Before the
Federal Communications Commission
Washington DC 20554

In the Matter of	)	
	)	
Revision of Part 15 of the Commission's Rules	)	ET Docket No. 13-49
to Permit Unlicensed National Information	)	
Infrastructure (U-NII) Devices in the 5 GHz Band	)	

COMMENTS OF THE
FIXED WIRELESS COMMUNICATIONS COALITION

The Fixed Wireless Communications Coalition, Inc. (FWCC)[1] files these Comments on Petitions for Reconsideration in the above-captioned proceeding.[2]

Among other rule changes, the Commission's consolidation of Sections 15.407 and 15.247 (as to the 5.8 GHz band) imposed the more restrictive out-of-band limits of Section 15.407.[3]

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[1] 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.

[2] *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, First Report and Order, 29 FCC Rcd 4127 (2014) (*First R&O*).

[3] *First R&O* at ¶¶ 119-20.

The FWCC supports three Petitions for Reconsideration that seek reinstatement of the Section 15.247 out-of-band limits: those of the Wireless Internet Service Providers Association, Cambium Networks, Inc., and JAB Wireless, Inc.

In the alternative, the FWCC supports the petition of Motorola Solutions, Inc. that requests an extension of the transition period.

The FWCC seeks dismissal or denial of the petition filed by the Association of Global Automakers, Inc. regarding possible interference between U-NII devices at 5.8 GHz and operations in the adjacent 5.9 GHz band, on the ground it contests matters that arose long before this proceeding.

A. THE COMMISSION SHOULD REINSTATE SECTION 15.247 OUT-OF-BAND LIMITS FOR 5.725-5.85 GHZ.

Sections 15.247 and 15.407 regulated similar operations in almost-identical frequency bands under different technical rules. One of the differences concerned out-of-band emissions limits.

Broadly speaking, Section 15.247 required that out-of-band emissions be 20 dB lower than the highest in-band emissions.[4] Section 15.407 requires that emissions within 10 MHz of the

[4] "In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c))." 47 C.F.R. § 15.247(b)

band edge not exceed −17 dBm/MHz EIRP, and elsewhere, not exceed −27 dBm/MHz EIRP.[5] The degree by which the Section 15.407 limits are more stringent varies with the circumstances, but can easily reach several tens of dB.

The *First R&O* adopts the Section 15.407 limits for all unlicensed operations in the band. The Commission states:

> Manufacturers have the flexibility to determine how they should meet the lower out-of-band emissions limit whether by reducing power, decreasing antenna gain, or utilizing tighter filters.[6]

None of these options is a good one. Compliance will result in higher costs for equipment, less useful bandwidth, the need for additional installations, or some combination of these. Petitioner Cambium Networks, Inc. estimates the cost increases for needed filtering would range from 7% up to an unacceptable 300%, depending on the equipment category.[7] Even with the filtering, Cambium calculates that the useful bandwidth will drop from 125 MHz to about 45 MHz.[8] Alternatively, manufacturers could comply by cutting power by 12 dB—but this reduces the range to where the same coverage would require 16 base stations rather than the one needed today.[9]

An ongoing "natural experiment" in the 2400-2483.5 MHz unlicensed band tends to support Cambium's conclusions. The lower edge of that band has the same "20 dB down" out-

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[5] 47 C.F.R. § 15.407(b)(4). Additionally, emissions in the Section 15.205 "restricted bands" or below 1 GHz must comply with the limits in Section 15.209. 47 C.F.R. §§ 15.407(b)(6), (7).

[6] *First R&O* at ¶ 119.

[7] Cambium Networks, Inc. at 7 (table).

[8] *A study of the effect of using Part 15.407 rather than 15.247 for OOBE* at 6 (dated May 30, 2014), *attached to* Petition for Reconsideration of Cambium Networks, Ltd.

[9] Cambium Networks, Inc. at 18.

of-band limit that the Commission recently abandoned for 5.8 GHz. The upper edge abuts a restricted band, so the out-of-band limit there is much lower at –41.3 dBm/MHz.[10] The real-world consequences of this asymmetry show up in Wi-Fi channel placement. The lowest-frequency Wi-Fi channel has its lower edge at 2401 MHz, just 1 MHz from the lower band edge, but the highest-frequency channel reaches only to 2473 MHz—fully 10.5 MHz below the upper band edge.[11] That uppermost 10.5 MHz is inaccessible to Wi-Fi because of the need to meet the upper-edge out-of-band limit. The Section 15.407 out-of-band limit for 5.8 GHz is not as stringent, but the principle holds: in equipment design, nothing comes for free. Tightening the out-of-band limit must either raise costs, impair performance, or both.

The Section 15.407 out-of-band limits will have a disproportionate impact on users of high-gain antennas, including several FWCC members.[12] The new rule pairs unlimited antenna gain with no power penalty, and hence unlimited EIRP—which we strongly favor—with a low, fixed-value out-of-band limit. The combination is unworkable. For a given output power, the difference between in-band levels and the out-of-band limit goes up with increasing antenna gain. FWCC members' antenna gains are nearly always over 23 dBi, and typically range up to 33-38 dBi.[13] The new rules require a system using a 36 dBi antenna, for example, to suppress out-of-band emissions by an extra 30 dB, compared to a system using a 6 dBi antenna. Where

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[10] Section 15.209(a) (table) specifies the limit as 500 μV/m at 3 meters, which is equivalent to 75 nW or –41.3 dBm.

[11] *See Terrestrial Use of the 2473-2495 MHz Band for Low-Power Mobile Broadband Networks*, Notice of Proposed Rulemaking, 28 FCC Rcd 15351 at ¶ 21 (illustration) (2013).

[12] *See First R&O* at ¶¶ 109-110.

[13] Letter from Mitchell Lazarus, Counsel, FWCC to Ms. Marlene H. Dortch, Secretary, FCC in ET Docket No. 13-49 at 2 (filed Oct. 30, 2013).

the Section 15.407 limits are demanding even for a 4 watt EIRP system, they are vastly more so for a high-gain system using an EIRP that can run hundreds of time higher.

Mimosa Networks, Inc. suggests resolving the discrepancy by increasing the out-of-band limits beyond the Section 15.407 values by 1 dB for each dB that the antenna gain exceeds 6 dBi.[14] That would at least keep the required suppression constant for higher antenna gains, and also recognizes that a higher-gain system presents proportionately less risk to adjacent-band users, due to its higher directionality. But Mimosa's proposal still requires higher suppression than the Commission or the parties have justified.

The Commission defends its decision: "The majority of commenters support the Commission's proposal to apply the more restrictive unwanted emissions limits …."[15] Of the eleven comments cited, however, all but one merely support technical rule changes in the most general terms, for the sake of harmonization or consistency.[16] Only the Wi-Fi Alliance even mentions the out-of-band proposal. Its comment says the proposed limits would not affect the utility of devices, and would help to ensure there is no increase in potential interference, but offers no evidence or argument to support either of these conclusions.[17] The petition from Cambium Networks, Ltd. disputes the first, explaining in detail why the new limits in fact would have a strongly adverse impact on device feasibility and utility. We discuss the interference issues here.

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14 Petition for Partial Reconsideration of Mimosa Networks, Inc. at 9.

15 *First R&O* at ¶ 115 & n.178.

16 We are unable to find the TIA Comments cited in note 178.

17 Wi-Fi Alliance at 13.

There is no countervailing benefit that justifies disrupting the long-successful operations at 5.8 GHz. Neither the *First R&O* nor the underlying Notice of Proposed Rulemaking indicates what services the stricter limit is meant to protect. A passing reference might suggest the intended beneficiary is Terminal Doppler Weather Radar (TDWR);[18] but considering that TDWR is 75 MHz away, and that past TDWR interference arose from improperly modified devices,[19] the reference to protecting TDWR makes more sense if applied to the new software security requirements, rather than the out-of-band limits.

The most plausible potential out-of-band interference victim, apart from amateur radio, is the Dedicated Short-Range Communications Service (DSRC) at 5.85-5.925 GHz. Despite its having been authorized for more than 10 years,[20] DSRC still exists mostly in PowerPoint. Its designers have known from the beginning that their environment includes out-of-band emissions from long-standing neighbors in the spectrum. Of course they would prefer to make their own job easier by shifting their burden to others—we all would. That does not justify impairing a widely deployed and useful service in favor of a more recent newcomer whose actual deployment remains uncertain.

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[18] "The differences in these rules [Sections 15.407 and 15.247] have persisted and lead to the situation where devices authorized under the frequencies permitted under Section 15.247 were modified to operate on frequencies permitted only for U-NII devices without complying with the rules designed to prevent interference to other radio services, resulting in harmful interference to TDWRs." *First R&O* at ¶ 87.

[19] The *First R&O* (at ¶ 9) says that TDWR interference resulted from improperly modified devices"[i]n many cases." We are not aware of any case in which a compliant, unmodified 5.8 GHz device caused interference to a TDWR installation.

[20] *Dedicated Short-Range Communication Services in the 5.850-5.925 GHz Band*, Report and Order, 19 FCC Rcd 2458 (2004).

B. IN THE ALTERNATIVE, THE COMMISSION SHOULD EXTEND THE TRANSITION PERIOD.

The Commission imposed a brief transition period: certification applications after 12 months from the effective date must show compliance with the new rules, as must devices that are manufactured, marketed, sold, or imported more than 24 months after the effective date.[21]

We agree with Motorola that these time periods are far too short, for all the reasons Motorola sets out.

We emphasize particularly that 12 months is inadequate for a company to re-engineer its entire 5.8 GHz product line, even allowing for a few additional months' head start from release of the First Report and Order. Particularly as to high-gain systems, the design problems are formidable and will take time.

We add an additional reason to Motorola's list: engineering, developing, and marketing a new radio-frequency device is expensive. Manufacturers count on the devices remaining on the market long enough to recoup the up-front investment. Having to cut off sales after only two years imposes an unfair hardship.

Along with Motorola, we see no basis for undue urgency. We are not aware of present problems arising from 5.8 GHz out-of-band emissions; nor does the Commission cite any. We ask the Commission to allow at least three years for certification under the present rules, and at least six years for manufacture, marketing, sale, and importation under the present rules.

C. THE COMMISSION SHOULD DISMISS OR DENY THE PETITION OF THE ASSOCIATION OF GLOBAL AUTOMAKERS, INC.

The Association of Global Automakers, Inc. (Global) asks the Commission to confirm, through testing, that 5.8 GHz operations will not cause interference to automotive operations in

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[21] *First R&O* at ¶ 120.

the adjacent 5.9 GHz band, to resolve any interference this testing uncovers, and—separately—to suspend 5.8 GHz unlicensed U-NII operations until the U.S. Department of Transportation (DoT) and the National Highway Traffic Safety Administration (NHTSA) complete their own studies of 5.9 GHz automotive communications.

What triggers Global's concern is the expansion of the 5.8 GHz U-NII frequency range by 25 MHz, up to 5.85 GHz. That places the upper edge of the U-NII band at the lower edge of the DSRC band. Global says:

> The Commission should allow these important [DoT, NHTSA, and NTIA] studies to conclude their ongoing testing and analysis before finalizing any plans to allow thousands of fixed and mobile Wi-Fi devices to operate adjacent to these vehicular safety networks.
>
> There is no obvious reason why there should be a rush to unleash tens of thousands of new Wi-Fi devices into the radio bands immediately adjacent to these vehicular safety networks.[22]

Global overlooks that Section 15.247 has authorized unlicensed operations over the entire 5.725-5.85 GHz band, and adjacent to what is now DSRC, since 1985.[23] When DSRC received the allocation for its band,[24] contiguous unlicensed operation had long been part of the local environment. Global's objections are 29 years out of time. Even if the Commission grants the pending requests to roll back the out-of-band limits, the interference threat to DSRC will be no worse than it has been since DSRC's inception.

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[22] Association of Global Automakers, Inc. at 10-11.

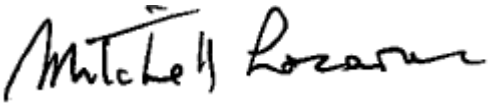
[23] *Spread Spectrum and Other Wideband Emissions Not Presently Provided for in the FCC Rules and Regulations*, First Report and Order, 58 R.R.2d 251 (1985).

[24] *Dedicated Short Range Communications of Intelligent Transportation Services*, Report and Order, 14 FCC Rcd 18221 (1999).

CONCLUSION

The Commission should restore the out-of-band emissions limits to Section 15.247 levels, or in the alternative, should extend the transition period. It should dismiss or deny Global's petition on the ground that the issues arose decades before the order it challenges.

Respectfully submitted,



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CERTIFICATE OF SERVICE

I, Deborah N. Lunt, a secretary with the firm of Fletcher, Heald & Hildreth, PLC, hereby state that true copies of the foregoing Comments of the Fixed Wireless Communications Coalition were sent this 14th day of August 2014, by first class mail, postage prepaid to the attached service list, except to persons listed at the FCC in Washington, DC, which were hand delivered.

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