

May 1, 2013

**ORIGINAL**

**VIA HAND DELIVERY**

Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 12th Street, S.W., Room TW-A306  
Washington, D.C. 20554

FILED/ACCEPTED

MAY - 1 2013

Federal Communications Commission  
Office of the Secretary

**Re: Petition for Rulemaking**

Dear Secretary Dortch:

On behalf of Mimosa Networks, Inc., please find enclosed a Petition for Rulemaking requesting the Commission to initiate a rulemaking proceeding to amend Parts 2 and 90 of the Commission's Rules to create a new frequency allocation for wireless broadband services.

An additional copy of this filing has been provided, which you are requested to date-stamp and return in the envelope provided.

Please contact the undersigned at 703-584-8660 if any questions arise concerning the above-referenced enclosure or if you require any additional information.

Sincerely,



Russell D. Lukas  
John Cimko

Attorneys for:  
*Mimosa Networks, Inc.*

Enclosure

cc: Consumer and Government Affairs Bureau  
Reference Information Center

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WTB 13-10

FILED/ACCEPTED

MAY - 1 2013

Federal Communications Commission  
Office of the Secretary

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

**ORIGINAL**

In the Matter of	)	
	)	
Amendment of Parts 2 and 90 of the	)	RM- _____
Commission's Rules To Create a New	)	
Frequency Allocation for Wireless	)	
Broadband Services	)	

**PETITION OF MIMOSA NETWORKS, INC.,  
FOR A RULEMAKING TO CREATE A NEW FREQUENCY  
ALLOCATION FOR WIRELESS BROADBAND SERVICES**

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May 1, 2013

*WTB 13-10*

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## SUMMARY

Mimosa Networks, Inc., respectfully submits this Petition for Rulemaking to advocate that the Commission should initiate a proceeding for the purpose of making spectrum in the 10.0-10.5 GHz band available for wireless broadband services. Mimosa's proposal would promote the Commission's goal of providing broadband access to all Americans, would benefit wireless Internet service providers, mobile wireless carriers, and telecommunications equipment providers, and would also benefit the national economy.

A hallmark of the Commission's spectrum policies has been to adopt rules for spectrum use that encourage new technologies, innovative services for consumers, and efficient use of a valuable but finite national resource. The emergence and growth of wireless broadband has heightened the importance of these policies. Since the adoption of the Commission's National Broadband Plan three years ago, the Commission has been aggressive in pursuing both spectrum and universal service policies intended to ensure that all Americans have access to advanced broadband services.

The problem faced by the Commission, however, is that the enormous popularity of wireless broadband services, and their growing importance for businesses and the national economy, have complicated the Commission's efforts to ensure that sufficient spectrum is available to meet the expanding demand and need for wireless broadband. To take one example, by mid-2012, 78 percent of adults in the U.S. were using smartphones, approximately 34 percent of U.S. households are now wireless-only, and from July 2011 to June 2012 wireless data traffic in the U.S. totaled 1.16 trillion megabytes, compared to 568 billion megabytes a year before, a 104 percent year-over-year increase.

Recent steps taken by the Commission to make additional spectrum available for wireless broadband have been beneficial, but additional steps are necessary. For example, the Commission has acted to improve access to microwave bands regulated under Part 101 of its rules, but the success of these undertakings has been blunted by a number of factors, including the fact that legacy equipment in some of the bands involved does not use modern technologies and the utility of other Part 101 bands for wireless broadband is compromised by extreme attenuation during rain conditions. The Commission has also made the 3.65 GHz band available for wireless broadband on a shared basis, but use of the band has been limited by the small amount of spectrum (25 megahertz) allowed on radios with contention-based protocols.

Mimosa proposes a further step the Commission should take in its continuing efforts to meet consumer and business needs for wireless broadband spectrum. In addition to considering options for repurposing spectrum for wireless broadband use, the Commission should permit spectrum sharing in order to make additional spectrum available for wireless broadband services.

Specifically, Mimosa urges the Commission to consider authorizing wireless broadband services in the 10.0-10.5 GHz band pursuant to its Part 90, Subpart Z, rules. This band is a strong candidate for creating new opportunities for wireless broadband service providers to utilize long-distance, high-capacity links. An important advantage of the 10.0-10.5 GHz band for wireless broadband is that the band is only moderately susceptible to attenuation due to rain-fading effects, especially when compared to spectrum in higher frequencies. In addition, including the 10.0-10.5 GHz band under the Subpart Z rules would bring International Telecommunication Union Region 2 into alignment with Regions 1 and 3, which already have the band allocated for both fixed and mobile operations.

The 10.0-10.5 GHz band is currently allocated for radiolocation and amateur radio use. In order to guard against interference with both U.S. Government and civilian radar operations, Mimosa proposes the application of Dynamic Frequency Selection restrictions to wireless broadband operations in the band. Further, the application of the coordination procedures and requirements provided in Subpart Z will ensure that amateur radio operations in the band will not be disrupted. In addition, as a further safeguard, Mimosa proposes a band plan for the 10.0-10.5 GHz band that would protect frequencies in the band that are most often used by amateur radio operators.

Finally, Mimosa explains that its proposal to utilize spectrum in the 10.0-10.5 GHz band, pursuant to Subpart Z rules, to address the need for efficient microwave backhaul for use in connection with the provision of both fixed and mobile wireless broadband services would serve to complement the Commission's proposed use of spectrum in the 3.5 GHz band on a shared basis for small cell deployments as a means of enabling more efficient spectrum use.

**Before the  
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**PETITION OF MIMOSA NETWORKS, INC.,  
FOR A RULEMAKING TO CREATE A NEW FREQUENCY  
ALLOCATION FOR WIRELESS BROADBAND SERVICES**

Pursuant to Section 1.401 of the Commission's Rules,<sup>1</sup> and in accordance with Sections 1, 301, 302(a), and 303 of the Communications Act of 1934,<sup>2</sup> Mimosa Networks, Inc. ("Mimosa"),<sup>3</sup> by its attorneys, hereby respectfully submits this Petition to request that the Commission initiate, as soon as practicable, a rulemaking to create a new domestic spectrum allocation, and new and revised service rules, for wireless broadband services.

**I. INTRODUCTION.**

The Obama Administration<sup>4</sup> and the Commission have given priority to developing policies and adopting initiatives designed to make advanced wireless broadband services available across the country. These efforts have been productive, but more needs to be done.

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<sup>1</sup> 47 C.F.R. § 1.401.

<sup>2</sup> 47 U.S.C. §§ 151, 301, 302(a), 303.

<sup>3</sup> Mimosa, which is headquartered in Los Gatos, California, is a manufacturer of wireless broadband products.

<sup>4</sup> See, e.g., President Barack Obama, Remarks by the President on the National Wireless Initiative in Marquette, Michigan (Feb. 10, 2011) at 8, *available at* <http://www.whitehouse.gov/the-press-office/2011/02/10/remarks-president-national-wireless-initiative-marquette-michigan> (articulating the goal of achieving virtually ubiquitous wireless broadband coverage).

In this Petition, Mimosa presents a proposal for an important step that the Commission should take to advance its wireless broadband policies. The proposal involves revising the Commission's Part 90 rules to make spectrum in the 10.0-10.5 GHz band available for use in the provision of wireless broadband services. Allocating this spectrum for wireless broadband would benefit consumers, wireless Internet service providers ("WISPs"),<sup>5</sup> mobile wireless broadband providers, and equipment manufacturers, and would also benefit the national economy. The 10.0-10.5 GHz band is currently allocated for Amateur and Radiolocation services, and Mimosa proposes rules in this Petition to address any risks of interference between wireless broadband services and the services for which the band is currently allocated.<sup>6</sup>

**II. THE COMMISSION SHOULD CONTINUE TO PURSUE SPECTRUM POLICIES THAT FACILITATE THE ONGOING GROWTH OF WIRELESS BROADBAND SERVICES.**

The Commission has been diligent in developing and implementing spectrum policies intended to be responsive to changing technologies and the growth in demand for bandwidth that can accommodate burgeoning levels of wireless data traffic. But recent and projected increases in this level of demand underscore that these efforts by the Commission must be accelerated in order to avert a potential spectrum crisis.

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<sup>5</sup> WISPs are "entrepreneurial . . . service providers . . . that currently bring broadband services to consumers particularly those living in rural areas of the United States." *Wireless Operations in the 3650-3700 MHz Band*, ET Docket No. 04-151, *Rules for Wireless Broadband Services in the 3650-3700 MHz Band*, WT Docket No. 05-96, *Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket No. 02-380, *Amendment of the Commission's Rules With Regard to the 3650-3700 MHz Government Transfer Band*, ET Docket No. 98-237, Report and Order and Memorandum Opinion and Order, 20 FCC Rcd 6502, 6503 (para. 2) (2005) ("3650 MHz Order").

<sup>6</sup> Amendments to the Commission's rules proposed by Mimosa are shown in Appendix A.



**A. Progress in Expanding the Availability of Broadband.**

Declaring that “[b]roadband is the great infrastructure challenge of the early 21st century[.]”<sup>7</sup> the Commission has provided bold and effective leadership in striving to meet the congressional mandate “to ensure that all people of the United States have access to broadband capability . . . .”<sup>8</sup> For example, the Commission has transformed its high-cost universal service program, “establish[ing] a framework to bring broadband to millions of Americans over the coming years, and set the country on a path to universal availability of fixed and mobile communication networks capable of providing voice and broadband services where people live, work, and travel within a decade.”<sup>9</sup>

The Commission also “has taken multiple steps to remove regulatory barriers and lower the cost of broadband buildout, such as easing access to utility poles and speeding processes for siting cell towers[.]”<sup>10</sup> and has “taken major steps to protect innovators and the development of new applications, services, and devices that drive demand for broadband . . . .”<sup>11</sup> Further, the

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<sup>7</sup> Omnibus Broadband Initiative, FCC, CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN, GN Docket No. 09-51, at 3 (2010) (“Broadband Plan”).

<sup>8</sup> American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, § 6001(k)(2)(D), 123 Stat. 115, 516 (2009).

<sup>9</sup> *Inquiry Concerning the Deployment of Advanced Telecommunications Capability to All Americans in a Reasonable and Timely Fashion, and Possible Steps to Accelerate Such Deployment Pursuant to Section 706 of the Telecommunications Act of 1996, as Amended by the Broadband Data Improvement Act*, GN Docket No. 11-121, Eighth Broadband Progress Report, 27 FCC Rcd 10342, 10344-45 (para. 3) (2012) (“*Eighth Broadband Report*”).

<sup>10</sup> Remarks of FCC Chairman Julius Genachowski, “Winning the Global Bandwidth Race: Opportunities and Challenges for the U.S. Broadband Economy,” Vox Media Headquarters, Washington, D.C., Sept. 25, 2012, available at <http://www.fcc.gov/document/chairman-genachowski-remarks-broadband-vox-media>.

<sup>11</sup> *Id.*

Commission two years ago launched the Broadband Acceleration Initiative, focusing on removing barriers to build-out and expediting cost-cutting initiatives.<sup>12</sup>

In addition, “wireless and wireline broadband providers have made great progress. These providers invest tens of billions of dollars annually in the networks that make broadband possible, and [during the past 17 years, since passage of the Telecommunications Act of 1996] they are reported to have invested more than \$1 trillion dollars combined.”<sup>13</sup> These and other Commission initiatives, combined with telecommunications industry investment, innovation, and other actions, “have taken significant and substantial steps to accelerate the deployment and availability of broadband . . . .”<sup>14</sup>

## **B. The Challenges Ahead.**

Developing effective broadband policies is one of the Commission’s most important priorities. As the Commission has explained:

Fixed and mobile broadband have become crucial to our nation’s economic growth, global competitiveness, and civic life. Businesses need broadband to attract customers and employees, job-seekers need broadband to find jobs and training, and children need broadband to get a world-class education. Broadband also helps lower the costs and improve the quality of health care, and enables people with disabilities and Americans of all income levels to participate more fully in society. Community anchor institutions, including schools and libraries, cannot achieve their critical purposes without access to robust broadband. Broadband-enabled jobs are critical to our nation’s economic recovery and long-term economic health, particularly in small towns, rural and insular areas, and Tribal lands.<sup>15</sup>

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<sup>12</sup> FCC, THE FCC’S BROADBAND ACCELERATION INITIATIVE, REDUCING REGULATORY BARRIERS TO SPUR BROADBAND BUILDOUT (2011), available at [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-304571A2.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-304571A2.pdf).

<sup>13</sup> *Eighth Broadband Report*, 27 FCC Rcd at 10344 (para. 2) (footnote omitted).

<sup>14</sup> *Id.* at 10344 (para. 1).

<sup>15</sup> *Connect America Fund*, WC Docket No. 10-90, *A National Broadband Plan for Our Future*, GN Docket No. 09-51, *Establishing Just and Reasonable Rates for Local Exchange Carriers*, WC Docket No. 07-135, *High-Cost Universal Service Support*, WC Docket No. 05-337, *Developing an Unified Intercar-*

The need for effective policies to utilize spectrum for the delivery of broadband services has been heightened by the shift away from reliance on other infrastructure for broadband. Copper-based infrastructure is a waning area of capital investment, with leading carriers such as Verizon and AT&T shifting their focus toward wireless mobility, and Long Term Evolution (“LTE”) technology in particular.<sup>16</sup> Moreover, fewer than half of existing macrocells in the United States are served by fiber connections today,<sup>17</sup> even as the demand for Internet bandwidth is

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*rier Compensation Regime*, CC Docket No. 01-92, *Federal-State Joint Board on Universal Service*, CC Docket No. 96-45, *Lifeline and Link-Up*, WC Docket No. 03-109, *Universal Service Reform – Mobility Fund*, WT Docket No. 10-208, Report and Order and Further Notice of Proposed Rulemaking, 26 FCC Rcd 17663, 17667-68 (para. 3) (footnote omitted) (2011) (“*CAF Order*”), *pets. for review pending sub nom. In re: FCC 11-161*, No. 11-9900 (10th Cir. filed Dec. 18, 2011) (and consolidated cases).

<sup>16</sup> For example, the Chairman and Chief Executive Officer of Verizon has explained that:

[T]he vision that I have is we are going into the copper plant areas and every place we have FiOS, we are going to kill the copper. We are going to just take it out of service and we are going to move those services onto FiOS. We have got parallel networks in way too many places now, so that is a pot of gold in my view. And then in other areas that are more rural and more sparsely populated, we have got LTE built that will handle all of those services and so we are going to cut the copper off there. We are going to do it over wireless. So I am going to be really shrinking the amount of copper we have out there . . . . So there is lots of opportunities there and FiOS is continuing to do very well so we can grow the top line through FiOS and we can leverage the cost efficiencies on the network side. So margins can improve.

Thomson Reuters, “VZ–Verizon at Guggenheim Securities Symposium (Edited Transcript)”, June 21, 2012, *available at* [http://www.media-alliance.org/downloads/Verizon\\_Kill\\_Copper.pdf](http://www.media-alliance.org/downloads/Verizon_Kill_Copper.pdf), at 8 (quoting Lowell McAdam, Chairman and Chief Executive Officer, Verizon). AT&T announced last year that it is planning to expand its LTE network with a \$14 billion investment. AT&T plans to deploy 10,000 cell towers (“macrocells”) and 40,000 small cells (“microcells”), signaling “that ‘wireless densification’ of its network through the use of small cells and distributed antennas is the name of the game for AT&T.” Dan Jones, “AT&T Puts Up \$14B To Boost Broadband,” *Light Reading Mobile*, Nov. 7, 2012, *available at* <http://www.lightreading.com/fourth-generation-4g-wireless/att-puts-up-14b-to-boost-broadband/240143372>. AT&T’s chief strategy officer, John Stankey, explained that “[t]here’s no surprise what’s causing this: the full shift of voice communications to wireless and surging demand for wireless data . . . .” *Id.* (internal quotation marks omitted).

<sup>17</sup> Carol Wilson, “Wireless Fiber Demand Fuels New Options,” *Light Reading*, June 26, 2012, *available at* <http://www.lightreading.com/long-term-evolution-lte-/lr-live-wireless-fiber-demand-fuels-new-options/240138058> (reporting that “[t]oday, only about 30 percent of the 300,000 towers built in the U.S. have fiber, even as wireless service providers plan to build out four to six times as many towers in order to make the best use of their limited spectrum”).

approaching 1 Gbps per tower.<sup>18</sup> Only a small fraction of microcells will be connected by fiber facilities, and, again, each microcell will drive an increase in required bandwidth. Microwave backhaul has become the most cost-effective solution to connect LTE mobility networks to the fiber backbone.<sup>19</sup>

Although progress has been made, many hurdles remain as the Commission seeks to fulfill the congressional mandate to bring broadband to all Americans. The Commission has determined, for example, that “approximately 19 million Americans lack access to fixed broadband meeting the speed benchmark [of 4 Mbps/ 1 Mbps] and approximately 76 percent of these Americans reside in rural areas.”<sup>20</sup> Moreover, “the available international broadband data . . .

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<sup>18</sup> See Joan Engebretson, “Report: Mobile Internet Bandwidth Demand To Double Annually,” Telecompetitor, Mar. 14, 2012, *available at* <http://www.telecompetitor.com/report-mobile-internet-bandwidth-demand-to-double-annually/> (reporting that a study forecasts that Internet-generated broadband traffic will double year-over-year on mobile networks, “driven in large part by ‘power users’ that are using a disproportionate amount of bandwidth”).

<sup>19</sup> “Microwave spans the capacity regime of copper, as well as the lower end of the fiber capacity regime and is unique in its ability to be cost-effective at either end of this spectrum.” Exalt Communications, Inc., “Economics of Backhaul,” undated, *available at* <http://www.exaltcom.com/Economics-of-Backhaul.aspx>. “[F]or the majority of applications—10s or 100s of megabits per second—microwave is simply more cost effective [than fiber]—and far faster to deploy.” *Id.*

<sup>20</sup> *Eighth Broadband Report*, 27 FCC Rcd at 10369 (para. 44). The Commission has long recognized the difficulties associated with bringing broadband to rural areas. See, e.g., Michael J. Copps, Acting Chairman, FCC, BRINGING BROADBAND TO RURAL AMERICA: REPORT ON A RURAL BROADBAND STRATEGY (May 22, 2009), *available at* [http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-291012A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-291012A1.pdf), at para. 2:

As many of their fellow citizens in more densely populated parts of the country go online for work, education, entertainment, healthcare, civic participation, and much more, too many rural Americans are being left behind. Rural governments and businesses are missing opportunities to function more efficiently and effectively. Even in rural areas where broadband is available, infrastructure deployment has not kept pace with the growing need for faster and more reliable connectivity. At a time when access to affordable, robust broadband services is a fundamental part of efforts to restore America’s economic well-being in both rural and urban areas, we must ensure that this capability is available to open the doors of opportunity for everyone.

suggest that the availability and deployment of broadband in the United States may lag behind a number of other developed countries in certain respects . . . .”<sup>21</sup>

In addition to these challenges regarding the availability of broadband to consumers in all regions and areas of the country, the burgeoning growth of wireless broadband is also testing the Commission’s spectrum policies. Since the publication of the Broadband Plan, wireless broadband demand and usage have continued to increase dramatically.<sup>22</sup> The Commission has stated, for example, that “there were an estimated 317.3 million total mobile wireless connections at the end of 2011, up five percent from 301.8 million at the end of 2010, and up nine percent from 290.7 million at the end of 2009[,]”<sup>23</sup> that “the total number of mobile wireless connections now exceeds the total U.S. population[,]”<sup>24</sup> and that, “[i]n some cases mobile broadband networks are being used as a replacement for wireline last-mile solutions, where location makes deployment of wireline facilities inefficient.”<sup>25</sup>

In addition, CTIA has indicated that, by mid-2012, 78 percent of adults in the U.S. were using smartphones,<sup>26</sup> that approximately 34 percent of U.S. households are now wireless-only,<sup>27</sup>

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<sup>21</sup> *Eighth Broadband Report*, 27 FCC Rcd at 10401 (para. 135).

<sup>22</sup> *See, e.g., Amendment of the Commission’s Rules with Regard to Commercial Operations in the 3550-3650 MHz Band*, GN Docket No. 12-354, Notice of Proposed Rulemaking and Order, 27 FCC Rcd 15594, 15596 (para. 2) (2012) (“3.5 GHz Band NPRM”) (noting that “[d]emand for wireless broadband capacity is growing much faster than the availability of new spectrum”).

<sup>23</sup> *Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless, Including Commercial Mobile Services*, WT Docket No. 11-186, Sixteenth Report, FCC 13-34 (Mar. 21, 2013), at para. 244 (footnote omitted).

<sup>24</sup> *Id.*

<sup>25</sup> *Id.*

<sup>26</sup> CTIA–The Wireless Association® (“CTIA”) Comments, WC Docket No. 10-90, filed Mar. 28, 2013 (“CTIA Comments”), at 6. Approximately half of the wireless phones in the United States “are smartphones, which generate 35 times the traffic of traditional wireless phones. Tablet computers generate 121 times the traffic of traditional wireless phones.” Remarks of Commissioner Jessica Rosenworcel, Silicon

and that, “[f]rom July 2011 to June 2012, reported wireless data traffic over all U.S. wireless devices totaled 1.16 trillion megabytes, compared to 568 billion megabytes a year before, a 104% increase year-over-year.”<sup>28</sup>

These developments underscore the fact that the Commission must continue its efforts to design spectrum strategies that are able to accommodate the Nation’s growing broadband needs. As Commissioner Rosenworcel has explained, “[i]n the simplest terms, the demand for our airwaves is going up and the supply of unencumbered spectrum is going down. The pressure is on.”<sup>29</sup> The Commission noted in the Broadband Plan that “[t]he use of wireless broadband is growing rapidly, primarily in the area of mobile connectivity, but also in fixed broadband applications[,]”<sup>30</sup> and concluded that “[t]he growth of wireless broadband will be constrained if government does not make spectrum available to enable network expansion and technology upgrades. In the absence of sufficient spectrum, network providers must turn to costly alternatives, such as cell splitting, often with diminishing returns.”<sup>31</sup>

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Flatirons: The Next Ten Years of Spectrum Policy, Washington, D.C., Nov. 13, 2012 (“Rosenworcel Remarks”), *available at* <http://www.fcc.gov/document/commissioner-rosenworcel-remarks-silicon-flatirons-conference>.

<sup>27</sup> CTIA Comments at 4 n.8.

<sup>28</sup> *Id.* at 7.

<sup>29</sup> Rosenworcel Remarks.

<sup>30</sup> Broadband Plan at 76.

<sup>31</sup> *Id.* at 77. *See* Exec. Office of the President, President’s Council of Advisors on Science and Technology, REPORT TO THE PRESIDENT: REALIZING THE FULL POTENTIAL OF GOVERNMENT-HELD SPECTRUM TO SPUR ECONOMIC GROWTH, July 2012, *available at* [http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast\\_spectrum\\_report\\_final\\_july\\_20\\_2012.pdf](http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast_spectrum_report_final_july_20_2012.pdf), at v (noting that “[t]he growth of wireless technology in the past few years has been nothing short of astonishing. The advent of smartphones, tablets, and many other devices has made mobile information access a central feature of our lives. In the coming years, access to spectrum will be an increasingly important foundation for America’s economic growth and technological leadership.”).

The fact is that, while “demand for additional . . . spectrum-based services is . . . accelerating[,]”<sup>32</sup> the wireless industry, if the *status quo* is not altered, will be “lucky if it has three years of spectrum resources.”<sup>33</sup> According to Elizabeth Bowles, President of the Wireless Internet Service Providers Association (“WISPA”), “[f]rom an industry perspective, our primary challenge is the lack of spectrum . . . .”<sup>34</sup> Ms. Bowles points out that “[w]e have members who are serving the same number of customers that they had four years ago, but they need four times the amount of broadband [spectrum] as they did to serve the same number of customers. It is essentially a crisis.”<sup>35</sup>

In the next section, Mimosa suggests that one of the steps the Commission should take toward addressing this crisis is making the 10.0-10.5 GHz band available for wireless broadband services.

### **III. THE COMMISSION SHOULD REVISE ITS PART 90 RULES TO ESTABLISH A NEW FREQUENCY ALLOCATION FOR WIRELESS BROADBAND SERVICES.**

Recent actions the Commission has taken to make additional spectrum available for wireless broadband services have been encouraging, but various factors have made the spectrum

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<sup>32</sup> Peter Rysavy, “4G World: The Need for More Spectrum,” INFORMATIONWEEK, Oct. 31, 2012, available at <http://www.informationweek.com/mobility/3g/4g-world-the-need-for-more-spectrum/240012599>. For example, tablets consume three times more data than smartphones. *Id.*

<sup>33</sup> *Id.* See Brian X. Chen, “Carriers Warn of Crisis in Mobile Spectrum,” N.Y. TIMES, Apr. 17, 2012, available at [http://www.nytimes.com/2012/04/18/technology/mobile-carriers-warn-of-spectrum-crisis-others-see-hyperbole.html?pagewanted=all&\\_r=0](http://www.nytimes.com/2012/04/18/technology/mobile-carriers-warn-of-spectrum-crisis-others-see-hyperbole.html?pagewanted=all&_r=0) (reporting that “[t]he wireless carriers [AT&T, Verizon, T-Mobile, and Sprint] say that in the next few years they may not have enough [spectrum] to meet the exploding demands for mobile data. The result, they ominously warn, may be slower or spotty connections on smartphones and tablets. They imply in carefully couched language that, given the laws of supply and demand, the price of cellphone service will soar.”). The article notes that others disagree with this assessment.

<sup>34</sup> Paul Kirby, “Wireless Internet Providers Stress Need for More Spectrum,” TR DAILY, May 16, 2012, available at <http://www.wispa.org/news/2012/05/18/wireless-internet-providers-stress-need-for-more-spectrum> (quoting Elizabeth Bowles, President of WISPA).

<sup>35</sup> *Id.* (quoting Elizabeth Bowles).

bands allocated by the Commission less than optimum for wireless broadband. Mimosa explains in the following sections that the 10.0-10.5 GHz band, which has long-reach, high-capacity characteristics, is a promising candidate for allocation for wireless broadband services.

**A. Previous Actions Taken by the Commission Have Been Beneficial But Have Been Outpaced by Increased Demand for Wireless Broadband Services.**

One step taken by the Commission to address growing spectrum needs has been to allocate spectrum bands regulated under Part 101 of its rules and spectrum in the 3650-3700 MHz band for wireless broadband service. While these actions reflect the Commission's commitment to respond to increasing spectrum needs, the allocated spectrum has not met expectations because of factors such as outmoded radio equipment, extreme attenuation in certain conditions, and the limited amount of spectrum available in the bands.

**1. Bands Regulated by Part 101 of the Commission's Rules.**

Part 101 of the Commission's Rules regulates several microwave bands that are useful for fixed backhaul and point-to-multipoint data services. Over the last few years, the Commission has taken actions to improve access to Part 101 spectrum resources.<sup>36</sup> The Commission's efforts, however, have not kept up with increasing bandwidth demand in the Nation. Most legacy microwave radios in use today do not employ modern technologies such as adaptive modulation.

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<sup>36</sup> See *Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees; Petition for Rulemaking filed by Fixed Wireless Communications Coalition to Amend Part 101 of the Commission's Rules to Authorize 60 and 80 MHz Channels in Certain Bands for Broadband Communications*, WT Docket No. 10-153, RM-11602, Report and Order, Further Notice of Proposed Rulemaking, and Memorandum Opinion and Order, 26 FCC Rcd 11614 (2011); *Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul and Other Uses and to Provide Additional Flexibility to Broadcast Auxiliary Service and Operational Fixed Microwave Licensees; Petition for Rulemaking filed by Fixed Wireless Communications Coalition to Amend Part 101 of the Commission's Rules to Authorize 60 and 80 MHz Channels in Certain Bands for Broadband Communications*, WT Docket No. 10-153, RM-11602, Second Report and Order, Second Further Notice of Proposed Rulemaking, Second Notice of Inquiry, Order on Reconsideration, and Memorandum Opinion and Order, 27 FCC Rcd 9735 (2012).



Hence, they lack the immunity to interference that is common in modern radios, including those based upon low-cost WiFi technology. Short of mandating the elimination of legacy microwave radios, the Commission is limited as to the actions that can be taken in the bands with many existing licenses governed by its Part 101 rules.

Newer Part 101 bands, such as the millimeter wave bands from 71-76 GHz and from 81-86 GHz,<sup>37</sup> offer the opportunity for innovation, with large bandwidth,<sup>38</sup> unconstrained channel utilization,<sup>39</sup> and a general lack of congestion. The newer Part 101 bands, however, are at frequencies that suffer from extreme attenuation during rain conditions.<sup>40</sup> Hence, operations within these bands are limited to short ranges, often less than one mile with high reliability. Some backhaul applications will benefit from millimeter wave radios, but many backhaul applications require high-capacity radios capable of operation at 10 miles or more. Part 101 bands from 4 GHz through 12 GHz would be ideal, but they are congested with legacy radios, and include antenna specifications that are physically impractical for many applications.<sup>41</sup>

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<sup>37</sup> 47 C.F.R. Part 101, Subpart Q.

<sup>38</sup> The Commission's rules provide, for example, that "[a]n entity may request any portion of the 71-76 GHz and 81-86 GHz bands, up to 5 gigahertz in each segment for a total of 10 gigahertz. Licensees are also permitted to register smaller segments." 47 C.F.R. § 101.1505(a).

<sup>39</sup> See E-Band Communications, "70/80 GHz Overview," 2013, *available at* <http://www.e-band.com/index.php?id=69> (indicating that, since the 71-76 and 81-86 GHz bands are "licensed technology, all links are granted full interference protection from other nearby wireless sources").

<sup>40</sup> See Broadband Plan at 93 (footnote omitted) (indicating that "spectrum below 12 GHz is preferred for long-link backhaul because of rain-fading effects at higher frequencies"). *But see* Dr. Jonathan Wells, "White Paper on WiMAX Backhaul at 70/80 GHz," Oct. 2006, *available at* <http://www.wimax-industry.com/sp/gbm/dl/WiMax%20Backhaul%20101106%20Final.pdf>, at 4 (indicating that "[r]ain does cause additional attenuation" in these higher frequency bands, but suggesting that radio paths can be planned in ways to moderate this effect).

<sup>41</sup> The Broadband Plan addresses antenna issues with respect to bands below 12 GHz:

*Restrictions on antenna size.* The tower lease costs for mounting antennas can constitute up to 40% of the total cost of microwave ownership. These lease costs are directly related to the size of the antenna. Smaller antennas may also cost less to manufacture and distri-

## 2. Commission Licensing for the 3650-3700 MHz Band.

The 3.65 GHz band was historically allocated for radiolocation use, initially on a primary basis for the Federal Government, and later on a secondary basis for non-government radiolocation use.<sup>42</sup> In a Commission rulemaking conducted between 1998 and 2005, the 3.65 GHz band transitioned to a “lightly licensed” band under Part 90 rules, for the delivery of broadband services, particularly in rural areas. The Commission concluded that the 3.65 GHz band would be best put to use on a non-exclusive, shared-use basis.<sup>43</sup>

The Commission adopted a nationwide, non-exclusive licensing scheme for terrestrial operations in the band and adopted provisions to enable cooperative, shared use of the band,<sup>44</sup>

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bute, are less expensive to install because they weigh less and need less structural support, and cost less to maintain because they are less subject to wind load and other destructive forces. Current rules on antenna sizes are designed to maximize the use of microwave spectrum while avoiding interference between operators. It is important to ensure these standards are up-to-date in order to maximize the cost-effectiveness of microwave services.

Broadband Plan at 94 (internal quotation marks and footnotes omitted).

<sup>42</sup> *3650 MHz Order*, 20 FCC Rcd at 6504 (para. 4).

<sup>43</sup> The Commission noted that:

We believe that our licensing scheme and technical rules adopted herein will result in investments in this band. In addition, . . . much of the interest in development of the band is focused on smaller markets and less densely populated areas of the US where there is less likelihood of congestion and interference. Even in those larger markets that will be open for terrestrial use, we believe that licensees in the band will have the incentive to develop spectrum sharing practices based on the use of contention-based technologies that will promote efficient use of the band. In short, we believe that our decision strikes the best balance for all the competing interests in a manner that best serves the public interest.

*Id.* at 6512 (para. 30).

<sup>44</sup> The Commission stated that “[a]ll wireless licensees in the 3650 MHz band will have equal rights to the use of this spectrum (*i.e.*, no priority for first-in users), but all these licensees will have a mutual obligation to cooperate and avoid harmful interference to each another.” *Id.* at 6513 (para. 31).

including a streamlined licensing mechanism<sup>45</sup> and a requirement that equipment operating in the band incorporate a contention-based protocol to minimize interference.<sup>46</sup> The Commission concluded that this licensing approach reached an appropriate balance, providing a framework with low entry costs and minimal regulatory delay, while still ensuring more orderly operation than would exist under a traditional unlicensed approach in which users must accept interference from others in the band and users' locations may be unknown.<sup>47</sup>

Despite industry support for the framework for operation within the 3.65 GHz band, use of the band has been limited by the small amount of spectrum (25 megahertz) allowed on radios with contention-based protocols, including those based upon low-cost repurposed WiFi silicon

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<sup>45</sup> The Commission concluded that its “streamlined licensing and registration process will provide additional spectrum to WISPs and other potential users suitable for backhaul and other broadband purposes such as community networks—at low entry costs and with minimal regulatory delay.” *Id.* at 6508 (para. 16).

<sup>46</sup> The Commission explained that:

To ensure efficient and cooperative shared use of the spectrum, we further require all terrestrial operations in the 3650 MHz band to use technology that includes a contention-based protocol. Such systems allow multiple users to share the same spectrum by defining the events that must occur when two or more devices attempt to simultaneously access the same channel and establishing rules by which each device is provided a reasonable opportunity to operate. Under this approach, terrestrial operations can operate in geographic areas of their own choosing and, because a contention-based protocol will control access to spectrum, terrestrial operations will avoid interference that could result from co-frequency operations.

*Id.*

<sup>47</sup> *Id.* at 6508 (para. 16), 6524-25 (para. 61).

chipsets.<sup>48</sup> Wireless operators have often chosen to use the unlicensed Part 15 5 GHz band instead, because wider and more channels are available, albeit without spectrum coordination.<sup>49</sup>

**B. Utilizing the 10.0-10.5 GHz Band for Wireless Broadband Services.**

As Mimosa has described in the preceding sections of this Petition, the Commission has given priority to developing policies to promote the deployment of broadband networks, including strategies to facilitate the availability of spectrum for wireless broadband services. But the Commission's efforts to date with respect to wireless broadband have faced higher and higher hurdles because of the extraordinary growth in the use of wireless broadband services and the increasing bandwidth capacity consumed by this use.

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<sup>48</sup> See Sam Churchill, "PureWave: 3.65 GHz Speed with 900 MHz Coverage," DAILYWIRELESS.ORG, available at <http://www.dailywireless.org/2012/02/15/purewave-3-65ghz-speed-with-900-mhz-coverage/> (indicating that, "[s]ince the FCC has opened up the 3.65GHz band for semi-licensed operations, operators have found that the power limitations imposed by the FCC have greatly limited the effective range of networks in the band").

<sup>49</sup> In 1997, the Commission made available 300 megahertz of spectrum at 5.15-5.25 GHz and 5.725-5.825 GHz for use by Unlicensed-National Information Infrastructure ("U-NII") devices that are regulated under Part 15, Subpart E, of the Commission's Rules. In 2003, the Commission made an additional 255 megahertz of spectrum available in the 5.47-5.725 GHz band for U-NII devices. *Revision of Part 15 of the Commission's Rules To Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, ET Docket No. 13-49, Notice of Proposed Rulemaking, 28 FCC Rcd 1769, 1770-71 (para. 4) (2013). The Notice of Proposed Rulemaking proposes to make available an additional 195 megahertz of spectrum in the 5.35-5.47 GHz and 5.85-5.925 GHz bands for U-NII use. *Id.* at 1770 (para. 2). The National Telecommunications and Information Administration ("NTIA") has explained that:

U-NII devices provide short-range, high-speed unlicensed wireless connections in the 5 GHz band for, among other applications, Wi-Fi-enabled radio local area networks, cordless telephones, and fixed outdoor broadband transceivers used by wireless internet service providers. Unlicensed wireless broadband systems have become critical complements to licensed commercial mobile networks and to fixed wireline networks. For example, smart phones, tablets, net-books and laptops typically have inexpensive embedded Wi-Fi capabilities that enable high-speed broadband connectivity in a wide array of locations.

NTIA, Evaluation of the 5350-5470 MHz and 5850-5925 MHz Bands Pursuant to Section 6406(b) of the Middle Class Tax Relief and Job Creation Act of 2012, Jan. 2013, available at [http://www.ntia.doc.gov/files/ntia/publications/ntia\\_5\\_ghz\\_report\\_01-25-2013.pdf](http://www.ntia.doc.gov/files/ntia/publications/ntia_5_ghz_report_01-25-2013.pdf), at i.

What should the Commission do next? As a general matter, Mimosa endorses the Broadband Plan's Recommendation 5.15, which suggests that the Commission and NTIA should work "to identify additional candidate federal and non-federal spectrum that can be made accessible for both mobile and fixed wireless broadband use, on an exclusive, shared, licensed and/or unlicensed basis."<sup>50</sup> Mimosa also agrees with the U.S. Department of Justice's observation that, "[g]iven the potential of wireless services to reach underserved areas and to provide an alternative to wireline broadband providers in other areas, the Commission's primary tool for promoting broadband competition should be *freeing up spectrum*."<sup>51</sup>

Commissioner Rosenworcel has concluded that dealing with the growing mismatch between spectrum supply and demand requires innovation by the telecommunications industry as well as the Commission, including the development of "creative spectrum policy responses."<sup>52</sup> While Commissioner Rosenworcel calls for a new near-term approach to facilitate federal spectrum repurposing,<sup>53</sup> Mimosa believes that the Commission also should take steps to facilitate spectrum sharing as a means of making additional spectrum available for wireless broadband services. The specifics and benefits of Mimosa's proposal are discussed in the following sections.<sup>54</sup>

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<sup>50</sup> Broadband Plan at 96.

<sup>51</sup> Ex Parte Letter from Christine A. Varney, Ass't Atty. General, U.S. Dep't of Justice, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 09-51 (Jan. 4, 2010), at 21 (emphasis added), *quoted in* Broadband Plan at 78.

<sup>52</sup> Rosenworcel Remarks.

<sup>53</sup> *Id.*

<sup>54</sup> See *3.5 GHz Band NPRM*, 27 FCC Rcd at 15606 (para. 34) (footnote omitted):

In recent years, the Commission has continued to work extensively to clear wireless spectrum for traditional, exclusive licensing uses. However, it has become increasingly clear that such efforts alone will not suffice to meet the growing demand for commercial wireless spectrum. As such, the Commission has taken several concurrent actions to promote

**1. The Commission Should Authorize Wireless Broadband Services in the 10.0-10.5 GHz Band Pursuant to the Commission’s Part 90, Subpart Z, Rules.**

Mimosa respectfully requests the Commission to consider including additional spectrum under Part 90, Subpart Z, of the Commission’s Rules,<sup>55</sup> for use in connection with the provision of wireless broadband services. With the goal of creating new opportunities for wireless broadband service providers to utilize long-distance, high-capacity links, the 10.0-10.5 GHz band, currently governed for civilian use under Part 97 of the Commission’s Rules,<sup>56</sup> appears to be a most promising option, and Mimosa requests that the Commission issue a notice of proposed rulemaking to consider allocating this spectrum for use pursuant to Subpart Z.

Across all three International Telecommunication Union (“ITU”) Regions, the 10.0-10.5 GHz band is allocated for Radiolocation and Amateur Radio.<sup>57</sup> However, ITU Regions 1 and 3 also have the band allocated for Fixed and Mobile operation.<sup>58</sup> Including the 10.0-10.5 GHz band under the Subpart Z rules would bring ITU Region 2 into alignment with Regions 1 and 3.

A significant advantage offered by the 10.0-10.5 GHz band for use in connection with the provision of wireless broadband services is that the band is only moderately susceptible to attenuation due to rain-fading effects, especially when compared to spectrum in higher frequencies,

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spectrum sharing and innovative licensing models designed to address the spectrum shortage.

<sup>55</sup> 47 C.F.R. Subpart Z (Wireless Broadband Services in the 3650-3700 Band), §§ 90.1301-90.1337 (“Subpart Z”). Subpart Z “sets out the regulations governing wireless operations in the 3650-3700 MHz band. It includes licensing requirements, and specific operational and technical standards for wireless operations in this band.” 47 C.F.R. § 90.1301. “Service in the 3650-3700 MHz band is authorized through non-exclusive nationwide licenses and requires the registration of individual fixed and base stations. All stations operating in this band must employ a contention-based protocol.” *3.5 GHz Band NPRM*, 27 FCC Rcd at 15604 (para. 28) (footnotes omitted).

<sup>56</sup> 47 C.F.R. § 97.301(a) (listing authorized frequency bands for the Amateur Radio Service).

<sup>57</sup> See 47 C.F.R. § 2.106, Table of Frequency Allocations.

<sup>58</sup> *Id.*

including the 71-76 and 81-86 GHz bands.<sup>59</sup> As a general matter, “[t]he most common reason for the strong preference for lower frequencies for even short-haul routes is the susceptibility of frequencies above 10 GHz to rainfall attenuation.”<sup>60</sup> This attenuation effect “increases rapidly with frequency. For example, . . . rainfall intensity causing only a few dB of attenuation at lower frequencies could be sufficient to cause a long-term path outage at 18 GHz.”<sup>61</sup>

With respect to the 10.0-10.5 GHz band and the 71-76 GHz band specifically, calculations based on propagation and attenuation models developed by the ITU<sup>62</sup> indicate that horizontal polarization specific attenuation (at a 25mm/hour rain rate) is 0.70 dB/km at 10 GHz, compared to 11.35 dB/km at 76 GHz. Thus, rain attenuation at 76 GHz is prohibitively high, while rain fade effects at 10 GHz are relatively moderate. The ITU models illustrate that rain fade begins to be a factor in the 6 GHz range, has a moderate effect in the 10 GHz range, but becomes very severe beginning in the 18 GHz range. These calculations support the conclusion that, while rain fade effects in the 10.0-10.5 GHz band do not significantly mitigate its serviceability for wireless broadband, rain attenuation in the 71-76 GHz band and other higher frequencies regulated by Part 101 of the Commission’s Rules is so severe that the bands are not plausible for high reliability links (99.999 percent availability) at distances of more than 1.5 km.<sup>63</sup>

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<sup>59</sup> Rain-fade problems associated with higher frequencies are discussed in Section III.A.1., *supra*.

<sup>60</sup> Aviat Networks, *White Paper: Rain Fading in Microwave Networks*, Aug. 2011, available at <http://www.scribd.com/doc/62683191/Rain-Fading-in-Microwave-Networks>, at 4.

<sup>61</sup> *Id.*

<sup>62</sup> See ITU, *Recommendation ITU-R P.387-6: Characteristics of Precipitation for Propagation Modelling*, Feb. 2012; ITU, *Recommendation ITU-R P.838-3: Specific Attenuation Model for Rain for Use in Prediction Methods*, 2005.

<sup>63</sup> See Huawei, “E-Band Microwave Is Emerging for MBB,” available at [http://www.huawei.com/ilink/en/solutions/broader-smarter/morematerial-b/HW\\_196154](http://www.huawei.com/ilink/en/solutions/broader-smarter/morematerial-b/HW_196154).

Licensed use of the 10.0-10.5 GHz band has been very limited in the United States, with only 220 active licenses for Radiolocation services in the band.<sup>64</sup> Amateur Radio use of the 10.0-10.5 GHz band has become popular in recent years,<sup>65</sup> although Part 97 bands at 5 GHz and 24 GHz are already successfully shared with other services, including unlicensed Part 15 operations.

In Mimosa's view, the coordination procedures and requirements provided in Subpart Z will ensure that amateur radio operators will be able to continue using the 10.0-10.5 GHz band as they do currently, without any disruption of their activities resulting from the Commission's making the band available for wireless broadband services.

Specifically, the amendments proposed by Mimosa provide that all stations operating in the 10.0-10.5 GHz band must employ a contention-based protocol.<sup>66</sup> In establishing its licensing rules for wireless broadband services in Subpart Z, the Commission explained that “[t]he non-exclusive licensing scheme we employ [in the rules], coupled with the required use by all licensees of contention-based technology, permits a high degree of access and spectrum re-use in these bands by multiple users, while minimizing the likelihood of harmful interference.”<sup>67</sup> In addition, application of the contention-based protocol will also accelerate widespread use of the band for wireless broadband services through the use of low-cost radio implementations based upon WiFi chipsets.

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<sup>64</sup> This figure is derived from a recent search of Land Mobile Radiolocation licenses, using the FCC Universal Licensing System.

<sup>65</sup> See Brian Thorson, “Entering the Exciting World of Ten GHz,” undated, *available at* <http://www.hamradio.com/sbms/presentations/AF6NA/Entering%20The%20Exciting%20World%20of%20Ten%20GHz%20-%20Masster.pptx> (discussing amateur radio operators' construction of 10 GHz band transceivers).

<sup>66</sup> See Appendix A.

<sup>67</sup> *3650 MHz Order*, 20 FCC Rcd at 6517 (para. 43).



Mimosa also suggests two additional steps to promote the coexistence of wireless broadband and amateur service operations in the 10.0-10.5 GHz band. First, Mimosa proposes a band plan for the 10.0-10.5 GHz band<sup>68</sup> that would protect frequencies in the band that are most often used by amateur radio operators. The proposed band plan would create a specific guard band and would utilize a 20 megahertz channelization scheme. Second, Mimosa proposes a rule amendment requiring wireless broadband service operations in the 10.0-10.5 GHz band to avoid harmful interference with amateur service and amateur-satellite service operations in the band.

Mimosa recognizes the need for both point-to-point and point-to-multipoint operations, and therefore suggests that the Commission allow both modes of operation within the 10.0-10.5 GHz band. Because of the need for higher Equivalent Isotropically Radiated Power (“EIRP”) to overcome rain fade in the frequency band, Mimosa suggests that the Commission establish an EIRP limit of 55 dBW for fixed station operations in the 10.0-10.5 GHz band pursuant to the Subpart Z rules.<sup>69</sup> As an additional means of facilitating point-to-point and point-to-multipoint operational modes, Mimosa suggests that wireless broadband service providers operating in the 10.0-10.5 GHz band be given latitude to innovate with respect to antenna designs, subject to the EIRP limit of 55 dBW.

Mimosa is aware that there may be concerns that allocating spectrum in the 10.0-10.5 GHz band for use in the provision of wireless broadband services could risk interference with U.S. Government and civilian radar operations in the band.<sup>70</sup> To guard against any such risk,

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<sup>68</sup> See Appendix B.

<sup>69</sup> This proposed use of an EIRP limit of 55 dBW is based on transmitter power limitations for the 10.7-11.7 GHz band in Part 101 of the Commission’s Rules. *See* 47 C.F.R. § 101.113(a).

<sup>70</sup> The 10.0-10.5 GHz band is allocated for U.S. Government and non-Government Radiolocation operations. *See* 47 C.F.R. § 2.106, Table of Frequency Allocations.

Mimosa suggests that the Commission should apply Dynamic Frequency Selection (“DFS”) restrictions to wireless broadband operations in the band.<sup>71</sup> The application of such restrictions would be effective in addressing any concerns regarding interference with radar operations.

Finally, Mimosa suggests that its proposal for utilization of the 10.0-10.5 GHz band for wireless broadband can serve as a complement to proposals recently made by the Commission in the *3.5 GHz Band NPRM*. Mimosa’s proposal calls for making suitable spectrum available on a shared basis principally for high-capacity macrocell backhaul covering long distances, and for both point-to-point and point-to-multipoint operations. The *3.5 GHz Band NPRM*, on the other hand, proposes to create a new Citizens Broadband Service in Part 95 of the Commission’s Rules to promote spectrum sharing and the use of small cells.<sup>72</sup> “Small cells are typically used to extend wireless coverage to areas where macro cell signals are weak or to provide additional data capacity in areas where existing macro cells are overloaded.”<sup>73</sup>

Small cells can provide more efficient spectrum use, and expand capacity,<sup>74</sup> in cases in which available spectrum is not optimum for macrocell deployment. The Commission has noted the commercial wireless industry’s view that the 3.5 GHz band is not well suited for macrocell deployment because of limited signal propagation in the band and the prospect that commercial

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<sup>71</sup> See Cisco Systems, Inc., “Dynamic Frequency Selection,” 2008, available at <http://www.cisco.com/en/US/docs/routers/access/3200/software/wireless/RadioChannelDFS.pdf> (explaining that “DFS is the process of detecting radar signals that must be protected against interference from . . . radios, and upon detection switching the operating frequency of the . . . radio to one that is not interfering with the radar systems”).

<sup>72</sup> The Commission explains that “[s]mall cells are low-powered wireless base stations intended to cover targeted indoor or localized outdoor areas ranging in size from homes and offices to stadiums, shopping malls, hospitals, and metropolitan outdoor spaces.” *3.5 GHz Band NPRM*, 27 FCC Rcd at 15596 (para. 4).

<sup>73</sup> *Id.* at 15605 (para. 30).

<sup>74</sup> *Id.* at 15596 (para. 4).

uses would be restricted to areas outside large “exclusion zones.”<sup>75</sup> Thus, both the *3.5 GHz Band NPRM* and Mimosa’s proposal seek to pursue spectrum sharing arrangements to enable more efficient spectrum use and increase spectrum capacity, by taking different but complementary approaches. While the Commission’s proposal focuses on “reusing” spectrum frequencies in “targeted indoor or localized outdoor areas[,]”<sup>76</sup> Mimosa proposes the utilization of the 10.0-10.5 GHz band to address a different problem: the growing need for efficient microwave backhaul for use in connection with the provision of both fixed and mobile wireless broadband services.

Mimosa also notes that its proposal and the Commission’s 3.5 GHz band proposal are distinguishable for another reason: They take different approaches to guard against interference in connection with the shared use of spectrum. The Commission proposes that the Citizens Broadband Service would be managed by a Spectrum Access System (“SAS”), which would serve as the exclusive or principal interference mitigation mechanism.<sup>77</sup> As Mimosa has discussed, its proposal relies on a proposed band plan and two existing mechanisms—the required use of contention-based technology and Dynamic Frequency Selection restrictions—to prevent harmful interference.

Mimosa believes that its proposal’s reliance on existing interference mitigation mechanisms would facilitate and expedite the utilization of the 10.0-10.5 GHz band for wireless broadband service. In contrast, the Commission has recognized that “the SAS we propose would be a

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<sup>75</sup> *Id.* at 15597 (para. 6). The National Telecommunications and Information Administration (“NTIA”) has recommended that any new commercial uses in the 3.5 GHz band occur outside exclusion zones (which the Commission estimates to cover approximately 60 percent of the U.S. population), in order to protect U.S. Government operations in the band. *Id.* The Commission is seeking comment on whether the use of small cell technology in the 3.5 GHz band could significantly reduce the size of the exclusion zones proposed in NTIA. *Id.* at 15598 (para. 8).

<sup>76</sup> *Id.* at 15596 (para. 4).

<sup>77</sup> *Id.* at 15597 (para. 7).

new iteration of database technology used to manage spectrum resources, and that its creation would require significant planning and testing.”<sup>78</sup>

**2. Various Stakeholders Would Benefit from the Commission’s Making the 10.0-10.5 GHz Band Available for Wireless Broadband Service.**

The allocation of long-reach, high-capacity spectrum in the 10.0-10.5 GHz band to wireless broadband services pursuant to Subpart Z would bring significant benefits to consumers as well as other stakeholders.

Consumers.—As Mimosa has discussed, the progression from conventional cellphones to smartphones to tablets has led to dramatic increases in voice and data traffic.<sup>79</sup> Further developments in wireless technologies are likely to continue and even accentuate this trend. A central mission of the Commission “is to ensure that all Americans are served by networks that support high-speed Internet access—in addition to basic voice service—where they live, work, and travel.”<sup>80</sup> Making the 10.0-10.5 GHz band available for wireless broadband services will serve this mission, benefiting consumers by adding to the spectrum capacity available for broadband and enhancing the options of wireless service providers in meeting consumer demand for wireless broadband.

Wireless Internet Service Providers.—A new breed of WISPs is using low-cost WiFi-based radio technologies to deliver fixed broadband services in areas where subscribers may not have other viable Internet access. The radios used are a fraction of the cost of legacy microwave radios, and yet the scale of the WISP networks is limited by the capacity of the radios and frequency congestion, in particular where their wireless networks use backhaul facilities to fiber

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<sup>78</sup> *Id.* at 15626 (para. 95).

<sup>79</sup> See Section II.B., *supra*.

<sup>80</sup> *CAF Order*, 26 FCC Rcd at 17668 (para. 5).

networks. The 10.0-10.5 GHz band allocation proposed by Mimosa would facilitate access to higher capacity backhaul that would provide a path for WISPs to offer better services in rural areas, while becoming viable competitors to cable and Digital Subscriber Line providers in urban and suburban areas.

Mobile Wireless Service Providers.—Mimosa’s proposal will enhance the ability of cellular carriers and other mobile wireless service providers to meet consumer demand for advanced wireless broadband services. Specifically, allocating the 10.0-10.5 GHz band for wireless broadband services will create a viable alternative to fiber facilities for long-distance macrocell backhaul. The availability of this alternative will enhance broadband competition and lower wireless carriers costs, both of which will benefit consumers.

Telecommunications Equipment Manufacturers.—Mimosa’s proposal will also create an opportunity for expansion of the wireless broadband industry. This expansion, in addition to benefiting consumers and wireless service providers, would increase the level of telecommunications equipment production and sales.

In addition to these advantages that Mimosa’s proposal would have for consumers, WISPs, mobile wireless service providers, and equipment manufacturers, the proposal would also benefit the national economy generally. “Fixed and mobile broadband have become crucial to our nation’s economic growth”<sup>81</sup> in part because businesses increasingly rely on broadband services in numerous ways. The ability of businesses to expand their operations, reach new customers, and compete in new markets is linked in part to their opportunity to access and utilize advanced broadband networks. Mimosa’s proposal for allocating the 10.0-10.5 GHz band for wire-

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<sup>81</sup> *CAF Order*, 26 FCC Rcd at 17667 (para. 3).

less broadband services is a step the Commission should take to provide increased capacity for wireless broadband services.

#### IV. CONCLUSION.

For the reasons discussed in this Petition, Mimosa Networks, Inc., respectfully requests the Commission to initiate a rulemaking proceeding for the purpose of allocating spectrum in the 10.0-10.5 GHz band for use in the provision of wireless broadband services pursuant to Part 90, Subpart Z, of the Commission's Rules.

Respectfully submitted,

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## APPENDIX A: Proposed Rules

### PART 2 – FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

1. The authority citation for Part 2 continues to read as follows:

**AUTHORITY:** 47 U.S.C. 154, 302a, 303, and 336, unless otherwise noted.

2. Section 2.106, the Table of Frequency Allocations, is amended as follows:
  - a. Revise page 47.
  - b. In the list of non-Federal Government footnotes, revise footnote NG50.

#### § 2.106 Table of Frequency Allocations.

The revisions and additions read as follows:

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[On page 47, in the list of allocations in the Non-Federal Table (1) in the row headed “10-10.45” insert “Mobile except aeronautical mobile” after Radiolocation US108; and (2) in the row headed “10.45-10.5” insert “Mobile except aeronautical mobile” after Radiolocation US108.]

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#### NON-FEDERAL (NG) FOOTNOTES

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NG50 In the band 10-10.5 GHz, non-Federal stations in the radiolocation service and in the mobile service shall not cause harmful interference to the amateur service; and in the sub-band 10.45-10.5 GHz, these stations shall not cause harmful interference to the amateur-satellite service.

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### PART 90 – PRIVATE LAND MOBILE RADIO SERVICES

1. The authority citation for Part 90 continues to read as follows:

**AUTHORITY:** 47 U.S.C. 154(i), 161, 303(g), 303(r), 332(c)(7).

2. The table of contents for Part 90 is amended by revising Subpart Z to read as follows:

**Subpart Z – Wireless Broadband Services in the 3650-3700 MHz and 10.0-10.5 GHz Bands**

- 90.1301 Scope.
- 90.1303 Eligibility.
- 90.1305 Permissible operations.
- 90.1307 Licensing.
- 90.1309 Regulatory status.
- 90.1311 License term.
- 90.1312 Assignment and transfer.
- 90.1319 Policies governing the use of the 3650-3700 MHz and 10.0-10.5 GHz bands.
- 90.1321 Power limits in the 3650-3700 MHz band.
- 90.1322 Power limits in the 10.0-10.5 GHz band.
- 90.1323 Emission limits.
- 90.1324 Employment of Dynamic Frequency Selection in the 10.0-10.5 GHz band.
- 90.1331 Restrictions on the operation of base and fixed stations in the 3650-3700 MHz band.
- 90.1333 Restrictions on the operation of mobile and portable stations.
- 90.1335 RF safety.
- 90.1337 Canadian and Mexican coordination.

3. Subpart Z is amended by revising the heading to read as follows:

**Subpart Z – Wireless Broadband Services in the 3650-3700 MHz and 10.0-10.5 GHz Bands**

4. Section 90.1301 is amended by revising the first sentence to read as follows:

**§ 90.1301 Scope.**

This subpart sets out the regulations governing wireless operations in the 3650-3700 MHz and 10.0-10.5 GHz bands.

5. Section 90.1305 is amended to read as follows:

**§ 90.1305 Permissible operations.**

Use of the 3650-3700 MHz and 10.0-10.5 GHz bands must be consistent with the allocations for these bands as set forth in part 2 of the Commission's Rules. All stations operating in these bands must employ a contention-based protocol (as defined in § 90.7).

6. Section 90.1307 is amended by revising the first sentence to read as follows:

**§ 90.1307 Licensing.**



The 3650-3700 MHz and 10.0-10.5 GHz bands are licensed on the basis of non-exclusive nationwide licenses.

7. Section 90.1319 is amended by revising the heading and paragraph (a), paragraph (b), paragraph (c), and the first sentence of paragraph (d), and by adding a new paragraph (e), to read as follows:

**§ 90.1319 Policies governing the use of the 3650-3700 MHz and 10.0-10.5 GHz bands.**

(a) Channels in the 3650-3700 MHz and 10.0-10.5 GHz bands are available on a shared basis only and will not be assigned for the exclusive use of any licensee.

(b) Any base, fixed, or mobile station operating in the bands must employ a contention-based protocol.

(c) Equipment incorporating an unrestricted contention-based protocol (i.e. one capable of avoiding co-frequency interference with devices using all other types of contention-based protocols) may operate throughout the 50 megahertz of the 3650-3700 MHz band. Equipment incorporating a restricted contention-based protocol (i.e. one that does not qualify as unrestricted) may operate in, and shall only tune over, the lower 25 megahertz of the 3650-3700 MHz band. In the 10.0-10.5 GHz band, unrestricted or restricted contention-based protocols may be used without limitation.

(d) All applicants and licensees shall cooperate in the selection and use of frequencies in the 3650-3700 MHz and 10.0-10.5 GHz bands in order to minimize the potential for interference and make the most effective use of the authorized facilities. \* \* \*

(e) Stations in the Wireless Broadband Service operating in the 10.0-10.5 GHz band will be operated to avoid harmful interference to the Amateur Service in the 10.0-10.5 GHz band, and such stations shall not cause harmful interference to the Amateur-Satellite Service in the 10.45-10.5 GHz sub-band, respectively.

8. Section 90.1321 is amended by revising the heading to read as follows:

**§ 90.1321 Power and antenna limits in the 3650-3700 MHz band.**

9. A new Section 90.1322 is added to read as follows:

**§ 90.1322 Power and antenna limits in the 10.0-10.5 GHz band.**

(a) Base and fixed stations are limited to 55dBW equivalent isotropically radiated power (EIRP).

(b) Power will be reduced to that necessary to achieve adequate link margin.

(c) Antenna design shall be left to the discretion of the license holder, subject to the 55dBW EIRP limit.

10. A new Section 90.1324 is added to read as follows:

**§ 90.1324 Employment of Dynamic Frequency Selection in the 10.0-10.5 GHz band.**

(a) Devices operating in the 10.0-10.5 GHz band shall employ a Dynamic Frequency Selection (DFS) radar detection mechanism to detect the presence of radar systems and to avoid co-channel operation with radar systems. The minimum DFS detection threshold for such devices is -64 dBm. The detection threshold is the received power averaged over 1 microsecond referenced to a 0 dBi antenna. The DFS process shall be required to provide a uniform spreading of the loading over all the available channels.

(b) The DFS requirement applies to the following operational modes:

(1) The requirement for channel availability check time applies in the master operational mode.

(2) The requirement for channel move time applies in both the master and slave operational modes.

(c) A device shall check if there is a radar system already operating on the channel before it can initiate a transmission on a channel and when it has to move to a new channel. The device may start using the channel if no radar signal with a power level greater than the interference threshold value listed in paragraph (a) is detected within 60 seconds.

(d) After a radar's presence is detected, all transmissions shall cease on the operating channel within 10 seconds. Transmissions during this period shall consist of normal traffic for a maximum of 200 ms after detection of the radar signal. In addition, intermittent management and control signals can be sent during the remaining time to facilitate vacating the operating channel.

(e) A channel that has been flagged as containing a radar system, either by a channel availability check or in-service monitoring, is subject to a non-occupancy period of at least 30 minutes. The non-occupancy period starts at the time when the radar system is detected.

11. Section 90.1331 is amended by revising the heading to read as follows:

**§ 90.1331 Restrictions on the operation of base and fixed stations in the 3650-3700 MHz band.**

12. Section 90.1335 is amended to read as follows:

**§ 90.1335 RF safety.**

Licensees in the 3650-3700 MHz and 10.0-10.5 GHz bands are subject to the exposure requirements found in § 1.1307(b), 2.1091 and 2.1093 of our Rules.

## APPENDIX B: Proposed Band Plan

<b>Proposed 10.0-10.5GHz Band Plan</b>
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Frequency		
From	To	Use
10.000	10.010	Guard Band
10.010	10.030	Channel 1
10.030	10.050	Channel 2
10.050	10.070	Channel 3
10.070	10.090	Channel 4
10.090	10.110	Channel 5
10.110	10.130	Channel 6
10.130	10.150	Channel 7
10.150	10.170	Channel 8
10.170	10.190	Channel 9
10.190	10.210	Channel 10
10.210	10.230	Channel 11
10.230	10.250	Channel 12
10.250	10.270	Channel 13
10.270	10.290	Channel 14
10.290	10.310	Channel 15
10.310	10.330	Channel 16
10.330	10.350	Channel 17
10.350	10.370	Amateur Calling Band
10.370	10.390	Channel 18
10.390	10.410	Channel 19
10.410	10.430	Channel 20
10.430	10.450	Channel 21
10.450	10.500	Amateur Satellite

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