

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington D.C. 20554**

In the matter of:)	
)	
Unlicensed Operation in the TV)	ET Docket No. 04-186
Broadcast Bands)	
)	
Additional Spectrum for Unlicensed Devices)	ET Docket No. 02-380
Below 900 MHz and in the 3 GHz Band)	
)	

COMMENTS OF

Michael Mason, RF Audio and Communications Consultant

INTRODUCTION

I am in the business of specifying, providing, and coordinating wireless audio and communications systems for the entertainment industries. Many of my clients revolve around sports broadcasting and their associated shows. I have been on site for Super Bowls, Final Fours, Award Shows, Golf Tournaments, and many other large “special” events. I have also been involved with theatrical arts, corporate events as well as houses of worship.

I have decided to comment on this NPRM because I believe there will be grave consequences to the users of the already congested spectrum if more devices are allowed to be unlicensed and uncoordinated without some regard for the protection of the current users.

Some of the systems I work with can be construed as the “money” sounds of the show. Wireless audio is often used for sideline reporting, trophy presentations, sound effects, and point-of-view sound effects (players, coaches and officials wearing microphones). Wireless intercoms are most often used to control events, aid in the coaching of teams, and aid in the production management of the broadcast. Wireless audio and communications allow production to take an audience, which can literally be thousands of miles away, and give them the experience as if they were in the venue. The uses for wireless devices in broadcast and special events are endless, but unfortunately there is a finite amount of spectrum available and that is shrinking every minute.

DISCUSSION

Entertainment productions, be it Broadcast, Theatrical, Live Concert, Corporate Presentation, or any other facet depends on wireless communications and/or wireless audio to make it happen. It may just be one cellular phone used for coordinating, but in most instances it is significantly more. Most large productions use in excess of 100 frequencies and some of the larger events, such as a Super Bowl, an Awards Show, or College Basketball’s Final Four tournament will easily use in excess of 250 and sometime upwards of 1000. And those numbers are just inside the venue. That does not take into consideration any users directly outside the venue, such as a “tailgate” setup. These frequencies are used for Audio, Communications, Talent Cueing, and of course Public Safety.

The frequencies needed to control, broadcast and coordinate these shows and the venues they are in need to come from somewhere. Most often the equipment operates within the TV spectrum, concentrating on 174 – 216 MHz, 470 – 608 MHz, and 614 – 806 MHz and is 250 mW or less. This

spectrum is ever shrinking due to the advent of DTV and growth of wireless users. Should more unlicensed devices be allowed in this spectrum, it is my opinion that the consequences will far outweigh the benefits to the users.

How many times has a broadcaster gone to the Trophy Presentation with a wireless microphone in hand and how many times have you seen the lips move but hear no audio? The reason this happens is due interference and inter-modulation. During a typical Super Bowl Trophy Presentation, there is one wireless microphone on the stage for the network covering and about 150 other wireless microphones for the other media entities directly in front of that stage. Despite the best coordination efforts by the Society of Broadcast Engineers (SBE) volunteers and the National Football League (NFL), all the planning and coordination of making sure that no two users are on the same frequency and that there is enough guard space on either side of a channel, is not enough to change physics and the congestion caused by all those transmitters being at the same place at the same time.

Broadcasters, promoters, management companies, etc. rely heavily on sponsorships to get the financing for production. Special production elements such as “Sounds of the Game” and Trophy Presentations often have their own sponsors. If these elements of a production cannot be used, there is a distinct possibility that sponsors will pull their funding. This will have the domino effect. Jobs will be lost in the production. For example, I am concerned that the need for professionals such as me will be lost. The loss of specialty audio and communications will trickle into the loss of video and other production positions. Unfortunately, once income is lost, spending soon follows.

Another, and by far no less important consequence, is the impact on public safety. Interference and inter-modulation do not discriminate. They will affect anything in their path.

ANALYSIS

In my opinion the NPRM does not safeguard enough spectrum for broadcast, theatrical and other entertainment production. I would like to see a minimum of Eight (8) 6 MHz channels be set aside in each market where unlicensed devices are not authorized to operate. This will allow broadcaster/producers ample spectrum to operate the so-called “money” devices without the chances of being interfered with by the unlicensed devices. I would suggest 3 VHF channels and 5 UHF channels. Within any given 6 MHz TV channel, the highest usage density I have seen is about 10 – 12 channels of wireless microphones or intercoms. With 8 TV Channels, this would allow 96 usable wireless microphone and intercom channels under the ideal circumstances.

Given that most of the events I speak of occur within one venue and the immediate surrounding area, the FCC should consider requiring unlicensed devices to have a scanning feature that listens for active wireless microphones and intercoms and would lock out any and all TV channels currently in use. Taking this concept one step further, venues could have some sort of control frequency (“beacon”) that contains the data of what is in use at any particular moment. This device could be programmed by the local coordinators of an event or the facility managers of the venue. It could be activated and deactivated at will and implemented only when necessary to secure the spectrum for a production. In actuality, this should not be an either/or. Unlicensed devices should have both.

Along with a technology for scanning and blocking frequencies already in use, the FCC must consider other ways on eliminating interference and inter-modulation. Such methods are limiting power, channel spacing, and bandwidth limiting. Should the FCC adopt a plan where unlicensed devices are allowed, I would suggest that channels be spaced so that no channels that are adjacent be designated as usable for these unlicensed devices. A better scenario would be every third channel. Like wise, the same scheme should apply for the channels reserved for the current users. If channels are not stacked up upon themselves, there is less a chance of inter-modulation.

Power and bandwidth limitations should also be imposed on these unlicensed devices. The NPRM proposes that the maximum power for fixed devices be limited to 1 watt peak and the maximum power for portable devices be limited to 100 mW. I believe that these limitations will suffice.

CONCLUSIONS

I have been working as a RF Audio and Communications Engineer and Consultant for nearly 20 years. Again, I am submitting my comments here because I am concerned about the effects that more unlicensed devices will have on the already limited spectrum. I make my living utilizing wireless technology in the entertainment industries that cannot exist with interference. If there is interference, wireless microphones and wireless communications become useless to these industries. The impact on public safety must also be considered. Interference and Inter-modulation will not discriminate.

I believe the FCC needs to implement safeguards to protect existing users, especially broadcasters, from the many avenues of interference. As I stated earlier, Control Devices/Frequencies, Channel Spacing, Power Limiting and Bandwidth Limiting are all viable ways of accomplishing this. I must also state that I believe that no one of these is the answer, but yet the answer lies as a combination of them all:

- Each market should have TV channels that are free of unlicensed devices
- Unlicensed devices should have a way of scanning for a “beacon control” signal that contains data indicating blocked channels
- Unlicensed devices should have a way of scanning for TV channels in use by wireless microphones and intercoms in the unblocked channels
- Unlicensed devices should have both power and bandwidth limitations as specified in the NPRM

Thank you for taking the time to consider my comments.

Respectfully submitted,

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