InfoComm Releases Special Report on White Spaces

3/3/2009

WHAT LIES IN THE FUTURE FOR WIRELESS MICROPHONES?

Charting a path through the White Spaces maze

In simpler times past, when "white spaces" were nothing more intimidating than half of the 64 squares found on a chessboard, no one much cared about the FCC, its reassignment of the analog TV spectrum, or wireless microphones. With the move to DTV and the dawning of a new age of personal electronics, however, the White Spaces — now having gained a capital "W" and a capital "S" seemingly to signify their newfound importance — are poised to play a larger role in virtually everyone's lives.

For those of you still just joining us on this topic, White Spaces are the unused channels between stations within the analog TV spectrum used by the audio industry for the last 20 years to carry wireless mic signals. As a result of the FCC edict spelling the end of analog TV broadcasts as we know them on June 12 of this year (a date postponed from February 18), as well as market forces and other regulatory moves made by the agency that will shrink the amount of real estate available for use within the White Spaces, wireless microphone users are standing at a crossroads. Affected people include your pastor giving his Sunday sermon, an executive addressing shareholders in a boardroom, sports announcers sharing the latest news from the dugout, the aerobics instructor cuing a spin class, or a rock star playing a packed arena.

A big part of the controversy surrounding the White Spaces in recent times stems from the presence of manufacturers seeking to bring new, unlicensed, wireless consumer products (TV Band Devices, or simply TVBDs in FCC parlance) to market. With these newcomers and legacy users like wireless mic owners each vying for their slice of the shrinking-spectrum White Spaces pie, the FCC moved definitively last November, releasing its Second Report and Order on the topic approving the use of unlicensed consumer TVBDs within the frequencies, but also insuring safeguards to protect wireless microphones.

As of this writing, no one really has a clear idea of what shape and flavor the new TVBDs will take. Prototypes seen and tested by the FCC thus far are merely crude, conceptual devices rolled about on laboratory carts and looking like a cross between R2-D2 and bits and pieces of a broken, handheld hair dryer. Suffice it to say for now that the new TVBDs will eventually be some sort of portable communications devices, even though what we've seen so far is a long way from pocket-sized.

Prior to its ruling last November, the FCC leveraged more change for wireless microphone owners when it auctioned off what is commonly referred to as the "700 MHz band" in April of 2008. Actually the frequencies lying between 698 and 806 MHz (UHF channels 52-69), the 700 MHz band went into the spotlight when the FCC first announced the move to DTV. Unlike in the old analog world, where TV stations serving the same markets had to be kept off adjoining channels to avoid interfering with one another, in the age of digital TV this need no longer exists. With the FCC's mandated move to DTV, then, the broadcast spectrum becomes more consolidated, leaving this "digital dividend".

When it became clear that the day was rapidly approaching when wireless mic users would no longer have access to the 700 MHz band, manufacturers stopped building systems for use in these frequencies. This was in the spring of 2007, and by the end of that year, potential TVBD manufacturers were lobbying to use the remaining White Spaces for their portable devices. The audio industry fought back, motivated by the possibility that TVBDs would create so much interference once they were added to the spectrum that wireless microphones might not be operable at all. Adding validity to these fears, prototype TVBDs failed miserably when it came to not interfering with both wireless mics and DTV transmissions in laboratory and real-world tests conducted by the FCC.

Taking all of these complexities into consideration in its efforts to make the airwaves useful for everyone, the FCC's Second Report and Order ruling made late last year starts by recognizing that some wireless microphone use is planned in advance and occurs according to a scheduled calendar of events (e.g., concerts, board meetings, sporting events, etc.). Conversely, other wireless use is labeled "itinerant" in the

Order, a term the ruling defines as happening at random times and places like when a team of TV news reporters is covering a developing story.

Logically taking the next step, the FCC ruling defines two types of TVBDs: Portable TVBDs and fixed TVBDs. To insure a place for wireless mics within the frequency spectrum, portable TVBD use will be limited to channels 21-36 and 38-51 only, and fixed TVBDs will be allowed on TV channels 2, 5-13, 14-36, and 38-51.

To further limit the potential for interference with wireless microphones, the FCC Order effectively has three other levels of protection.

Particularly useful for wireless users who only need a small number of mics or operate at random times, certain channels within the spectrum have been declared off-limits to TVBDs by the ruling. A careful inspection of the frequency map drawn for the new world order reveals these free zones: Portable TVBDs, for instance, aren't allowed below channel 21. On the other hand, fixed TVBDs aren't allowed to use the channels on either side of one occupied by a TV station. That means--according to the geographic area you're in--that there will be a few channels between 14 and 20 that are always entirely clear. In some locales, where a few of those channels are designated for public safety use, the FCC is laying claim to a pair of additional channels for wireless microphones.

OK, you ask, so what does the FCC have planned as a safeguard for large wireless microphone systems, like those used at major sporting events? Good question, and that brings us to the second level of the Order's wireless mic protection. To defend large-scale wireless microphone usage from attack, the FCC is requiring that all TVBDs be capable of determining their location within 50 meters using GPS guidance or a similar system. Once a TVBD establishes where it is, next it has to consult a database that will send it a list of available TV channels safe to use at that particular spot. Until the TVBD receives this list, it will remain inoperable.

The Order is lenient in defining who can register in the database, all a wireless mic user has to do is list the date, time, and location in latitude and longitude of their event, along with the TV channels they'll be using. There will be no fee for a wireless mic user to register, however, the database administrator (a third party to de determined by the FCC) can levy TVBDs an access fee.

As a final safeguard to wireless microphone users, the FCC has mandated that all TVBDs must use spectrum sensing to detect and avoid wireless microphones, TV stations, and any other authorized source in their operating location, regardless of whether or not they are registered in the database or not. The TVBD has to scan the spectrum it is operating in for at least 30 seconds every time it is powered on. After that, it must scan its operating channel every 60 seconds to insure that additional microphones haven't been turned on. When and if a new wireless microphone is discovered by a TVBD, it must discontinue transmitting on the TV channel in question within two seconds.

Comprehensive, fair, and practical in its approach, the FCC Order does, however, remain hands-off in some areas, and these probably warrant a few lines of mention here. Nothing is said about the licensing of wireless mics, and this is a topic best left for separate discussion in its own dedicated space.

As for when wireless mics will have to cease operating within the 700 MHz band, the Order remains conspicuously mute on this matter. Any wireless microphone operator would be wise, however, to vacate those frequencies as soon as possible, as it's not a matter of if anymore, just when.

At this point in the transition, it's been a long road with a little wheel and a lot of turns to get where we are today. For those who have been huddled with the fear that they'd never be able to use their wireless mics again, obviously the good news is that's simply not true in all cases. The best advice is to keep abreast of the topic, know the frequency landscape before you go into any project (and this includes not only DTV at large, but also public safety bands), and once the database is up-and-running, get registered. Change is coming, yes, but with careful planning, everyone can survive.