

October 23, 2008

**VIA Electronic Mail**

Hon. Kevin J. Martin  
Chairman  
Federal Communications Commission  
445 12th Street, S.W.  
Washington, DC 20554

Re: Unlicensed Operation in the TV Broadcast Bands, ET Docket No. 04-186

Dear Chairman Martin:

Shared Spectrum Company (SSC) hereby submits for the record in the above-captioned proceeding a paper entitled "Using Joint Detection to Allow Safe Operation of Television Band 'White Space' Devices," a previous version of which was recently presented at the 3rd IEEE International Symposium on New Frontiers in Dynamic Spectrum Access Networks (Chicago, IL, Oct. 14-17, 2007). This paper reports the results of a study and analysis conducted by SSC to determine a range of detection thresholds at which new dynamic spectrum access (DSA) devices can safely operate in unoccupied spectrum allocated to terrestrial television broadcasting and other services without causing harmful interference.

SSC's paper shows that to prevent harmful interference to DTV stations, to avoid the "hidden node" problem and to minimize false alarms, a simple joint detection approach can work effectively at reasonable detection thresholds that can vary depending on the DSA devices' output powers. Specifically, when sensors are paired as indoor and outdoor nodes, the combined information increases the probability of successful detection, ensuring that if one sensor is affected by shadowing or local propagation loss the other sensor is able to provide a more accurate picture. Based on SSC's analysis of data collected by the synchronized nodes at several locations in Northern Virginia from 13 DTV stations, the paper makes the following conclusions:

- The Listen-Before-Talk, threshold-based approach is an effective dynamic spectrum access technique in the TV white spaces *when joint detection is used*.
- When joint detection is used, a DSA system using a 10 W transmitter and sensing the DTV pilot threshold at *-130 dBm* (-118.5 dBm DTV signal power level) results in no or minimal harm and potentially acceptable false alarm rates, but an additional 10 km keep-out distance around the DTV station's contour is suggested.
- When joint detection is used, a DSA system using a 100 mW transmitter and sensing the DTV pilot threshold of *-120 dBm* (-108.5 dBm DTV signal power level) would result in no harm and potentially acceptable false alarms rates.

The false alarm rate caused by detection of distant TV transmitters when the DSA device was located outside of the service contour was still significant (20-40 percent using the above threshold values), but this would be acceptable if sufficient bandwidth is available in other open channels.

We hope that this submission is both helpful to the Commission and timely as it nears a decision in the TV White Spaces rulemaking. The Commission's impending action would mark an important step

in the nearly 8-year effort to achieve greater spectrum efficiency through access to the unused white spaces in the TV bands by means of innovative technologies like those that SSC has developed.

By way of background, in June 2000, SSC first proposed to the Commission that it open up access to the TV bands to software defined radios (SDRs) that would provide cost-efficient, high capacity data transmission, especially in rural areas, while employing various means to ensure against harmful interference to TV receivers.<sup>1</sup> Since then, not only has SSC supported this proceeding and other Commission initiatives to promote secondary spectrum markets, cognitive radios and innovative spectrum sharing, but it has successfully developed and demonstrated for the military technologies that enable dynamic access to the radio frequency spectrum using advanced communications protocols and sensing capabilities that avoid causing harmful interference to existing users. These advanced, proven spectrum sharing technologies will enable military, public safety, critical infrastructure, industrial and commercial radio networks to dynamically adapt to changing spectrum needs and environments under the control of software-based usage policies and network management tools. By providing flexible access to a wide range of devices and services that possess the necessary “cognitive” capabilities to protect (and potentially enhance) incumbent operations in the TV bands, the Commission should establish a clear glide path for fostering further spectrum access innovations and rapidly bolstering broadband penetration, especially in rural areas.

SSC commends the Office of Engineering and Technology (OET) and those parties who participated in the prototype testing as they undertook unprecedented efforts to prove the concepts of spectrum sensing and sharing in the TV bands. Based on these efforts and the comprehensive record before it, the Commission should proceed both expeditiously and cautiously to (1) authorize high power fixed DSA operations in the TV bands and (2) continue the close examination of inexpensive and safe sensing-based approaches for deploying personal/portable devices. At the same time, the Commission should avoid adopting an inflexible, one-size, fits-all interference avoidance approach with particular predetermined parameters or outdated processes. As other parties in this proceeding have recognized, multiple interference avoidance methods must be available, including those analyzed by SSC in the attached paper.

As we did in our previous filings, SSC also urges the Commission not to foreclose the use of higher powered fixed, networked DSA systems in the TV white space bands.<sup>2</sup> If the true benefits of the TV white spaces are for rural broadband services, it is incumbent upon the Commission to allow systems with advanced dynamic spectrum access capabilities to operate with as much as ten (10) watts in appropriate circumstances. In addition to high-quality detection features like those discussed in the attached paper, such systems can be centrally controlled by network operators to ensure quick remediation of real and potential interference incidents by any base or subscriber unit. Moreover, contrary to a recent press report and to set the record straight, Shared Spectrum Company is a small business hoping to overcome longstanding regulatory barriers to the introduction of innovative technologies and we have absolutely no intention (or ability) to “wear down” the Commission.

Based on a common objective of promoting the evolutionary deployment of a wide range of devices and broadband services that compliment – not conflict with – the DTV transition, SSC recommends the adoption of equipment certification procedures that provide the FCC’s Lab, Telecommunications Certification Bodies (TCBs), industry standards organizations, incumbent licensees, equipment manufacturers, software developers, service providers and other stakeholders flexible but meaningful guidance on an acceptable range of capabilities that such devices and systems must now and

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<sup>1</sup> See Comments of Shared Spectrum Company in ET Docket No. 00-47, *Inquiry Regarding Software Defined Radios* (June 14, 2000).

<sup>2</sup> See Reply Comments of Shared Spectrum Company in ET Docket Nos. 04-186 and 02-380 (Jan. 31, 2005).

over time possess. Which capabilities are required to earn certification would depend on the intended implementation of a particular device or class of devices, interference avoidance test results and other risk factors. From this guidance, an entrepreneurial, innovation-based ecosystem can flourish.

DSA technology gives rise to the possibility of a new regulatory approach that is effective and highly adaptive. It permits an evolutionary approach that does not require extensive *ex ante* regulation of the introduction of new technology, but still gives existing users assurance against harmful interference. To permit an orderly and timely development of optimal configurations while, at the same time, allaying concerns regarding the possibility of destructive interference, SSC suggests that the Commission authorize the use of the TV bands by new DSA devices subject to the simple requirement that they do not cause harmful interference to protected licensees along with (1) a fair testing and evaluation process that proves they don't and (2) meaningful and reliable *ex post* dispute resolution and enforcement mechanisms.

Accordingly, Shared Spectrum Company urges swift action in this proceeding so that innovation can carry forth. Please do not hesitate to contact the undersigned should you need additional information or have any questions.

Sincerely,

/s/ Mark A. McHenry  
Mark A. McHenry  
President

/s/ Peter A. Tenhula  
Peter A. Tenhula  
Vice President and General Counsel

Enclosure: "Using Joint Detection to Allow Safe Operation of Television Band 'White Space' Devices"

cc (w/ enclosure): Commissioner Michael J. Copps  
Commissioner Jonathan S. Adelstein  
Commissioner Deborah Taylor Tate  
Commissioner Robert M. McDowell  
Mr. Julius Knapp