

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

In the Matter of	)	
	)	
Reassessment of Federal Communications	)	ET Docket No. 13-84
Commission Radiofrequency Exposure Limits and	)	
Policies	)	
	)	
Proposed Changes in the Commission’s Rules	)	ET Docket No. 03-137
Regarding Human Exposure to Radiofrequency	)	
Electromagnetic Fields	)	

**COMMENTS OF THE  
FIXED WIRELESS COMMUNICATIONS COALITION**

The Fixed Wireless Communications Coalition, Inc. (FWCC)<sup>1</sup> files these Comments in the above-captioned proceeding.<sup>2</sup>

**A. INTRODUCTION**

The Commission proposes to regulate exposure from RF-emitting sources according to their physical properties rather than their service categories.<sup>3</sup> As part of this process, the Commission seeks to move away from service-specific “categorical exclusions”—criteria that

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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> *Reassessment of Federal Communications Commission Radiofrequency Exposure Limits and Policies*, First Report and Order Further, Notice of Proposed Rule Making, and Notice of Inquiry 28 FCC Rcd 3498 (2013) (*Notice*).

<sup>3</sup> *Notice* at ¶ 4.

exempt devices from further need to establish compliance—in favor of new, general exemptions that would uniformly govern all regulated RF sources.<sup>4</sup>

The FWCC opposes certain specifics of this change as they apply to fixed service facilities under Part 101.

The current rules categorically exempt Part 101 facilities, other than subparts G, L, and Q.<sup>5</sup> The proposed criteria for categorical exclusion would require at least a preliminary calculation for every fixed service facility. Worse, an anomaly in the proposal would deny categorical exclusion to many, perhaps most, fixed service installations and require them to undergo further evaluation. Yet a slightly modified criterion that takes into account the Commission’s own rule on antenna patterns results in virtually all Part 101 facilities being categorically excluded.

Accordingly, we ask the Commission to declare Part 101 facilities (other than subparts G, L, and Q) to be categorically excluded. In the alternative, we ask the Commission to amend its proposed criterion so as to take into account the requirement on antenna patterns.

More generally, we question whether the effort to standardize categorical exclusions across all services is in the public interest.

The proposal has a significant downside. Although the *Notice* refers to “simple calculations” for determining whether a given facility is categorically excluded,<sup>6</sup> in fact the calculations can become complex. If the facility includes multiple transmitters, they can become

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<sup>4</sup> *Id.*

<sup>5</sup> 47 C.F.R. § 1.1307(b)(1) (Table 1). Subparts G, L, and Q regulate, respectively, 24 GHz, Local Multipoint Distribution Service (LMDS), and collectively the 71-76, 81-86, and 92-95 GHz bands.

<sup>6</sup> *Notice* at ¶ 4.

exceedingly complex. We do not see an offsetting benefit. There is no suggestion that the proposed procedure would more accurately or reliably indicate which facilities can safely be excluded than do the present rules. Nor can we foresee any plausible circumstance in which the proposed uniform approach simplifies the assessment of a given facility.

The Commission offers two rationales for harmonizing categorical exclusions across services. One is the trend toward opportunistic spectrum access, under which multiple types of devices used for multiple purposes might access the same frequency band.<sup>7</sup> Even so, we submit that multiple individual assessments, under separate rules tailored to each type of device, will be simpler in practice than the more involved uniform calculation applied to each of those same devices. The Commission's other rationale is that uniform rules would eliminate the need to establish exclusion criteria for new or converging services.<sup>8</sup> On balance, though, it seems more efficient for the Commission to set one-time exclusion criteria in the course of authorizing a new service than for myriad licensees in the field to struggle with the harmonized calculations for every new installation.

#### **B. SINGLE-SOURCE FIXED SERVICE INSTALLATIONS**

The present Section 1.1307 categorically exempts most fixed service facilities.<sup>9</sup> This is entirely appropriate. A fixed service transmitter, sited high off the ground, produces a tight, directional beam aimed at a receiver likewise sited high off the ground. Successful communication requires a line-of-sight path clear of all structures and terrain. Any workable path

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<sup>7</sup> Notice at ¶ 4.

<sup>8</sup> Notice at ¶ 119.

<sup>9</sup> 47 C.F.R. § 1.1307(b)(1) (Table 1).

design eliminates any possibility of a place where a person might be within the beam of RF energy.

The proposed rule would exempt a facility if its effective radiated power (ERP) in watts “in any direction” is less than  $19.2 R^2$ , where R is the distance in meters “in any direction” between the nearest exposure victim and the antenna.<sup>10</sup>

This language creates an anomaly as to the high-gain antennas used in the fixed service. By Commission rule, a Part 101 transmitting antenna must concentrate a very large proportion of its energy in one direction.<sup>11</sup> A person who might be exposed will necessarily be in a different direction.

We illustrate the point with a numerical example in the 6 GHz band. This is the worst-case band for our argument due to its potential for high power (to serve long links) and relatively lax antenna standards.

We start with the Commission’s proposed formula for categorical exclusion:<sup>12</sup>

$$P_{ERP} \leq 19.2 R^2 \quad (1)$$

where  $P_{ERP}$  is the maximum power in any direction in watts ERP, and R is the minimum separation distance in meters.

Fixed service operators, along with the language of the Commission’s rules, specify fixed service power in watts EIRP, rather than watts ERP. Expressed in EIRP, equation (1) becomes:<sup>13</sup>

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<sup>10</sup> Notice at ¶¶ 130-31 & Table 1. Categorical exclusion would also require that R exceed  $\lambda/2\pi$ , where  $\lambda$  is the wavelength. The longest wavelength used in the fixed service, at 4 GHz, is 7.5 cm, putting  $\lambda/2\pi$  at just over a centimeter, so this condition can always be ignored.

<sup>11</sup> 47 C.F.R. § 101.115 (setting minimum antenna standards).

<sup>12</sup> Notice at ¶ 130 (Table 1).

<sup>13</sup>  $P_{EIRP}$  exceeds  $P_{ERP}$  by 2.15 dB, or equivalently,  $P_{EIRP} = P_{ERP} \times 1.64$

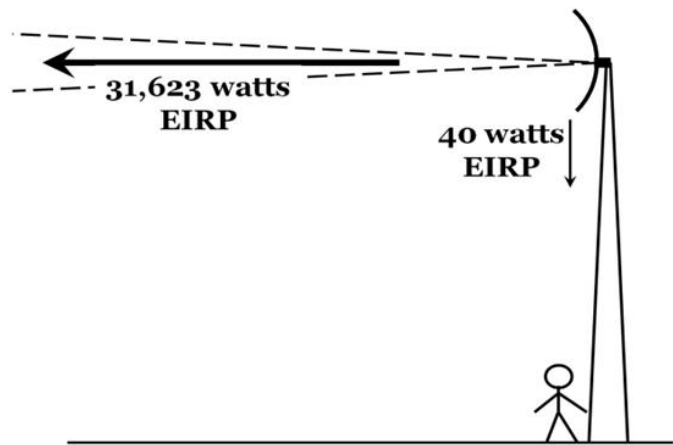
$$P_{EIRP} \leq 31.5 R^2 \quad (2)$$

Rearranging to find the minimum separation distance for a given power yields:

$$R \geq \sqrt{\frac{P_{EIRP}}{31.5}} \quad (3)$$

The highest power used in practice in the 6 GHz band is about 45 dBW EIRP, equivalent to 31,623 watts EIRP. For this  $P_{EIRP}$ , equation (3) yields a minimum separation distance of 32 meters. That is, for the facility to be categorically excluded, the closest access must be at least 32 meters (105 feet) away from the antenna.

This result makes sense only if the exposure victim is directly in the antenna beam—and that is impossible. The antenna is always high on a tower; the beam is horizontal, or nearly so, high overhead; the nearest potential victim is below the tower. See Figure 1.



**Figure 1**  
Horizontal vs. Downward Emissions  
(per example in text)

Commission rules require the antennas for this band to suppress in the downward direction by at least 29 dB.<sup>14</sup> The highest possible downward emission is thus 45–29 = 16 dBW EIRP, equivalent to 40 watts EIRP.

Plugging the 40 watt value for power into equation (3) gives  $R = 113$  cm (45 inches). That is, if the proposed formula took into account the downward suppression required by the Commission’s own rules, every single-source fixed service installation would be categorically

<sup>14</sup> 47 C.F.R. § 101.115(b) (table; column headed “30° to 100°”).

excluded, because every fixed service antenna is mounted far more than 45 inches above the nearest potential victim.

### C. MULTIPLE-SOURCE FIXED SERVICE INSTALLATIONS

The proposed computation for multiple fixed RF sources, such as multiple antennas collocated on the same tower, likewise categorically excludes all fixed service installations if the required downward suppression is figured in.

The Commission proposes this formula for multiple collocated sources, with evaluation to be required if the computed value exceeds unity:<sup>15</sup>

$$\sum_{i=1}^a \frac{P_i}{P_{th,i}} + \frac{\sum_{j=1}^b SAR_j}{1.6 \text{ W/kg}} + \sum_{k=1}^c \frac{ERP_k}{ERP_{th,k}} + AEQ \geq 1 \quad (4)$$

Only the third and fourth terms apply to the fixed service. In the third term,  $ERP_k$  is the power of the  $k$ th source, in watts ERP, and  $ERP_{th,k}$  is the permissible power from equation (1) for the  $k$ th source, also in watts ERP. The fourth term, AEQ, represents the exposure due to RF sources outside the rest of the calculation.

For this example, we can ignore AEQ.<sup>16</sup> We will suppose an implausibly high-powered collocation: ten transmitters on the same tower, each operating at a full 45 dBW (31,623 watts) EIRP. In equation (4), we can change both  $ERP_k$  and  $ERP_{th,k}$  to the equivalent EIRPs with no effect on the outcome.<sup>17</sup> Taking into account the downward suppression required by the

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<sup>15</sup> Notice at ¶ 141.

<sup>16</sup> This assumption is valid in the fixed service context if the calculation takes account of all collocated antennas and there are no other significant RF sources within a few tens of meters.

<sup>17</sup> This is because the 1.64 factor that changes ERP to EIRP cancels out between the numerator and denominator.

Commission’s rules, as above, each transmitter produces a maximum downward emission of 40 watts EIRP. The third term of equation (4) says the facility will be categorically excluded if:

$$\sum_1^{10} \frac{40 \text{ watts}}{[\text{result from equation (2)}]} < 1$$

Substituting equation (2) in the above, we have categorical exclusion if:

$$10 \times \frac{40}{31.5R^2} < 1$$

Solving for R gives  $R > 3.6$  meters. Again, allowing for the required downward suppression, this improbably high-powered collocation is categorically excluded if the nearest exposure victim is at least 3.6 meters (12 feet) below an antenna. (Twelve feet is the height of one story of an office building.)

As a practical matter, a tower carrying multiple antennas will always put the lowest antenna at least 12 feet above a point accessible to people. See Figure 2. Thus, even an improbably high-powered collocation will always qualify for categorical exclusion—if the required downward suppression is allowed in the calculation.



**Figure 2**  
**High-Mounted Fixed Service Antennas**  
 Source: Carl Chapman Photography. With permission

**D. REQUESTED CHANGES TO PROPOSED RULES**

In view of the showing here that a fixed service facility will always qualify for categorical exclusion, if required antenna standards are taken into account, we ask the Commission simply to preserve the present rule that provides a blanket categorical exclusion to

Part 101, excepting subparts G, L, and Q.<sup>18</sup> Those subparts should remain subject to the conditions laid out in the present rule.<sup>19</sup>

In the alternative, for antennas that exceed some minimum gain (we suggest 30 dBi), the Commission should allow licensees this alternative definition of the terms “ERP” and “R” as used in the *Notice* at ¶ 130, Table 1:

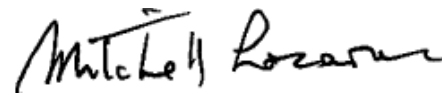
ERP is the radiated power in watts measured in any direction, relative to a half-wave dipole. R is the minimum distance in meters from any part of the radiating structure of a transmitting antenna or antenna array to the body of a nearby person, measured in the same direction as the ERP. Evaluation is required if the ERP exceeds the value in the right-hand column of Table 1 in any direction.

This alternative definition should be available to all Part 101 licensees, including subparts G, L, and Q.

### CONCLUSION

The Commission’s proposed rules would deny categorical exclusion to fixed service facilities that, when properly assessed, pose no possible threat of harm from RF exposure. The Commission should adopt rules that resolve this anomaly.

Respectfully submitted,



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September 3, 2013

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<sup>18</sup> 47 C.F.R. § 1.1307(b)(1) (Table 1).

<sup>19</sup> *Id.*



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