

OCT - 8 2015

Federal Communications Commission
Office of the Secretary

15-245

ZenFi Networks, Inc.
FRN 0023895865

Waiver Request – Call sign: WQUN758

REQUEST FOR WAIVER

ZenFi Networks, Inc. (“ZenFi”) holds a nationwide, non-exclusive license (call sign WQUN758) in the 71-76 GHz, 81-86 GHz, and 92-95 GHz bands (“70/80/90 GHz bands”) Millimeter Wave Radio Service, which qualifies it to register site-based links for fixed point-to-point commercial service. ZenFi seeks a waiver of the applicable Part 1 and Subpart Q of Part 101 rules to permit use of the 102-109.5 GHz band under its existing Millimeter Wave Radio Service license and to register individual point-to-point links at locations within the New York City, Chicago, Washington, DC, and San Francisco metropolitan markets using the regulatory framework established for registering links in the 70/80/90 GHz bands.

The Commission has pending before it a petition for rulemaking filed by Battelle Memorial Institute, Inc. (“Battelle”) asking the Bureau to amend Parts 1 and 101 of the rules to propose service rules for commercial fixed use of the 102-109.5 GHz band under a regulatory regime drawn from the Commission’s existing rules permitting “pencil beam” millimeter wave point-to-point radio links in the 70/80/90 GHz bands.¹ Comments filed in response to Battelle’s petition were overwhelmingly supportive for Commission issuance of a notice of proposed rulemaking. The National Academy of Sciences’ Committee on Radio Frequencies (“CORF”) in its comments stated it “does not oppose” fixed commercial use of the sort proposed in Battelle’s

¹ Battelle developed technology for commercial use that can wirelessly deliver 10 gigabit/second Ethernet (“10GE”) data streams, with less latency than fiber optic cable. Battelle Memorial Institute, Inc., Petition for Rulemaking to Adopt Services Rules for the 102-109.5 GHz Band, RM-11713 (filed Feb. 6, 2014).

petition provided appropriate frequency coordination procedures are established to protect radio astronomy service (“RAS”) observations.²

Fixed commercial use of the 102-109.5 GHz band is allocated on a co-primary basis with the RAS and fixed commercial use of the 105-109.5 GHz segment of the band is allocated on a co-primary basis with space research (passive).³ Use of the band for these services is limited, thus allowing a fixed terrestrial service such as ZenFi’s to be introduced without adverse impact. In fact, the only current Federal use of the 102-109.5 GHz band is by the RAS for observations. Footnote US342 of the U.S. Table of Allocations mandates protection of RAS use of the 102-109.5 GHz band.⁴ Footnote 5.562B of the International Table of Allocations restricts space research (passive) in the 105-109.5 GHz part of the band in the United States to “space based radio astronomy.”⁵

ZenFi understands the RAS currently uses the band for observations from sites in Kitt Peak, Arizona and at the Combined Array for Research in Millimeter-wave Astronomy (CARMA) observatory in California, and has plans to begin observations from the Haystack Observatory in Massachusetts and the Green Bank Telescope in West Virginia.⁶ ZenFi also understands that RAS use of the band may change over time and involve other observatories.

² Comments of National Academy of Sciences’ Committee on Radio Frequencies, RM-11713 (filed Nov. 4, 2014) (“*CORF Comments*”).

³ See 47 C.F.R. §2.106. See also *Amendment of Part 2 of the Commission’s Rules to Realign the 76-81 GHz band and the Frequency Range Above 95 GHz Consistent with International Allocation Changes*, Report and Order, 19 FCC Rcd. 3212 (2004).

⁴ Footnote US342 of the U.S. Table of Allocations provides that “all practicable steps shall be taken to protect the radio astronomy service from harmful interference” in the 102-109.5 GHz band. 47 C.F.R. § 2.106 n.US342.

⁵ 47 C.F.R. § 2.106 n.5.562B

⁶ *CORF Comments* at 5-6.

But ZenFi does not expect any future RAS observatories to be located in close proximity to any of the four metropolitan areas identified in this waiver request such that RAS observations in the 102-109.5 GHz band would be affected. ZenFi wants to protect the work of the radio astronomers. Under the proposed coordination and link registration approach described in this waiver request, ZenFi's use of the 102-109.5 GHz band, which will be limited to the four identified metropolitan areas, will not interfere with the current and planned observations by RAS noted by CORF.⁷ Currently, there are no non-Federal users of the band.

Grant of ZenFi's waiver request will make the newly developed technology, which enables reliable, interference-free wireless links capable of delivering 10 gigabit/second Ethernet service ("10GE"), available for commercial use in the near term in the four identified metropolitan markets while the Commission considers amending the rules in accordance with Battelle's rulemaking petition. ZenFi understands that grant of its waiver request will serve as a pre-requisite for coordinating and registering individual point-to-point links in the 102-109.5 GHz band in the four identified markets. ZenFi's use of the 102-109.5 GHz band would continue pending resolution of the Battelle rulemaking proceeding.

I. ABOUT ZENFI

ZenFi is a startup at the forefront of fiber optic and fixed wireless network infrastructure. As New York City's premier provider of fronthaul and backhaul fiber to the New York metro wireless community, ZenFi specializes in providing high-performance optical network solutions to large enterprises, wireless mobile network operators, and telecommunications service providers over a private, dedicated fiber optic network between various types of buildings and

⁷ *CORF Comments* at 4-6.

cell sites as well as carrier hotels and data centers. ZenFi helps its customers meet the exploding demands of today's connected users and devices by deploying an integrated network solution that reduces operational costs, simplifies deployment, and enables connectivity.

ZenFi was founded by the innovative team that successfully built and sold Lexent Metro Connect, a carrier-neutral fiber network in the New York City metropolitan area, and Metro Network Services. ZenFi's team brings more than 60 years of experience and history in the telecom industry.⁸ ZenFi's founders recognized early on the need for a company that could bridge the gap between traditional wireline fiber companies and their disconnected wireless counterparts and formed the company to solve one of today's major telecommunications issues: providing accessible and affordable bandwidth for mobile wireless applications. ZenFi's in-house engineering, construction, and service teams leverage its privately-owned fiber optic network to tackle today's challenging connectivity problems. Employing an innovative model featuring neighborhood network and colocation infrastructure, ZenFi's fronthaul, backhaul and distributed colocations offer wireless providers direct connectivity to traditional wireline service providers. Unlike traditional carrier networks that are built for enterprise applications and have sparse fiber density between end-user sites, ZenFi's purpose-built dark fiber network leverages a neighborhood fronthaul fiber network and colocation infrastructure model specifically designed to support the wireless service provider requirement for densification—bringing more small cells, in-building and outdoor Distributed Antenna System (“DAS”) remotes, Remote Radio Heads (“RRHs”), macro sites, and Wi-Fi access points closer to the user. The ZenFi model makes widespread adoption of Fiber-to-the-Antenna (“FTTA”) a cost-effective and realistic

⁸ See Exhibit 1 for biographical information on ZenFi's leadership.

solution for wireless carriers and neutral hosts. Providing both high bandwidth connectivity coupled with distributed colocation facilities gives customers the flexibility to deploy as little or as much of their network as possible.

Wireless networks have grown increasingly sophisticated in recent years to meet demands of users seeking consistent, quality connectivity from nearly anywhere on any device. For any market to succeed, it must adapt to support the growing and diversifying technology needs of business. ZenFi is working to provide cutting-edge optical network technology specifically designed to enable the Internet of Things and to provide organizations with the high-performance infrastructure necessary to support continued mobile growth as well as consistent service accessibility and reliability. With the proliferation of mobile communications, fiber must be highly accessible to a wide array of solutions. ZenFi and its new fiber optic and fixed wireless network make that a reality for the New York metro area.

II. ZENFI'S PROPOSED USE AND NEED FOR WAIVER

ZenFi seeks to use the 102-109.5 GHz band to provide high-speed, low latency point-to-point data streams with high reliability to users that demand a wireless solution with the high bandwidth of fiber, including for local area networks and broadband Internet access. ZenFi's wireless links can be used to provide diverse and resilient backhaul solutions for customers located in each of the New York City, Chicago, DC, and San Francisco metropolitan areas. Conceptually, the high-speed, point-to-point wireless links are best visualized as a ring in the sky customers can use to supplement physical fiber already deployed on the ground.

While modern fiber optic networks can support 10-gigabit/second ("10GE") Ethernet service, technological limits coupled with the lack of sufficient contiguous bandwidth available

in the 71-76 GHz, 81-86 GHz, 92-94 GHz, and 94.1-95 GHz bands have effectively constrained wireless users of these bands to a far lower capacity – generally 1GE service. In contrast, the 102-109.5 GHz band is largely fallow and undeveloped, already allocated for fixed use on a co-primary basis, offers favorable propagation characteristics, and has 7.5 GHz of contiguous bandwidth necessary to support 10GE or higher data streams. And as a result of technological advances, the 102-109.5 GHz can now be used to provide highly-reliable wireless links that can support the cost-effective, low latency wireless delivery of 10GE data streams, a data rate that was previously possible only over fiber.

The cost to deploy fiber optic cable is highly variable. In urban areas the cumulative cost of right of ways, permits, construction, and installation are often prohibitive for new or smaller user sites. Wireless 10GE point-to-point service provides connectivity that is faster to deploy and can be easily repurposed as needs and sites change. In addition, wireless 10GE has very different post-disaster survivability and restoration characteristics than fiber and can be employed to provide redundancy in the design of robust networks.

ZenFi anticipates a principal use of the band will be for localized augmentation of the fiber infrastructure where fiber is either not available or deployment of new fiber is not economically feasible, or as a means to provide diversity if the existing fiber deployment fails. ZenFi expects demand for its service will come from multiple users, including governments, healthcare providers, educational institutions, the financial community, colocation data center

operators, mobile network operators, and other intensive data users located in areas where fiber optic service is not feasible or path diversity is required.

Historically, non-Federal users seeking to use a shared band were required to submit an FCC Form 601 application for frequency assignment to the Commission, which would bring the request to NTIA's Frequency Assignment Subcommittee ("FAS") of the IRAC for approval. The historical approach is well suited for obtaining a geographic area based license or for obtaining a site-based license with a frequency path consisting of only one link or multiple links with fixed end points. But the historical approach does not work in a metropolitan area where the customer needs a more complex path that consists of multiple links, each which may have end points that are not fixed. This is precisely the service that the cutting-edge technology that will be deployed in the 102-109.5 GHz band to deliver high-speed, point-to-point data streams with high reliability is designed to address.

In short, the historical process is not nimble enough to accommodate a path constructed from multiple end points, none which are fixed, which inevitably involves multiple rounds of re-engineering before the final path design is determined. To make the historical process sufficiently nimble would require ZenFi to expend significant resources by entering into multiple leases and obtaining FCC licenses for multiple sites, many which would never be used, so that it would have a sufficient inventory of site end points from which to construct a customer's path. Not only is such process impractical, it also is not economically viable.

To illustrate, in designing a customer path, multiple sites must first be analyzed for potential feasibility. ZenFi's engineers begin by utilizing desktop engineering to identify potential sites along the path. Preliminary surveys are then done to make a first cut about a site's feasibility. Next, zoning for each feasible site must be reviewed to determine if the proposed use is allowed. After that, landlords are identified and contacted to inquire about a site's use and availability. The final step is entering into lease negotiations for the site. Landlords are not interested and unwilling to enter into contingent leases. If a site is determined to not be feasible or cannot be obtained, the path must be re-engineered. This illustrates how securing a particular site or designing a link to use in the path is interdependent on securing other sites and links in the path. A change in siting one or more endpoints may have a cascading effect on the path design.

The logistical issues that flow from designing a path with multiple sites and links makes using the historical process not practical or economically viable. This is because using the historical process will require ZenFi to enter into site leases and obtain licenses for a significant number of links before the customer has committed to a final path design. Ideally, to enable it to respond to inevitable changes and re-engineering of path design, ZenFi would be required to enter into a significant number of leases and license multiple links in advance so that it has a sufficient inventory of links from which to construct a path. It simply is not practical and not economically viable for ZenFi to expend resources on leases for multiple sites, any which may never be used, and to obtain FCC licenses for these sites, simply to be able to design a path that meets a particular customer's needs.

These issues that flow from designing a path with multiple links in a densely developed metropolitan area are best resolved by using the registration framework that was developed for the 70/80/90 GHz band because it will allow links to be registered without having to first commit significant resources to securing and obtaining licenses for sites that ultimately may never be used. Indeed, the innovative link registration framework that was developed for 70/80/90 GHz is a critical element to designing frequency paths that will meet a customer's needs.

Therefore, because the historical approach for obtaining a license for a link is not practical for designing a usable path for customers seeking high-speed high bandwidth wireless service in densely developed metropolitan markets (like the four markets identified in this waiver request), ZenFi seeks a waiver of the relevant rules in Subpart Q of Part 101 of the Commission's rules⁹ and any applicable procedures to enable it to use the regulatory framework established for the 70/80/90 GHz band to coordinate and register links in the 102-109.5 GHz band. ZenFi understands the current system used to register links in the 70/80/90 GHz band is fully automated and that grant of this waiver will not result in the current system being modified to include within the fully automated process the 102-109.5 GHz band.

Instead, based on informal discussions with a database manager and accounting for information unique to the 102-109.5 GHz band, for the reasons below ZenFi believes that any or all of the current Database Managers should have the capability to put into place a manually operated structure to effectuate link coordination and registration that would accommodate

⁹ 47 C.F.R. Part 101, Subpart Q.

ZenFi's waiver request.¹⁰ First, there are no non-Federal users in the 102-109.5 GHz band.

Thus, only registration will be required for initial links within any of the four identified geographic markets; coordination is not required for initial links because there are no other non-Federal users. As additional link registrations are requested within a market, inter-system coordination will be required. Second, the RAS is the only Federal user in the band. ZenFi understands that the RAS does not make observations at any location within the four identified metropolitan geographic markets or observe at sites near these markets such that ZenFi customers operating links in the 102-109.5 GHz would cause harmful interference to the RAS. Because this waiver is limited to link registrations within the four identified metropolitan geographic markets, ZenFi believes any coordination concerns about Federal use can be

¹⁰ The Broadband Division of the Wireless Telecommunications Bureau designated Frequency Finder, Inc., Micronet Communications, Inc. and Andrew LLC d/b/a Comsearch as Database Managers and charged them with jointly developing and managing the link registration system. *See Allocations and Service Rules for the 71-76 GHz, 81-86 GHz, and 92-95 GHz Bands*, WT Docket No. 02-146, Order, 19 FCC Rcd. 20254 (2004) (“*Database Manager Order*”). As a condition of the designation, each Database Manager was required to execute a Memorandum of Understanding (“MOU”) with the Bureau’s Broadband Division, memorializing their duties and responsibilities. The duties and responsibilities are defined in paragraph 10. ZenFi believes the MOU and *Database Manager Order* authorized the Broadband Division of the Wireless Telecommunications Bureau to add to the duties and responsibilities of each Database Manager link coordination and registration for the 102-109.5 GHz band under paragraph 10.A, which provides that “[a] Database Manager may offer additional services, such as frequency coordination and other services to assist a licensee in designing a link and resolving any interference concerns.” *See Database Manager Order*, 19 FCC Rcd. 20254, 20258, ¶ 10.A. (2004). The Bureau can use the Commission’s general waiver authority under Section 1.3 of the rules to add to the duties and responsibilities of each Database manager link coordination and registration for the 102-109.5 GHz band. 47 C.F.R. §1.3.

addressed and resolved early on when this waiver request is presented to IRAC for approval.

ZenFi does not object to a waiver condition that would require future links to be coordinated with IRAC at such time as additional RAS observatories are built in or near the four identified metropolitan geographic markets. In any event, Footnote US342 provides additional protection from harmful interference to the RAS observations in the 102-109.5 GHz band.

III. JUSTIFICATION FOR ZENFI'S WAIVER REQUEST

The Commission's rules may be waived for good cause shown.¹¹ Likewise, under Section 1.925, a waiver may be granted if it is shown that (a) the underlying purpose of the rule(s) would not be served or would be frustrated by application to the instant case, and grant of the requested waiver would be in the public interest; or (b) in light of unique or unusual circumstances, application of the rule(s) would be inequitable, unduly burdensome, or contrary to the public interest, or the applicant has no reasonable alternative.¹²

Good cause exists in this case to grant the waiver under Section 1.3 and under the first prong of Section 1.925. First, grant of the requested waiver would not frustrate the underlying purpose of the relevant part of Subpart Q of Part 101 of the Commission rules.¹³ Subpart Q of Part 101 was adopted to establish service rules to promote non-Federal development and use of the "millimeter wave" spectrum on a shared basis with Federal Government operations. The rules were likewise adopted to implement a flexible and innovative regulatory framework for the 71-95 GHz bands to streamline the administrative process for non-Federal Government users in

¹¹ 47 C.F.R. § 1.3.

¹² 47 C.F.R. §1.925(b)(3); *see also WAIT Radio v. FCC*, 418 F.2d 1153, 1159 (D.C. Cir. 1969); *Northeast Cellular Telephone Co. v. FCC*, 897 F.2d 1164, 1166 (D.C. Cir. 1990).

¹³ 47 C.F.R. Part 101, Subpart Q.

the band. Grant of ZenFi's waiver will continue to serve the underlying purpose of this rule and extend its reach to the four identified markets in the 102-109.5 GHz band, a band that is largely fallow, already allocated for fixed use on a co-primary basis, and has the 7.5 GHz of contiguous bandwidth necessary to support 10GE service. Granting ZenFi's waiver will allow the 102-109.5 GHz band to be used to provide highly-reliable wireless links that can support the cost-effective, low latency wireless delivery of 10GE data streams, a data rate that was previously possible only over fiber.

Second, grant of the waiver is in the public interest because it will address the growing demand for reliable, interference-free wireless links capable of delivering 10GE. The cost to deploy fiber optic cable is highly variable. In urban areas the cumulative cost of rights of ways, permits, construction, and installation are often prohibitive for new or smaller user sites. Wireless 10GE point-to-point service provides connectivity that is faster to deploy and can be easily repurposed as needs and sites change.

Exhibit 1 – Biographical Information of ZenFi’s Leadership

Ray La Chance, President and Chief Executive Officer. As President and CEO, Mr. La Chance applies proven industry management expertise to deliver cutting-edge communication network solutions to the market. Ray oversees all aspects of the business operations, effectively leading a team of experts to solve industry problems created by the proliferation of mobile data. In addition to Ray’s role at ZenFi, he is also a Founding Partner of Metro Network Services, LLC, a company focused on network planning, engineering, deployment and maintenance. Ray is an information technology industry veteran with more than 20 years of experience managing teams to design, build, and operate complex, high-capacity networks for large enterprises, financial firms and telecommunications service providers. Prior to ZenFi and Metro|NS, Ray was President and CEO of Lexent Metro Connect, LLC from 2007 to its successful sale in December 2010 to Lightower Fiber Networks. Ray was also the Co-Founder of Realtech Systems Corp., an enterprise network integration and professional services firm where he served as President and CEO. Ray received a Bachelor of Science degree in Computer Science from the State University of New York at Albany in 1985.

Victoria O’Kane, Chief Operating Officer. As COO, Ms. O’Kane relies on her proven array of experience in the telecommunications and engineering fields to steer and manage the day-to-day operations of the business. In addition to Victoria’s role at ZenFi, she is also a Founding Partner of Metro Network Services, LLC, where she oversees the company’s operations effectively providing network planning, engineering, deployment and maintenance solutions for companies throughout the New York Metro market. Prior to co-founding Metro|NS, Victoria worked as Director of Carrier Sales and Marketing for Lexent Metro Connect until it was sold to Lightower Fiber Networks in December 2010. In 2010, Victoria also joined her family’s business, Hugh O’Kane Electric Co., Inc. as a third-generation owner along with two cousins, and remains a Board member and Partner in the firm. Prior to joining the telecommunications sector in 2008, Victoria worked within the financial community in operations support; this experience continues to prove highly useful at both ZenFi and Metro|NS where she frequently offers network consultation, engineering and support to both the financial and service provider markets. Victoria holds a B.A. in International Studies from Boston College, and an MBA from the Tuck School of Business at Dartmouth College.

Michael Brescio, Chief Financial Officer. As CFO, Mr. Brescio is responsible for the overall financial management of the company. Michael spent 13 years with General Electric where he most recently oversaw a multi-billion dollar bond portfolio for the GE Pension with a focus on the utility and energy sectors. Before that role, Mr. Brescio spent six years with GE Capital providing project financing and corporate loans to utility and energy businesses. He was also a member of GE’s Corporate Audit Staff and a graduate of the GE Financial Management Program. Michael holds a BS in Accounting from Boston College and an MBA from Columbia University. He is a CPA and GE Six Sigma quality program black belt.

Doug Haluza, Chief Technology Officer. Mr. Haluza joined ZenFi Networks, LLC as CTO after serving as CTO of Metro Network Services, LLC and Director of Engineering for Lexent Metro Connect from 2003 through 2010. Doug has over 25 years of experience in planning, designing, and operating telecommunications networks using copper, wireless, and fiber transmission systems. His experience includes fiber network design and build-out, technical consulting, and emergency network restoration. Prior to joining ZenFi Networks and Metro|NS, Doug managed the Engineering Department at Lexent Metro Connect, and was Engineer-Communications for the Long Island Rail Road. Doug received a Bachelor of Engineering degree in Electrical Engineering and Computer Science from the State University of New York at Stony Brook in 1984. Doug is a licensed Professional Engineer.

Patrick O'Hare, Senior Vice President of Operations. Mr. O'Hare has over 23 years of experience in the telecommunications industry. Prior to ZenFi Networks, Pat served as Senior Vice President of Sidera Networks, where he led all operations, service delivery and engineering functions and was instrumental in the company's acquisition by Berkshire Partners. Mr. O'Hare was also the Senior Vice President of Operations and Engineering at RCN Metro, Sidera's predecessor company, and was integral to the company's acquisition by ABRY Partners and the successful separation of assets from the RCN Cable parent company. Previously, he was the Vice President of Field Operations for Zayo Bandwidth, where he was responsible for all aspects of field operations and the company's fiber to the tower deployments. Prior to that, Pat was Vice President for Field Operations for Level 3 Communications, where he was responsible for field operations, outside plant, colocation and facilities for the East region. During his tenure at Level 3, Mr. O'Hare also held responsibility nationally for the company's Customer Program Management organization. Before joining Level 3 in 1999, he held several management positions of increasing responsibility in corporate communications, customer service and operations at Verizon's predecessor companies; New York Telephone, NYNEX and Bell Atlantic. Mr. O'Hare holds an MBA from Long Island University and a Bachelor's degree from the State University of New York – University at Albany.

Walter Cannon, Vice President, Sales & Marketing. As Executive Vice President of Sales and Marketing, Mr. Cannon leverages over 20 years of technology sales and executive management experience in the enterprise and financial marketplace to lead the sales team in effectively delivering network solutions that enable customers to grow their businesses more effectively. Prior to ZenFi, Walter served as Vice President of Sales and Marketing at Metro|NS, where he effectively developed sales strategies that delivered results. Before Metro|NS, Walter was the Director of Enterprise Sales for Lexent Metro Connect, where he was responsible for growing Lexent's core business. Walter previously served as Vice President at TCG SecureZone and helped forge key relationships and partnerships with numerous business and enterprise clients. Walter received a degree in Liberal Arts with a focus in Engineering and Mathematics from Wayne State University in Detroit, Michigan.

Rao Karanam, Vice President, Solutions Engineering. Mr. Karanam is Vice President of Solutions Engineering. He is involved in business planning as well as sales, marketing, and project delivery support. Rao has extensive experience in planning, building, and operating telecommunication networks for enterprise businesses and carriers. At Metro Network Services, and previously at Lexent Metro Connect, Rao program-managed the engineering and supported the successful deployment of low-latency microwave networks (for HFTs), several metro fiber networks, and over one thousand DAS nodes in the New York City metro area. Prior to that, Rao was involved in product management at JP Morgan Chase, optical networking at Realtech Systems Corp., and various network planning, optimization, and design activities at AT&T Labs and Bell Labs. Rao holds a Ph.D. in Electrical Engineering from Oregon State University and an MBA from Rutgers University.

Bob Goedel, Controller. Mr. Goedel joined ZenFi as Controller after serving a dual role as Controller at Metro Network Services, LLC and Project Controller at Hugh O’Kane Electric Company, Inc. from 2010 through 2014. Bob has over 20 years of finance and accounting experience specializing in all aspects of operations control and finance. Prior to joining Metro Network Services, LLC and Hugh O’Kane Electric Company, Inc., Bob held positions as Operations Controller at Lexent Metro Connect, VP of Finance at Triad Communications Group and Finance Manager at National Network Technologies, LLC.