July 19, 2010

Ex Parte

Julius Knapp
Chief
Office of Engineering and Technology
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

Re: Unlicensed Operation in the Television Broadcast Bands, ET Docket No. 04-186; Amendment of Parts 15, 74, and 90 of the Commission's Rules Regarding Low Power Auxiliary Stations, ET Docket No. 10-24, WT Docket Nos. 08-166, 08-167; Fostering Innovation and Investment in the Wireless Communications Market, GN Docket No. 09-157

Dear Julie,

Thank you for taking the time to meet with a number of us recently to discuss how to open up vacant television band spectrum ("white spaces") for unlicensed broadband use in the near term. The 19 undersigned companies and organizations share the Commission's enthusiasm about the potential use of white spaces for a wide range of innovative applications and services, and remain committed to working with the Commission to realize this goal. Unlicensed access to white spaces spectrum will not interfere with any potential future Commission decision to repurpose the television bands. The Commission should proceed to issue its final order on reconsideration and move forward with white spaces as soon as possible.

We are also pleased to read the President's memorandum on June 28 that supports, among other issues, identifying and releasing 500 MHz of federal and commercial spectrum, and redeploying spectrum to high-value uses such as wireless broadband. We believe that the FCC efforts on TV white spaces and the Administration's intent on spectrum, if deployed and managed in a thoughtful way, would increase industry's contributions to realizing the economic, strategic and public policy goals outlined in the FCC's National Broadband Plan.

Companies have already made substantial investments and plan to accelerate ongoing investments in the development of white spaces solutions and we look to the Commission to establish favorable final rules. The rules should eliminate the sensing requirement for devices that use geolocation technologies; treat unauthorized wireless microphones as Part 15 devices rather than broadcast licensees; relax rules regarding antenna height restrictions for fixed devices; reduce the protection radius for Part 74 personal/portable devices; and authorize multiple database administrators. Once the Commission addresses these considerations, we look forward to redoubling our efforts to develop innovative white spaces solutions and to fully realize the potential of this spectrum and the Commission's vision.

We write today, however, to reiterate (1) the substantial benefits of enabling access to unlicensed spectrum below 1 GHz; and (2) that white space technologies will allow flexibility for any future reallocation of television spectrum.

1. Access to the White Spaces Will Enable New Applications and Services that Are Not Feasible Using Unlicensed Spectrum at Higher Frequencies.

As the Commission is aware, spectrum below 1 GHz has uniquely favorable propagation characteristics.[1] White spaces frequencies, which range from 54 MHz to 698 MHz, will enable applications and services that dramatically improve upon networks using existing unlicensed frequencies, including the 2.4 GHz and 5 GHz bands currently used for Wi-Fi. This will result in a great advance in the wireless broadband ecosystem. Transmissions using white spaces frequencies can attain a greater range for the same power—or the same range with lower power consumption—than existing higher frequency unlicensed bands.[2] The improvements in range and/or power consumption are exceptionally important. In fact, the substantially better propagation characteristics of spectrum below 1 GHz permit each node of a wireless network to take advantage of dramatically improved range—potentially three to five times greater than a Wi-Fi network node—using otherwise identical operating parameters. This range increase, in turn, may expand network coverage by a factor of nine.[3] At ranges below maximum transmit power, enhanced white spaces devices would be able to employ power levels lower than those necessary today with Wi-Fi and thus greatly extend battery life, which would also pay an environmental dividend.[4] In addition, spectrum below 1 GHz is better able to penetrate walls and other structures, making a white spaces-based network viable for users operating indoors who are less likely to receive a usable signal at higher frequencies.[5]

The American public stands to benefit greatly from the utilization of white spaces through devices and applications that are not possible using traditional Wi-Fi. The utilization of unlicensed white spaces spectrum below 1 GHz will unlock powerful innovations benefitting consumers, as well as commercial, educational, healthcare, industrial, and government organizations.[6] Such benefits include new wireless devices and reliable broadband connectivity; increased broadband access, particularly for those who live in underserved areas; seamless and

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1 *See, e.g., Unlicensed Operation in the TV Broadcast Bands, Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket Nos. 04-186 and 02-380, First Report and Order and Further Notice of Proposed Rulemaking, ¶ 1 (Oct. 12, 2006).

2 Richard Thanki, *The Economic Value Generated by Current and Future Allocations of Unlicensed Spectrum* (Sept. 2009) GN Docket Nos. 09-157 and 09-51, at 6 (filed Nov. 5, 2009) ("Thanki Report").

3 *See, e.g.*, *Reply Comments of Microsoft Corporation*, GN Docket Nos. 09-157 and 09-51, at 8-9 (filed Nov. 5, 2009) ("Microsoft Innovation Reply Comments"); *See also* Thanki Report at 51.

4 Thanki Report at 52.

5 Microsoft Innovation Reply Comments at 8-9.

6 *See, e.g.*, Thanki Report at 50, fig. 34.

reliable communication networks for emergency responders; and increased connectivity for classrooms.[7]

Unlicensed applications that would be enabled or improved by the use of white spaces spectrum include consumer electronics that have a range of radios allowing users to automatically switch from White Spaces to Wi-Fi to Bluetooth to CMRS as the environment or applications demand; whole-home wireless networks that have the throughput and range to connect every device on multiple floors; larger and more reliable commercial hotspots; relief for overburdened campus networks; wireless records management, process monitoring, control, and automation for municipalities or large enterprises; wide-area systems control and sensor networks; and significantly more effective and longer-range home/premises monitoring/control and smart metering.[8]

Significant work is being done to develop Wi-Fi products that can be used in the TV white spaces. The IEEE's 802.11af Task Group is currently working on specifications to extend 802.11 Wi-Fi signaling into the TV white spaces bands. In June, the Wi-Fi Alliance started work on white spaces that will build on the IEEE 802.11af standard to create test plans and deploy a product certification program.

In addition to many of the undersigned companies and organizations, members of the Wi-Fi Alliance supporting this effort include a diverse group of network operators, chip vendors, device manufacturers, and other companies supporting the Wi-Fi Alliance's activities. This effort illustrates that a significant segment of the industry is gearing up for the white spaces opportunity.

Recent demonstrations using experimental licenses in numerous locations have demonstrated the real-world potential of white spaces.[9] White spaces spectrum is being used on an experimental basis today for numerous applications, and in numerous locations, where use of unlicensed spectrum at higher frequencies or wireline infrastructure is infeasible. These uses include non-mission critical public safety applications; water level and water purity sensors; flood control and remote control of municipal facilities; public Internet hot spots and control of utility infrastructure, including broadband connectivity to remote substations; remote monitoring and management of electricity use; and providing broadband Internet access to underserved and remote locations.[10]

The city of Wilmington, North Carolina—which was the first city to complete the DTV transition—has operated an experimental white spaces network since December 2009 in an

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7 *See, e.g.*, Dell, Inc. and Microsoft Corp., *Notice of Ex Parte*, GN Docket Nos. 09-47, 09-51, 09-137, and 09-157; ET Docket Nos. 10-24 and 04-186; WT Docket Nos. 08-166 and 08-167 (filed Mar. 5, 2010).

8 *See, e.g.*, Thanki Report at 50, fig. 34.

9 *See, e.g.*, Spectrum Bridge Inc., *Observations and Conclusions from Experimental Deployment of TV White Space Networks* (June 2010), ET Docket No. 04-186 (filed Jun. 24, 2010) ("Spectrum Bridge Report").

10 Spectrum Bridge Report at 7, 9.

urban/suburban environment. This trial utilizes a large number of radios operating to demonstrate "Smart City" applications. In addition to public Internet access "hot spots," the network is in the early stages of supplying low-cost broadband to a low-income housing development with a population of 420 residents. The network also includes government and public service applications (*e.g.*, remote cameras on evacuation routes), water level and water purity sensors for EPA compliance, flood control, and monitoring of city facilities (*e.g.*, lights in city parks). The use of white spaces for these applications was ideal because the cost of connecting outlying locations was made affordable by the inherent Non-Line of Sight performance advantages of white spaces spectrum. As a result of the success of this network, the city and county will add new applications, including remote monitoring and control of critical bridge and highway/traffic infrastructure. Based on the results of this demonstration, the State of North Carolina has expressed interest in building a statewide network similar to the Wilmington network once the white space rules are finalized.[11]

In addition, Microsoft last year implemented an experimental white spaces-based network—known as the "White-Fi" network—on its Redmond, Washington campus. This network provides wireless broadband connectivity on Microsoft's Redmond campus, including in fixed and vehicular-mounted environments. This level of network connectivity is impractical using existing unlicensed spectrum at 2.4 GHz or above.

Finally, Google, Spectrum Bridge, and Plumas-Sierra Rural Electric Cooperative ("PSREC") earlier this month launched the nation's first "Smart Grid" wireless network trial for electricity networks using white spaces spectrum in Plumas County, California. The Smart Grid network provides real-time broadband connectivity to remote substations and switchgear, enabling PSREC to (1) manage the electrical system remotely, (2) obtain critical data from substations, (3) manage power flow, and (4) protect the system and employees while maintaining the local grid. In addition, the Smart Grid network uses Google's PowerMeter technology, which includes free energy monitoring tools that enable consumers to save energy and money by providing access to energy consumption information.[12]

2. White Space Devices Will Allow Flexibility for Any Future Reallocation Decisions in the Television Broadcast Bands.

A Commission decision allowing unlicensed access to white spaces spectrum in no way would interfere with its potential future decision to repurpose parts of the television bands for mobile broadband use. The Commission's current rules require that white spaces devices be uniquely flexible and spectrum agile, since they must query a database to determine the spectrum available for use at their location. Databases can easily send new lists of acceptable and

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[11] Spectrum Bridge Report at 7-8.

[12] *See* Google PowerMeter, *available at* http://www.google.com/powermeter/.

unacceptable frequencies to associated devices as required. White spaces devices therefore will be designed to specify and identify a wide range of frequencies for available use.[13]

The National Broadband Plan recommends that the FCC "move expeditiously" to complete the white spaces reconsideration order, and then proceed to "evaluate the impact on the viability of use of TV white spaces" as it considers other, longer term changes to the TV band that will free up additional spectrum for broadband.[14] In addition, the Plan recommends that, "[a]s the FCC seeks to free up additional spectrum for broadband, it should make a sufficient portion available for use exclusively or predominantly by unlicensed devices."[15] If the Commission were to repurpose broadcast spectrum in the future, databases could be updated to reflect the new band plan. Operation in only newly authorized frequencies would apply to all white spaces devices, even those devices that are already in consumers' hands. A database would enable any white spaces devices in the field to use or avoid new spectrum bands within their frequency ranges—whether within a dedicated unlicensed range of television spectrum or not—without any action on the part of consumers.

In short, the Commission can consider television band repurposing without fear that white spaces devices will make its job more difficult.

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We share the Commission's enthusiasm that unlicensed broadband access using the white spaces will enable the development and use of applications—starting with those described briefly above, but more importantly others that innovators have not yet imagined. Upon final rules, companies and organizations look forward to pursuing white spaces technology and driving white spaces solutions into the marketplace that offer consumers additional broadband choices.

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[13] As long as manufacturers know that they may have to retune all white spaces devices to another frequency band or set of bands within what is currently the television band – they will build devices that can do this easily. White spaces radios are not infinitely tunable, of course.

[14] Federal Communications Commission, *Connecting America: The National Broadband Plan*, Recommendation 5.12, at 95 (2010).

[15] *Id.*, Recommendation 5.11 at 94-95.

Sincerely,

Atheros Communications, Inc.

Broadcom Corporation

Comsearch

Dell Inc.

Google Inc.

Hewlett-Packard Company

LG Electronics

LS telcom AG

Marvell Semiconductor, Inc.

Microsoft Corporation

Motorola, Inc.

Nokia Inc.

Research In Motion Limited

Skype Technologies

Spectrum Bridge Inc.

Telcordia Technologies, Inc

TV Band Service LLC

Wireless Internet Service Providers Association

WSdb, LLC

cc: Chairman Genachowski
Commissioner Copps
Commissioner McDowell
Commissioner Clyburn
Commissioner Baker