An Overview of 800MHz Re-banding and Considerations for In-Building Wireless Systems
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Introduction: As more and more users of wireless services continue to crowd the airwaves, it has become necessary for the FCC (Federal Communications Commission) to make some long needed changes as to how the radio spectrum is divided up. The R.F. (Radio Frequency) spectrum is somewhat like beachfront property, there is only so much of it and limited supply and huge demand tends to drive the prices sky high. If you want a piece of it you will most likely have to wait a long time and pay dearly to get some in just the right spot. Not to mention but several folks are waiting like vultures right behind you to get their hands on your beachfront digs should something happen and you no longer can hold on to your prize!

This article will focus on a particularly popular and hotly contested piece of beachfront, the 800MHz slice. This band is in the news because in recent years as wireless services covering public, private, commercial and government users continue to grow, ever-increasing instances of interference between these users has caused a large number of complaints to the FCC. These complaints are due to lapses in radio service that cover such critical PS (Public Safety) services as Fire, Police and Emergency Medical. After years of debate and many studies, the FCC has decided to re-shuffle (or "re-band") the frequencies between 806MHz and 869MHz.

The Problem: of interference basically boils down to the fact that the trunked PS radios used by regional (State & Local) Public Safety and NPSPAC (National Public Safety Planning Advisory Committee) users operate in the same band with the users of commercial ESMR (Enhanced Specialized Mobile Radio) services such as Nextel and SouthernLINC. The band between 851-866MHz is currently where both Nextel and SouthernLINC use a radio system developed by Motorola called iDEN (Integrated Digital Enhanced Network) to provide both the lightning fast PTT (Push-to-Talk) trunked services that dispatch driven customers want along with a cellular telephone. The iDEN and Public Safety systems don't play nice when forced to share portions of this spectrum. Even though both systems individually meet all FCC emissions requirements, the two prove to be incompatible coexisting inside the same tightly packed bands.

The Solution: Red Line: To solve the main issue, the FCC is moving ESMR (mainly Nextel) currently operating alongside private SMR and Public Safety (Figure 1: blue & red areas), into their own 862-869MHz ESMR spectrum (yellow area).

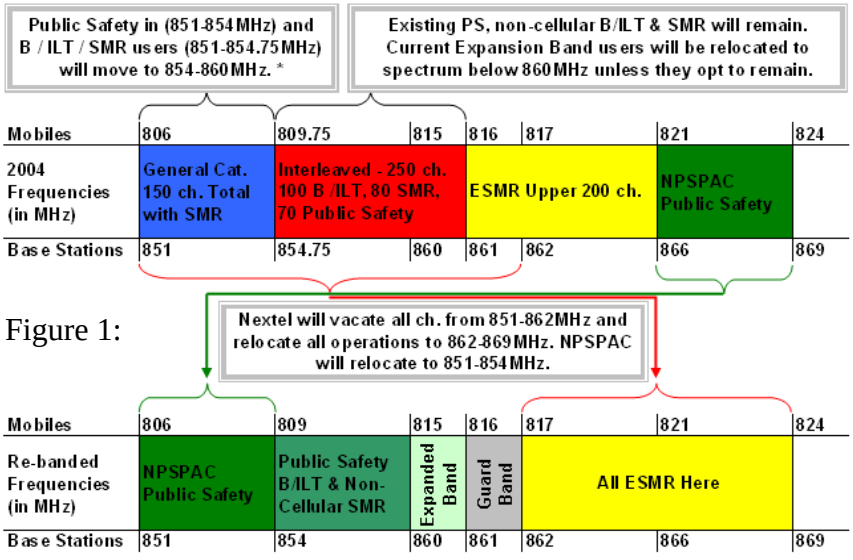

Figure 1:

* Certain details of the re-banding plan regarding exact frequencies and timeframes of eligibility have been omitted for the sake of brevity and clarity as it applies to in-building services.

Green Line: NPSPAC will move down 15MHz to the beginning of the band (green) and non-PS traffic (blue) will move up to the 854-860MHz band.* The Expanded Band and the Guard Band will separate all ESMR from Public Safety.

In-Building Wireless: These changes will no doubt create a much "cleaner" R.F. spectrum for both ESMR and Public Safety users. However, as with any high frequency radio service, many buildings, especially larger structures, continue to have severe problems due to poor or non-existent interior coverage.

In many cases, large buildings flush with steel reinforced concrete, metal siding, metal floor pans and low-e glass, create an impossible barrier for any such services to penetrate very far, if at all, into these structures. Many times this is a huge business problem for commercial ESMR users. For Public Safety users this problem might possibly represent a code violation, or at the very least a huge safety issue.

In-Building Coverage Solutions to Bridge the Wireless Gap:

Proximity Wireless provides Turn-Key solutions and expert engineering services for in-building DAS (Distributed Antenna Systems) that are capable of carrying any radio service from VHF through C-Band (5GHz). For Fire, Police, EMT or other critical Public Safety services, DAS solutions that cover large public, private, or government buildings with poor Public Safety coverage, is a much faster, cheaper and more spectrally-friendly solution than retuning or augmenting the outdoor network. In some cases, a DAS solution has reduced or eliminated an existing "NEAR-FAR" interference problem that Public Safety users frequently experience when inside large buildings. Such interference comes into play when the signal they are using is weak inside a building relative to a neighboring cellular ESMR signal. The DAS system brings the weak PS signals up to par with the stronger ESMR signals thereby reducing interference inside that venue. In all cases, legacy or future, DAS solutions greatly improve interoperability by assuring robust and balanced coverage between competing systems.

Re-banding Changes for In-Building Solutions:

In light of the re-banding changes, most OEM's of in-building equipment have made appropriate modifications to their products for future designs and implementations. However, some major changes may need to be done to legacy installations. In general, smaller, repeater-based systems will work with no modifications. Most equipment of this type covers the entire 806-824/851-869MHz bands and most small distribution systems are generally going to be broad-band in nature. Some larger DAS systems may require changes to their head-end systems or need to be re-tuned (if possible) to accommodate the re-banding changes. In addition, timing for many of the re-banding changes has slipped significantly. The FCC order to have all conversions completed by June 26, 2008 is way behind schedule. The FCC deadline, which was never premised upon a "synchronized" spectrum swap between Nextel and Public Safety, has not changed. For Nextel, the problems have compounded in that many of the NPSPAC licensees won't be ready to relocate by the deadline. It appears that in some areas Nextel may be left with insufficient spectrum and some interruption of service could be possible. In some areas Nextel is attempting to temporarily "park" some of their channels in the 900MHz band while waiting for all of the NPSPAC incumbents to vacate. In some cases this may take until 2009 or 2010. When re-banding finally does occur in your area, in-building problems that may crop up must be addressed quickly. Large venues with poor Fire, Police, or EMT coverage can be a huge liability. To summarize, most existing in-building solutions that carry, Public Safety, ESMR and/or Cellular services should be tested and adjusted to assure spectral purity and optimum performance. Properly adjusted and optimized, the new re-banded 800MHz region will afford all DAS users a higher level of performance, coverage and interference reduction, leading to safer and more productive environments for all.

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