

No Time to Waste: Co-ops Need to Plan Now for 2013 Land Mobile Radio Upgrade

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Co-operatives might think they have plenty of time to comply with the FCC's upcoming narrowbanding mandate. After all, the Jan. 1, 2013 deadline is still more than three years away.

But experts warn that time is of the essence. Utilities could be denied an operating license or be left with useless land mobile radios if they aren't already doing their upgrade homework for the switch from wideband to narrowband. And co-ops are not guaranteed a spot on the narrowband spectrum—they have to apply for it.

Typically, it can take up to two years for an operation to migrate to a new radio system, according to studies by wireless engineers. This accounts for the design, construction, installation and training stages but does not take budgeting time into consideration. Depending on a co-op's budget cycle, that can add six to 12 months to the process.

"You tell people they have until 2013 to do something, and they figure they have plenty of time, but that's not how it works," advises Todd Ellis, manager of wireless systems for the National Rural Telecommunications Cooperative (NRTC). "You need to do something now. Don't wait. The Federal Communications Commission will not sympathize because you're a public utility. You're not going to get a channel any faster than Joe's Towing."

The regulatory goal is for all radio equipment to be operating on 12.5 kHz-spaced voice channels by the end of 2012. Plus, co-ops need to keep in mind that FCC mandates beyond 2013 will eventually require equipment to handle 6.25 kHz channels. These narrowband systems are digital, so licenses will need to be updated to specify that. What exactly should co-ops be doing to make this transformation as painless and economical as possible? In pursuit of those answers, *Tech Surveillance* talked to numerous specialists including Ellis at NRTC, wireless engineers at Engineering Associates (EA) in Georgia and the communications staffer at Rappahannock Electric Cooperative in Virginia.

The Mandate and What It Means

In the mid-1990s, knowing that it was running short on frequency "real estate," the FCC ordered all operators of land mobile radios using channels between 150 and 174 MHz and 421 and 512 MHz to migrate from wideband to narrowband channels.

By 2013, all voice radio equipment needs to be operating on 12.5 kHz voice channels. After that deadline, those still using wideband channels risk: loss of radio communications; substantial FCC fines and revocation of their frequency license.

Other Article of Interest

- [Rappahannock: How One Co-op Handled Its Radio Upgrade to Comply with the FCC's Upcoming Narrowbanding Mandate](#)

Attainment of Cooperative's Strategic Business Goals



Land mobile radios and communications are just a segment of what cooperatives need to consider as they work toward attaining their business goals.

Source: *Engineering Associates, CRN Mobile Technology Report*

As an added caveat, co-ops need to be aware that by Jan. 1, 2011, all new radios imported into and sold in the United States must be narrowband capable. In other words, any replacement radios added to the fleet will only be capable of narrowband channels. They probably won't work on wideband channels or infrastructure. The good news on that front is that beginning in 1997, land mobile radios had to be manufactured so they could function at 12.5 and 25 kHz channel spacing. The not-so-good news is that a recent NRTC study of co-ops revealed that the average age of all land mobile radio systems is 22 years. That's a distinct indicator that many legacy systems without 12.5 kHz capabilities are due for replacement.

Is Switching to 220 MHz an Option?

Yes. The narrowbanding mandate does not affect the 220 MHz channels, so a switch is possible. Currently, most co-ops are operating on either ultra-high frequency (UHF) on a 450 MHz channel or a very high frequency (VHF) on a 150 MHz channel. Both of these bands are affected by the narrowbanding mandate.

Back in 1998, NRTC purchased eight 12.5 kHz-spaced 220 MHz channels nationwide at auction. Also, the cooperative works with its partner organization MCLM to lease or sell up to 40 additional 12.5 kHz-spaced channels to members. A co-op can lease a channel for \$75 per month for up to 10 years or buy a channel for around \$13,000. "This switch to narrowband is happening because they are running out of spectrum in metropolitan America," explains Don Bowman, NRTC's former vice president of utility solutions who recently became director of strategic services for the North Carolina Electric Membership Corp. "But in rural America, the spectrum is not nearly as crowded yet. But co-ops still need to plan now for 2013."

Be Aware of Your FB Status

Co-ops also need to consider the particulars of how the FCC classifies use on licensed frequencies, Ellis says. For instance, many co-ops use FB2 channels, which can be shared and thus not used exclusively by a single licensee. However, exclusive-use FB8 channels are necessary for co-ops planning on purchasing a digital or trunked radio system. This exclusivity can be maintained out to 125 miles from the cooperative's tower.

An influx in digital and trunked radio systems and the need for exclusive channels will lead to a shortage of channels. That means licensees normally operating on FB2 channels could end up sharing their assignment with several others. With that scenario, co-ops need to keep in mind that they might have to compete with towing companies, taxi cabs and construction groups for channel use.

Is Now the Time to Switch to Digital Radios?

Each co-op should examine its specific needs and decide how to best future-proof its land mobile radio systems. Overall, digital uses the frequency spectrum more efficiently than analog. Digital also can combine voice and data into the same device, and offers enhanced functionality with an integrated privacy-encryption capability.

Though some dispute these claims, digital also can offer clearer audio and a bit more range. As the user radio signal starts to degrade with distance from the transmit site, digital error-correction technology can deliver voice and data content with minimal loss over a given coverage area.

Another plus of digital technology is that it allows for integrated data communications, so users can send and receive images and information, and locate a vehicle or field crews in real time.

"These features are becoming the norm for public systems, and more of a necessity for the business community," says Bill Durham, a wireless engineer with Alpharetta, Ga.-based EA. He co-authored the "Putting Mobile Technology to Work" report for the Cooperative Research Network in early 2009."

Digital might sound like a glamorous leap forward but it might not be appropriate for everybody. Analog, for instance, could continue to be the most reasonable choice for utilities using older post-1997 radios with 12.5 kHz voice channel capabilities. Both digital and analog are capable of providing enhanced features such as emergency alert, caller ID and short data messaging.

"Right now, not many digital systems are available that are cost-effective and expandable enough to work for bigger co-ops, those with two or more transmitter sites," Ellis says.

For smaller co-ops, he says, the sole advantage of going digital now is gaining expandability by having more channels per frequency at no extra charge.

Basically, two types of digital systems now exist—FDMA and TDMA—and both are based on a European standard. The frequency division multiple access (FDMA) standard features two adjacent narrower 6.25 kHz channels. It provides one voice/data path for each spectrum slice, Ellis says. Time division multiple access (TDMA) features a wider 12.5 kHz channel but allows for multiple time slots in that same bandwidth.

Durham points out that radio system equipment vendors are currently delivering analog/digital capable base systems and portable devices that will support 12.5 kHz-6.25 kHz channel spacing. Preloading of devices and equipment can make a co-op's migration to digital radio much smoother.

Selecting a standards-based digital system will allow multiple radio equipment vendors and device manufacturers to offer additional alternatives that will support voice and Internet protocol (IP) data, Durham says. Not only does this create pricing competition, he adds, but it also protects the initial capital invested in a new radio system.

Consider the Bigger Communications Picture

Co-op decision-makers figuring out their land mobile radio future need to keep in mind that mobile technology planning should not be viewed as a separate business function. It is just one aspect of the information technology (IT) and communications big picture.

Mobile technology planning should be included as part of an overall design to extend the business office technology into the field, Durham recommends.

To maximize the potential benefits of any mobile technologies, he emphasizes, co-ops have to view and treat them as strategic resources—ones that achieve long-term goals—rather than tactical ones—for gaining short-term specific objectives. Co-ops need to think about how all of these technologies can increase outage responsiveness, improve the safety of field utility workers, and help to streamline grid maintenance and other member services.

"The law of obsolescence will get you if you don't develop these strategic plans, and ask yourself if the technology you're investing in will be supported in five years," Durham says. "When you don't plan properly, that's when you paint yourself into a corner. For instance, a nonstandard product might be quicker to market or cheaper to buy. But in the long run, if you invest in something like that you'll end up doing a forklift upgrade. And you don't want to have to make such an expensive purchase every three to five years."

For instance, Durham says, deploying the most current handheld devices, and then adding software features would be a less expensive and effective technology migration for co-ops.

"You have to ask specific questions, and take that extra step of planning for technology migration and obsolescence when you're purchasing," he continues. "Gone are the days when you can buy a radio system and have it meet your needs for 20 years or more."

What About Open or Proprietary Standards?

In the public safety realm, the Association of Public Safety Communication Officials (APCO) is charged with compiling standards for their land mobile radios. These Project 25 (P25) specifications are being designed to allow interoperability among radios from different manufacturers. The standards require basic communications but allow manufacturers to offer unique features.

APCO's first phase was establishing an FDMA standard. APCO is currently finishing up work on the second phase, using TDMA technology, and the standards are not yet final.

For many of these vendors, the modification to meet the Phase II TDMA requirement is expected to be a software upgrade, but buyers should exercise caution until the standards are final, Durham writes in his report. Durham also points out that while legacy analog radios are not compatible with P25 digital standards, APCO P25 radios should be able to communicate on conventional analog systems.

Ellis has one caveat for co-ops about P25. He points out that it's an open digital standard geared to meet the needs of fire, police, emergency medical services and other public service entities. These organizations are eligible to receive grant money to purchase radios adhering to this standard. Utilities are not eligible for that grant money, so these radio systems could be prohibitively expensive for co-ops.

Co-ops could lease this type of radio system and pay the vendor a use fee to maintain it. Or, they could skip the use fee by buying their own P25-compatible radios. However, Ellis says, prices for these radios are \$2,800 to \$4,000 apiece. That's considerably more expensive than the \$600 to \$1,000 cost for commercially available mobile and portable radios suitable for utility use. Another downside, notes Ellis, is that co-ops could experience delays on the system for not being priority users or the public service entities could decide not to serve an area where the co-op needs coverage.

DMR (digital mobile radio) is another open digital standard that has migrated here from Europe. It has three levels, Ellis explains. Tier 1 works in direct mode with no repeaters or other infrastructure; Tier 2 allows multisite access; and Tier 3 is a trunked configuration. Another standard that has migrated here, MPT-1327, is basically an analog version of DMR Tier 3.

What Are Other Considerations?

"Manufacturers are looking for mainstream, and co-ops are not mainstream," Ellis says. "They have unique needs." The top three considerations for co-ops investing in new radios need to be functionality, scalability and flexibility. "All these depend on the needs of the specific co-op," Ellis says. "They need to be thinking about what features they need, if they will be adding automatic vehicle location (AVL), and about using talk groups allowed for in a trunking system."

"They need to consider how much can be added to the system they select, if it can be extended to distant users and if there are channels still available for the system they want."

Though owning a radio system usually makes the most sense for co-ops, Ellis says, leasing might make more sense under certain circumstances.

If Ellis were in charge of a co-op, here's what he would recommend to provide the most flexibility. First, he would switch to the 220 MHz spectrum and start investing in a multi-modal radios (analog/digital) that would allow a switch from the MPT-1327 analog open standard to DMR Tier 3, a digital open standard. Once all the older analog-only radios have been replaced, the co-op can concentrate on upgrading to a digital infrastructure and radio tower sites. EA wireless engineers recommend that co-ops take a three-pronged approach to meeting the 2013 FCC deadline. First, employees need to review their equipment and systems to find out what is narrowband capable. Then, they need to budget for equipment upgrades and replacements. And finally, they need to investigate the capabilities of different frequency bands, radio manufacturers and technologies. This will allow them to use the mandate as an opportunity to improve their electric distribution operations with wireless technology.

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