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August 1, 2016

Ex Parte

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street SW
Washington, DC 20554

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

Dear Ms. Dortch:

On July 28, 2016, I spoke via telephone with Matthew Hussey, Associate Chief (Policy) in the Office of Engineering & Technology. We discussed the attached Status Update on the TV White Space Connectivity Ecosystem and Project Deployments.

Pursuant to the Commission's rules, a copy of this notice is being filed electronically in the above-referenced docket. If you require any additional information, please contact the undersigned.

Sincerely,

/s/ Paula Boyd

Paula Boyd
Director, Government and Regulatory Affairs
MICROSOFT CORPORATION

Encl.

cc: Matthew Hussey

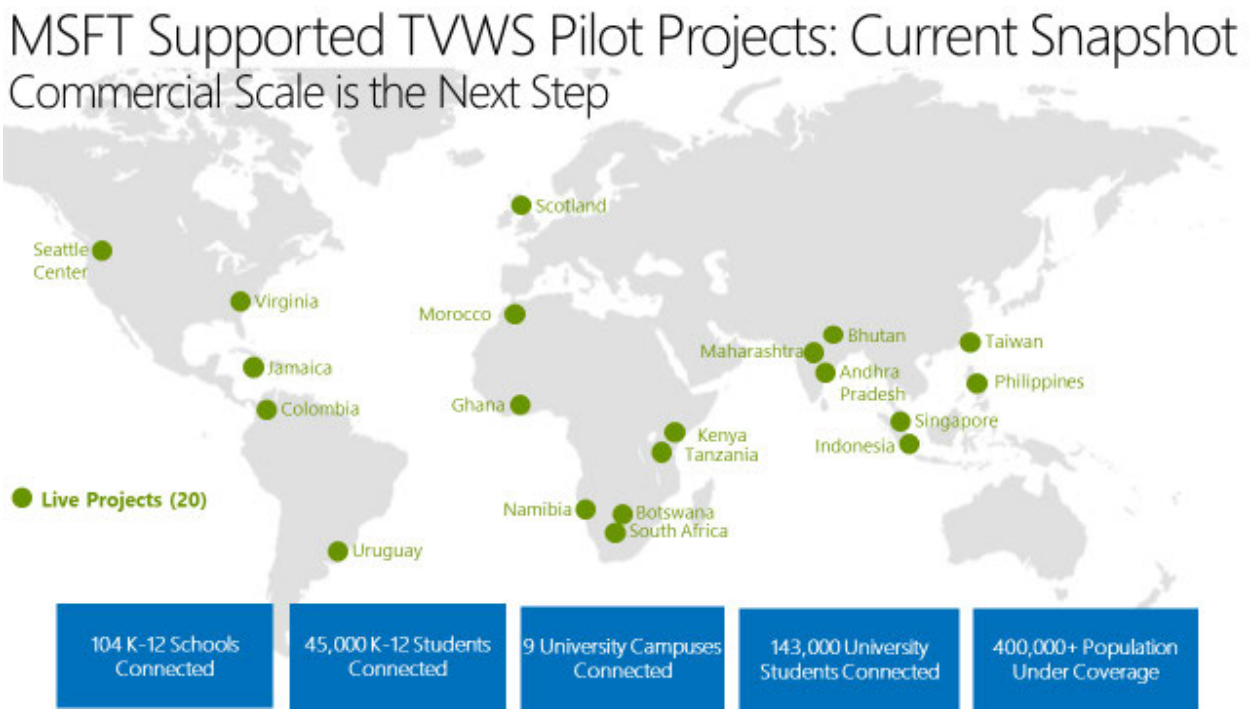
Status Update on the TV White Space Connectivity Ecosystem and Project Deployments

The building blocks are falling into place for a globally scalable marketplace for devices capable of dynamically accessing unused TV white space spectrum. Numerous standards have been developed including the IEEE's 802.11af standard for Wi-Fi in the television white space spectrum and the IEEE 802.22 standard for wide area networks. Each of these advances is creating opportunities for vendors to begin product development. Indeed, while current TV white space technologies are based on proprietary technologies, the first generation of standards-based devices are in development. Mediatek, for example, notably demonstrated its first tri-band 5 GHz, 2.4 GHz, and TV white spaces prototype based on the 802.11af Wi-Fi standard in a recent trial in Glasgow, Scotland. Several companies have announced plans to manufacture devices incorporating MediaTek's first generation 802.11af chipset.

Moreover, the IETF PAWS standardized protocol for device to database communication is now stable, with devices and databases now deploying to meet the draft standard. And, the TV white space database providers have developed a specification for database-to-database communication, which is being extended to countries beyond the United States. In Europe, the ETSI BRAN has completed and approved EN 301 598, which could become the European (and by default African) standard for TV white space devices.

A variety of private and public sector entities currently are involved in deployments of TV white spaces technologies on five continents. Microsoft, for example, has partnered with network operators to deploy TV white space networks in 20 countries already. Many of these projects are commercial deployments combining different licence-exempt and licensed wireless technologies, including TV white spaces, in places ranging from the densest urban environments to rural areas lacking even electricity and encompassing both broadband and machine-to-machine communications.[1] These deployments are helping address key policy challenges around digital and social inclusion and are improving citizen access to education, healthcare, and government services. These projects are increasing available bandwidth and are helping to make wireless connectivity more ubiquitous and affordable. They are having real impact on people's lives. The map below illustrates the current reach of Microsoft's pilot projects.

[1] *See, e.g.,* http://research.microsoft.com/en-us/projects/spectrum/pilots.aspx.



In Virginia, USA, Microsoft and the Mid-Atlantic Broadband Communications Corporation (MBC) are using TV White Space technology to extend broadband access to unconnected primary and secondary students in rural, high-poverty school districts. Thanks to the success of the FCC's E-Rate program most schools in the United States have Internet access; however, millions of American schoolchildren – disproportionately those who are low-income – lack broadband connections at home.

To address this "homework gap", this project leverages fiber optic broadband connectivity MBC has already deployed to 159 K-12 public schools serving over 70,000 students in Southern Virginia. In this proof-of-concept project, MBC will leverage the fiber optic connectivity already provided to schools and install TV white spaces base stations at the schools to extend the reach of broadband access into the surrounding communities. These TV white space base stations will enable students to connect to safe school district networks from home and access content and applications needed to complete their homework assignments. Students will connect to the TV white space network through a Wi-Fi access point which includes TV white space technology for last mile connectivity and which is manufactured by Adaptrum, a Silicon Valley startup.

Phase I of this project focuses on the Southern Virginia counties of Halifax and Charlotte, specifically 18 schools with approximately 7,500 students. Halifax and Charlotte were chosen as the first deployment locations based on the availability of MBC fiber-optic connectivity to the schools, the presence of existing towers at the schools, and a significant opportunity for impact in these communities with a general lack of widespread affordable broadband options. The TVWS connectivity in Halifax and Charlotte counties will be made available to approximately 3,500 students who, according to the respective school districts, lack broadband Internet access at home.

Microsoft is not the only company involved in such deployments. TV white space technology is now being deployed globally. These deployments have taken place in locations as diverse as the United States, Namibia, the United Kingdom, South Africa, Singapore, Japan, South Korea, Ghana, the Philippines, Kenya, Tanzania, and Malawi.

Each of these projects has occurred with the support and authorizations from the relevant regulatory authorities. In all cases, access to the Internet was expanded and/or improved without causing interference to incumbent users, including broadcasters. Indeed, across all of these projects there has not been a single report of harmful interference to incumbent users, including broadcasters. More information on trials, pilot projects, and commercial deployments is available on the Dynamic Spectrum Alliance's website.[2]

[2] *See* http://www.dynamicspectrumalliance.org/pilots.html.