BEFORE THE
FEDERAL COMMUNICATIONS COMMISSION
Washington D.C. 20554

In the Matter of	)	
	)	
Initial Evaluation of the Performance of	)	
Prototype TV-Band White Spaces	)	**ET Docket No. 04-186**
Devices	)	
	)	
Unlicensed Operation in the TV	)	
Broadcast Bands	)	

COMMENTS OF SHURE INCORPORATED
REGARDING PROPOSALS FROM ENTITIES SEEKING
TO BE DESIGNATED TV BAND DEVICE DATABASE MANAGERS

The one or more database administrators ultimately selected by the Commission from the pool of private industry applicants will have enormous, unprecedented responsibilities with regard to the management of regulated radiofrequency spectrum, a public resource historically managed by the federal government.[1] The TV bands database will be the first line of defense against harmful interference capable of disrupting broadcast and live events enjoyed by millions of Americans. In the absence of

[1] *See Office of Engineering and Technology Invites Proposals from Entities Seeking to be Designated TV Band Device Database Managers*, Public Notice, ET Docket No. 04-186, DA 09-2479 (Nov. 25, 2009) ("*Database Administrator RFP*"); *see also* Comsearch Proposal to be Designated as a TV Band Device Database Manager, ET Docket No. 04-186 (filed Jan. 4, 2010) ("*Comsearch Proposal*"); Frequency Finder, Inc. TV Band Device Database Manager Proposal, ET Docket No. 04-186 (filed Jan. 4, 2010) ("*FFI Proposal*"); Proposal by Google Inc. to Provide a TV Band Device Database Management Solution, ET Docket No. 04-186 (filed Jan. 4, 2010) ("*Google Proposal*"); White Spaces Proposal by KB Enterprises LLC and LS Telcom, ET Docket No. 04-186 (filed Jan. 4, 2010) ("*KB Proposal*"); Key Bridge Global LLC Proposal to Administer a TV Bands Database, ET Docket No. 04-186 (filed Jan. 4, 2010) ("*Key Bridge Proposal*"); Neustar, Inc. Proposal for Designated TV Band Device Database Manager, ET Docket No. 04-186 (filed Jan. 4, 2010) ("*Neustar Proposal*"); Spectrum Bridge Inc. Response to PN DA-09-2479 Proposals for Designated TV Band Database Manager, ET Docket No. 04-186 (filed Jan. 4, 2010) ("*Spectrum Bridge Proposal*"); Telcordia Technologies Proposal Seeking to be Designated as a TV Band Device Database Manager, ET Docket No. 04-186 (filed Jan. 4, 2010) ("*Telcordia Proposal*"); WSdb, LLC Proposal to be Designated TV Band Device Database Manager, ET Docket No. 04-186 (filed Jan. 4, 2010) ("*WSdb Proposal*").

mature and reliable spectrum sensing techniques, the TV bands database will likely remain the exclusive means of protecting incumbent users for the foreseeable future.

Given the critical role the TV bands database will play in ensuring that higher priority incumbent services do not experience harmful interference, it is absolutely critical that the Commission thoroughly evaluate and validate the proposed database administrators and their untested, complex system architectures. Essential technical prerequisites for a database administrator include the ability to update registered incumbent user sites in near real-time and the implementation of effective security countermeasures capable of defeating sophisticated threats. It is also imperative that the administrator be an impartial, neutral party rather than an interested provider of unlicensed devices or technology that will have strong incentives to prohibit database access to incumbents and unaffiliated unlicensed devices. The Commission must also be careful to ensure that the prospective database administrators do not and cannot assume a policymaking role by imposing additional burdens or requirements on incumbent registrants in the database beyond those requirements expressly stated by the FCC in the Second Report and Order or upon reconsideration.[2]

I. REAL-TIME UPDATES AND SYNCHRONIZATION ARE NECESSARY TO PROTECT INCUMBENTS AND ENCOURAGE SPECTRAL EFFICIENCY

The selected database administrator(s) must offer near real-time updates and synchronization. These features are critical for protecting wireless microphone and other incumbent spectrum users, many of which have dynamic spectrum needs that can change dramatically in a matter of minutes. Shure and numerous other commenters in this

[2] *See Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, Second Report and Order and Memorandum Opinion and Order, 23 FCC Rcd 16807 (2008) ("*Second Report and Order*").

lengthy proceeding have explained how quickly the spectrum needs of wireless microphone incumbents can change.[3] For example, breaking events may require a news gathering team to quickly deploy equipment on frequencies that could not have been reserved in advance. Alternatively, unforeseen technical problems may force a frequency coordinator at a large sporting event, award ceremony or concert to reassign equipment to new, previously unreserved frequencies. Regardless of how the need arises, when new channels are needed immediately for incumbent use there must be a mechanism to accommodate these users and set aside channels. Proactively addressing this issue, the majority of proposals to administer a TV bands database include both a near real-time update feature (*i.e.*, immediate reservation of a channel requested by an incumbent user), and near real-time inter-database synchronization (*i.e.*, immediate communication of changes in channel status between competing databases to ensure that all administrators have current information).[4] Given that the majority of applicant proposals have voluntarily opted to implement near real-time updates and synchronization, and no applicant to administer a TV bands database has argued that these features create technical or financial burdens, Shure urges the Commission to select only applicants that can offer these features and to make near real-time updates and synchronization a mandatory obligation.

Moreover, the incorporation of near real-time updates and synchronization will encourage incumbent users to reserve channels only for the period of time they actually

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[3] *See e.g.*, Society of Broadcast Engineers Consolidated Reply to Oppositions to Petitions for Reconsideration, ET Docket No. 04-186 (filed May 18, 2009) (discussing the critical use of wireless microphones "when the unpredictable events that the public needs to know about occur"); *see also* Comments of Radio-Television News Directors Association, ET Docket No. 04-186 (filed Jan. 30, 2007) (noting that "when emergency situations arise wireless microphones must work immediately").

[4] *See Key Bridge Proposal* at 98-100; *SpectrumBridge Proposal* at 10, 22; *KB Proposal* at 14, 31; *WSdb Proposal* at 2(a)-5; *Telcordia Proposal* at 15.

need to operate on the frequencies, promoting spectral efficiency by making channels more rapidly available for unlicensed use after the conclusion of a protected incumbent's broadcast, production or event. Incumbents will not be motivated to "overbook" channels to ensure that late running events are protected from unlicensed devices that are mistakenly assigned incumbent frequencies still in use. If incumbents have a high degree of confidence that all TV bands databases are updating and synchronizing in near real-time, coordinators of incumbent operations will know that they can reserve channels "on the fly" if needed, and the incentive to "overbook" will be minimized.

II. BASIC SECURITY FEATURES ARE NEEDED TO PROTECT THE UTILITY OF THE WHITE SPACES AND MUST BE MANDATORY

The selected database administrator(s) must incorporate certain basic security features. Unlicensed TV Band Devices ("TVBDs") that operate co-channel with protected incumbents may disrupt live or broadcast events, and may also present an acute threat to public safety should they prevent breaking news, announcements and alerts from being disseminated. The record is replete with different scenarios that could compromise the database and result in intentional or accidental co-channel operations.[5] Given these abundant threats, it will be impossible to effectively "administer" the "white spaces" within the TV bands without basic security features. At a minimum, Shure asks the Commission to ensure that the following features are required in any TV bands database architecture that it approves.

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[5] *See, e.g.*, Key Bridge Global LLC Petition for Reconsideration, ET Docket No. 04-186, at 2-4 (filed Mar. 19, 2009) (discussing "primary security risks likely to affect an operational unlicensed TV Broadcast Bands regime" including "unauthorized transmitters" and "phantom databases"); *see also* Society of Broadcast Engineers, Inc. Petition for Reconsideration, ET Docket No. 04-186, at 22 (filed Mar. 19, 2009); Opposition and Comments of MSTV and NAB to Petitions for Reconsideration and Clarification, ET Docket No. 04-186, at 15-16 (noting the likelihood of "malicious" attacks on database administrators).

A. Confirmation of Device Certification at the Time of Frequency Assignment

The Commission's mandate that the FCC laboratory directly evaluate and certify unlicensed TVBDs is meaningless if the approved databases do not confirm the certification status of devices seeking channel lists of frequencies available for unlicensed use. Failure to confirm the certification status of a TVBD at the time of channel assignment could result in improper attempts to gain access to the database by rogue devices. It also makes the identification and deactivation of devices that have been recalled or otherwise prohibited from operating pursuant to an FCC instruction much more difficult, if not impossible, to oversee. Without a certification confirmation requirement individuals that are unknowingly operating devices that have been recalled may actually never realize that the operation of his or her unlicensed TVBD is prohibited. In contrast, if certification is required, the recalled device never has an opportunity to disrupt incumbent service because the database will not assign a channel for operation.

It is also critical for the FCC to require Mode II devices acting as hubs to convey the necessary information for a database administrator to confirm the certification status of Mode I personal/portable devices using the former as a conduit to gain channel list assignments. Given that Mode I devices are likely to be prolific, highly mobile, and the most likely type of device to come into close contact with wireless microphones operating at large venues, it is absolutely critical that the FCC and database administrators have the capability to accurately track, and, if necessary, prohibit transmissions from these devices. Only confirming the status of Mode II hub devices would be akin to checking the identification for the pilot of a commercial airline but none of the passengers.

Multiple database administrators agree that the confirmation of a device's certification status is critical to maintaining the integrity and utility of the TV broadcast bands.[6] Further, there is no additional cost or burden to the manufacturer or database administrator. Certification data can be passed in milliseconds between the registering unlicensed TVBD and the database administrator. The end user will not experience any delay, and the performance of the TVBD will be unaffected.

B. Implementation of Robust Authentication

Attacks on major corporate networks are becoming increasingly sophisticated and successful.[7] Any database approved by the Commission must be constructed to address these unfortunate but quite possible (and even perhaps likely) malicious third party attempts to spoof or hack the "white space" database(s). Strong authentication is the most effective deterrent against such security risks.

Strong authentication is readily implementable at little or no cost to the manufacturer.[8] There is no need for a manufacturer to develop proprietary technology given that "off the shelf" open standards exist and software development libraries are widely available.[9] Moreover, multiple database administrator applicants have already indicated that they will widely support a variety of authentication protocols.[10]

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[6] *See Key Bridge Proposal* at 64; *see also WSdb Proposal* at 5(b)-1.

[7] *See* Siobhan Gorman and Evan Perez, *FBI Probes Hack at Citibank*, The Wall Street Journal, Dec. 22, 2009 (noting that an attack on Citibank's network resulting in the theft of tens of millions of dollars "highlights the growing sophistication and threat posed" by foreign criminal networks targeting United States based facilities); *see also* Sarah Jacobsen, *Twitter Resets User Passwords in Wake of Phishing Attack*, PCWorld, Feb. 2, 2010 (discussing repeated phishing attacks during calendar year 2009 that compromised high profile Twitter accounts).

[8] *See e.g., Key Bridge Proposal* at 62-64.

[9] *See Id*.

[10] *See Id*.; *see also WSdb Proposal* 5(b)-1 through 5(b)-4.

End users will remain completely oblivious to the implementation of an authentication feature in their device, but will directly benefit from the effective added security. Specifically, the incorporation of authentication will create a strong disincentive for malicious third parties to "spoof" a database for the purpose of collecting sensitive, proprietary information about end users.[11] To the extent that a "spoofed" or "ghost" database is created, authentication will prevent it from creating widespread, devastating co-channel interference by inappropriately classifying occupied channels as available for unlicensed use. When the end user device fails to authenticate the database, the communication between the "spoofed" or "ghost" database and end user will end without a frequency assignment.[12] In short, without authentication you cannot obtain a channel assignment. At the same time, the incorporation of authentication will have no adverse effect on latency or throughput of fixed, Mode II or Mode I devices.

III. THE COMMISSION SHOULD APPOINT MULTIPLE COMPETITIVE ADMINISTRATORS

Shure supports the designation of multiple entities to operate the database. Competition between administrators will encourage fast and efficient registration for incumbents and non-discriminatory access for TVBDs. Competition will also prevent one entity from becoming the sole administrator of the TV broadcast bands, with *de facto* ability to hinder unaffiliated TVBDs and incumbents alike from gaining unfettered access to the database.

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[11] For example, strong authentication will protect sensitive and closely guarded frequencies at major events from becoming available to malicious third parties that may attempt to jam signals or record the underlying content.

[12] Of course, the end user is free to re-query an FCC-approved TV bands database for an accurate channel assignment.

IV. NEUTRALITY IS CRITICAL TO THE EFFECTIVE ADMINISTRATION OF THE "WHITE SPACES"

The public interest requires that the database should not be operated and controlled by parties that stand to gain from the selection of open channels. A manufacturer of unlicensed TVBDs will be highly motivated to limit protections to incumbents in an effort to open more spectrum for the operation of its own equipment and/or to give preferential channel assignments and other benefits to its own customers. While Shure would hope that companies participating in the database proposal process would not engage in discriminatory, preferential treatment, as a matter of sound public policy, it is essential for the Commission to ensure the impartiality of the chosen database administrator or administrators by requiring the administrator to be a neutral party unaffiliated, directly or indirectly, with any interested party.

The Commission has previously stated that a database overseeing telecommunications resources should be impartial to "ensure. . . timely and efficient access" to public resources, and also "neutral in order to maintain the trust and confidence of the entities that submit sensitive data."[13] Imposing a similar standard for impartiality and neutrality on TV bands database administrators would promote the Commission's long-standing goals in this proceeding of making spectrum available for unlicensed use while ensuring that all incumbent services are protected from interference.[14] It would also promote timely and efficient access to the database and trust in the administrator, both of which are critically important to incumbents, including

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[13] *See Request of Lockheed Martin Corporation and Warburg, Pincus & Co. for Review of the Transfer of the Lockheed Martin Communications Industry Services Business*, Order, 14 FCC Rcd 19792, at ¶ 24 (rel. Nov. 17, 1999) ("*NANPA Neutrality Order*").

[14] *See Unlicensed Operation in the TV Broadcast Bands; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, Notice of Proposed Rulemaking, ET Docket Nos. 04-186, 02-380, FCC 04-113, at ¶ 2 (2004) ("*NPRM*").

wireless microphone users who have historically treated frequencies and channel assignments as highly proprietary and operationally sensitive information.

Several potential applicants seeking authority to administer a TV bands database fall short of satisfying the threshold for an impartial, neutral administrator. Specifically, the proposal including Shared Spectrum Company ("SSC") as a team member should be subjected to close scrutiny given that SSC is a potential provider of unlicensed TVBDs or unlicensed TV device technology. SSC, together with Microsoft Corp., a prospective provider of White Space devices and long-time advocate for repurposing the unassigned core TV bands for unlicensed White Space devices use, has vigorously advocated for the reduction of wireless microphone user rights to interference protection.[15] It is impossible to reconcile the need for an impartial, neutral database administrator with an applicant's public advocacy campaign to limit protections of the incumbent services that the database is designed to protect. Absent a firm neutrality requirement, this would be the classic case of the "fox guarding the henhouse."

V. DATABASE ADMINISTRATORS CANNOT CREATE NEW REQUIRMENTS THAT ARE DIFFERENT OR BEYOND WHAT IS EXPRESSLY STATED BY THE COMMISSION

The Commission should reject proposals that indicate that the prospective administrator intends to impose requirements on the access to the database that are not set forth in the FCC's Second Report and Order or adopted by the Commission on

[15] In pressing the Commission to cut back on wireless microphone protections, SSC and Microsoft submitted to the FCC a flawed "engineering" study that contradicts years of engineering and analysis conducted by the Commission's engineers regarding a wireless microphone's ability to tolerate interference without suffering a degradation in performance. Shure provided a detailed critique of the SSC/Microsoft filing. *See* Edgar C. Reihl, P.E., *Analysis and Review of the Report on "The impact of man-made noise on protection requirements for wireless microphones" Commissioned by Microsoft and Performed by Shared Spectrum Company*, Nov. 30, 2009, submitted as an attachment to the ex parte letter of Catherine Wang, Bingham McCutchen LLP, to Julius P. Knapp, ET Docket No. 04-186 (Nov. 30, 2009).

reconsideration. Database administrators are not policy makers and are not authorized to determine the substantive rights of incumbent users of TV band spectrum, including wireless microphones. The FCC has carefully and expressly stated what information is needed to register a wireless microphone for protection in the database.[16] The Commission must make clear that it is wholly inappropriate for an administrator to try to alter this set of required information by performing a private assessment of the social or economic value of the incumbent activity to be registered, the license status of the incumbent attempting to register, eligibility for interference protection, or any other matter not specified in the rules. This information is not subject to challenge or expansion at the whim of a database administrator regardless of the administrator's intentions or purpose. They must apply the FCC rules as stated until such time as there is a change in the rules, if and when such a change occurs. To let a database administrator implement its own separate set of database access policies would be an inappropriate delegation of Commission authority and a patent corruption of the administrative process. To the extent that at a later date a database administrator attempts to implement obstacles that unnecessarily hinder a microphone user's ability to register his or her equipment in the database, Shure will expect the Commission to take immediate and forceful action to rectify such an abuse of power.

[16] *See Second Report and Order* at ¶ 220.

Respectfully submitted,

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