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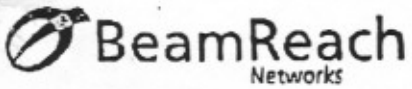

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Magalie Roman Salas, Secretary
Federal Communications Commission
445 Twelfth Street SW
Washington, DC 20554

August 21st 2001

By Hand Delivery

Written Ex Parte Comments

XM Radio, Inc. request for STA, File No. SAT-STA-20010712-00063
Sirius Satellite Radio, Inc. request for STA, File No. SAT-STA-20010724-00064
IB Docket No. 95-91 - Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310 – 2360 MHz Frequency Band

Dear Ms. Salas,

Please accept the attached Ex Parte Comments into the Record under the above mentioned Proceeding. The Comments are triggered by the recently filed requests of SDARS Licensees to commence commercial operation of terrestrial repeaters under Special Temporary Authority.

Any questions can be addressed to the undersigned.

Yours sincerely

Randall Schwartz
Director, Regulatory and Standards

RSchwartz@BeamReachNetworks.com

Tel.: 408-869-8782

Before the

FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of:

XM Radio, Inc. request for STA, File No. SAT-STA-20010712-00063
Sirius Satellite Radio, Inc. request for STA, File No. SAT-STA-20010724-00064
Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band, IB Docket No. 95-91

EX-PARTE COMMENTS OF BEAMREACH NETWORKS INC.

BeamReach Networks Inc. ("BeamReach") hereby submits Ex-Parte comments on the above-referenced proceeding in light of recent SDARS Licensees' requests for Special Temporary Authority to operate (high power) terrestrial repeaters within their frequency band and the potential impact on licensees in the WCS and MMDS/ITFS bands. In particular, BeamReach addresses the system-level impact of terrestrial repeaters on WCS deployments.

1. Introduction

BeamReach Networks Inc. is a privately held company based in Sunnyvale, California. BeamReach developed its spectrally-efficient Adaptive Multibeam OFDM wireless technology for the provision of broadband wireless access (BWA) services in frequencies below 6 GHz. For additional information about the company and/or its technology, please refer to the BeamReach Reply Comments and Ex Parte presentation in the recent FCC 3650 MHz proceeding[1], the BeamReach comments previously filed in this Docket[2], or visit **www.beamreachnetworks.com**.

BeamReach Networks is designing a product specifically to deliver BWA services in the WCS band and thus BeamReach has detailed knowledge of the technical regulations and implications for manufacturing a product to deliver services in this band. The next generation WCS equipment BeamReach Networks is developing is designed to meet or exceed all of the Commission's rules governing transmissions in the WCS band.

Given the technical specifications provided in the STAs filed by the SDARS operators[3], BeamReach has

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1. Docket ET98-237 : Reply Comments of BeamReach Networks Inc, filed 18th December 2000 and Ex Parte Presentation on 31st January 2001.
2. Docket IB95-91 : Comments of BeamReach Networks Inc., filed 23rd May 2001.
3. SAT-STA-20010712-00063 filed 12th July 2001 by XM Radio, Inc. and SAT-STA-20010724-00064 (continued....)

analyzed the proposed deployment of terrestrial repeaters and assessed the impact on a WCS service provider's deployment of BeamReach's equipment in the greater Boston area. This analysis concludes that the proposed deployment of high power SDARS repeaters will severely impair the use of the WCS band for emerging 2-way broadband services.

BeamReach has undertaken the following technical analyses to evaluate the proposed deployments of high and medium power terrestrial repeaters:

a) Signal Strength Prediction Using Longley-Rice Model – Greater Boston

The proposed deployment of Sirius and XM SDARS repeaters in the Boston Metro area was analyzed using a terrain-based propagation modeling tool. The transmitter locations, output powers (EIRP), antenna patterns and transmitter heights were inputs to this tool. This analysis determined the extent of the proposed coverage and produced a map of the signal strength using the Longley-Rice propagation model.

b) Generalized Quantitative Analysis of Excluded Households

A generalized model of the intermodulation distortion caused by the proposed Sirius and XM repeaters was used to determine the percentage of households that would be prevented from accessing BWA services in the WCS band.

2. BeamReach CPE Receiver Characteristics

The performance characteristics of the BeamReach customer premises equipment (CPE), specifically the CPE noise floor, third order intercept point, and 1 dB desensitization level due to blocking signals within the RF passband are provided in Table 1 below. These figures will be utilized in the intermodulation analysis provided in the next section.

Table 1 BeamReach Residential CPE RF Parameters

Radio Parameter	Value
Duplexing Method	TDD, A pair, B pair, and C/D used for Tx/Rx
Noise Figure	5 dB
IF Bandwidth	1.25 MHz

(Continued from previous page)
filed 12th July 2001 by Sirius Satellite Radio.

Frequency Range	WCS Bands A, B, C, D
Input IP3 for signals within RF BPF	-7 dBm
RF Preselection Filter, Bandpass Characteristics	55 MHz centered on WCS band
Antenna Beamwidth	18° -3 dB points, 36° to sidelobe level

It should be noted that the frequency spacing between the proposed XM and Sirius repeaters is such that 3rd order intermodulation products of these two signals will land directly in the WCS band – specifically the A, B, C, and D blocks. From the values in Table 1, Table 2 can be derived. The radiated susceptibility due to blocking and due to intermodulation distortion are shown, as is the noise level causing a 1 dB degradation in the sensitivity.

Table 2. Impairment Onset Levels

CPE Parameters	Value
Radiated Susceptibility, Blocking	-39 dBm
Radiated Susceptibility, IMD, Two signals within the RF Passband	-50 dBm signal 1, -80 dBm signal 2 -60 dBm signal 1, -60 dBm signal 2 -70 dBm signal 1, -40 dBm signal 2
Broadband IMD noise allowable, 1 dB degradation	-114 dBm

Radiated Susceptibility, IMD as listed above defines the minimum level of signal received from both repeaters at the WCS CPE that will cause Broadband IMD at the level shown above. Said another way, IMD interference will occur when both SDARS operators are operating terrestrial repeaters in the same market with overlapping signal strength in excess of those values shown in the Table above.

3. Coverage and Propagation Analysis

Analysis of the proposed deployment of Sirius and XM repeaters in the greater Boston area, as filed with the FCC, was undertaken by BeamReach Networks using the CommStudy terrain based propagation modeling tool. The location, call signature, antenna height above ground level, antenna model and ERP

values were taken from Sirius and XM Radio's requests for STA[4] as inputs into this tool.

This analysis determined the extent of the proposed coverage and the resulting signal strength from the proposed Sirius and XM Radio repeaters in the Massachusetts area surrounding Boston using the Longley-Rice propagation model. The Longley-Rice propagation model was used to model the attenuation effects caused by distance and terrain. The BeamReach CPE antenna was assumed to be at the nominal antenna height, 20 feet above ground level (approximately rooftop level for a single story home).

4. Technical Analysis – Intermodulation

The frequency spacing between XM and Sirius repeaters ensures that 3rd order intermodulation products between these two signals will land directly in the WCS band – A, B, C, and D blocks. Any market where both operators are deployed will restrict the usability of the WCS band.

Figure 1 depicts the signal strength from the proposed Sirius repeater in the area surrounding Boston using the Longley Rice model. For reference, the three closest XM Radio repeaters are shown on the plot, but do not contribute to the signal strength shown for the Sirius repeater.

4. SAT-STA-20010712-00063 filed 12th July 2001 by XM Radio, Inc. and SAT-STA-20010724-00064 filed 12th July 2001 by Sirius Satellite Radio.

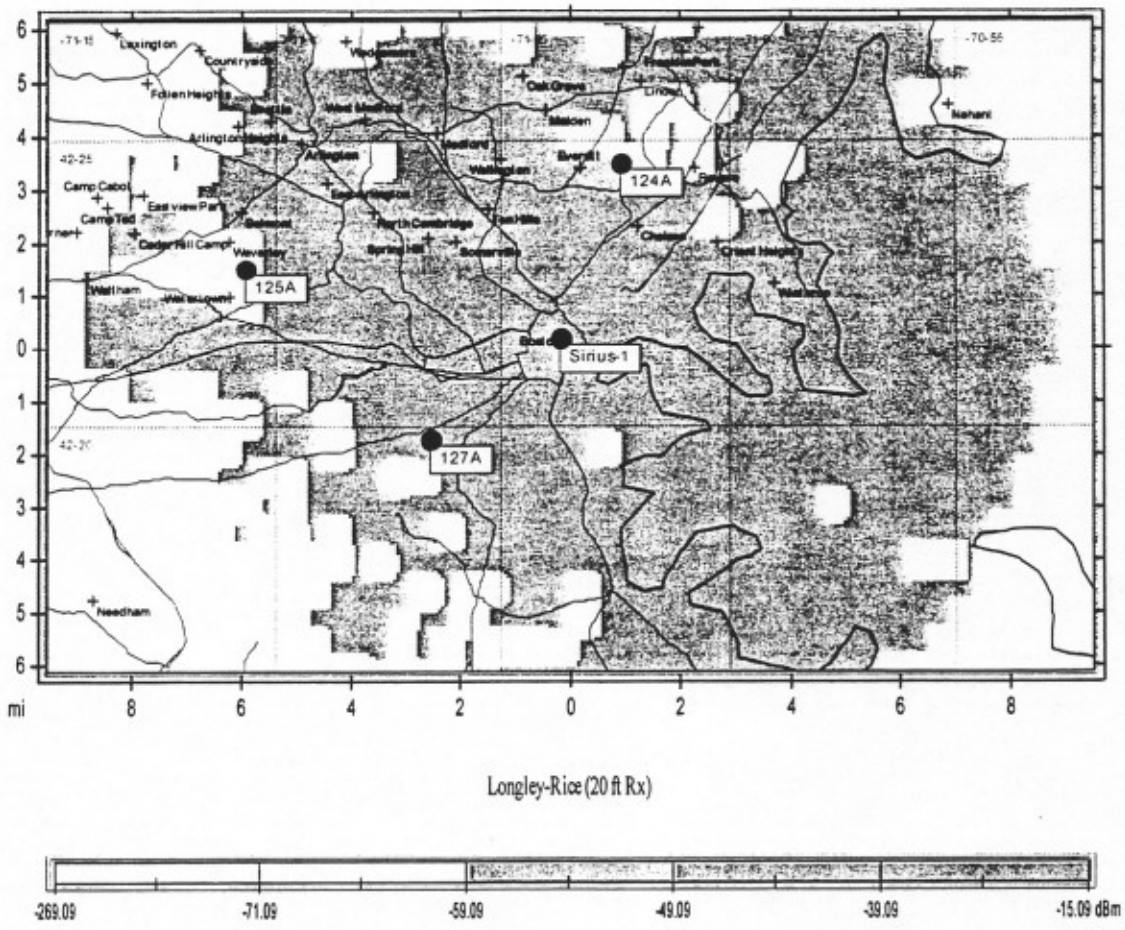

Figure 1. Contour of Sirius Coverage Causing IMD (> -60 dBm)

Figure 2 depicts the signal strength from three of the proposed XM Radio repeaters in the area surrounding Boston using the Longley-Rice model. The Sirius repeater is also shown on the plot but does not contribute to the signal strength for the XM repeaters.

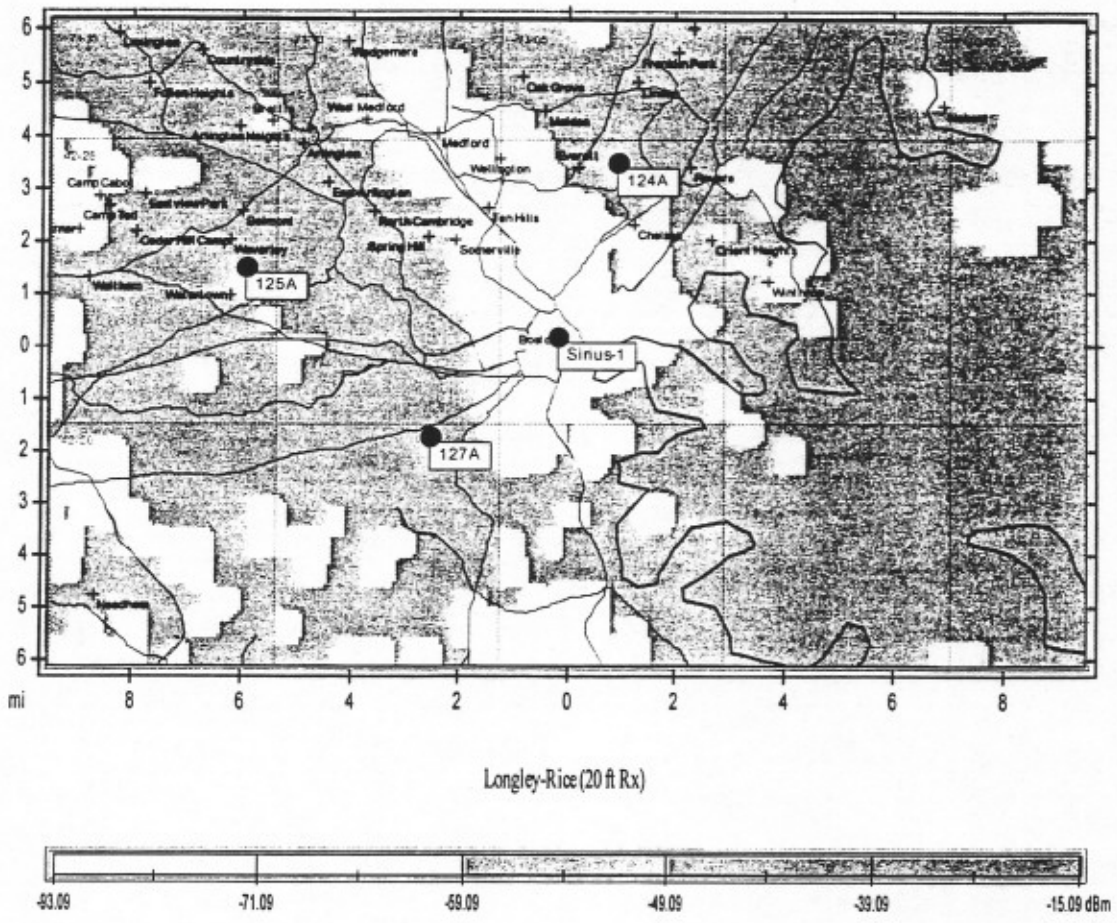

Figure 2. Contour of XM Radio Coverage Causing IMD (> -60 dBm)

The shading indicates the regions in which signal strength from the SDARS terrestrial repeaters is in excess of –60 dBm. To determine the regions in which interference from intermodulation products causes degradation in the WCS band at the BeamReach CPE, the intersection of regions above –60 dBm is determined. Thus, regions which are shaded on both plots are regions in which CPE experience either performance degradation or outage due to XM/Sirius induced IMD. When these two plots are overlaid on each other, a significant portion of the suburban and urban regions of greater Boston will see a power level in excess of –60 dBm from both SDARS service providers.

Adding further complexity is the fact that other signal strength combinations from XM and Sirius repeaters produce similar performance impacts. For instance, two signals of –50 dBm and –80 dBm respectively produce the same results as –60 dBm and –60 dBm.

BeamReach has attempted to quantify the number of households that would be affected by intermodulation interference using a generalized model emulating the proposed XM/Sirius deployment with our own equipment in the city of Boston. In analyzing the intermodulation products which result from mixing the SDARS' transmissions at the WCS receiver, there is virtually an infinite number of scenarios, each with different geographic spacing between SDARS terrestrial repeaters, WCS base stations and CPE. The one scenario that can be analyzed is that where the BeamReach cells are located in the same service area as interfering repeaters being operated by SDARS operators, such that the BeamReach CPE "see" with both SDARS repeaters.

The analysis is based on IMD limiting and assumes that both XM and Sirius operate in the same market, cover the same region, and operate at the same power level. In this calculation, the 3rd order IMD product produced in the CPE front-end is the limiting factor. The unfortunate frequency spacing between XM and Sirius repeaters ensures that 3rd order intermodulation products produced by these two signals will land directly in the WCS band.

The threshold criteria assumed the BWA sensitivity was degraded beyond an allowance of 1 dB. The methodology assumed the BWA system covered the Boston region using a cellularized layout with BeamReach system parameters, link budgets, coverage margins and fade margins. The Hata COST 231 Suburban model was used to determine the BWA cell radius. From the cell radius, the number of subscribers in the addressed market was computed from the demographics of the area.

The number of households denied access was then determined by using the susceptibility of the CPE and the EIRP of the repeaters. An additional 10 dB of repeater suppression was added due to CPE sidelobe performance. The height of the repeater was taken as the average antenna height used in the proposed Boston deployment, approximately 60 meters, and each repeater EIRP was set at 2,000 watts, then each set to 20,000 watts.

Table 4 illustrates the percentage of households excluded due to medium and high power repeater operation. The percentages represent the areas where the interference caused by the repeaters is too great to allow reliable operation of the BWA system in the adjacent WCS band. Of particular note, two operators utilizing 20,000 watt transmitters in the same market destroys the use of the WCS market for broadband wireless access. Even 2,000 watt operation in this scenario excludes 18% of the addressed market.

Table 4 Households Excluded Due to SDARS Repeater Operation (IMD)

Case	Percentage of Households Excluded
2,000 watts, IMD	18%
20,000 watts, IMD	72%

The direct result of the blocking interference will be a significant increase in the difficulty of marketing and deploying the WCS service. Specifically, it will be more difficult for the WCS service provider to determine whether a particular customer location can be served at the point the potential customer enquires about service. The service provider will not be able to ensure a potential customer that service can be provided until a site survey has been completed, which increases the cost of service deployment.

5. Conclusions and Recommendations

In summary, BeamReach Networks has undertaken an analysis of the SDARS terrestrial repeater deployment proposed by XM Radio for the Boston market as part of its STA application. This analysis concurs with comments previously submitted that SDARS repeaters will cause blocking interference in the WCS band and that SDARS transmissions mixing with WCS transmissions will create 3rd and 5th order intermodulation products within the WCS band.[5] The analysis also shows that when both SDARS licensees utilize terrestrial repeaters in the same market, the 3rd order intermodulation products resulting from mixing of both SDARS frequencies at the WCS receiver have an even greater impact. This phenomenon will occur within a WCS receiver (such as BeamReach's) when the interfering SDARS signals exceed – 60 dBm, resulting in exclusion zones much larger than previously noted within this Docket. The proximity of these bands is too close to allow for economical filtering. As such, granting the SDARS licensees' proposals to use high powered (greater than 2,000 W EIRP per 5 MHz) terrestrial repeaters would render WCS spectrum useless and eliminate the option of using the WCS band for competitive broadband services.

BeamReach offers the following conclusions from our analysis:

1. The use of terrestrial repeaters significantly impacts the deployment of broadband wireless access in the WCS band. Interference effects due to blocking and intermodulation are both

5. Docket IB95-91 : Comments of Wireless Communications Association International, Inc., filed 15th December 2000.

observed. This will result in exclusion zones for the WCS service of significant size.

2. The proposed SDARS repeater frequency spacing yields 3rd order intermodulation products in the WCS band. The proximity of these bands is too close for economical filtering. For 2,000 W EIRP repeaters, 18% of households will be affected. For 20,000 W EIRP repeaters, the intermodulation will block out 72% of households.

3. It will be extremely difficult, if not impossible, to effectively plan the deployment of a WCS network (select base station sites and identify exclusion zones) in the presence of 2,000 Watt EIRP repeaters, unless steps are taken to ensure adequate spacing between repeaters belonging to different SDARS operators.

BeamReach Networks urges the Commission to reject the STA applications currently under consideration and rapidly complete the proceeding under this Docket establishing rules for the deployment of SDARS terrestrial repeaters. BeamReach makes the following recommendations related to the SDARS repeater rules to enable WCS service providers to limit the addressable market lost due to SDARS operation:

1. Output power of the repeaters should be limited to 2,000 W EIRP per 5 MHz (no more than 400 W per MHz) and SDARS licensees should be required to pre-coordinate deployments with WCS service providers.

2. Moreover, pre-coordination between XM and Sirius should be required to ensure that their repeater locations, power levels and antenna heights produce overlapping contours effecting no more that 2% of the households. These contours should be –50 dBm/-80 dBm, -60 dBm/-60 dBm, and –70 dBm/-40 dBm.

3. The proposed out-of-band suppression requirements of 75 + 10log(P) dB for SDARS transmissions mean that WCS licensees would be held to a higher standard. SDARS licensees should be required to abide by the same WCS requirement of 80 + 10log(P) dB or relief should be granted to WCS licensees.

BeamReach agrees with the previous comments of AT&T Wireless Services, BellSouth, Verizon, WCA, Metricom and WorldCom that the rules for SDARS terrestrial repeaters should be determined in consideration of the rules applicable to the adjacent WCS band. In particular, SDARS repeaters should be limited to the same maximum power emissions as other WCS band transmitters (2,000 W per 5 MHz equivalent to 400 W per MHz).

Respectfully Submitted,

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