SMR Benefits from Digital

Photo courtesy Kenwood

New digital trunked technology is helping a California company compete with commercial cellular providers.

By Joyce Peters

When Mobile Relay Associates (MRA) decided to build a new digital specialized mobile radio (SMR) network, management debated several issues on different fronts. MRA wanted to provide customers with a leading-edge communications network that deployed all the feature sets they had been asking for. Company officials weren't satisfied with the technology options available from manufacturers before new digital trunked technologies were introduced. MRA staff talked to many SMRs about technologies they used, services offered and problems experienced with analog technologies.

MRA operates Logic Trunked Radio (LTR) analog networks at 450 – 474 MHz in Southern California and at 800 MHz in Colorado. Several concerns kept MRA from moving ahead with the purchase of a new network until staff learned about NEXEDGE technology. NXDN is the protocol for the common air interface developed jointly by Icom and Kenwood, which uses FDMA operating at 12.5- or 6.25-kilohertz wide channels. Kenwood markets its NXDN products under the NEXEDGE brand.

The company's most recent California network, completed in December 2008, is based on NEXEDGE, and the company is energized with the new future it offers. The current five sites are networked by microwave and IP technology. When an expansion is completed, the network will offer coverage from San Diego to Santa Barbara.

A Service Boost

FDMA technology allows the company to offer seamless coverage and enhanced services with the security of electronic serial number (ESN) registration. The network manager must authorize all NXDN communications devices by ESN. Requirements are a USB system key, site license and software for programming. NEXEDGE restricts unauthorized units from being cloned to the trunked system. The digital subscriber units only function when the network manager authorizes the ESN and services on the system. Unauthorized units on the LTR systems have resulted in loss of revenue for the company.

The technology allows MRA to use 6.25-kilohertz narrowband channels at UHF 450 – 512 MHz. Using 6.25-kilohertz channels has put the firm ahead of the FCC's narrowbanding mandate, which requires all VHF and UHF licensees to operate in 12.5-kilohertz or smaller channels by 2013.

Features offered are voice; data (text messages and GPS); group, broadcast and individual calling;

When an expansion of Mobile Relay Associate's digital network is completed, coverage from San Diego to Santa Barbara will be available.

caller ID; VoIP services; and multi-site seamless coverage in the areas of the network footprint. A customer can choose one service, all features or a set of services, saving the customer money and tailoring service to its needs.

MRA's five-channel system networked at five sites cost about $100,000 per site excluding charges for microwave or IP technology. Exclusive channels are required. The company plans to build seven more sites in late 2009 and early 2010. The coverage footprint of a site has increased by 20 percent compared with previous technology. The company can now recommend the use of portable units in vehicles with excellent coverage — an exciting business prospect. Using portables is a plus to customers for the benefits of transportable radios used outside vehicles. There are 75 percent more portable subscribers on the NEXEDGE network than mobile units.

One business customer provides vehicle recovery for multiple vehicle companies. The work is dangerous, and employees wear bullet-proof vests. The company's devices consist of portable units, mobiles in vehicles with GPS and Garmin-installed boards.

Another customer is a school district whose employees were to talk in many areas of the school district for emergency communications. School officials considered adding a conventional repeater to one of MRA's tower sites, but the licenses that the FCC would grant were low in power and would be shared by other users at the specified frequency. The district chose to use MRA's digital network. The portables work great, and employees can now reach all of the schools in the district. The district also turned in the Sprint Nextel phones that employees previously used.

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Large networks can be built using digital technologies with seamless handoffs to additional tower sites in the network. If one of the sites goes down, other sites in the network take over and the customer stays on the air without interruption. Subscribers now have a choice between digital systems that offer all the features of a cellular system, along with assurance that the SMR system will operate in emergency circumstances when cellular networks may be off the air. During emergencies, cellular tower sites will likely be overloaded with calls. On the MRA digital trunked network, each caller can talk for 60 seconds on the system timer, and when it times out, the next caller is free to capture the channel. This allows all users to use the system. The system operates in message trunked mode. NEXEDGE technology allows the network to go into fail-soft mode, so even if one site goes down, another site can stand alone and cover up to 75 – 100 miles. Most cellular sites use public lines for backhaul service, while many MRA site links are microwave, the best path for seamless networking.

MRA is one of the first SMRs to deploy NXDN technology; there were some difficulties, and the company learned a great deal. Many firmware updates have taken place along the way, as in any new network. Obtaining exclusive channels is a must for building out a digital system. If channels aren't exclusive, find a way to lease or buy them. Do your homework, talk to other SMRs that have installed digital systems and ask for advice. Engage help from a consultant who has deployed a digital network. The savings in time and money from the support and expertise has significant value to your organization's bottom line. The future for SMRs has never been brighter. ■

Joyce Peters is sales manager for Mobile Relay Associates (MRA), a company that provides tower sites, frequencies and consulting to the communications industry and private organizations. She consults regularly with executives from a variety of fields to help create solutions. Prior to her current position, she managed the marketing team at Securicor in Southern California. E-mail comments or questions to Peters at joyce@mra-raycom.com.