Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington D.C. 20554

In the matter of:	)	
	)	
Request for Comments on the Spectrum	)	ET Docket No. 02-135
Policy Task Force Report, released	)	FCC 02-322
November 15, 2002	)	
	)	

COMMENTS OF

Shure Incorporated

Shure Incorporated ("Shure") hereby files these Comments in the above-captioned matter. Shure herein urges the Commission to use great care in applying new regulatory methodologies to the broadcast radio and television spectrum. Every American citizen relies on the broadcast media for news, information, and entertainment. In addition to being the primary users of the broadcast spectrum, radio and television stations themselves depend on Wireless Audio Systems that operate as Low Power Auxiliary Stations ("LPAS") within that spectrum on a secondary basis. Most radio and television productions today would be impossible without these devices, the viability of which would be severely threatened in an unregulated "spectrum commons" environment.

Shure is a respected manufacturer of professional wireless audio products that operate within the 470-806 MHz band under Section 74.861 of the Commission's Rules, 47 C.F.R. § 74.861, as Low Power Auxiliary Stations ("LPAS"). Shure holds Grants of Equipment Authorization (Certifications) from the Federal Communications Commission ("FCC") for these products. As such, Shure is well-qualified to comment on the LPAS issues raised in this proceeding. Shure has also participated in previous Commission actions involving LPAS devices.[1]

[1] *See, e.g.*, Comments of Shure Brothers Incorporated filed September 11, 1997 in ET Docket No. 97-157; Comments of Shure Brothers Incorporated filed July 16, 1999 in WT Docket No. 99-168; Reply Comments of Shure Incorporated filed August 7, 2001 in ET Docket No. 01-75.

I. The Commission Should Not Abandon the Use of "Command and Control" Regulatory Methodology for Broadcast Radio and Television Spectrum

Shure applauds the groundbreaking work of the Spectrum Policy Task Force, and the Commission's goal of becoming a more dynamic and responsive regulatory agency. However, we do have concerns about the application of any regulatory model that would threaten the viability of broadcast spectrum for present and future users, and thus endanger the ability of the American public to receive the vital news and information upon which it depends. Indeed, regulation of the broadcast bands for the public good has historically been one of the Commission's most important duties. In the Spectrum Policy Task Force Report, the authors note that "Command-and-control regulation should be reserved for situations where prescribing spectrum use by regulation is necessary to accomplish important public interest objectives or to conform to treaty obligations".[2] Both of these situations apply to broadcast spectrum bands. In fact, the Report further states: "Broadcast spectrum should remain subject to the current regulatory model, which is based on statutory public interest objectives".[3]

Our concern lies especially with the potential application of the "Spectrum Commons" model within the broadcast radio and television bands. As pointed out in the Spectrum Policy Task Force Report, this model has led to explosive growth in the so-called "Part 15 bands" where unlicensed operation is presently allowed. It is highly doubtful that the broadcast bands could support this amount of growth without harmful interference to primary and secondary users.

Historically, the Commission has maintained very tight control over operations within the broadcast spectrum. This has resulted in a broadcasting system that the American public is able to rely upon with a high degree of certainty. Radio and television receivers are typically operated by people who have little or no technical knowledge, under reception conditions that are often highly unfavorable. Although newer technologies such as DTV offer some performance improvements and service enhancements, they still require a minimum Signal-to-Noise Ratio (SNR) in order to function. Unlike analog transmission systems, which degrade gradually in the

---

[2] Spectrum Policy Task Force Report, Page 5

[3] Op. Cit., P. 6

presence of interference, digital systems cease to function altogether if the SNR drops below a minimum requirement (typically 15 dB for DTV).

In addition to radio and television broadcasting, broadcast spectrum is also used for other important purposes by secondary users. Among these are Wireless Audio Systems that operate as Low Power Auxiliary Stations (LPAS). Many radio and television productions today are absolutely dependent upon Wireless Audio Systems, especially wireless microphones, and would be impossible without them. Shure therefore strongly believes that the public also has a clear interest in continued, unhampered wireless microphone use. Further, Wireless Audio Systems have a long history of successfully operating as Low Power Auxiliary Stations (LPAS) on a secondary, non-interference basis in the Part 74 TV bands – the only spectrum suitable for such operations. The Commission should consider the needs of Wireless Audio Systems in applying the recommendations of the Spectrum Policy Task Force in future rulemaking proceedings.

II. The Application of a "Spectrum Commons" Underlay in the Broadcast Spectrum Bands Would Likely Result in Harmful Interference to Broadcasting and Secondary Services Alike

In a recent Notice of Inquiry[4], the FCC has proposed the creation of a "Spectrum Commons" underlay that would permit unlicensed wireless devices to operate in the broadcast spectrum bands. Based on Shure's real-world experience, it is difficult to imagine how any of the technologies or protocols mentioned in the Spectrum Policy Task Force Report would be adequate to protect licensed primary and secondary broadcast band users from harmful interference caused by unlicensed devices, if they were permitted to operate in the Broadcast Spectrum bands.

As the Commission is probably aware, most Americans living in urban areas have discarded their rooftop television antennas. Many have opted in favor of cable or satellite systems, augmented in some cases by "rabbit ears" or other types of indoor antennas for local TV reception. Others who cannot afford cable or satellite subscriptions are likely to use indoor antennas exclusively. Although these antennas may be adequate for analog TV reception, they

are potentially unsatisfactory for digital (DTV) reception. One reason for this is the fact that indoor antennas are prone to multipath interference caused by local reflections, especially in the UHF band. Indoor antennas are also much more susceptible to electrical noise and interference generated within the home or building (including that which could be created by unlicensed devices), since they are so much closer to it. In addition, they pick up a much weaker signal than an outdoor antenna would.[5]

As shown in Figure 1 of the Spectrum Policy Task Force Report[6], it doesn't matter what the signal level is at the transmitter location, it matters what it is at the receiver location. More precisely, it matters what the Signal-to-Noise Ratio (SNR) is at the receiver input. As previously discussed, the available signal strength from a desired station can vary significantly indoors, due to building attenuation and local reflections. Equally, because of the presence of local noise sources, it is very difficult to predict accurately what the so-called "Interference Temperature" will be at a given location inside a house or building. In such an uncertain environment, it seems problematic to set an "Interference Temperature" value based on some arbitrary factor such as distance from the transmitter, as shown in Figures 2 and 3 of the Report. For those living in rural areas that are beyond the FCC's signal protection contours, the situation would be just as serious. These locations are already impacted by fluctuating signal levels caused by propagation disturbances, as well as man-made and atmospheric interference. Any additional noise burden imposed by unlicensed devices operating within the TV bands could obliterate whatever reception is now available to rural viewers.

The situation is equally critical for secondary spectrum users, such as Wireless Audio Systems operating as Low Power Auxiliary Stations ("LPAS"). Again, based on Shure's real world experience working with program producers who use wireless audio equipment on a daily basis, the importance of having a known interference environment cannot be underestimated. Professional users expect the performance of a wireless microphone to be equal to a wired

---

[4] ET Docket 02-380; "In the Matter of Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band".

[5] Typically, building attenuation is on the order of 15 dB at VHF frequencies and 20 dB at UHF, although these figures can vary widely depending upon construction and internal location.

[6] Op. Cit., P. 28

model. That means there can be no interruptions (even momentarily), changes in level or frequency response, or extraneous noises; such as "crackles", "pops", "whistles", or "hum". Technical problems such as these are very apparent when they occur during a live event, as happened during the recent telecast of the Super Bowl. By analogy, if an unlicensed device suddenly "fired up" in the middle of an important broadcast and knocked a live wireless microphone off the air, it would cause havoc.

Although far weaker than the television transmitters that represent the primary users of the Broadcast Spectrum bands, Wireless Audio Systems, such as wireless microphones, can operate successfully as long as the interference environment is known and stable. Operation on occupied TV channels can be avoided, and frequency coordination can prevent interference between users. The addition of a multiplicity of new unlicensed devices, acting on their own “protocols”, would make frequency coordination chaotic. Although it is difficult to predict what types of products might end up operating in the broadcast spectrum given an unlicensed “spectrum underlay” model, currently available unlicensed devices such as cordless phones and wireless Local Area Networks would be potential candidates. Such devices would be very likely to be operated in close proximity to radio and TV receivers and wireless microphone systems, and would therefore have a high potential for interfering with reception.

Given the above scenarios, if the Commission were to apply the “Spectrum Commons” model to the Broadcast Spectrum bands, and allow unlicensed devices to “underlay” the licensed broadcasting and auxiliary services that operate in these bands, the potential for harmful interference to those services would be greatly increased.

III. The Technologies and Protocols Proposed by the Report would be Inadequate to Protect Broadcast Spectrum Users from Harmful Interference

The writers of the Spectrum Policy Task Force Report have proposed the use of various technologies to prevent harmful interference to licensed users by unlicensed wireless devices. Although some of these techniques have possible merit in other situations, Shure believes that within the broadcast spectrum, their use would not be adequate to protect either primary or secondary licensed users from harmful interference.

Use of GPS technology to establish the location of an unlicensed transmitter and determine suitable operating frequencies: Shure believes that there are several problems with this approach. It should perhaps be obvious, but GPS signals are not receivable at many locations inside of a building. The addition of a GPS receiver would also add significant cost and complexity to devices that are typically very inexpensive.[7] Another, perhaps more subtle issue is that for every location within the U.S., someone would have to make a decision about which television channels would be protected, and which would be permitted to be interfered with by unlicensed devices. How would this decision be made? Strictly on the basis of distance from the TV transmitter, without taking any other factors into account? How would such a system protect secondary licensed users such as Wireless Audio Systems or Medical Telemetry Systems, which operate on vacant TV channels; especially since these systems are mobile?

Use of protocols, such as a requirement for an unlicensed transmitter to listen before transmitting: There are several problems with this idea. First, it implies that an unlicensed device would not be able to transmit continuously, since it would have to interrupt its transmissions to listen. Further, if such a device sensed a clear frequency and began transmitting, it could block a licensed user from using that frequency at a later time. For example, program producers often wait until shortly before "going live" to turn on an LPAS transmitter in order to conserve battery life for on-air use. If they were to discover that a previously clear frequency had suddenly become unusable, they might not be able to shift frequencies quickly enough to avoid an interruption in the middle of a live production.

CONCLUSIONS

Reliable, high quality broadcast service is vitally important to the American public. Accordingly, the broadcast spectrum must be protected from any possibility of harmful interference. As noted in the Spectrum Policy Task Force Report, it should continue to be regulated by the traditional "Command and Control" methodology. The establishment of a "Spectrum Commons" underlay permitting unlicensed devices to operate within the broadcast bands could create interference problems on a grand scale. It could also jeopardize the transition

[7] A typical 80211.b wireless LAN device today sells for less than $100 at retail

to DTV. Secondary users of broadcast spectrum such as Wireless Audio Systems (LPAS), which are essential to broadcast program production, would be especially vulnerable due to the fact that they are also low power devices. The importance of wireless audio to broadcasting operations, as pointed out by the SBE in previous proceedings[8] and presentations[9] is unquestioned by anyone familiar with the industry. Wireless Audio Systems now play a vital role in virtually every kind of audio production, large or small. In today's increasingly crowded RF spectrum landscape, the only satisfactory spectrum for reliable operation of these devices has been and continues to be secondary use of the Part 74 TV spectrum.

Respectfully submitted,

SHURE INCORPORATED

Edgar C. Reihl, P.E.
Principal RF Engineer & Director, Global Compliance
222 Hartrey Avenue
Evanston, IL 60202-3696

January 27, 2003

[8] Comments filed by Society of Broadcast Engineers, Incorporated on May 14, 2001 in GN Docket No. 01-74 at pp. 1-2.

[9] "Broadcast News and Sports Tutorial" presented by the SBE on December 17, 2002