

Before the  
Federal Communications Commission  
Washington, DC 20554

In the Matter of	)	
	)	
Review of Part 15 and other Parts	)	ET Docket No. 01-278
of the Commission's Rules.	)	RM-9375
	)	RM-10051
	)	

**Reply Comments of Motorola, Inc.**

Motorola hereby submits these reply comments in response to the FCC's Notice of Proposed Rule Making and Order in the above-captioned proceeding to review Part 15 and other parts of the Commission's rules. Specifically Motorola believes that the Commission should deny the proposals of Sirius Satellite Radio Inc. ("Sirius") and XM Radio Inc. ("XM") that the Commission significantly reduce permitted emissions levels for Part 15, 18 and 95 devices.

The proposals are based upon unrealistic conservative assumptions on the satellite received signal levels, since as shown below, the actual signal levels within CONUS are significantly higher than represented in calculations. Furthermore in regions where other obstacles will reduce the satellite down link signal level, such as urban canyon or tunnels, Sirius and XM are building extensive terrestrial networks that will enhance its signal, rendering further unrealistic the analysis based solely on satellite received signal level. Finally it should be noted that nothing has changed the interference environment for either Sirius or XM since the Commission originally authorized the service, the designers of these systems should have been fully aware, and factored into the design, that other

devices are authorized to emit signals at the Part 15 levels that Sirius and XM are now raising concerns.

## **1. Background**

Sirius requests that the emissions from Part 15 and 18 devices be reduced in order to protect SDARS receivers from a proliferation of unlicensed devices, specifically devices that are based on the Bluetooth and 802.11b standards. It proposes that the aggregate free space field strength of co-polarized out-of-band, radiated emissions from these devices into the 2320-2345 MHz band not exceed  $8.6 \mu\text{V}/\text{m}$  at 3 meters, as measured in a 1 MHz bandwidth, for devices that are placed on the market 18 months after the a final rule is published.<sup>1</sup>

XM, expressing the same concern on the proliferation of unlicensed devices and the impact of the SDARS receivers, proposes that the Commission updates its rules to establish out-of-band emissions limit into the 2320-2345 MHz band of no more than  $18 \mu\text{V}/\text{m}$  at 3 meters as measured in a 2 MHz interval for unlicensed devices operating exclusively inside of vehicles and  $8.6 \mu\text{V}/\text{m}$  at 3 meters measured in a 1 MHz interval for unlicensed devices in all other environments.<sup>2</sup> They further extend this requirement to Family Radio Service radios operating in accordance to Part 95 of the Commissions rules.

Shown in the table below are the proposals relative to the current Part 15 requirement for unlicensed radiators of  $500 \mu\text{V}/\text{m}$  at 1 meter. It should be noted that the

---

<sup>1</sup> *Sirius Radio Satellite, Inc, Petition for Rulemaking in the Matter of Revision of Part 15 and Part 18 of the Rules regarding Out-of-Band Emissions of Radio Frequency Devices*, at page 14.

<sup>2</sup> *XM Radio Inc., Comments in the Matter of Review of Part 15 and other Parts of the Commission's Rules*, at page 1.

proposal by Sirius is on an aggregate basis, the proposed out-of-band emissions level for a single device would be lower.

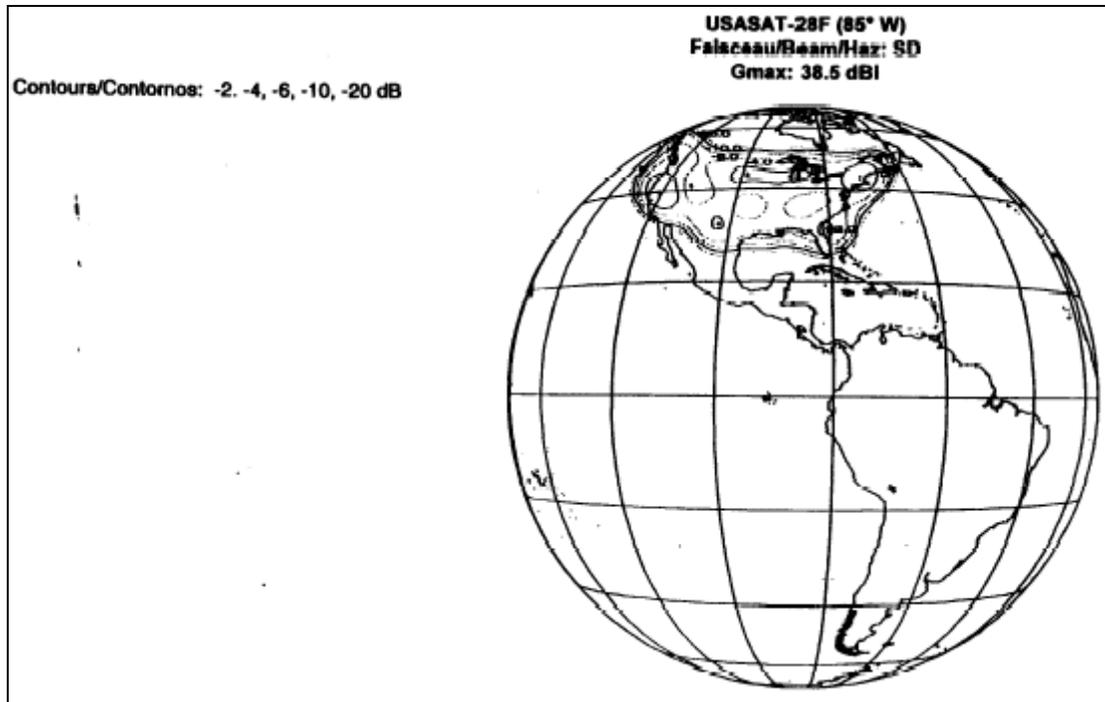
	Proposal	Relative to current Part 15 levels
XM	18 $\mu\text{V}/\text{m}$ in 2 MHz – In Vehicles	-34.9 dB
XM	8.6 $\mu\text{V}/\text{m}$ in 1 MHz – All other environments	-35.3 dB
Sirius	Aggregate 8.6 $\mu\text{V}/\text{m}$ in 1 MHz	-35.3 dB

## 2. Sirius and XM analysis is based on unrealistic assumptions

The key in assessing the interference environment that SDARS receivers operate in is the amount of link margin designed into these system, this link margin was chosen by satellite operators based upon a variety of factors, such as what is the expected interference environment, use of modulation and access techniques, satellite diversity, transmission schemes, intended audience, and use of terrestrial repeaters. The FCC found that it would be difficult for satellite operators to define one specific value that should be used and found that it would not specify a single power flux density (PFD) requirement for these systems.<sup>3</sup>

---

<sup>3</sup> *Report and Order and Memorandum Opinion an Order and Further Notice of Proposed Rule Making*, FCC No. 97-70, at 97.



**Figure 1: XM Radio (USASAT-28F) Space Station Service Contours.**

The operators of SDARS systems are basing the levels that they find acceptable upon receivers that are located in disadvantaged areas. These areas are described as edge of coverage by SDARS receivers and represent very low signal levels from the satellite, these levels are not representative based on the known system characteristics. For example the level represented in the XM filing indicates a power flux density of  $-110$   $\text{dBW/m}^2/\text{MHz}$ .<sup>4</sup> The peak power flux density is stated to be  $-95$   $\text{dBW/m}^2/\text{MHz}$ , some 15 dB higher than the levels used in the analysis.<sup>5</sup> Representative levels can be found by considering the satellite gain contours over the service area, CONUS, these contours show that even at border areas the power level is still 7.5 dB higher than stated in the XM analysis. This level is represented in agreed power levels in the Mexican-America

<sup>4</sup> XM filing at Attachment 1.

<sup>5</sup> *Concerning the coordination between U.S. Satellite Digital Audio Radio Service and Canadian Fixed Service and Mobile Aeronautical Telemetry Service in the band 2320-2345 MHz*, <http://www.fcc.gov/ib/pdn/agree/darsagr4.pdf>, at p.2

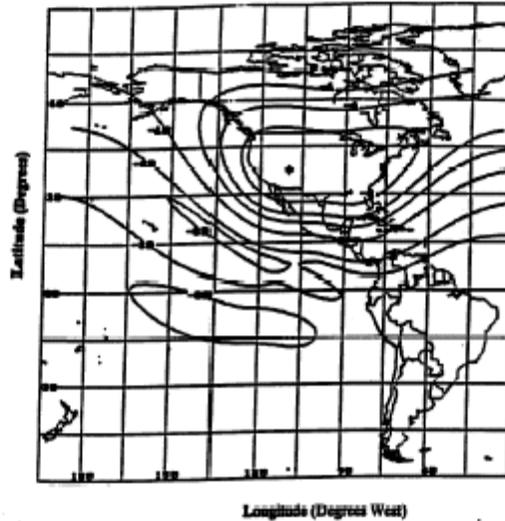
coordination region.<sup>6</sup> The typical antenna contours are shown above in Figure 1 (above)<sup>7</sup>, this figure is the space station contour gains for USASAT-28F (XM satellite). Representative gain contours for the Sirius Satellite (USASAT-28C) is shown in Figure 2 (below)<sup>8</sup>. While it is true for cases where the link margin is minimal that any additional interference (or propagation loss) will cause a system to lose signal, consideration of typical signal levels must be considered. As shown in the figures, the regions where minimal link margin exists for this system correspond to regions where it is unlikely to have any significant operation of either Part 15/18 devices or even SDARS receivers. Requiring that emissions from unlicensed devices be significantly reduced to protect this unlikely interference scenario is unduly restrictive.

---

<sup>6</sup> *Agreement between the government of the United States of America and the government of the United Mexican States concerning the use of the 2310-2360 MHz band*, [http://www.fcc.gov/ib/pndagreements/docs/dars\\_agrees/usmexdars.pdf](http://www.fcc.gov/ib/pndagreements/docs/dars_agrees/usmexdars.pdf)

<sup>7</sup> Id. at Appendix II, part 1A, XM Radio ITU Coordination Information Satellite @ 85 degrees.

<sup>8</sup> Id. at Appendix II, part 2, Sirius Satellite Radio ITU Information.



$G_{max} = 32.4 \text{ dBi}$

Frequency: 2320 - 2332.5 MHz

Gain Contour Levels: -2 dB, -4 dB, -6 dB, -10 dB, -20 dB, and -30 dB

The service area is the lower 48 contiguous states

(Note: The satellite transmit beam is continuously steered to cover the defined service area when activated.)

**Figure 2: Sirius (USASAT-28C) Space Station Service Contours.**

802.11b devices have penetrated a significant market, yet no real data has been provided that interference from these devices will cause interference, in fact measurements performed on behalf of XM indicate other sources are more likely to cause interference. Interestingly enough in the filing by XM the main source of interference is not the equipment operating in the 2.4 GHz band but interference from vehicle ignition noise.<sup>9</sup> It should be further noted that these measurements do not accurately represent the relative levels of signals received by the SDARS receiver, since the measurements were performed with a relatively high gain antenna the measurements will weight the terrestrial based signals at a higher level than the satellite downlink signals due to difference in antenna gain towards those sources.

The impact on these devices on meeting the lower emissions requirements is not as minimal as expressed by XM.<sup>10</sup> Requiring manufactures to include additional filters to meet these proposed levels is non-trivial. Designs would have to be modified, additional parts would be required that can impact the system power requirements, and current manufacturing processes would have to be changed, all at a non-trivial cost to manufactures.

### **3. Conclusion**

Specifying emissions limits that are significantly lower than currently required for all unlicensed devices is not warranted and will unduly restrict future developments of 802.11b, Family Radio Service, and Bluetooth devices. For these reasons Motorola believes the Commission should deny the proposals by XM and Sirius.

Respectfully submitted,

By: /s/ Robert D. Kubik  
Robert D. Kubik, Ph.D.  
Manager, Spectrum and Regulatory Policy  
Motorola Government Relations

---

<sup>9</sup> XM petition at Annex B, section 5. It should be noted that measurements indicate that various types of equipment are currently operating in the 2.4 GHz ISM band as show by the signal levels in this band.

<sup>10</sup> XM at p. 22.