

**Before the
Federal Communications Commission
Washington, D.C. 20554**

In the Matter of)	
)	
Comment Sought on Competitive Bidding)	AU Docket No. 20-34
Procedures and Certain Program)	WC Docket No. 19-126
Requirements for the Rural Digital)	WC Docket No. 10-90
Opportunity Fund Auction (Auction 904))	

To: The Commission

COMMENTS OF CAMBIUM NETWORKS, LTD.

Cambium Networks, Ltd. (“Cambium”), pursuant to Section 1.415 and 1.419 of the rules of the Federal Communications Commission (“FCC”), submits these Comments on the above-referenced Public Notice. The FCC seeks comment on certain aspects of Phase I of the Rural Digital Opportunity Fund (“RDOF”) reverse auction, including competitive bidding procedures and program requirements.¹ Cambium urges the FCC to assure that RDOF support facilitates robust competition and does not deter the deployment of innovative technologies to meet the nation’s 5G needs. To do so, the FCC must not arbitrarily limit the marketplace potential of 5G service or prevent cost-efficient deployment alternatives by restricting applicants from proposing fixed wireless technology solutions in their bids in the Gigabit performance tier. As discussed below, Gigabit fixed wireless solutions are here, and more will be available in time for applicants to meet their performance obligations under the RDOF program.

¹ See *Public Notice*, “Comment Sought on Competitive Bidding Procedures and Certain Program Requirements for the Rural Digital Opportunity Fund Auction (Auction 904),” AU Docket No. 20-34 and WC Docket Nos. 19-126 & 10-90 (rel. Mar. 2, 2020) (“*Public Notice*”). Federal Register publication of the NPRM occurred on March 17, 2020. 85 Fed. Reg. 15092 (Mar. 17, 2020).

Background

Cambium has been designing and delivering fixed wireless broadband access equipment for nine years as an independent company and has a history originating at Motorola Solutions in 1999. Some employees have been designing fixed wireless broadband access equipment for more than 25 years. Cambium products and services support communications networks deployed by service providers, enterprises, governmental and military agencies, oil, gas and utility companies, Internet service providers and public safety first responders.

Equipment manufactured by Cambium (and its predecessor Motorola) delivers service to more than seven million premises worldwide. The company's devices support cost-effective broadband connectivity for point-to-point and point-to-multipoint installations. The company supports broadband deployments using several spectrum bands, including 900 MHz, 2.4 GHz, 3.55 GHz (Citizens Broadband Radio Service), 5.15 GHz (U-NII-1), 5.25 GHz (U-NII-2A), 5.47 GHz (U-NII-2C), 5.725 GHz (U-NII-3), 28 GHz (Upper Microwave Flexible Use Service) and 60 GHz. As described herein, 60 GHz is transformative of the ability to deliver Gigabit speeds to the home.

Cambium produces equipment to enable shared fixed wireless service at Gigabit speeds. Cambium's Massive Multiuser Multiple Input Multiple Output (MU-MIMO) technology, cnMedusa, has been sold for four years. Cambium's customers have implemented this solution, which can deliver up to 1.6 Gbps (per sector), to serve more than 19,000 sectors² worldwide. The wireless industry as a whole is adopting and benefitting from Massive MU-MIMO technologies and you see the technology reflected in standards such as the 3GPP 5G. Massive MU-MIMO is but one example of technologies being invented and adopted by fixed wireless broadband

² Sector herein refers to Base Station Sector, a portion of the Base Station coverage often of 90°. The sector throughput is instantaneously divided among the Premises connected to that sector in an optimum manner.

manufacturers to provide spectrally efficient high capacity wireless networking solutions to network operators, that allow them to meet the needs of their customers today, and we have every reason to expect that invention to continue.

In recent trials, new equipment to operate at 60 GHz (57 ~ 66 GHz) currently delivers to the home at a range of 1 km up to 3.6 Gbps (with a potential growth to up to 7.2 Gbps). As another example, Cambium is also trialing equipment to operate at 28 GHz (24.125~29.5 GHz) that currently delivers to the home at a range of up to 3 km speeds of up to 400 Mbps, with such speeds projected to reach 1 Gbps to the home by 2022. Other equipment options are at various stages of research and development at Cambium and in the industry.

Unfortunately, the FCC's proposal for the RDOF program would disadvantage applicants that may wish to incorporate fixed wireless technologies into Gigabit networks. As described below, Cambium urges the FCC to reconsider its proposal, which discounts the prevalence and capabilities of fixed wireless technologies, which are evolving quickly and are being deployed rapidly in anticipation of 5G services.

Discussion

The Public Notice seeks comment on Phase I of the FCC's Rural Digital Opportunity Fund Auction (Auction 904), an auction that will "award up to \$16 billion over 10 years to service providers that commit to offer voice and broadband services to fixed locations in eligible unserved high-cost census blocks."³ In the RDOF Report and Order, the FCC characterized the RDOF deployment obligations as "technology-neutral standards for voice and broadband services" and determined that Auction 904 applicants may bid to provide service via one of four performance

³ Public Notice at para. 1.

tiers.⁴

- Minimum: 25/3 Mbps, with a monthly usage allowance that is the greater of 250 GB or the average usage of a majority of fixed broadband customers, based on Wireless Telecommunications Bureau's annual announcement.
- Baseline: 50/5 Mbps, with a monthly usage allowance that is the greater of 250 GB or the average usage of a majority of fixed broadband customers, based on Bureau's annual announcement
- Above Baseline: 100/20 Mbps, with a 2 TB monthly usage allowance
- Gigabit: 1 Gbps/500 Mbps, with a 2 TB monthly usage allowance.

Within each tier an applicant may bid to offer either low-or high-latency service.

Disappointingly, the Public Notice proposes “precluding any applicant that intends to use fixed wireless or DSL technologies from bidding in the Gigabit tier if the applicant has not reported offering Gigabit broadband service in its FCC Form 477 data.”⁵ The FCC asserts that based on FCC Form 477 data as of December 31, 2018, that “it *appears* unreasonable to expect that an applicant choosing to use either fixed wireless or DSL would be able to offer Gigabit speeds by the first service milestone unless it has a reported history of offering such speeds.” In Cambium's view, such an “appearance” is not reality and does not comport with the marketplace in the fixed wireless industry. Cambium urges the FCC to reject this preclusion proposal, for several reasons.

First, the FCC should not prematurely foreclose proposals for Gigabit fixed wireless services based on misplaced assumptions. In Cambium's view, it is entirely reasonable to expect winning RDOF bidders to be ready to timely deploy new Gigabit broadband services. Gigabit fixed wireless service is not a nascent technology and can offer cost-effective competition to fiber

⁴ *Rural Digital Opportunity Fund, Connect America Fund*, Report and Order, WC Docket Nos. 19-126 and 10-90 (rel. February 7, 2020) at para 31. (“RDOF Report and Order”)

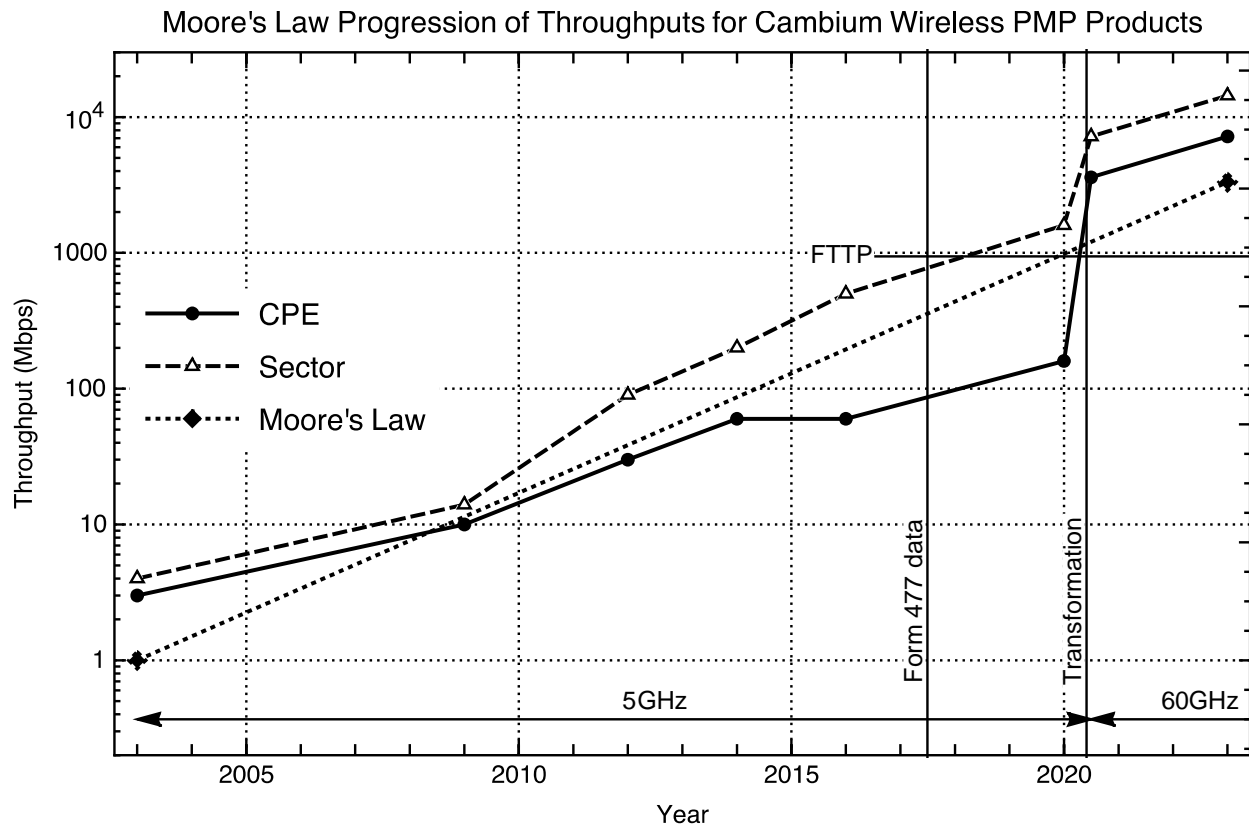
⁵ Public Notice at para. 51 (emphasis added).

services. Such deployments may be used alone or in conjunction with a hybrid fiber/fixed wireless network. Such fixed wireless technology is available in trials today and will be rolled out quickly considering the great demand for wireless broadband services.⁶

The Public Notice presumes that deployments are “unreasonable” unless they would offer Gigabit speeds by the first RDOF service milestone. Cambium notes that there should be ample time for applicants to meet this milestone with fixed wireless technology. Many technologies have followed Moore’s Law⁷ in capability since about 1970 due to the increasing integration of processors. Fixed wireless technology is no different and benefits from increased processing power and finer geometries enabling higher frequency RF chips.

⁶ See, e.g., *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, Report and Order and Order of Proposed Modification, GN Docket No. 18-122 (rel. Mar. 3, 2020) at para. 1 (highlighting demand for wireless broadband services and the FCC’s comprehensive strategy to enable 5G network deployments).

⁷ https://en.wikipedia.org/wiki/Moore%27s_law.



In the long term, the speed and efficiency of wireless technology follows Moore's Law. As the figure above indicates, the speed of CPE⁸ has not kept pace with the law, while the speed of Sectors has kept pace. 2020 is the year when there is a transformation in the speed available to low cost CPEs. Low cost devices have recently become available for 60 GHz use. They can use extraordinary RF bandwidth, which multiplies by more than 10 times the speed delivered to the premises. Cambium projects that the speeds that will be general available by July 2020 will exceed the speeds delivered by Fiber to the Premises (FTTP). FTTP is not normally available in rural areas due to the cost of installation.

⁸ CPE herein refers to Customer Premises Equipment, which will normally be attached to one sector of a base station.

As to the first milestone, all RDOF recipients “must complete deployment to 40 percent of the required number of locations as determined by the Connect America Cost Model by the end of the third year [of support].”⁹ Should Auction 904 commence as of October 22, 2020, as currently scheduled, the first awards of support may not happen until 2021 at the earliest. If Auction 904 proceeds similarly to the CAF Phase II reverse auction, then Auction 904 will last for several weeks and will be subject to applicable post-auction procedures.¹⁰ Even for a hypothetical award of support in January 2021, the end of the third year would occur in January 2024, or nearly four years from today. At the rate of evolution in this industry, such a deployment period is substantial. In Cambium’s view, even a provider who has not yet deployed Gigabit fixed wireless today, much less as of December 31, 2018, should have equipment choices to meet the initial milestone at the Gigabit tier.

Second, the FCC’s proposal would sacrifice the significant potential for cost efficient uses of RDOF deployment support at Gigabit speeds for the sake of near-term “streamlin[ing] the review of short-form applications.”¹¹ While Cambium supports FCC efforts to streamline its processes and to help accelerate the introduction of next-generation services, such streamlining here could bring tremendous cost for the overall RDOF program. Cambium anticipates that in certain situations, Gigabit fixed wireless solutions would be more cost effective than fiber deployments with equivalent speeds. Yet the approach outlined in the Public Notice would foreclose even the consideration of such a proposal, even in extremely rural areas where cost efficiencies could be substantial. In short, Cambium believes that the public interest does not

⁹ 47 C.F.R. § 54.802(c)(1).

¹⁰ Auction 903, the Connect America Fund Phase II auction, ran from July 24, 2018 until August 21, 2018, with post-filing long forms due by October 15, 2018 and support awarded thereafter. *See* <https://www.fcc.gov/auction/903>.

¹¹ *Id.* at para. 46.

support this trade off via a categorical restriction that could withhold from service providers an important tool for bridging the digital divide.

Finally, Cambium joins others urging the FCC to reconsider its initial proposal. Cambium concurs in the Comments of the Wireless Internet Services Providers Association (“WISPA”), wherein WISPA argues that the FCC should not rely on outdated information about providers’ capabilities and that allowing for Gigabit fixed wireless proposals would spur 5G deployments.¹² Instead, as WISPA argues, applicant short forms should be evaluated case-by-case for purposes of determining whether the applicant is reasonably capable of meeting its public interest obligations. In addition, Cambium agrees with W.A.T.C.H. TV Company that certain fixed wireless technologies will soon be widely available for the deployment of Gigabit services and therefore should not be foreclosed today in the RDOF program’s Gigabit tier.¹³

Conclusion

Cambium applauds the FCC for seeking to speed the deployment of 5G and Gigabit services to the marketplace, but the specific proposal to exclude fixed wireless from the Gigabit performance tier should be rejected. Rather than building the RDOF program around a flexible, market-driven approach to awarding support, particularly in areas where cost efficiencies may be at a premium, the Public Notice takes an unduly restrictive view of the capabilities of fixed wireless technology for gigabit applications. Instead, the FCC should allow each RDOF applicant to make its case for the reasonableness of its proposal and let the reverse auction process direct efficient allocation of government support to 5G services that can be built from a broad array of

¹² Comments of the Wireless Internet Service Providers Association in AU Docket No. 20-34 and WC Docket Nos. 19-126 & 10-90 (Mar. 27, 2020).

¹³ Comments of W.A.T.C.H. TV Company in AU Docket No. 20-34 and WC Docket Nos. 19-126 & 10-90.

technologies.

Respectfully submitted,

/s/

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