

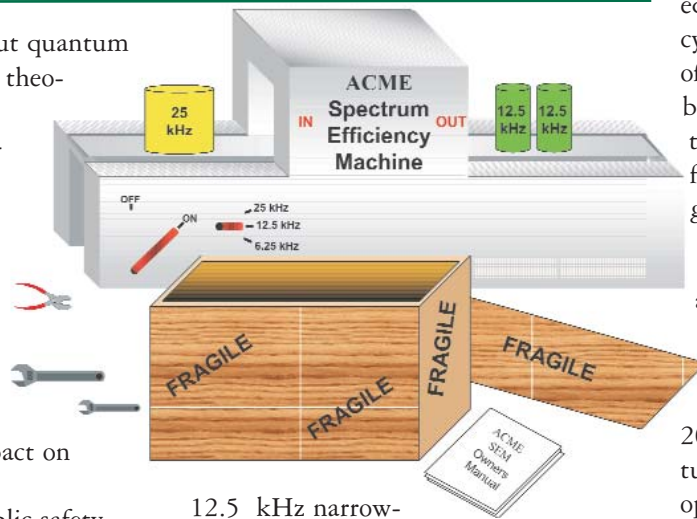
# The Journeys Through Space, Time, and the Spectrum Efficiency Continuum

## A Primer on Narrowbanding for Public Safety

This article is not about quantum physics, unified field theory, or building a device to simplify the transition to narrowband operation, but instead something a bit more practical to our daily lives – how the Federal Communications Commission hopes to realize the goal of spectrum efficiency and its impact on the way we do our jobs. Nonetheless, if you are public safety chief and this subject seems daunting, please skip to the last section of this article for the bare minimum you need to know!

The Federal Communications Commission (FCC) has been working on migrating licensees in certain VHF and UHF bands for the past 15 years. The push for increased spectrum efficiency is not new. The FCC has been working toward this goal since 1992 by releasing a Notice of Proposed Rule Making (NPRM).<sup>1</sup> The pace on the road to spectrum efficiency has been somewhat slow but is finally making progress. On December 23<sup>rd</sup>, 2004, the FCC issued a Third Memorandum Opinion and Order (3<sup>rd</sup> MO&O) and a Third Further Notice of Proposed Rule Making and Order (3<sup>rd</sup> FNPRM&O)<sup>2</sup> which finalized the deadlines for switching to 12.5 kHz “narrowband” radios. This Order pertains to licensees operating in the Industrial/Business or Public Safety Radio Pool in the 150-174 MHz and 421-512 MHz bands.

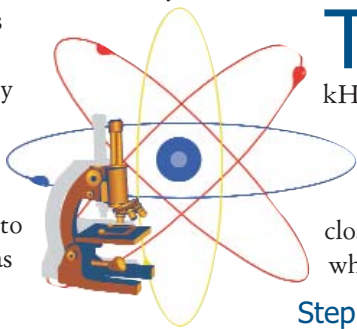
Radios manufactured since 1997 have been required by the FCC to have this



12.5 kHz narrowband capability.

Narrowband operation can be realized by analog or digital technology. Older radios made prior to 1997 for use in the same bands have a wider 25 kHz bandwidth.

### Spectrum Efficiency Mechanics – How the Rule Works



The outcome of the Order that makes the migration to 12.5 kHz a date-certain event is achieved in two steps, occurring on January 1, 2011, and January 1, 2013. Let's take a closer look at just what happens when these dates roll around.

#### Step 1: January 1, 2011

Applications for new operations using 25 kHz channels will cease to be accepted midnight January 1, 2011. After January 1, 2011, applications for new operations using a bandwidth greater than 12.5 kHz will be accepted only to the extent that the equipment meets the spectrum efficiency standard of one channel per 12.5 kHz of channel bandwidth (voice) or 4800 bits per second per 6.25 kHz (data).

Applications for modification of operations that expand the authorized

contour of an existing station using 25 kHz channels will be accepted until January 1, 2011. After January 1, 2011, applications expanding the authorized contour of an existing station will be accepted only to the extent that the equipment meets the spectrum efficiency standard of one channel per 12.5 kHz of channel bandwidth (voice) or 4800 bits per second per 6.25 kHz (data) if the bandwidth for transmissions specified in the modification application is greater than 12.5 kHz.

Manufacture and importation of any 150-174 MHz and 421-512 MHz band equipment operating on a channel bandwidth up to 25 kHz will be permitted until January 1, 2011. After January 1, 2011, manufacture and importation of any equipment operating on a channel bandwidth greater than 12.5 kHz will be accepted only to the extent that the equipment meets the spectrum efficiency standard of one channel per 12.5 kHz of channel bandwidth (voice) or 4800 bits per second per 6.25 kHz (data).

#### Step 2: January 1, 2013

Deadline for migration. On this date you must have a radio that operates on 12.5 kHz channels, or a radio that achieves the narrowband equivalent of one channel per 12.5 kHz of channel bandwidth (voice) or 4800 bits per second per 6.25 kHz (data) if the bandwidth for transmissions specified in the modification application is greater than 12.5 kHz.

Deadline for operations in bands shared with federal government users in the 150.05-150.8 MHz, 162.0125-173.2 MHz, and 173.4-174 MHz bands are required to follow the timeline laid out under ET Docket No. 04-243/FCC 05-69 for narrowband migration.<sup>3</sup> Where the shared plan differs with the narrowbanding Order is that wideband licenses will no longer be granted after the effective date of the Order, and all wideband operation must cease on January 1, 2013. Other changes include adding more channels

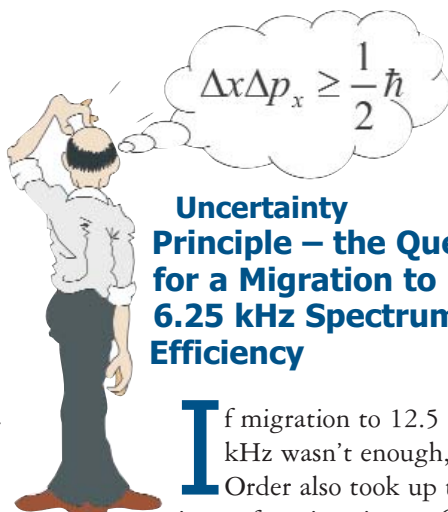
and deleting others to match the National Telecommunications and Information Administration (NTIA) band plans.

## Producing A More Stable Isotope of the Order – Ensuring Interoperability

Even though the Order goes a long way toward the realization of the FCC's narrowbanding goal, there is still room for improvement. NPSTC has some ideas that could improve the Order and better serve the public interest. One such concept is replacing the two-date process by a single date certain deadline for migration to 12.5 kHz, which is all inclusive of applications and equipment. The concern with the two-step process is that the use of the January 1, 2011 date, if allowed to stay as is, could have a negative impact on public safety. The fear is interoperability will be severely impeded – adversely affecting public safety's ability to serve the public. Until the January 1, 2013, date, the only assured form of interoperability will be through the use of equipment that supports 25 kHz operation. This 2011 date threatens to take this capability away. Even new systems need this capability to communicate with existing infrastructure whether it is native to the system or neighboring systems.

Another issue with the present Rule is the prohibition of the expansion of existing 25 kHz systems.

Enacting a contour expansion prohibition on 25 kHz systems can result in intra-system incompatibilities – the inability to interoperate within their own system. The FCC should consider rescinding the prohibition on contour expansion to 25 kHz systems based upon the adverse effect it may have on interoperability alone.

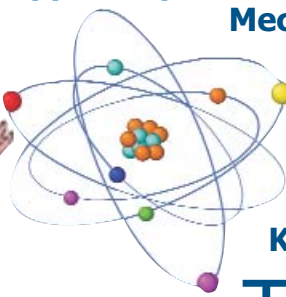


## Uncertainty Principle – the Quest for a Migration to 6.25 kHz Spectrum Efficiency

If migration to 12.5 kHz wasn't enough, the Order also took up the issue of a migration to 6.25 kHz in the 3rd FNPRM. Many not familiar with the proceeding are probably asking themselves as they read this, why? Common sense would dictate that before dreaming of a transition to 6.25 kHz transition, it would be a prudent to first complete the transition to 12.5 kHz. The Commission noted in their proceeding that commenters viewed setting a date for 6.25 kHz transition as being "premature and inappropriate." There is no standards-based equipment available today that operates on 6.25 kHz. The effect of establishing a 6.25 kHz date without a standard over the air protocol will have adverse effects on interoperability. In short, a date for 6.25 kHz migration is a bad idea at this time. Let's make sure we do the migration to 12.5 kHz right first.

## Applied Spectrum Efficiency Mechanics – What a Public Safety Chief Needs to Know

The affected radio frequency bands include the most commonly used emergency medical service (EMS) channels, and frequencies commonly employed by fire and police agencies. Regardless of how the dates discussed above pan out, it is inevitable that certain radio equipment, particularly units



older than 1997, need to be replaced. Public safety chiefs now have the time to accommodate a graduated replacement schedule in their budgets to meet the deadline (whatever it turns out to be). They are advised to take this article to their communications manager/contractor/vendor and ask them to inventory their equipment and propose a replacement schedule and plan that assures interoperability of old and new equipment as replacement is gradually accomplished.

*Tony Cimo is a research engineer and System Technology Center (STC) Frequency Coordinator. He can be reached at [cimo@syrres.com](mailto:cimo@syrres.com). Kevin McGinnis, MPS, EMT-P is a Program Advisor to the National Association of State EMS Directors and can be reached at [mcginnis@nasemsd.org](mailto:mcginnis@nasemsd.org).*

<sup>1</sup>Notice Of Proposed Rule Making PR Docket 92-235, Replacement of Part 90 by Part 88 to Revise the Private Land Mobile Radio Services and Modify the Policies Governing Them, Adopted October 8, 1992. [http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native\\_or\\_pdf=pdf&id\\_document=1077990001](http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=1077990001)

<sup>2</sup>Third Memorandum Opinion And Order, Third Further Notice Of Proposed Rule Making And Order Adopted: December 20, 2004 Released: December 23, 2004 order. [http://braunfoss.fcc.gov/edocs\\_public/attachmatch/FCC-04-292A1.pdf](http://braunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-292A1.pdf)

<sup>3</sup>Amendment of Parts 2 and 90 of the Commission's Rules to Provide for Narrowband Private Land Mobile Radio Channels in the 150.05-150.8 MHz, 162-174 and 406.1-420 MHz Bands that are Allocated for Federal Government Use [http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native\\_or\\_pdf=pdf&id\\_document=6517498338](http://gulfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6517498338)

