

**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of)	
)	
Competitive Bidding Procedures and Certain)	AU Docket No. 17-182
Program Requirements for the Connect)	WC Docket No. 10-90
America Fund Phase II Auction (Auction 903))	

To: The Commission

COMMENTS OF MICROSOFT CORPORATION

Microsoft Corporation (“Microsoft”) hereby submits its Comments in response to the Commission’s Public Notice in the above-captioned proceeding.¹ Microsoft shares the Commission’s commitment to closing the rural broadband gap. As evidenced in its 2017 white paper setting forth a blueprint for connecting rural America,² Microsoft’s vision aligns closely with the Commission’s Connect America Fund (“CAF”) Phase II auction goals.

Microsoft supports the use of both licensed and unlicensed spectrum bands for “last mile” service to meet the CAF Phase II obligations. Microsoft urges the Commission to add

¹ *Comment Sought on Competitive Bidding Procedures and Certain Program Requirements for the Connect America Fund Phase II Auction (Auction 903)*, Public Notice, FCC 17-101, rel. Aug. 4, 2017 (“Auction Public Notice”).

² *See, A Rural Broadband Strategy, Connecting Rural America to New Opportunities*, Microsoft, May 2017, <https://msblob.blob.core.windows.net/ncmedia/2017/07/Rural-Broadband-Strategy-Microsoft-Whitepaper-FINAL-7-10-17.pdf>.

Television White Spaces (“TVWS” or “TV White Spaces”) spectrum to the list of suitable spectrum bands, set forth in Appendix B to the *Auction Public Notice*. Deployment of broadband in TV White Spaces spectrum will meet or exceed the minimum performance requirements and other criteria established by the Commission, offering service providers an important option for the provision of broadband service to rural and remote areas.

I. Background

In the *Auction Public Notice*, the Commission initiates the pre-auction process for the CAF Phase II auction, which will award universal service fund support to service providers that commit to offer voice and broadband services to fixed locations in unserved high-cost areas.³ Among the issues raised in the *Auction Public Notice*, the Commission seeks comment on how an applicant can become qualified to participate in the auction.⁴ With regard to wireless broadband service, the Commission proposes:

Requiring each applicant that intends to use radiofrequency spectrum to submit certain types of information regarding the sufficiency of the spectrum to which it has access to aid Commission staff in determining whether the applicant is expected to be reasonably capable of meeting the public interest obligations for each performance tier and latency combination that it selected in its application.⁵

³ *Auction Public Notice* at ¶ 1.

⁴ *Id.* at ¶ 3.

⁵ *Id.* at ¶ 37.

The Commission’s proposal is consistent with the rules for participating in competitive bidding for the Remote Areas Fund.⁶

In Appendix B to the *Auction Public Notice*, the Commission identifies “the spectrum bands that could be used for the last mile to meet Phase II obligations....”⁷ The Commission lists a total of 19 spectrum bands and/or services, including three unlicensed bands, and the CBRS band, where General Authorized Access (“GAA”) users will be “licensed by rule.” The Commission asks whether there are “other spectrum bands than can offer sufficient uplink or downlink bandwidth – individually or in combination – to meet the various performance tier and latency combination qualifications.”⁸ The Commission also asks whether it should “consider the differences between licensed and unlicensed spectrum ... when evaluating whether an applicant has sufficient spectrum resources.”⁹

⁶ See, 47 CFR §§ 54.315(a)(6) and 54.804(a)(6) (“To the extent that an applicant plans to use spectrum to offer its voice and broadband services, demonstrate it has the proper authorizations, if applicable, and access to operate on the spectrum it intends to use, and that the spectrum resources will be sufficient to cover peak network usage and deliver the minimum performance requirements to serve all of the fixed locations in eligible areas, and certify that it will retain its access to the spectrum for at least 10 years from the date of the funding authorization.”)

⁷ *Id.* at ¶ 40 and Appendix B.

⁸ *Id.* at ¶ 40.

⁹ *Id.* at ¶ 40.

II. Microsoft Is Committed To Connecting Rural America

Microsoft's call for a new strategy on rural broadband connectivity reflects, in part, its own experience as a company working around the world to make use of TV White Spaces spectrum. Microsoft has deployed 20 TV White Spaces projects in 17 countries that have served 185,000 users. Microsoft has committed to invest in partnerships with telecommunications companies with the goal of bringing broadband connectivity to two million people in rural America by July 4, 2022.

Microsoft and its partners will have 12 projects up and running in 12 states in the next 12 months. Microsoft's goal is not to enter the telecommunications business itself or even to profit directly from these projects. Rather, Microsoft will invest in the upfront capital projects needed to expand broadband coverage, seek a revenue share from operators to recoup its investment, and then use these revenue proceeds to invest in additional projects to expand coverage further. As part of this effort, Microsoft will also license intellectual property for free and provide technical training.

III. TV White Spaces Spectrum Offers An Important Option For The Provision Of Broadband Service To Rural Areas

The Commission should add TV White Spaces spectrum to the list of suitable spectrum bands in Appendix B. Broadband deployment using the TVWS spectrum will meet or exceed the minimum performance requirements and other criteria established by the Commission. TV White Spaces offer operators a stand-alone solution or a critical piece of a hybrid solution to

serving rural areas. Further, technology neutrality requires that TV White Spaces be included with the other spectrum bands initially identified by the Commission.

A. The Provision Of Broadband In TV White Spaces Spectrum Meets Or Exceeds The Minimum Performance Requirements

The use of TV White Spaces for the provision of broadband service meets the minimum performance criteria specified by the Commission: throughput of 10 Mbps/1 Mbps or greater, and latency of less than 100 milliseconds, meeting the Commission’s requirements for “low latency.” In rural and remote areas, there will be more than enough vacant TV channels to support the minimum performance requirements. In Microsoft’s initial deployments, described below, users routinely achieve speeds well in excess of the minimum 10/1 speed and well below the minimum 100 ms latency requirements for CAF II participation. Accordingly, applicants proposing to use TV White Spaces spectrum to provide broadband service to rural areas should be eligible to participate in the CAF Phase II auction, just like other applicants proposing to use other licensed and unlicensed bands.

Specifically, Microsoft asks the Commission to modify the chart in Appendix B to include the following row:

	Paired Licensed		Unpaired Licensed	Unlicensed
Spectrum Band/Service	Uplink Freq. (MHz)	Downlink Freq. (MHz)	Uplink & Downlink Freq. (MHz)	Unlicensed (MHz)
TV White Spaces				54 – 72 MHz (VHF) 76 – 88 MHz (VHF) 174 – 216 MHz (VHF) 470 -- 698 MHz (UHF)

TV White Spaces spectrum is as good, if not better, than many of the other spectrum bands listed in Appendix B for the rural deployments contemplated by CAF Phase II. The TV White Spaces spectrum has excellent propagation characteristics: signals travel over long distances and can penetrate through walls and obstacles, including heavy foliage, hills and other topographical challenges presented by rural areas. Line of sight is not required to provide service.¹⁰ Microsoft's experience in rural deployments demonstrates that TV White Spaces signals can provide point-to-multipoint internet connections with throughput of 10 Mbps/1 Mbps or greater, and latency of less than 100 milliseconds at up to 10 miles from the base station. At the same power as Wi-Fi operating in the 2.4 GHz band, a TV White Spaces signal can travel up to four times the distance. That translates to 16 times the coverage area. The FCC allows fixed TV White Spaces devices (such as base station radios) to operate at up to 10 watts EIRP in rural areas, much higher than the 4-watt limit for Wi-Fi devices operating in the 2.4 GHz band.

TV White Spaces technology also has significant cost advantages over traditional wireless services – as little as 50 percent of the cost of deploying 700 MHz LTE and about 30 percent of the cost of higher-frequency LTE. The cost advantages of TV White Spaces are

¹⁰ By contrast, line-of-sight or near-line-of-sight is required to provide service in the five bands at or above 3.5 GHz listed in Appendix B.

particularly important in sparsely populated rural areas. As part of its recent Airband Initiative announcement, Microsoft noted that technologies leveraging the TV white spaces would be the most cost-effective solution for delivering broadband access to about 80 percent of the 23.4 million rural Americans living in communities without access to broadband.¹¹ These tend to be consumers located in communities with lower population densities, which are ideal places to leverage TV white spaces.

TV White Spaces offer operators a stand-alone solution or a critical piece of a hybrid solution to serving rural areas. For example, an operator may determine that the best way to provide broadband would be to deploy fiber or higher frequency wireless links in rural areas with higher population densities, while deploying TV White Spaces links to serve outlying areas with lower population densities. In all events, applicants should be given the opportunity to demonstrate that operations using TV White Spaces spectrum will meet or exceed the Commission's performance requirements.

B. TV White Spaces Spectrum Is Already Providing Much-Needed Broadband To Rural Areas

Microsoft, working with local partners, has already successfully launched TV White Spaces broadband service pilot projects in several rural areas in the United States. For example, in southern Virginia, Microsoft has partnered with Mid-Atlantic Broadband

¹¹ See <https://msblob.blob.core.windows.net/ncmedia/2017/07/Rural-Broadband-Strategy-Microsoft-Whitepaper-FINAL-7-10-17.pdf> (visited Sep. 17, 2017).

Communities, B2X, and the Tobacco Revitalization Commission to provide a “Homework Network” to school children in rural and underserved Charlotte and Halifax Counties. The project extends wireless broadband from local schools (which are served with fiber) to students’ homes using TV White Spaces equipment. In addition, Microsoft is deploying broadband access to residences in rural areas around Dalton, Georgia, to small businesses and residences in rural Washington County, Maine, to residences and farms in Scott County in southwest Kansas, and to residences, school districts, and state parks in Montmorency and Alpena Counties in northeastern Michigan. These pilot projects are bringing much needed broadband access to rural areas and demonstrating the suitability of TV White Spaces for broadband deployment.

C. The Chairman And Commissioners Have Expressed Strong Support For Providers Seeking To Use Unlicensed Spectrum To Participate In CAF Phase II

Microsoft applauds the Commission for recognizing the invaluable role that unlicensed spectrum can play in the provision of cost-effective broadband service in rural areas. The inclusion of multiple unlicensed bands in Appendix B reflects this, and implements the views expressed by a bipartisan majority of the Commissioners in connection with the adoption of the *2016 Report and Order*.¹² For example, then-Commissioner Pai stated that “we adopt rules

¹² *Connect America Fund, et al.*, Report and Order and Further Notice of Proposed Rulemaking, FCC

designed to induce new entrants like wireless Internet service providers ... [a]nd we treat small carriers using *unlicensed* spectrum on par with larger licensees.”¹³ Commissioner O’Rielly reiterated his principles for the CAF Phase II auction: “maximize coverage; eliminate artificial categories; [and] be open to all technologies;”¹⁴ Commissioner Clyburn observed that the bidding tiers “are structured in a way to encourage all providers – fixed or mobile, using licensed or *unlicensed* spectrum, terrestrial or satellite – to participate.”¹⁵ Commissioner Rosenworcel added that “we are open to any provider and technology that meets essential broadband performance and financial criteria.”¹⁶

IV. Conclusion

For the reasons set forth above, Microsoft urges the Commission to add TV White Spaces spectrum to the list of licensed and unlicensed spectrum bands suitable for CAF Phase II eligibility. Deployment of broadband using TV White Spaces spectrum will meet or exceed the minimum performance requirements and other criteria established by the Commission and

16–64, WC Docket Nos. 10-90, 14-58, and 14-259, rel. May 26, 2016 (“*2016 Report and Order*”).

¹³ *2016 Report and Order*, Statement of Commissioner Ajit Pai, Approving in Part and Concurring in Part, at 1. Chairman Pai recently expressed further support for wireless solutions: “[w]e expect that this auction will attract companies that have never before received universal funding. Among others, I’m thinking here about ... fixed wireless providers that can efficiently serve remote areas.” *Auction Public Notice*, Statement of Chairman Ajit Pai (emphasis added).

¹⁴ *2016 Report and Order*, Statement of Commissioner Michael O’Reilly, Approving in Part and Dissenting in Part, at 1.

¹⁵ *2016 Report and Order*, Statement of Commissioner Mignon Clyburn, at 1 (emphasis added).

¹⁶ *2016 Report and Order*, Statement of Commissioner Jessica Rosenworcel, at 1.

offer service providers an important option for the provision of broadband service to rural and remote areas.

Respectfully submitted,

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