, redundant coverage in all geographic areas, but this is not realistic right away. Early projections indicate NPSBN will include only data transmissions, not voice service, for the short term. Furthermore, even the most optimistic projections cannot establish when FirstNet will provide the proven and reliable network necessary for mission-critical applications that current land mobile radio (LMR) systems give us.

Agencies must give serious thought to the layers of deployment and functionality. Where will the systems first be deployed? Will FirstNet immediately serve rural areas? Given these concerns, along with operational and functional considerations and on-going development of standards, it is clear that Project 25 (P25) LMR networks are here to stay. As such, agencies must continue to maintain, optimize and build out P25 systems with an eye on future integration into Long Term Evolution (LTE) networks.

Because the rollout of new LTE networks will bring many technical challenges, integration with existing P25 networks will be layered and complex. The first step to ensuring integration between new and legacy systems is coverage — making sure the P25 system covers service areas, including areas LTE may or may not cover, to create a seamless integration environment, as well as a redundant and complete network.

Coverage for first responders must include a variety of service areas — in-building, parking garages and dense urban areas. Agencies cannot realistically expect the NPSBN to cover all of these areas with reliable coverage right out of the gate. Therefore, if agencies focus on proper planning and coverage modeling when building new and expanding existing P25 networks, they will take the first step toward integration with LTE, as well as ensure communications among first responders in all service areas.

A successful system deployment or expansion must take into account the integration of a variety of technologies and system architectures, and consider signal quality, interference and redundancy requirements. Because structures, foliage and other elements in a service area impact system performance, it is imperative that the data is current, accurate and granular. Not only does data provide an accurate representation of building footprints (continued on page 3)

How P25 Coverage Can Benefit FirstNet (continued)

and roadways, it is specifically designed for RF planning and regularly updated to reflect new service area developments. This data places different geographic areas in their respective categories — industrial, residential and retail. Because of the increasingly complex nature of service areas that contain a mixture of land-use types, a wireless system may behave much differently even in the smallest geographic areas. Creating 3D models or using technology, such as ray tracing, can help provide accurate site-specific calculations and predictions of how signals will interact within complex environments. Successful system planning will depend greatly on the accuracy and resolution of these databases. Regardless of the planning process chosen, not every real-world scenario can always be accounted for, such as environmental factors, which complicate matters because signals can reflect and diffract off of objects not within the direct path.

Obviously, not all networks will be outdoors. For any mission-critical network, it is vital to ensure in-building coverage. For a greater level of system accuracy, agencies must also consider cables and connectors in the design plan with losses assigned based on lengths, including interconnections between levels in a multi-floor building. .

The NPSBN will provide a much-needed improvement on high-speed communications that support data from a multitude of applications, as well as interoperability between agencies. However, we must continue to build well-proven P25 networks as needed, with a focus on immediate use as well as integration with LTE in the future.

(Excerpts from article by Bob Atkins, LMR+LTE The Evolving Public-Safety Network Radio Resource Mission Critical Communications)

The Uncertain Outlook for ProSe

As the industry begins to adopt Long Term Evolution (LTE) for its broadband data needs and many mission-critical features are standardized in the Third Generation Partnership Project (3GPP) process, LTE device-to-device (D2D) communications is one area where many questions remain.

While the feature, called proximity services (ProSe), was included in Release 13 in the 3GPP process, the feature is not available, or on the horizon, more than three years after initial standards were set.

Comparatively, mission-critical push to talk (MCPTT) was finalized in Release 14 and has made great strides. In fact, the second MCPTT Plugtests event to test interoperability between products and technology was held in June 2018. MCPTT was initially defined in Release 13 in 2016, while ProSe was initially defined in Release 12.

However, products with ProSe technology do not yet exist. The reasons for the feature's slow deployment are many and varied. The most obvious challenge is that chipmakers are not offering ProSe technology in chipsets.

"There are no commercially available devices with ProSe features, and we don't know of any chipmakers that offer chipsets with ProSe," says a Motorola Solutions spokeswoman.

TCCA Chief Executive Tony Gray agrees. "For the meantime, there is no publicly announced availability of chipsets from any manufacturer incorporating ProSe, hence no market or competition," he says.

Qualcomm, one of the wireless industry's largest chipset makers, did not respond to questions by press time. Dan Ericson, Harris senior scientist, says commercial chipset manufacturers are challenged to spend development time on ProSe when faced with much larger markets for capabilities, such as vehicle to everything (V2X). That technology is designed to enhance vehicular safety and provide essential communications services with nearby vehicles and infrastructure that enable driver assistance services and eventually, fully autonomous vehicles. Market insiders predict V2X will be deployed in every vehicle, every cellphone and ubiquitously along roadways.

"The overall market for ProSe in public safety and other critical communications applications is limited, and therefore, not very appealing to chipset and UE (user equipment) manufacturers used to dealing in millions of units," TCCA's Gray says.

Industry consultant Mel Samples says even when chipsets do come to market, it will probably take two to three iterations before the ProSe feature and the device capabilities will be in sync, so realistic tests similar to the MCPTT Plugtests can be conducted.

As a direct communications capability, ProSe has difficulty competing with existing technologies because of interference issues, particularly acute in public-safety use cases. In commercial operational modes, ProSe would likely be used only for short distances. At short distances, ProSe is somewhat more efficient for airlink resources; however, this benefit quickly diminishes with link distance. Ever increasing base station deployment densities minimize this benefit.

(Article excerpts by Sandra Wendelken and Dan Ericson, Senior Scientist, Harris, Mission Critical Magazine, Nov-Dec 2018)

Testimonials - ALMR Performance During Earthquake

During the first few hours after the earthquake, the ADOT&PF staff in Anchorage needed to know the extent of damage to our roads and bridges. We were not able to communicate with our field staff by phone. We used the ALMR system to get critical reports of damage from our field personnel in Anchorage, the MatSu Valley, and the Kenai Peninsula. ALMR gave us direct communication between our emergency operations center and our field staff, which helped us develop repair plans for the most critical infrastructure.
Greg Patz, Maintenance & Operations Manager, ADOT&PF Central Region

Because of the loading on the analog system in Palmer and the surrounding area, we moved much of our traffic to the ALMR system. We relied on the system for 24 hours during the event and aftermath. We experienced very few issues with the system. Most, because of our responders location, or site preference programming. The ALMR system performed beyond expectations, and supported our mission completely and without failure. We appreciate the day-to-day support and we also value the resource during large and extended events, such as the recent earthquake. Thank you for all the hard work and consummate professionalism.
Jim Goodman, Communications Specialist, Palmer Fire & Rescue

During the event we did not experience a radio or telephone outage. All radios, both conventional and ALMR, were operational through the initial event. Dispatch remained operational throughout the event. I also appreciate that when I called the ALMR office that afternoon, I was immediately put on speaker phone with all of the staff who were ready to assist. It made me feel confident that everyone there had my interests in mind and calmed my nerves, knowing that good people were monitoring and attending to the needs of the users.
Joel Butcher, MATCOM Dispatch

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ALMR Earthquake Stats

December 7 - Normal 24-hrs
ALMR:
91,725 PTTs / 230.48 airtime hrs
AWARN:
28,463 PTTs / 72.68 airtime hrs

November 30 - Earthquake
ALMR:
143,599 PTTs / 403.6 airtime hrs
2,350 busies
AWARN:
53,940 PTTs / 158 airtime hrs
2,911 busies

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