FCC Narrowbanding

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The FCC, in an attempt to gain more usage out of the current Private Land Mobile Radio spectrum, has instituted rules requiring narrowbanding in various frequency bands. This article will outline the ramification of these rules and discusses some of the considerations when upgrading existing public safety communication networks and equipment.

As of the time of this writing, the first of the FCC mandated dates has passed. As of January 1, 2011, radio licensees in the VHF and UHF bands can no longer apply for licenses based on 25 kHz channel efficiency. The only licenses that have been issued since that date are for 12.5 kHz channels. In addition, although manufacturers can continue to build and sell radios that have been type certified prior to January 1, 2011 that have 25 kHz modes, no new products can be type certified in VHF or UHF bands that have 25 kHz modes.

The remainder of the FCC actions for the VHF and UHF bands takes effect on January 1, 2013. At that time, all radio licensees must be operating on 12.5 kHz channels or have a channel efficiency of at least one voice path for 12.5 kHz of spectrum. Also at that time, manufacturers can not sell or import equipment that has a channel efficiency of only one voice call for 25 kHz of spectrum. In addition, radios type certified after this date must have a mode of operation that has an efficiency of at least one voice path in 6.25 kHz of spectrum.

Regarding the above requirements, the FCC makes no requirement for any specific technology to be implemented. Most equipment that has been manufactured within the last ten years has a 12.5 kHz analog mode implemented in the product. As such, licensees could meet these requirements by going from 25 kHz analog to 12.5 kHz analog operation. While this is an option, it is important to note that there would be some noticeable radio system degradation observed in the area of audio quality and range. A second alternative would be to migrate to a digital technology such as Project 25. Experience has shown that such a migration could be accomplished without degradation in system performance. In fact, certain improvements would be achieved with respect to range and voice quality.

FCC Narrowbanding Issues

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Following the narrowbanding program for VHF and UHF, the FCC will address the narrowband portion of the 700 MHz band. Effective January 1, 2015, radio licensees will not be able to apply for licenses for systems with a spectral efficiency of one voice call for 12.5 kHz of spectrum. Further, equipment manufacturers can not sell equipment having only 12.5 kHz channel efficiency, but must also incorporate a mode that has an efficiency of at least one voice path in 6.25 kHz of spectrum. The FCC has mandated that all users must be operating on equipment having a channel efficiency of one voice call for 6.25 kHz of spectrum by January 1, 2017.

The migration to 6.25 kHz channel efficiency will require a change in equipment to a new technology. The most likely candidate technology is Project 25 Phase II. Project 25 Phase II technology employs a two-slot Time Division Multiple Access (TDMA) approach in a 12.5 kHz spectrum. In this approach, a 12.5 kHz channel is divided into time slots. The channel is shared alternately between two call users. In this way, two simultaneous calls can be in progress within one 12.5 kHz channel. The result is that the FCC mandated spectral efficiency is met. Technology choices that were made during the standards development process attempted to maintain system performance in a migration from Project 25 Phase I to Phase II. In general, this goal was achieved. The system coverage is expected to be the same for Phase II technology as for Phase I. In the area of simulcast delay spread, however, some degradation from the Phase I fixed station simulcast modulation will be experienced. This degradation may affect the spacing of simulcast fixed station sites. Otherwise, system coverage and voice quality are expected to remain unaffected.

Currently, there are no FCC requirements for narrowbanding in the 800 MHz spectrum. Current licensees can continue to operate in 25 kHz efficiency modes, or can migrate to more spectrally efficient technologies as they see fit.

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With a long history of pioneering digital technology and several industry leading innovations in P25 digital systems, EFJohnson offers several products to help public safety entities meet the FCC narrowbanding mandates and achieve inter-operability while migrating to a standards based digital system.