

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

In the Matter of	)	
	)	
Amendment of Part 101 of the Commission's	)	
Rules to Facilitate the Use of Microwave for	)	
Wireless Backhaul and Other Uses and to	)	WT Docket No. 10-153
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	)	RM-11602
Authorize 60 and 80 MHz Channels in	)	
Certain Bands for Broadband	)	
Communications	)	

**COMMENTS OF THE  
FIXED WIRELESS COMMUNICATIONS COALITION  
IN RESPONSE TO THE COMMISSION'S  
NOTICE OF INQUIRY**

The Fixed Wireless Communications Coalition (FWCC)<sup>1</sup> files these comments in response to the Notice of Inquiry in the above-referenced docket.<sup>2</sup> The FWCC is also filing a

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<sup>1</sup> The FWCC is a coalition of companies, associations, and individuals interested in the fixed service—i.e., in terrestrial fixed microwave communications. Our membership includes manufacturers of microwave equipment, fixed microwave engineering firms, licensees of terrestrial fixed microwave systems and their associations, and communications service providers and their associations. The membership also includes railroads, public utilities, petroleum and pipeline entities, public safety agencies, cable TV providers, backhaul providers, and/or their respective associations, communications carriers, and telecommunications attorneys and engineers. Our members build, install, and use both licensed and unlicensed point-to-point, point-to-multipoint, and other fixed wireless systems, in frequency bands from 900 MHz to 95 GHz. For more information, see [www.fwcc.us](http://www.fwcc.us).

<sup>2</sup> *Amendment of Part 101 of the Commission's Rules to Facilitate the Use of Microwave for Wireless Backhaul*, Second Report and Order, Second Further Notice of Proposed Rulemaking, Second Notice of Inquiry, Order on Reconsideration, and Memorandum Opinion And Order, WT Docket No. 10-153, FCC 12-87 at ¶¶ 76-81 (released Aug. 3, 2012) (*Notice of Inquiry*).

separate submission today in response to the Second Further Notice of Proposed Rulemaking in this same docket.

**THE COMMISSION SHOULD RELAX ANTENNA STANDARDS IN THE 71-76 AND 81-86 GHz BANDS, AND MAKE OTHER ADJUSTMENTS TO THE RULES.**

**A. BACKGROUND**

The Commission adopted rules for the 71-76, 81-86, and 92-95 GHz bands in 2003, with the strong support of the FWCC.<sup>3</sup> Noting that the short wavelengths in these bands provide high gain and directivity from relatively small antennas, the Commission foresaw

the possibility of a more efficient use of the spectrum for point-to-multipoint applications. Since a greater number of high directive antennas can be placed than less directive antennas in a given area, the net result is higher reuse of the spectrum, and higher density of users, as compared to lower frequencies.<sup>4</sup>

The 2003 *Report and Order* considered power limits and antenna standards together.<sup>5</sup>

The Commission set a power limit lower than some parties had requested, and barred the use of Automatic Transmit Power Control (ATPC), while imposing relatively stringent antenna standards.<sup>6</sup> Contrary to its practice in most other Fixed Service bands, the Commission declined

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<sup>3</sup> *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, Report and Order, 18 FCC Rcd 23318 at ¶¶ 95-97 (2003) (*Report and Order*), recon. granted in part, Memorandum Opinion and Order, 20 FCC Rcd 4889 (2005) (*Reconsideration Order*).

<sup>4</sup> *Allocations and Service Rules for the 71-76 GHz, 81-86 GHz and 92-95 GHz Bands*, Notice of Proposed Rulemaking, 17 FCC Rcd 12182 at ¶ 6 (2002).

<sup>5</sup> *Report and Order* at ¶¶ 95-97.

<sup>6</sup> *Id.* at ¶ 96. ATPC is a technology that boosts transmitter power when needed to overcome temporarily adverse atmospheric conditions. See 47 C.F.R. § 101.3.

to provide separate Category A and Category B antenna standards, and instead established a single set of standards that applies in all cases.<sup>7</sup>

On reconsideration, the Commission allowed licensees to relax their antenna specifications in exchange for reduced power: where the initial rules had required an antenna gain of 50 dBi and set a power limit of +55 dBW EIRP, the revised rules allow antenna gains down to 43 dBi, with a proportional reduction in maximum authorized EIRP in a ratio of 2 dB reduced EIRP per 1 dB of reduced antenna gain.<sup>8</sup>

## **B. SUBSEQUENT DEVELOPMENTS**

In the seven years since the Commission last visited these rules, both the technology and the market have evolved. The technology is now pivoting to serve new applications. We respectfully suggest it is time for a fresh look at the rules, with the aim of facilitating this transition while still protecting more traditional uses of the bands.

The major factor driving changes at 70/80 GHz is the continuing growth in popularity of data-intensive mobile devices. The sales figures for smartphones continue to rise at an annual rate of 9 percent, with much of the current growth coming from prepaid handsets<sup>9</sup>—a market still a long way from saturation. Consumer interest remains intense; Apple reported sales of 5 million iPhone 5 units within the first three days of product launch.<sup>10</sup> Tablet sales are on a

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<sup>7</sup> *Report and Order* at ¶ 96.

<sup>8</sup> *Reconsideration Order* at ¶¶ 32-34, *codified at* 47 C.F.R. § 101.115(b) (table), n.15.

<sup>9</sup> Jeff Blagdon, The Verge, *US smartphone sales increase 9 percent thanks to huge prepaid growth*, <http://www.theverge.com/2012/8/9/3229678/npd-q2-2012-smartphone-prepaid-postpaid-growth>

<sup>10</sup> Press Release, Apple, Inc., iPhone 5 First Weekend Sales Top Five Million, *available at* <http://www.apple.com/pr/library/2012/09/24iPhone-5-First-Weekend-Sales-Top-Five-Million.html>

similar trajectory, although lagging by a few years due to their later introduction. But the tablet's bigger screen, improved media capabilities, and greater versatility, compared to a smartphone, means that owners consume more data per hour of use than do smartphone users. The Commission recently estimated that tablets use about 3.5 times as much spectrum as smartphones.<sup>11</sup>

The carriers that support these devices are squeezed for mobile access spectrum. The limited range of frequencies technically suited to end-user communications is in short supply and almost fully occupied.<sup>12</sup> Carriers are responding in the only way they can: by deploying ever-smaller cells, especially in heavily populated areas, so as to free up the same frequencies for reuse close by. New antennas tend to be installed on shorter towers, or (increasingly) on the sides of buildings and other structures, sometimes just a few tens of feet above street level.<sup>13</sup>

Each of these new cell antennas needs its own two-way connection to the carrier's network facilities. These links are generically termed "backhaul." The high data requirements

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<sup>11</sup> News Release, FCC, FCC Launches First-in-the-World Incentive Auction to Repurpose Broadcast Television Spectrum for Mobile Broadband (Sept. 28, 2012) (smartphones use 35 times more spectrum, and tablets use 121 times as much spectrum, as traditional cell phones). This may not be a strictly apples-to-apples comparison. All smartphones have 3G and/or 4G capability, while "Wi-Fi only" tablets that lack a 3G or 4G modem do not load carriers' wireless facilities. Complicating the picture is the growing use of 3G- and 4G-driven portable Wi-Fi hotspots to serve Wi-Fi-only tablets. Details aside, however, there is no question that mobile data consumed by smartphones and tablets is on a near-exponential upward trajectory.

<sup>12</sup> See Press Release, Committee on Science, Space, and Technology, Subcommittee Reviews Innovative Solutions to Alleviate "Looming Spectrum Crisis" (April 18, 2012), available at <http://science.house.gov/press-release/subcommittee-reviews-innovative-solutions-alleviate-%E2%80%98looming-spectrum-crisis%E2%80%99>; see also M. Lazarus, *The Great Radio Spectrum Famine*, IEEE SPECTRUM, Oct. 2010, available at <http://spectrum.ieee.org/telecom/wireless/the-great-radio-spectrum-famine/0>

<sup>13</sup> Lower antenna elevations help to confine the outgoing signal to a smaller area. A common sight nowadays is a tall cell tower with the top half or more empty, and the antennas clustered lower down—plain evidence of the changing trends in cell system design and denser antenna placement.

limit most backhaul connections to either fiber or point-to-point microwave. In some environments, particularly rough terrain and built-up population centers, fiber is expensive or impossible to install, leaving microwave as the only practicable option.

The ongoing shrinkage and proliferation of cells thus induces commensurate growth in demand for short-range, high-capacity backhaul links. The frequencies for those links, like end-user spectrum, sometimes must be multiply reused within a small area. For these “small cell” backhaul applications, 70/80 GHz is often the best choice. The very high available radio bandwidth—up to 5 GHz—can carry high data loads, while the high directivity and high space attenuation simplify designs for frequency reuse.

### **C. REQUESTED CHANGE IN ANTENNA STANDARDS**

The current requirements for the 70/80 GHz band preclude using the small, low-cost antennas that are necessary to fully exploit the potential of this spectrum. The antenna cost barrier is a major factor in holding back widespread take-up of these bands, particularly for new applications such as small cell backhaul.

We ask the Commission to amend the current requirements to include both Category A and Category B standards, in line with the rules for most other Part 101 bands. We expect the more stringent Category A antennas will continue to be used for the applications originally contemplated for these bands, such as point-to-point rooftop interconnections. The adoption of a Category B will allow the deployment of small, visually inoffensive planar antennas for installation closer to street level in support of high-capacity, small-cell urban backhaul.

Our proposed standards are set out in the following table:<sup>14</sup>

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<sup>14</sup> These standards are based in part on the ETSI document EN 302 317-4-2. The major departure reflects differences in how the FCC and ETSI define the limits on the radiation pattern envelope. The table in text converts the ETSI limits to conform to FCC conventions.

Frequency (MHz)	Category	Maximum beamwidth to 3 dB points (included angle in degrees)	Minimum antenna gain (dbi)	Minimum radiation suppression to angle in degrees from centerline of main beam in decibels						
				5° to 10°	10° to 15°	15° to 20°	20° to 30°	30° to 100°	100° to 140°	140° to 180°
71,000 to 76,000 (co-polar)	A	2.2	38	22	28	32	35	37	55	55
81,000 to 86,000 (co-polar)	A	2.2	38	22	28	32	35	37	55	55
71,000 to 76,000 (cross-polar)	A	2.2	38	35	35	40	42	47	55	55
81,000 to 86,000 (cross-polar)	A	2.2	38	35	35	40	42	47	55	55
71,000 to 76,000 (co-polar)	B	2.2	38	13	20	28	31	32	48	48
81,000 to 86,000 (co-polar)	B	2.2	38	13	20	28	31	32	48	48
71,000 to 76,000 (cross-polar)	B	2.2	38	33	33	33	38	40	48	48
81,000 to 86,000 (cross-polar)	B	2.2	38	33	33	33	38	40	48	48

#### D. OTHER REQUESTS

The FWCC has two additional requests relating to the 71-76 and 81-86 GHz bands.

While these do not fit squarely into the Notice of Inquiry, they are closely enough related that we think they are best presented here.

##### 1. *The Commission should adopt a channel plan for 71-76 and 81-86 GHz.*

As usage of the 71-76 and 81-86 GHz increases—as we expect it will, especially if the Commission adopts the antenna standards proposed above—the present *ad hoc* channelization will likely lead to unnecessary interference cases owing to overlapping channels, particularly around towers and rooftops shared by multiple users. Once these channels are in use, they are

difficult to change. We ask the Commission to proactively forestall this problem by establishing a channel plan.

One place to start is with the ITU band plan detailed in Recommendation ITU-R F.2006.<sup>15</sup> This Recommendation is admittedly complex, as it covers a wide range of operating bandwidths under both frequency division duplex (FDD) and time division duplex (TDD). An option that maintains full flexibility is simply to incorporate this plan into the Commission's Rules by reference.<sup>16</sup> Another option is to develop a simplified plan specifically for U.S. operations—preferably a subset of the plan in Recommendation ITU-R F.2006, in order to harmonize international manufacture. If the Commission prefers this second course, the FWCC will be pleased to assist in developing such a plan.<sup>17</sup>

**2. *The Commission should allow 45 degree polarization in the 71-76 and 81-86 GHz bands.***

In addition to the conventional horizontal and vertical polarizations, the Commission should allow polarizations at  $\pm 45$  degrees, as a further aid to coordination at congested points. This request would be inappropriate at lower frequencies, where slant polarization might prove an obstacle to coordination. Low cost flat plate antennas, due to the underlying technology, generally have a much cleaner azimuth/elevation radiation pattern envelope when used in slanted polarization. For example, the flat plane array antenna mentioned above as meeting category B would more than meet proposed category A requirements at  $\pm 45$  degree polarization. On

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<sup>15</sup> Recommendation ITU-R F.2006, *Radio-frequency channel and block arrangements for fixed wireless systems operating in the 71-76 and 81-86 GHz bands*, March 2012, available at [http://www.itu.int/dms\\_pubrec/itu-r/rec/f/R-REC-F.2006-0-201203-I!!PDF-E.pdf](http://www.itu.int/dms_pubrec/itu-r/rec/f/R-REC-F.2006-0-201203-I!!PDF-E.pdf)

<sup>16</sup> 1 C.F.R. §§ 51.1-11.

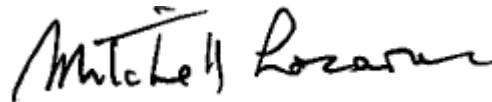
<sup>17</sup> The FWCC will welcome the participation of non-members in this process, and will make all of contributions in a publicly accessible docket specified by the Commission.

balance the availability of slant polarization will give operators an additional useful tool for avoiding interference.

### **CONCLUSION**

The Commission should move toward the adoption of rules based on the above suggestions at the earliest possible date.

Respectfully submitted,

A handwritten signature in black ink that reads "Mitchell Lazarus". The signature is written in a cursive style with a prominent initial "M".

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