Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington D.C. 20554

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

COMMENTS OF

Shure Incorporated

Shure Incorporated ("Shure") hereby files these Comments to the Notice of Inquiry ("NOI") in the above-captioned matter.[1] Shure agrees that the public would benefit from making additional spectrum available for unlicensed devices. However, Shure believes that the Commission should act carefully in changing its rules to allow for expanded unlicensed operations and should not at this time authorize unlicensed uses in the Television Broadcast bands. Overlapping spectrum reform issues are already under consideration in other proceedings and are the subject of pending legislation. Further, there are fewer potentially "vacant" television channels than suggested in the Commission's NOI and such channels are in fact not "vacant" given the important secondary operations such as Low Power Auxiliary Stations ("LPAS") and Medical Telemetry Devices currently using that spectrum. Permitting unlicensed devices to operate in the television broadcasting spectrum will likely cause significant harmful interference to those devices. Furthermore, implementing the technical and operational safeguards proposed in the NOI will not effectively protect them from interference.

American citizens rely heavily upon television for news and entertainment programming, particularly during times of conflict or natural disaster. In addition, radio

[1] *Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, Notice of Inquiry, ET Docket No. 02-380 (rel. Dec. 20, 2002) ("Additional Spectrum NOI").

and television stations use television spectrum for wireless microphones operating as Low Power Auxiliary Stations within that spectrum on a secondary basis. These devices are vital to the production of news and sports programming. The reliability of these devices is even more important at a time when millions of Americans depend on extensive television coverage for up-to-date news of the war. We are not convinced that they could be adequately protected from interference caused by millions of unlicensed devices operating in the same bands. We also share the concerns expressed by Commissioner Kevin J. Martin concerning the negative impact that such a decision could have on the DTV transition.[2]

Statement of Interest

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"). As such, Shure is well-qualified to comment on the LPAS issues raised in this proceeding. Shure holds Grants of Equipment Authorization (Certifications) from the Federal Communications Commission ("FCC") for these products. Shure has also participated in previous Commission actions involving LPAS devices.[3]

I. Commission Action in this Proceeding is Premature In light of Other Pending Proceedings Considering Spectrum Reform and Making New Spectrum Available for Unlicensed Devices

Many of the issues raised in the Commission's NOI in this proceeding are also under active consideration in the Commission's open Spectrum Policy Task Force proceeding (ET-Docket No. 02-135). Shure believes that Commission action in this

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[2] *Id.*, Separate Statement of Commissioner Kevin J. Martin.

[3] *See, e.g.*, *Reallocation of Television Channels 60-69, the 746-806 MHz Band*, Comments of Shure Brothers Incorporated, ET Docket No. 97-157 (filed Sept. 11, 1997); *Service Rules for the 746-764 and 776-794 MHz Bands, and Revisions to Part 27 of the Commission's Rules*, Comments of Shure Brothers Incorporated, WT Docket No. 99-168 (filed July 16, 1999);

proceeding is premature in light of the Commission's consideration of the same issues in ET Docket No. 02-135.[4] In that proceeding, the Commission sought comments on the creation of a "spectrum commons" underlay that would permit widespread operation of unlicensed wireless devices. The Commission should consider the comments on important related issues that it receives in that docket before acting in this proceeding.

Although the Spectrum Policy Task Force report recommends broad regulatory changes to take advantage of unused spectrum, the Commission also recognized that the Spectrum Commons model is inappropriate where spectrum use has been prescribed to accomplish important public interest objectives. Broadcast services, the Commission observed, provide "'universal' news, information, and entertainment to the general public. As such, broadcasting has consistently been a central focus of Congress and the Communications Act . . ."[5] On that basis, the Commission stated that "broadcast spectrum" should remain subject to the current regulatory model." [6] The Commission went on to state that "the Task Force does not recommend fundamental regulatory changes in the near term" with respect to currently allocated broadcast spectrum, noting that evolution towards greater flexibility is governed by the statutorily-mandated DTV transition process.[7] Shure is concerned that the proposals contained in the NOI could cause harmful interference to broadcasting stations and secondary users alike. The proposals in this proceeding are inconsistent with the Commission's stated policy in the Spectrum Policy Task Force Report to refrain from disturbing the broadcast spectrum.

Broadcast Auxiliary Service Rules in Part 74, Reply Comments of Shure Incorporated, ET Docket No. 01-75 (filed Aug. 7, 2001).

4 *Spectrum Policy Task Force Report*, ET Docket No. 02-135, (rel. Nov. 25, 2002) ("Spectrum Policy Task Force Report"). The Commission accepted comments on the issues raised by the Spectrum Policy Task Force report on January 25, 2003. Reply Comments were filed on February 28, 2003.

5 *Id.*, at Section VII-C, p. 44.

6 *Id.,* at Section II, p. 6.

7 *Id.*, at Section VII-D, p. 46.

Even if the currently allocated broadcast bands are not opened to unlicensed users, the Commission has many other spectrum options to identify additional opportunities for unlicensed operations. In addition to actions arising out of the Spectrum Policy Task Force report, the Commission is already looking to modify the rules to recapture the unused 1910-1920 MHz band (unlicensed asynchronous personal communications service ("PCS") band) and providing greater flexibility for unlicensed operations in the 1920-1930 MHz (currently reserved for unlicensed isochronous PCS use).[8] The FCC also recently reaffirmed its procedures authorizing unlicensed operation for ultra-wideband ("UWB") devices in spectrum that had previously been restricted.[9] With the additional technical standards that the FCC established, UWB devices are now permitted to operate in certain restricted bands.

Similarly, legislative initiatives are underway to identify additional spectrum for unlicensed operations. Senators Allen (R-VA) and Boxer (D-CA) have introduced legislation called the "Jumpstart Broadband Act" to allocate 255 MHz of spectrum in the 5 GHz band for unlicensed use by wireless broadband devices and especially for two-way digital services.[10] (On the House side, H.R. 363 has been introduced by Representatives Honda (D-CA), Dunn (R-WA) and Lofgren (D-CA) and H.R. 340 by Representatives Issa (R-CA) and Davis (D-VA) with similar provisions.) This legislation, if enacted, would greatly increase the potential spectrum options for unlicensed devices, in what Shure believes to be frequencies more suitable for unlicensed operations. In 2002, Representative Markey (D-MA) introduced the Wireless Technology Investment

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[8] *Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems,*Third Report and Order, Third Notice of Proposed Rulemaking and Second Memorandum Opinion and Order, RM-9498 (rel. Feb. 10, 2003).

[9] *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmissions Systems*, Memorandum Opinion and Order and Further Notice of Proposed Rule Making, ET Docket No. 98-153 (rel. March 12, 2003). *See also*, *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmissions Systems*, First Report and Order, ET Docket No. 98-153 (rel. April 22, 2002).

Digital Dividends Act which proposes, among other things, to designate 20 MHz below 2 GHz and 300 - 500 MHz in the 2–6 GHz frequency range for unlicensed use.

These regulatory and legislative efforts will likely lead to rule or statutory changes that identify new spectrum for unlicensed services. Shure supports the general effort to expand unlicensed operations but strongly believes that the Commission should not target spectrum for new unlicensed operations where such new operations are likely to impair existing services and uses. In light of the potential for interference to broadcast stations and secondary users as discussed in detail below, and the fact that spectrum policy for unlicensed operations is under consideration in other proceedings, Shure urges the Commission not to adopt rules that would permit unlicensed services to operate in the TV broadcast bands.

II. Unlicensed Devices Should Share Spectrum with Others of the Same Type

The Commission's Spectrum Policy Task Force Report proposed the creation of a "Spectrum Commons" for unlicensed devices.[11] Under this model, interference would be prevented through a combination of mandatory technical parameters and operating protocols. The Report also called for "clear and exhaustive" definitions of the rights of spectrum users.[12] It seems apparent that a true Spectrum Commons band would exist where all users played by the same rules; *i.e.* one class of users all operating under the same requirements. This scenario would appear to be practical for implementation in the new 3 GHz band that the Commission has proposed in this Proceeding. A true Spectrum Commons can also help prevent later claims by certain users that their services are more important that those of others and that they ought therefore to be

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10 *Jumpstart Broadband Act*, S. 159, 108th Cong. (2003).

11 *Spectrum Policy Task Force Report*, at Section VII-A, p. 35.

12 *Id.*, at Section V-B, p. 17.

given preferential treatment. This issue has already surfaced in the 902-928 MHz Part 15 “Spectrum Commons” band.[13]

The idea of a Spectrum Commons "underlay" is also intriguing, and offers promise under the right conditions. However, in order for an underlay to be practical, the primary or "authorized" users of a spectrum band must be able to count on a known signal "margin" in the transmission path, such that a minimum required signal-to-noise ratio (SNR) is always available. These conditions do not exist in the television broadcast bands because of the many variables that affect the home receiving environment. An example of a situation in which spectrum sharing might be successful using a low power spectrum commons underlay would involve operation in a band wherein the primary users are wireless links operating over fixed paths.

III. A "Spectrum Commons" Underlay for Unlicensed Devices within the Television Broadcast Bands Would Not Provide a Significant Amount of New Spectrum in Major Metropolitan Areas

In this NOI,[14] the FCC has proposed the creation of a "Spectrum Commons" underlay that would permit unlicensed wireless devices to operate in the television broadcast spectrum bands. Based on Shure’s analysis of the present and future usage of this spectrum, there is not a great deal of “white space” available in the broadcast bands for other uses. Over the past five years, 108 MHz of spectrum (a total of 18 TV Channels) has been taken away from television broadcasting by the FCC and reallocated to other uses. Responding to requests from the Public Safety Wireless Advisory Committee (PSWAC), the Commission reallocated 24 MHz of spectrum to Public Safety consisting of TV Channels 63-64 and 68-69 (764-776 and 794-806 MHz).[15] It also established a new “core” TV band consisting of Channels 2-51. Channels 52-59

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[13] *See, e.g., Spectrum Policy Task Force Report*, Comments of ITRON (filed Jan. 27, 2003).

[14] *Additional Spectrum NOI*, at ¶ 3.

and 60-69 (exclusive of the Public Safety allocation) were to be "reclaimed" and reallocated to other services; to be determined through spectrum auctions. At the same time, the Commission mandated the transition to Digital TV broadcasting that is currently in progress, and assigned all television broadcast license holders a second channel to use for digital transmission. This has effectively doubled the number of television signals on the air. As a result, we now have twice as many stations trying to squeeze into less than three-quarters of the spectrum previously available.

In addition to full power television stations, the television spectrum is also used by low power television (LPTV) stations and boosters, many of which previously operated on high UHF channels in the upper 700 MHz band that have now been reallocated. These stations will ultimately have to be relocated to the "core" TV band, which will eat up more of the "vacant" television spectrum.

In addition to issues discussed above, we note that Channel 37 is reserved for Radio Astronomy, and thus is not available for television broadcasting or LPAS operation anywhere in the U.S. As well, in some areas of the country such as southern California, UHF TV Channels 14-20 are used by Public Safety. There has so far been no indication as to whether the Commission would consider relocating these Public Safety stations to the new 700 MHz Public Safety bands and making the Channel 14-20 spectrum, which lies within the new "core" TV band, fully available for television broadcasting.

In a recent study by Shure involving numerous field measurements, our engineers confirmed that virtually all of the UHF TV channels in the Los Angeles area are now in use.[16] This has made it extremely difficult, and in some cases impossible, for

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[15] *See*, *Reallocation of TV Channels 60-69, the 746-806 MHz Band*, ET Docket No. 97-157 (rel. Oct. 9, 1998).

[16] A search of the FCC database for TV stations within a 100 km radius of L.A. shows that there are only three open channels (excluding Channel 37) between Channel 28 and 68.

secondary users of the UHF TV spectrum such as Low Power Auxiliary Stations to find adequate spectrum. As noted by Shure and others[17] in previous proceedings, radio and television program producers are heavily dependant upon wireless audio systems, including wireless microphones. Events such as the September 11 attack and the Super Bowl would be impossible to cover without wireless audio technology. Wireless audio technology also plays an important role in the news media's extensive war coverage.

From the above analysis, it is clear that in the larger cities where the demand for additional unlicensed wireless spectrum is greatest, the actual amount of potentially usable spectrum in the so-called "vacant" television channels would be minimal. Furthermore, these few "vacant" channels are not really unused. They are vitally important to secondary users-- including Low Power Auxiliary Stations-- for wireless microphones, in ear monitoring, interruptible foldback (IFB) monitoring, and cueing. In addition to these auxiliary broadcasting uses, "vacant" TV channels are also used by medical telemetry devices. As noted in the separate statement of Commissioner Kevin J. Martin in this proceeding, "[w]ireless microphone users, for example, are finding it increasingly difficult to find available spectrum."[18] The Commissioner further stated that "[p]articularly in urban areas, such as along the east and west coasts, there is much less broadcast spectrum available within which unlicensed devices could operate effectively."[19] We are in agreement with these observations.

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[17] *See, e.g.*, *Reallocation and Service Rules for the 698-746 MHz Spectrum Band*, Comments of the Society of Broadcast Engineers (SBE), GN Docket No. 01-74 (filed May 14, 2001).

[18] *Additional Spectrum NOI*, Separate Statement of Commissioner Kevin J. Martin.

[19] *Id.*, at Section V-A, p. 17.

IV. Unlicensed Devices Operating in the Television Broadcast Spectrum Could Cause Harmful Interference to Broadcasting Stations and Secondary Users Alike

As stated in our earlier Comments on the Spectrum Policy Task Force Report, [20] based on Shure's real-world experience, it is difficult to imagine how the technologies and protocols mentioned in the Report would be adequate to protect licensed primary or secondary users from harmful interference caused by unlicensed devices if they were permitted to operate in the television broadcast spectrum bands. Secondary users of television broadcast spectrum, such as wireless audio systems operating as Low Power Auxiliary Stations likely face the greatest threat of harmful interference from unlicensed devices. Although far weaker than a television transmitter, an LPAS device can be operated successfully within the television broadcast spectrum because interference can be anticipated. 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 is critical. In order to be usable in a professional application, a wireless microphone *must* be reliable. This is impossible in situations where interference is intermittent and unpredictable.

Low Power Auxiliary Stations, such as wireless microphones, have operated successfully on a non-interference basis within television broadcast spectrum for decades. This has largely been accomplished through frequency coordination. The addition of a multiplicity of unlicensed devices acting on their own "protocols" would result in a chaotic environment. These 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 interference potential. As noted in this proceeding, wireless medical telemetry devices are yet another concern.

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[20] *See, e.g.*, *Spectrum Policy Task Force Report*, Comments of Shure Incorporated (filed Jan. 27, 2003).

Shure also believes that the possibility of interference to television reception by unlicensed devices would be very high. Most Americans living in urban areas have discarded their rooftop television antennas in favor of cable or satellite systems, augmented by “rabbit ears” or other types of indoor antennas for local TV reception. Those 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. Indoor antennas are prone to multipath interference caused by local reflections, especially on the UHF band. They are also much more susceptible to electrical noise and interference generated within the home or building (including that which would be caused by unlicensed devices), since they are so much closer to it. In addition, they provide a much weaker signal than an outdoor antenna would.[21]

The single most important factor in determining the quality of reception available is the signal-to-noise ratio (SNR) at the television receiver input. The signal strength of a desired station can vary significantly indoors, due to building attenuation and local reflections. Because of the presence of local noise sources, it is very difficult to predict accurately what interference level will exist at a given location inside a house or building. For those living in rural areas that are beyond the FCC's signal protection contours, reception can be impaired by signal fluctuations 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.

[21] 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.

V. The Technical and Operational Safeguards Proposed by the Commission are Inadequate to Prevent Harmful Interference to Broadcasting Stations and Secondary Users

In this proceeding, the Commission has suggested various ways of preventing 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 television broadcast spectrum, their use would not be adequate to protect either primary or secondary licensed users from harmful interference.

A. Restrictions on power output: Due to the variability in the home television reception environment, we do not believe it would be practical to permit an increase in emission levels beyond what is currently permitted under the general Part 15 limits. We certainly feel that it would be inappropriate to allow power levels in excess of those currently permitted within the ISM bands. Consider that Low Power Auxiliary Station transmitters are only permitted to operate with a maximum of 250 milliwatts of output power, and that the vast majority use only 10 to 50 milliwatts.

B. Required separation distances and D/U ratios: At the present time, the television broadcast bands are in a state of flux, due to the DTV transition. The TV bands are filled with a mixture of analog and digital television signals, while most of the public is still using older analog television receivers. Given this state of affairs, we believe it is premature to establish what the protected contours of digital television stations should be, or what technical standards should apply between desired and undesired signals. It will not be appropriate to finalize these determinations until we are living in an all-digital television world. Because DTV signals exhibit a very sharp “cliff effect” below which reception is impossible, they may require as much or more protection from interference than analog signals would. This is especially true for viewers living near the limits of a station’s coverage, where atmospheric disturbances and noise can cause considerable variation in received signal levels. The Commission

must be careful not to foreclose on the programming choices available to members of the public who cannot, or who choose not to spend upwards of $400/year on cable or satellite subscription services, by permitting interference to unduly limit or disrupt reception of free, over-the-air television broadcasts.

C. Protection of other operations in the TV bands: Given the extent of possible uses for Private Land Mobile Radio Service (PLMRS) and Commercial Mobile Radio Service (CMRS) spectrum within the TV channels, we are not confident that technical limitations on unlicensed device operation would be adequate to protect these services from harmful interference. It is very easy to imagine situations where mobile radio equipment would be used in close proximity to a wireless LAN system or cordless telephone. As previously mentioned, we consider the threat of harmful interference to wireless microphones and other Auxiliary Broadcasting services to be especially great. We definitely would expect these systems to come into close contact, with undesirable consequences. As a manufacturer, we understand that when a member of the public buys a product such as a wireless LAN, they expect it to work. They are generally not experts in technology or communications law. In addition, once they have become dependent upon the operation of an unlicensed wireless device as a part of a computer network, for example, they are not going to be willing to shut it down if it interferes with a wireless microphone or other LPAS equipment. We believe it would be unwise for the Commission to allow large numbers of unlicensed devices to begin operations in spectrum that may turn out to be unavailable or unusable in the future.

D. Requirements for protecting Cable and Set Top Boxes: As stated previously, our recommendation is to prohibit the operation of unlicensed devices within the television broadcast spectrum. If this is done, the possibility of interference to cable and set top boxes will be minimal; particularly if these devices are designed to comply with European Electromagnetic Compatibility (EMC) immunity requirements mandated

by the R&TTE Directive. As a separate matter, we recommend that the Commission consider adopting EMC requirements for consumer products that are harmonized with those of the EU.

E. Restrictions on antennas and amplifiers: As the Commission learned from its experience with the 27 MHz Citizen's Band, external amplifiers can be a huge source of interference, when in the hands of the general public. As such, they can become a big regulatory headache. During the peak of the CB era, many companies sold external "linears" that were advertised as being able to "increase range far beyond FCC limits" and thus sold "for export only." At lower frequencies, an external antenna is virtually a requirement due to wavelength considerations; but in the higher bands where most unlicensed devices operate today, it may not be necessary. However, the use of directional antennas can benefit users by improving reliability, extending range in a particular direction, or both. At the same time, it can help reduce interference to (and from) other users. Accordingly, we do not think it would be desirable for the Commission to prohibit the use of external antennas entirely, but it would be prudent to place some restrictions on their use. Additionally, we do not think that external amplifiers should generally be allowed to be manufactured, sold, or used with unlicensed devices because of the potential for abuse.

F. 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. 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.[22] Access to a database of licensed stations would require the unlicensed device to connect to it via the Internet (or through some other suitable means), and would require that database to be kept up to

date. 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? Would it be determined strictly on the basis of distance from the TV transmitter, without taking any other factors into account? We do not see how such a system could offer protection to secondary licensed users such as wireless audio systems or to medical telemetry systems, especially since these systems are mobile.

G. Use of protocols, such as a requirement for an unlicensed transmitter to listen before transmitting: This seems like a logical idea until consideration is given to the ways that an unlicensed device might be used. First, it implies that transmission on a given frequency cannot be continuous, which may or may not be feasible. In addition, there is an issue if such a device senses a clear frequency and begins using it, thereby blocking a licensed user from using it at a later time. This situation would be highly problematic for wireless audio system users, who might not be able to shift frequencies quickly enough to avoid interference in the middle of a live production.

H. Use of frequency agility and sharing protocols: In the future, frequency agility will be a key requirement for most types of wireless equipment, except perhaps for those that operate in a dedicated band. The key will be to find ways to prevent such equipment from inadvertently transmitting on frequencies where it may cause harmful interference. As we have noted, this is a problematic issue for unlicensed devices operating in the television broadcast spectrum. We believe it is much more manageable for devices that are assigned to use a specific band of frequencies, such as the 2.4, 3.65, or 5.5 GHz bands.

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

I. Standards for sharing between unlicensed users: If the Commission wishes to pursue a true “Spectrum Commons” regulatory policy for certain bands, then it should take a “hands off” approach to the establishment of standards for interworking. As described in the Spectrum Policy Task Force Report, users should be able to employ the common spectrum for whatever purpose they require, so long as they do not interfere with others. There are many ways in which unlicensed devices might be used that do not require users to be able to communicate with one another. On the other hand, standards are vital in a “one-to-many” scenario as typified by the broadcast bands. Historically, whenever the Commission has not acted to set a single standard, the marketplace has been unable to do so. As a result, the technology failed, as exemplified by the nearly defunct AM Stereo system.

CONCLUSIONS

We share the Commission’s desire to increase the amount of spectrum available for unlicensed use by the public. On the other hand, reliable high quality broadcast service is also vitally important to the public; particularly in times of national emergency. Accordingly, broadcast spectrum must be protected from any possibility of harmful interference. The establishment of a "Spectrum Commons" underlay permitting unlicensed devices to operate within the television broadcast bands could result in interference problems on a grand scale.

At the present time, the Commission is requiring television broadcasters to make a major investment in DTV transmitting equipment. Ultimately, every American family will have to buy either a new digital television or set-top converter box in order to continue to receive television programming. As Commissioner Martin has noted, given

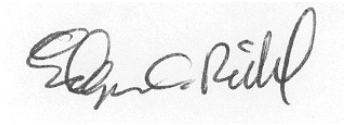
the scope of this undertaking, it seems imprudent to burden the television spectrum with millions of new unlicensed devices that could threaten its viability.[23]

Wireless microphones and other secondary users of television spectrum that are vital to broadcast program production would be especially vulnerable to interference from unlicensed wireless devices, and practical means of protecting them have not been identified. Indeed, because of the DTV transition, it is already difficult or impossible to find open TV channels in most major cities. Yet, in today's increasingly crowded RF spectrum landscape, the only satisfactory spectrum for reliable operation of these LPAS devices has been and continues to be secondary use of the Part 74 TV spectrum.

Respectfully submitted,

SHURE INCORPORATED

By:



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[23] *See*, *Additional Spectrum NOI*, Separate Statement of Commissioner Kevin J. Martin.