



Narrowbanding Prep

As VHF and UHF licensees begin to migrate to narrowband systems, planning in these crucial areas will help ensure the smoothest transition.

By Joe Blaschka Jr.

a significant quantity of narrowband-capable equipment currently being in service.

FCC officials thought that licensees would voluntarily move to narrowband technology,

and by now, everybody would be operating in narrowband channels. In 2003, to speed the process, the FCC issued new rules requiring all users in the VHF and UHF bands to convert to narrowband operation by Jan. 1, 2013. To make sure there was equipment in place to meet the deadline, the commission set Jan. 1, 2011, as the last date equipment capable of wideband operation could be manufactured or imported in the United States. After Jan. 1, 2011, any new radio purchased could very well not operate properly with the existing wideband system. Any licensee still using low-band (30–50 MHz) or 800 MHz can breathe a sigh of relief, because those bands are exempt from being narrowbanded.

Implementation

Several aspects of making the transition to narrowband should be considered: awareness, financial, operational,

equipment and transition planning.

1. Awareness. Many radio users are unaware of the upcoming narrowband transition. There still is time to act and begin the planning process, but time is rapidly ticking away given planning and budget cycles. Everyone should be talking about this issue at board meetings, fire and police chief gatherings, city staff meetings, company staff meetings and EMS councils, and vendors should advise their customers of this change.

This awareness needs to occur on a state- and nationwide basis as well. For example, many emergency medical systems operate with the expectation that medical teams and vehicles can be used statewide. This means virtually every hospital, each with individual budgeting processes and technical capabilities, needs to be included in the narrowband transition planning.

Awareness also includes the personnel and financial resources required to make the narrowband transition. If other projects are being contemplated during this same timeframe, there may not be adequate resources to accomplish all tasks. If planning is done across multiple agencies, each agency needs to allocate resources to narrowbanding tasks.

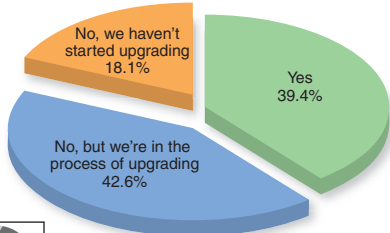
2. Financial. The time to plan and budget anything for 2010 is probably gone for many government agencies

The unstoppable countdown toward the end of wideband communications continues. Each second that goes by reduces the time available for user awareness, planning, budgeting and implementing the changes that will result Jan. 1, 2013. Time is running out to complete the tasks that may be required to make the transition without loss of service or operating in crisis mode.

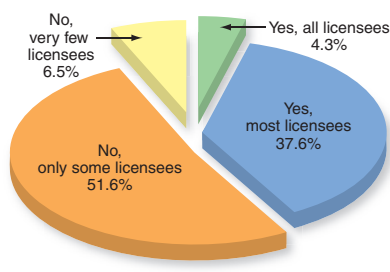
For more than four decades, two-way FM LMRs used a standard operating bandwidth of 20 kilohertz with a transmitter deviation of 5 kilohertz. FCC rulings during the past 10 years or so have aimed to reduce the standard operating bandwidth first to 12.5 kilohertz with a deviation of 2.5 kilohertz and ultimately to a 6.25-kilohertz bandwidth. In the late 1990s, the FCC required that any new type of accepted equipment be capable of 12.5-kilohertz operation. This change has resulted in

Photo courtesy Tait

Is Your Network Compliant with the 12.5 kHz Narrowbanding Mandate?



Will the Industry Meet the 2013 Narrowbanding Deadline?



The results reflect a 95 percent confidence level with a ± 10 percent margin of error.

given that preliminary budgets need to be submitted in the summer and fall of 2009. Because narrowbanding must be completed by Jan. 1, 2013, implementation must occur during 2012 or earlier — only two budget cycles away. The budgeting and planning process has to start no later than next year if the compliance dates are to be met.

Unlike 800 MHz rebanding, there is no Nextel equivalent to pay for this transition. There may be some money through various grant processes for interoperable communications. However, federal grants are competitive, and there is no guarantee an individual licensee will be successful in obtaining grant funding. Start now to find funding.

3. Operational. Operations may be affected by reduced coverage. This will depend on each situation, and narrow-

band and wideband radios will not interoperate together well. Coverage is the first issue to evaluate. There could be a significant reduction in coverage after narrowbanding, requiring the addition of voting receivers or additional transmitter sites depending on each specific case.

The other aspect is that the narrow deviation and overall reduction in FM signal-to-noise ratio make a system less tolerant to low audio from users' radios. This problem is exacerbated by the use of speaker-mics resulting in low talk-in volume. The use of audio processors to assist in boosting the audio levels has worked well in some installations.

4. Equipment. The amount of old equipment still in service is amazing — not just equipment from the 1990s, but Motorola Mocom 70s and Micors, GE Mastr II and more. In many cases, this equipment has been relegated to third-tier apparatus, backup use, volunteer search and rescue groups, and similar uses. However, there is also a considerable quantity of front-line equipment from the early- to mid-1990s still in service that isn't narrowband compatible. Most equipment purchased after 1998 will have narrowband capability on the existing channels, but may not work on the new narrowband channels. In most cases, that shouldn't be a problem, because most of the transitions are occurring on existing channels.

Inventory all equipment including base stations and backup and reserve equipment, along with model, serial number and number of channels each unit is capable of. Determine the wide/narrowband capability of each unit. If the equipment is only capable of wideband operation, list it as needing replacement. When replacing old equipment with new narrowband equipment, check specifications when operating in the narrowband mode carefully. Radios that had excellent specifications when in wideband mode may have only average specifications when operating in narrowband mode. Adjacent channel protection may not be as good as before.

5 Points to Consider

1. Narrowbanding is real and will affect every VHF and UHF user.
2. Time is short, especially when measured in budget cycles.
3. Interoperability needs to be considered on a local, regional and statewide basis.
4. Starting early is crucial to avoid last-minute major problems.
5. Resources are limited, so start early.

The need to operate in both wideband and narrowband modes during a transition could result in requiring twice the number of channels in radios. This could force even narrowband-capable radios to be replaced, because they will not have the capacity to support both modes during the transition. Most fire paging transmitters must be converted to narrowband operation. This will affect hundreds if not thousands of fire alerting pagers in an area. In some places, Plectron and Motorola fire alerting receivers are still in use; it's doubtful those will continue to work after the conversion to narrowband.

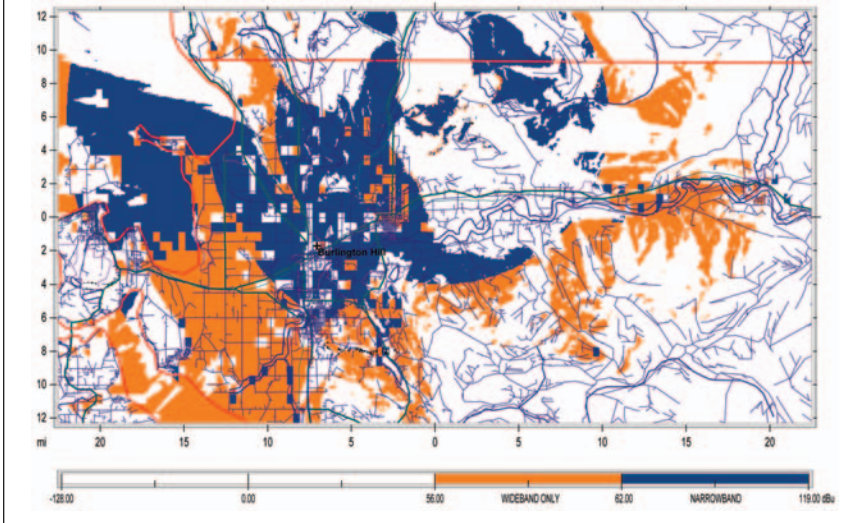
There is quite a debate about the need to convert to digital as part of the narrowbanding process. There is no FCC requirement to convert existing wideband systems to digital operation as part of this stage of narrowbanding. There are many analog narrowband systems in operation, and many if not all, existing systems could be converted to narrowband without transitioning to digital systems. While digital technology may offer range similar to wideband operation, in many cases, the complexity and cost of converting to digital far outweighs the coverage improvements.

5. Transition Planning. Many small systems can be converted in a day, possibly on the weekend, resulting in a simple and easy conversion. But most systems will require detailed and extensive transition planning to maintain proper operation. In addition, the wider issue of local and regional interoperability needs to be considered. The transition will require significant

Specification Comparison

	Wideband	Narrowband
■ Brand A	30 kilohertz 78 dB	12.5 kilohertz 67 dB
■ Brand B	30 kilohertz 70 dB	12.5 kilohertz 60 dB
■ Brand C	30 kilohertz 80 dB	12.5 kilohertz 63 dB
■ Brand D	30 kilohertz 80 dB	12.5 kilohertz 80 dB

Coverage Comparison



A map showing coverage differences between wideband and narrowband systems in Skagit County, Wash., north of Seattle

financial and personnel resources. Depending on a licensee's in-house capabilities, consultants or vendors may be needed to assist with the planning and engineering.

■ **Interoperability.** Most government systems and some commercial systems need to interoperate with other agencies or entities. In addition, many large fleets will take many days, weeks or even months to become narrowband ready. During the transition time, the ability to intercommunicate between wideband and narrowband units will be required. In most cases, this means programming channels in both the wideband and narrowband modes until the transition is complete. At that time, the old wideband channels must be removed, resulting in the radios being required to be programmed twice.

Most areas have statewide fire and police channels used for interoperability and mutual-aid responses. As areas start to convert, first responders may need to know if they should be communicating on the law interoperability channel in wideband or narrowband mode. In general, the fewer radio decisions that need to be made when responding to an emergency the better. It's often hard enough to get responders on the right channels, and making sure they are all on narrowband or wideband adds a significant amount of complexity. It's easier for users in a given region to convert at about the same time. I hope that won't be during the last quarter of 2012.

■ **Planning.** The transition of most systems will involve base station, mobile and portable equipment. However, depending on the coverage pre-

dictions, additional sites, voting receiver equipment and base station equipment could be required. This could mean a conversion to simulcast to get the desired coverage. It could also mean changes to the existing console system. The coverage analysis for both talk-in and talk-out will be the starting place to determine how much of the system design must change.

Implementation time and budget are directly tied to any system design changes. The need for additional sites could trigger permit applications, lease agreements and many other non-technical processes that can take many months to complete. Just as with rebanding, there will be a shortage of resources to implement narrowbanding. If everyone waits until the last half of 2012 to begin implementing, resources will be limited. ■

Joe Blaschka Jr. is the principal at Adcomm Engineering and a registered professional engineer (P.E.) in eight states. Blaschka has been working in the communications field for almost 40 years, obviously starting in kindergarten. He has authored numerous papers and presentations. E-mail comments to j.blaschka@adcomm911.com.

More Information

- Additional narrowband-specific information is available at www.adcommeng.com/html/narrowbanding.html.
- Hard copies of the planning tool can also be requested from narrowbanding@simulcastsolutions.com.
- An active online community exists at LMR_Narrowbanding@yahoo.com.