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File Number: SAT-STA-20070907-00121
Callsign:

FEDERAL COMMUNICATIONS COMMISSION
APPLICATION FOR SPACE STATION SPECIAL TEMPORARY AUTHORITY

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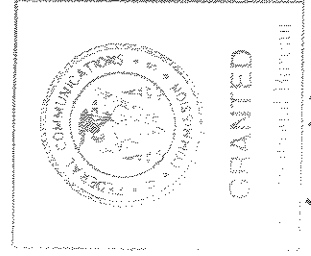
APPLICANT INFORMATION

Enter a description of this application to identify it on the main menu:

Sirius Satellite Radio Request for 30 day STA to operate SDARS repeaters and signal boosters at trade shows

1. Applicant

Name:	Sirius Satellite Radio Inc.	Phone Number:	212-584-5100
DBA Name:		Fax Number:	212-584-5353
Street:	1221 Avenue of the Americas 36th Floor	E-Mail:	
City:	New York	State:	NY
Country:	USA	Zipcode:	10020
Attention:	Mr. Patrick L. Donnelly		



File # SAT-STA-20070907-00121

Call Sign Grant Date 9/20/07
(or other identifier)

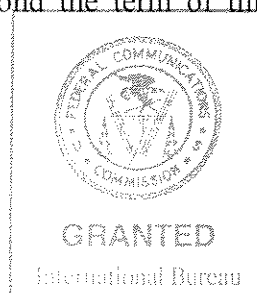
Term Dates
From Oct. 3 To: + 30 days

Approved: Policy Branch Chief

Application of Sirius Satellite Radio Inc. for Special Temporary Authority
IBFS File No. SAT-STA-20070907-00121

Special temporary authority (STA) IS GRANTED to Sirius Satellite Radio Inc. (Sirius) to operate an indoor terrestrial repeater with an Effective Isotropically Radiated Power (EIRP) of up to 200 watts (average) and up to five indoor repeaters with EIRP of up to 0.0001 watts at the International Boat Builders' Exhibition and Conference (IBEX) in Miami Beach, FL, from October 10-12, 2007, and at the SEMA automotive specialty products trade show in Las Vegas, NV, from October 30-November 2, 2007, according to the technical parameters specified in its application, subject to the following conditions:

1. Any actions taken as a result of this STA are solely at the applicant's own risk. This STA shall not prejudice the outcome of the final rules adopted by the Commission in IB Docket No. 95-91;
2. Operation of the terrestrial repeaters authorized pursuant to this STA is on a non-interference basis with respect to all permanently authorized radiocommunication facilities. Sirius shall provide the information and follow the process set forth in paragraphs 14 and 17 in 16 FCC Rcd 16773 (Int'l Bur. 2001) and 16 FCC Rcd 16781 (Int'l Bur. 2001), as modified by 16 FCC Rcd 18481 (Int'l Bur. 2001) and 16 FCC Rcd 18484 (Int'l Bur. 2001);
3. The terrestrial repeaters are restricted to the simultaneous retransmission of the complete programming, and only that programming, transmitted by the satellite directly to SDARS receivers;
4. The terrestrial repeaters shall comply with Part 1 of the Commission's rules, Subpart I - Procedures Implementing the National Environmental Policy Act of 1969, including the guidelines for human exposure to radio frequency electromagnetic fields as defined in Sections 1.1307(b) and 1.1310 of the Commission's rules;
5. The out-of-band emissions of the terrestrial repeaters shall be limited to 75+log(EIRP) dB less than the transmitter EIRP;
6. Sirius will maintain full ownership and operational control of the terrestrial repeaters;
7. Sirius will immediately shut down the terrestrial repeaters upon a complaint of interference, upon direction from the Commission, or upon finding that the repeaters have not been properly installed;
8. This STA is effective October 3, 2007, and will expire in 30 days thereafter, or on the date on which permanent rules governing repeater operations become effective, whichever occurs first.
9. This authorization is not one relating to an "activity of a continuing nature" for purposes of Section 1.62 of the Commission's rules and Section 558(c) of the Administrative Procedure Act. Continuation of operations beyond the term of this authorization will require prior affirmative authorization by the FCC.



w/conditions

File # SAT-STA-20070907-0012

Call Sign _____ Grant Date 9/20/07
(or other identifier)

Term Dates
From Oct. 3 To: +30 days

Approved: [Signature]
Policy Branch Chief

2. Contact			
Name:	Mr. Patrick L. Donnelly	Phone Number:	212-584-5100
Company:	Sirius Satellite Radio Inc.	Fax Number:	212-584-5353
Street:	1221 Avenue of the Americas	E-Mail:	
City:	New York	State:	NY
Country:	USA	Zipcode:	10020
Attention:		Relationship:	Same
(If your application is related to an application filed with the Commission, enter either the file number or the IB Submission ID of the related application. Please enter only one.)			
3. Reference File Number or Submission ID			
4a. Is a fee submitted with this application?			
☒ If Yes, complete and attach FCC Form 159. If No, indicate reason for fee exemption (see 47 C.F.R. Section 1.1114).			
☐ Governmental Entity ☐ Noncommercial educational licensee ☐ Other (please explain):			
4b. Fee Classification CXW – Space Station (Non-Geostationary)			
5. Type Request			
☒ Change Station Location ☐ Extend Expiration Date ☒ Other			
6. Temporary Orbit Location			7. Requested Extended Expiration Date

8. Description (If the complete description does not appear in this box, please go to the end of the form to view it in its entirety.) Sirius Satellite Radio requests Special Temporary Authority for 30 days to operate terrestrial repeaters and signal boosters at trade shows between October 8, 2007 and November 2, 2007.					
9. By checking Yes, the undersigned certifies that neither applicant nor any other party to the application is subject to a denial of Federal benefits that includes FCC benefits pursuant to Section 5301 of the Anti-Drug Act of 1988, 21 U.S.C. Section 862, because of a conviction for possession or distribution of a controlled substance. See 47 CFR 1.2002(b) for the meaning of "party to the application"; for these purposes. ☒ Yes ☐ No					
10. Name of Person Signing Patrick L. Donnelly	11. Title of Person Signing Exec. VP, GC, and Sec'y				
12. Please supply any need attachments. <table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Attachment 1: Attachment, Exhibits</td> <td style="width: 50%;">Attachment 2:</td> </tr> <tr> <td colspan="2">Attachment 3:</td> </tr> </table>		Attachment 1: Attachment, Exhibits	Attachment 2:	Attachment 3:	
Attachment 1: Attachment, Exhibits	Attachment 2:				
Attachment 3:					
WILLFUL FALSE STATEMENTS MADE ON THIS FORM ARE PUNISHABLE BY FINE AND / OR IMPRISONMENT (U.S. Code, Title 18, Section 1001), AND/OR REVOCATION OF ANY STATION AUTHORIZATION (U.S. Code, Title 47, Section 312(a)(1)), AND/OR FORFEITURE (U.S. Code, Title 47, Section 503).					

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Attachment

Sirius Satellite Radio Inc. (“Sirius”), pursuant to 47 C.F.R. § 25.120,¹ hereby requests Special Temporary Authority (“STA”) for 30 days to operate in its licensed frequency band (2320-2332.5 MHz) (1) low-power satellite DARS repeaters with an Effective Isotropically Radiated Power (“EIRP”) of 200 watts; and (2) signal boosters with an EIRP of 0.0001 watts that have previously been approved for use in retail stores. These low-power repeaters and signal boosters will be utilized at various trade shows on various dates between and including October 8, 2007 and November 2, 2007. Sirius intends to operate the repeaters and signal boosters independently – *i.e.*, Sirius will *not* operate them in conjunction with XM Radio, Inc., the other satellite DARS licensee.

The repeaters and boosters will be used by Sirius to carry out equipment and service demonstrations at trade shows across the United States for periods not to exceed six days (including two days prior to the official start of each trade show for set-up and testing activities). Due to blockage from walls and ceilings, it is often difficult to provide quality reception of SDARS satellite and even terrestrial signals inside of trade show venues, which often do not have line-of-sight views to receive Sirius’ signal. These difficulties with providing coverage inside the venues require radios to be displayed with hard wire connections, which limits the locations within a trade show venue that Sirius can set up its displays, creating difficulties for trade show organizers and Sirius. Because trade show venues typically consist of a large, often multi-level space, Sirius anticipates that the use of both a repeater and one or more (but fewer than five) strategically placed boosters will be necessary to ensure full coverage of each trade show. Accordingly, grant of the requested STA to use these repeaters for these limited periods will serve the public interest.

Technical Information. In Exhibit A, Sirius provides a list of technical parameters, locations, and dates for the trade show repeaters it seeks to operate pursuant to this STA. Sirius has included the following information: (1) event; (2) event date; (3) event location (specifying the center longitude and latitude of each trade show venue); (4) market; (5) antenna type; (6) antenna beamwidth; (7) total EIRP; and (8) approximate maximum height Above Ground Level (AGL). Sirius will operate its signal booster(s) at the same events, dates, locations, and markets specified in Exhibit A. Exhibit B lists the technical parameters for the signal boosters, which are identical to those previously approved by the Commission for use in retail stores.² Specifically, Sirius has

¹ Concurrent with this STA request, Sirius is filing an application for a 180-day STA to operate repeaters and signal boosters at trade shows from November 7, 2007 to February 18, 2008.

² See *Sirius Satellite Radio Inc. Request for Special Temporary Authority to Operate In-Store Signal Boosters in the Satellite Digital Audio Radio Service*, File No. SAT-STA-20030411-00075 (grant stamp with conditions issued June 26, 2003) (“2003 In-Store Booster Application”). In the 2003 application, Sirius also provided an interference analysis for the signal boosters that are the subject of this application. See *id.*, Exhibit C. That interference analysis is incorporated by reference herein, as permitted by 47 C.F.R. § 1.10009(c)(2). On June 5, 2003, Sirius further supplemented the application with a sample link budget for the signal boosters. See Letter from Robert D. Briskman to Marlene H. Dortch, Secretary, FCC, Re: Sirius

included the following information: (1) antenna type; (2) antenna beamwidth; (3) total EIRP; and (4) approximate maximum height Above Ground Level ("AGL"). Exhibits C and D provide RF exposure analyses for each individual trade show, and demonstrate that any human radiofrequency exposure that might occur is well below acceptable limits.

Interference Considerations. Sirius does not anticipate that the repeaters and boosters at these trade shows will cause harmful interference to other radio services. Because Sirius has exclusive use of its licensed frequency band,³ there is no potential for in-band interference. Moreover, the repeaters will operate at 200 watts, well below the threshold EIRP of 2000 watts that Wireless Communications Service ("WCS") licensees have identified as acceptable to avoid any interference with their services. Sirius has also previously demonstrated that the proposed boosters will not cause adjacent band interference to WCS operations.⁴ In addition, the repeaters and boosters will only be used for a limited time, further eliminating any opportunity for interference. Therefore, Sirius does not anticipate that these repeaters and boosters will cause blanketing interference to any WCS receivers.

Ownership and Control of Repeaters. Sirius will own each repeater and booster installed at a given venue and will retain full operational control of these repeaters and boosters. Sirius will also be responsible for installation of each repeater and/or booster.

Public Interest Considerations. Prompt grant of this STA will promote the continued success of satellite radio and thereby serve the public interest. The demand for SDARS radios by the public has continued to increase over time. Accordingly, Sirius has begun attending trade shows and conventions where it provides demonstrations of its equipment to consumers. Without repeaters and boosters to overcome signal blockage within the venues, however, Sirius cannot undertake real-time demonstrations of its equipment, especially demonstrations of the full mobility of SDARS service. These repeaters and boosters will provide clear signal reception within these venues for these demonstrations, and will eliminate any need for a hard wire connection.

Sirius understands that its operation of these repeaters and boosters under STA is on a secondary, non-interference basis. While Sirius does not anticipate any interference, should interference occur, it will cease operation of the interfering repeater and/or booster until such interference can be eliminated.

(Continued . . .)

Satellite Radio Inc. Request for STA to Operate In-Store SDARS Signal Boosters, File No. SAT-STA-20030411-00075 (filed June 5, 2003). The link budget is also incorporated by reference herein.

³ 47 C.F.R. § 25.202(a)(6) (stating the 2320-2345 MHz band is allocated exclusively for SDARS).

⁴ 2003 In-Store Booster Application at 4 and Exhibit C.

Certifications. Sirius acknowledges that the conditions imposed in the 2001 Order granting Sirius' request for STA to operate terrestrial repeaters⁵ will continue to apply to any repeaters authorized as a result of this application. Sirius further certifies that its operation of signal boosters at trade shows will comply, as applicable, with the "Micro-Repeater STA Conditions" that the Commission imposed on Sirius in granting the June 26, 2003 STA to operate 5,000 in-store signal boosters. Specifically, Sirius certifies the following:

- (1) Sirius will operate the repeaters and trade show signal boosters at its own risk, and such operation shall not prejudice the outcome of the final rules adopted by the Commission in GEN Docket 95-91;
- (2) Sirius will operate the repeaters and trade show signal boosters on a non-interference basis with respect to all permanently authorized radiocommunication facilities;
- (3) The repeaters and trade show signal boosters will be restricted to the simultaneous retransmission of the complete programming, and only that programming, transmitted by the satellite directly to SDARS receivers;
- (4) Where applicable, coordination of the repeaters and trade show signal boosters will be completed with all affected Administrations prior to operation, in accordance with all applicable international agreements including those with Canada and Mexico;
- (5) The repeaters and trade show signal boosters will comply with Part 17 of the Commission's rules – Construction, Marking, and Lighting of Antenna Structures;
- (6) The repeaters and trade show signal boosters will comply with Part 1 of the Commission's rules, Subpart I - Procedures Implementing the National Environmental Policy Act of 1969, including the guidelines for human exposure to radio frequency electromagnetic fields as defined in Sections 1.1307(b) and 1.1310 of the Commission's rules;
- (7) The out-of-band emissions of the repeaters and trade show signal boosters will be limited to 75+log (EIRP) dB less than the transmitter EIRP;
- (8) Sirius will operate the repeaters and trade show signal boosters according to the technical parameters provided in this application;
- (9) Sirius will maintain full ownership and operational control of each repeater and trade show signal booster; and

⁵ *Sirius Satellite Radio Inc. Application for Special Temporary Authority to Operate Satellite Digital Audio Radio Service Complementary Terrestrial Repeater*, Order and Authorization, File No. SAT-STA-20010724-00064, DA 01-2171 (Sept. 17, 2001).

Ms. Marlene H. Dortch
September 7, 2007
Page 4

- (10) Sirius will immediately shut down any repeater and any, or all, trade show signal boosters upon a complaint of interference, upon direction from the Commission, or upon finding that a repeater or trade show signal booster has not been properly installed.

EXHIBIT B

Attached is the following information for each of the trade show signal boosters Sirius seeks to operate pursuant to this STA.

- (1) antenna type;
- (2) antenna beamwidth;
- (3) total EIRP; and
- (4) approximate height Above Ground Level (AGL)

City	Antenna Type	Antenna Beamwidth	EIRP Total in Watts	Height AGL
Various	Antenna Specialists XMSSR923WR	75 degrees	0.0001	< 50 feet

The transmitted carriers have a center frequency and frequency stability identical to the received SDARS satellite or terrestrial carriers. Frequency accuracy is controlled by the satellite or terrestrial repeater and not by the booster.

EXHIBIT C

RF Exposure Analysis

International BoatBuilders' Exhibition & Conference (IBEX) 2007

October 10-12, 2007

Miami Beach Convention Center, Miami Beach, FL

This technical addendum is to support the STA request for IBEX 2007. This event is being held at the Miami Beach Convention Center in Miami Beach, FL. A low-power transmitter and signal booster will be used to provide coverage at the event.

1. RF Exposure Analysis for Low-Power Transmitter

The transmitter set up for the show is illustrated in the figures below:

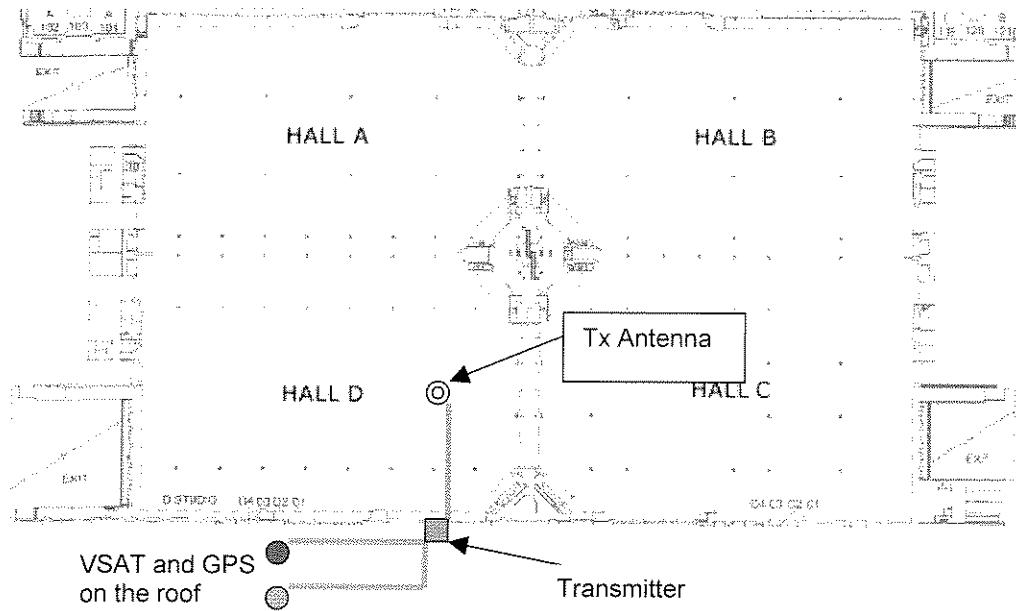


Figure 1. Diagram of Main hall

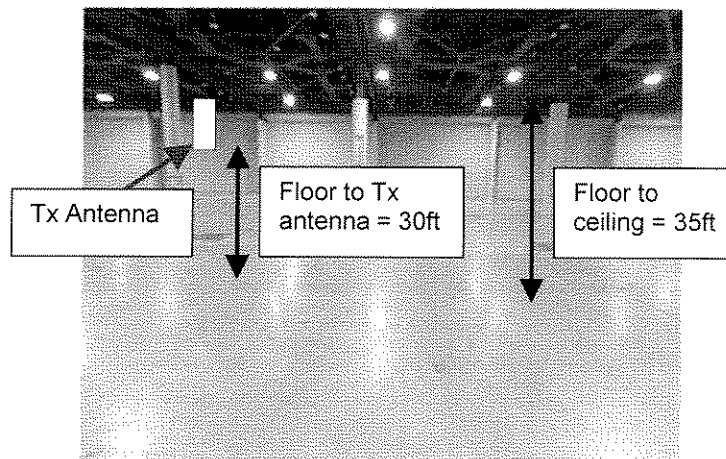


Figure 2. Main Exhibit hall

To establish the RF exposure environment for this request the following process has been used to establish that there is no general population exposure over the allowed limit:

1. The location of the antenna and the transmission parameters have been established. The antenna is placed 30 feet above the show floor as seen in Figure 2. A 20 watt (average), 90 watt (peak) power transmitter is used. Together with the assumed length and type of cable feeding the antenna (which is omni directional) and the type and gain of the antenna used, this leads to an effective isotropically radiated power (EIRP) of 200 watts (average) and 900 watts (peak). This calculation is summarized in Table1. The transmitter operates at 2.32625 GHz which is the carrier frequency allocated to the Sirius repeater network. At this frequency the FCC has established a limit of 1 mW/square centimeter for general population exposure (OET 65).
2. Using the calculation methods described in OET 65 and the EIRP's derived as described in "1" a calculation is made of the power density at various distances from the antenna for both the average and peak powers involved. The distance of 23 feet was chosen as the minimum distance criteria for exposure by taking the height of the antenna (30 feet) and subtracting a 7 foot allowance for the height of any individuals who may be present on the show floor. This distance represents the closest point that a member of the general population could approach this repeater antenna. Table 2 summarizes the results of the normal calculation (using the formula $\text{Power Density} = \text{EIRP} / (4 * \pi * R^2)$ from OET 65) and also a more conservative formula which takes into account reflection (the formula $\text{PD} = 2.56 * \text{EIRP} / (4 * \pi * R^2)$) also from OET 65. In order to provide a comprehensive

view, values are included separately for the regular case (average and peak power based) and for the reflective case (peak power based).

Summary

Using a very conservative approach the calculated RF exposure levels from the proposed installation are well within the stated limits defined in OET 65. Several worst case assumptions were made as follows:

1. No allowance was made for the significant reduction in power density that will occur due to the attenuation of the antenna pattern at the location immediately under the antenna, the location to which the minimum distance of 23 feet applies.
2. No allowance was made in the case of peak level calculations for the fact that these levels occur a very small fraction of the overall time of transmission.
3. The maximum transmitter power of 20 watts was used although in practice Sirius has determined that the transmitter will be operated at a level at or below 10 watts which will provide adequate margin for the demonstrations involved.
4. There is no access to the ceiling area where the antenna is mounted except with a construction lift.
5. The highest level of exposure, involving the potential for additive reflection and peak level EIRP was used as the exposure criteria.

Table 1. Transmit chain loss budget

	Average (watts)	Average (dBW)	Peak (watts)	Peak (dBW)
Transmitter output power	20	13.0	90	19.5
Cable Loss (db)		2		2
Antenna gain dBi (max)		12		12
EIRP (max)	200.0	23.0	900.0	29.5

The effective isotropic radiated power (EIRP) is calculated by taking the transmitter output power, subtracting the cable loss and adding the antenna gain.

The peak power is determined by applying the peak to average factor of the OFDM waveform to the average power of the transmitter. This peak level occurs less than 1/1000th of the time for the Sirius waveform for this transmitter type.

Table 2. Calculations for power density

- Power Density = $EIRP / (4\pi R^2)$ (Equation 4 page 19 of OET 65)
- Power Density adjusted for reflection = $2.56 * \text{Power Density}$ (Equation 7, page 21 of OET 65)

As can be seen from this table, even under very conservative transmission assumptions, the general population exposure limits are not exceeded at the worst case location.

Radial Distance from Antenna (Feet)	Power Density (Average) mW/square cm	Power density (Peak) mW/square cm	Peak power density with 2.56 multiplier (Max reflection)	Worst Case Safety Margin over exposure standard (times)
23	0.03343	0.15043	0.38510	2.59672
28	0.02256	0.10150	0.25984	3.84846
33	0.01624	0.07307	0.18707	5.34562
38	0.01225	0.05511	0.14108	7.08822
43	0.00956	0.04304	0.11018	9.07626
48	0.00768	0.03454	0.08842	11.30973
53	0.00630	0.02833	0.07252	13.76866
58	0.00526	0.02366	0.06056	16.51300
63	0.00446	0.02005	0.05133	19.48278
68	0.00382	0.01721	0.04406	22.69801
73	0.00332	0.01493	0.03823	26.15867
78	0.00291	0.01308	0.03348	29.86477
83	0.00257	0.01155	0.02957	33.81630
88	0.00228	0.01028	0.02631	38.01327
93	0.00204	0.00920	0.02355	42.46568
98	0.00184	0.00829	0.02121	47.14362
103	0.00167	0.00750	0.01920	52.07681
108	0.00152	0.00682	0.01747	57.26653
113	0.00138	0.00623	0.01595	62.67968
118	0.00127	0.00572	0.01463	68.34928
123	0.00117	0.00526	0.01347	74.26431
128	0.00108	0.00486	0.01243	80.42477
133	0.00100	0.00450	0.01152	86.83068
138	0.00093	0.00418	0.01070	93.48202
143	0.00086	0.00389	0.00996	100.37879
148	0.00081	0.00363	0.00930	107.52101
153	0.00076	0.00340	0.00870	114.90666

2. RF Exposure Analysis for Signal Booster

The set up of the signal booster in the meeting room is illustrated in the figures below:

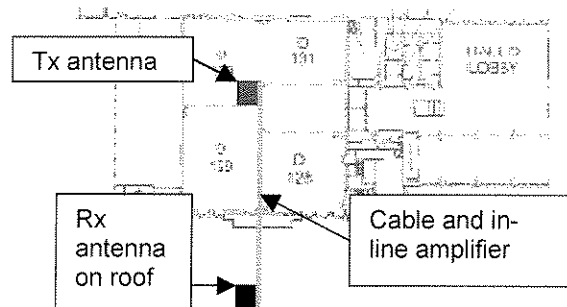


Figure 3. Diagram of meeting rooms

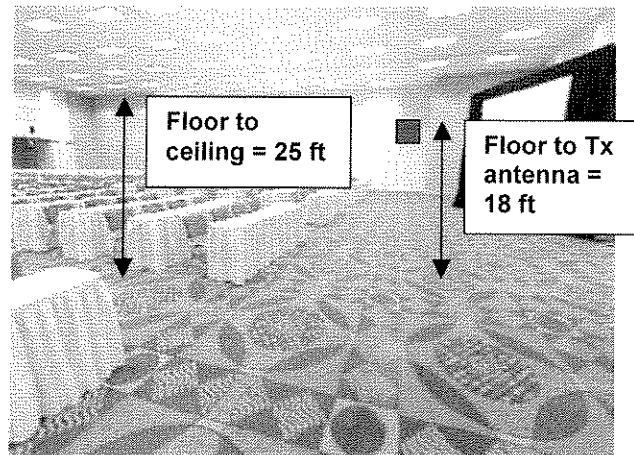


Figure 4. Meeting room

To establish the RF exposure environment for the signal boosters the following process has been used to confirm that there is no general population exposure over the allowed limit:

1. The transmit antenna is placed 18 feet above the meeting floor as seen in Figure 4. A 0.0001 Watt EIRP signal booster identical to boosters that have previously been approved for retail stores is used. The booster operates at 2320-2332.5MHz which is the carrier frequency allocated to the Sirius

repeater network. At this frequency the FCC has established a limit of 1 mW/square centimeter for general population exposure (OET 65).

2. Using the calculation methods described in OET 65 and the EIRP's described in "1" a calculation is made of the power density at various distances from the transmit antenna. The distance of 11 feet was chosen as the minimum distance criteria for exposure by taking the height of the antenna (18 feet) and subtracting a 7 foot allowance for the height of any individuals who may be present on the show floor. This distance represents the closest point that a member of the general population could approach this transmit antenna. Table 4 summarizes the results of the normal calculation (using the formula $\text{Power Density} = \text{EIRP} / (4 * \pi * R^2)$ from OET 65) and also a more conservative formula which takes into account reflection (the formula $\text{PD} = 2.56 * \text{EIRP} / (4 * \pi * R^2)$) also from OET 65. In order to provide a comprehensive view, values are included separately for the regular case and for the reflective case.

Summary

Using a very conservative approach the calculated RF exposure levels from the proposed installation are well within the stated limits defined in OET 65. Several worst case assumptions were made as follows:

1. No allowance was made for the significant reduction in power density that will occur due to the attenuation beyond the 3 dB antenna beamwidth.
2. The highest level of exposure, involving the potential for additive reflection was used as the exposure criteria.

Table 3. Signal Booster specifications

Antenna Type	Antenna Beamwidth	Total EIRP in Watts
Antenna Specialists XMSSR923WR	75 degrees	0.0001

Table 4. Calculations for power density

- Power Density = $\text{EIRP} / (4\pi R^2)$ (Equation 4 page 19 of OET 65)
- Power Density adjusted for reflection = $2.56 * \text{Power Density}$ (Equation 7, page 21 of OET 65)

As can be seen from this table, even under very conservative transmission assumptions, the general population exposure limits are not exceeded at the worst case location.

Radial Distance from Antenna (Feet)	Power Density mW/square cm	Power Density with 2.56 multiplier (Max reflection)	Worst Case Safety Margin over exposure standard (times)
11	0.000000073	0.00000019	5345616
12	0.000000061	0.00000016	6361725
13	0.000000052	0.00000013	7466191
14	0.000000045	0.00000012	8659015
15	0.000000039	0.00000010	9940196
16	0.000000035	0.00000009	11309734
17	0.000000031	0.00000008	12767629
18	0.000000027	0.00000007	14313882
19	0.000000024	0.00000006	15948491
20	0.000000022	0.00000006	17671459
21	0.000000020	0.00000005	19482783
22	0.000000018	0.00000005	21382465
23	0.000000017	0.00000004	23370504
24	0.000000015	0.00000004	25446900
25	0.000000014	0.00000004	27611654
26	0.000000013	0.00000003	29864765
27	0.000000012	0.00000003	32206233
28	0.000000011	0.00000003	34636059
29	0.000000011	0.00000003	37154242
30	0.000000010	0.00000003	39760782
31	0.000000009	0.00000002	42456879
32	0.000000009	0.00000002	45238934
33	0.000000008	0.00000002	48110546
34	0.000000008	0.00000002	51070516
35	0.000000007	0.00000002	54118842

EXHIBIT D

RF Exposure Analysis

**2007 SEMA Show
October 30 – November 2, 2007
Las Vegas Convention Center
Las Vegas, NV**

This technical addendum is to support the STA request for 2007 SEMA Show. This event is being held at the Las Vegas Convention Center in Las Vegas, NV. Two low-power transmitters and a signal booster will be used to provide coverage at the event.

RF Exposure Analysis for Low-Power Transmitter

The transmitters set up for the show are illustrated in the figures below:

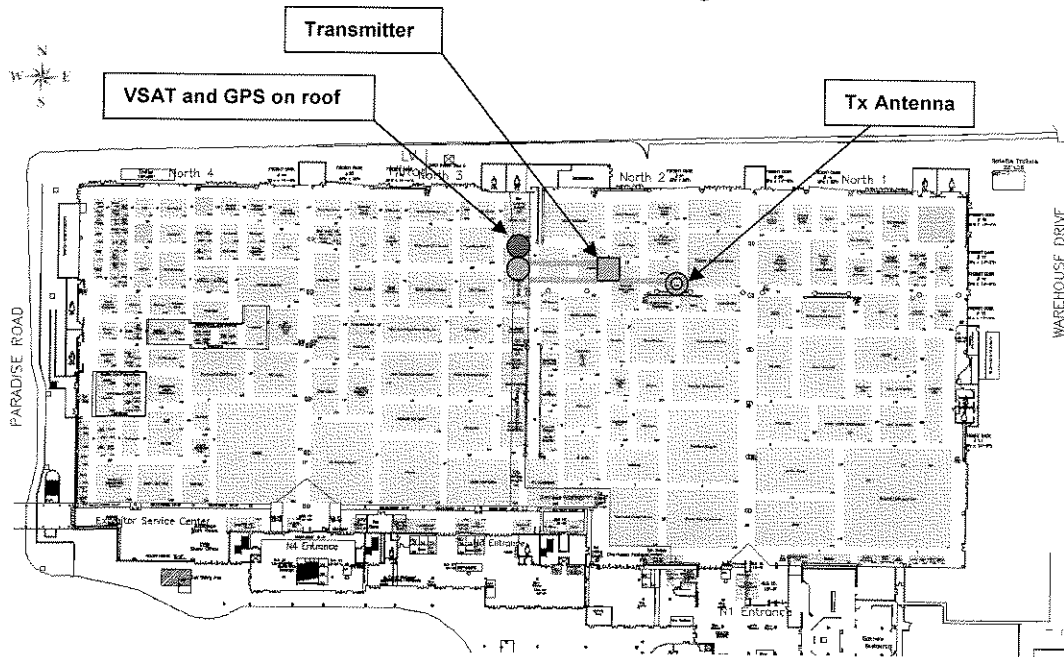


Figure 1. Diagram of North hall

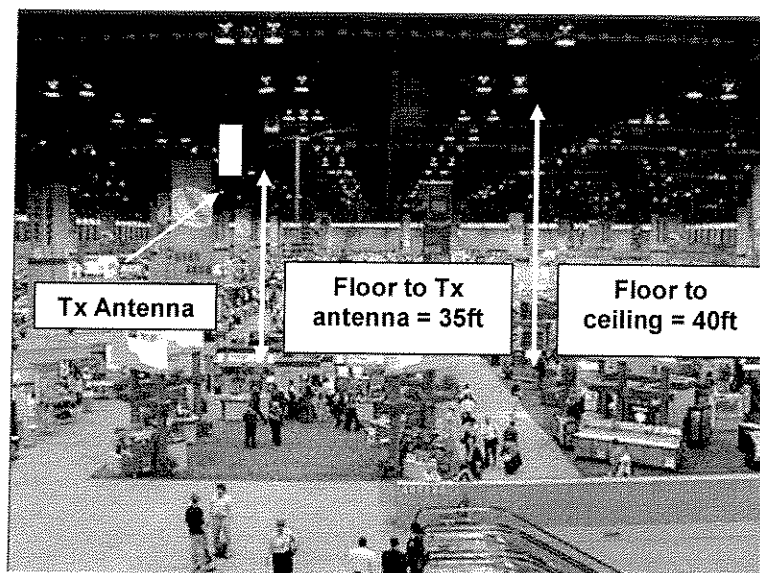


Figure 2. North Main Exhibit hall

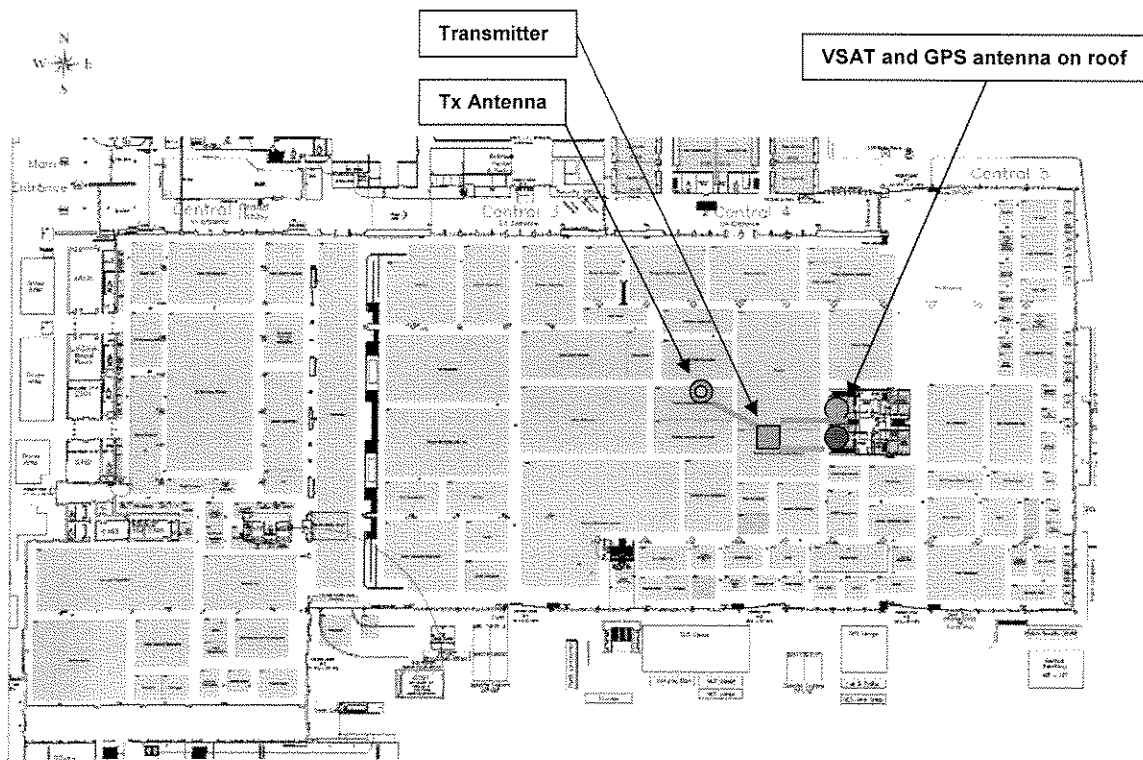


Figure 3. Diagram of Central hall

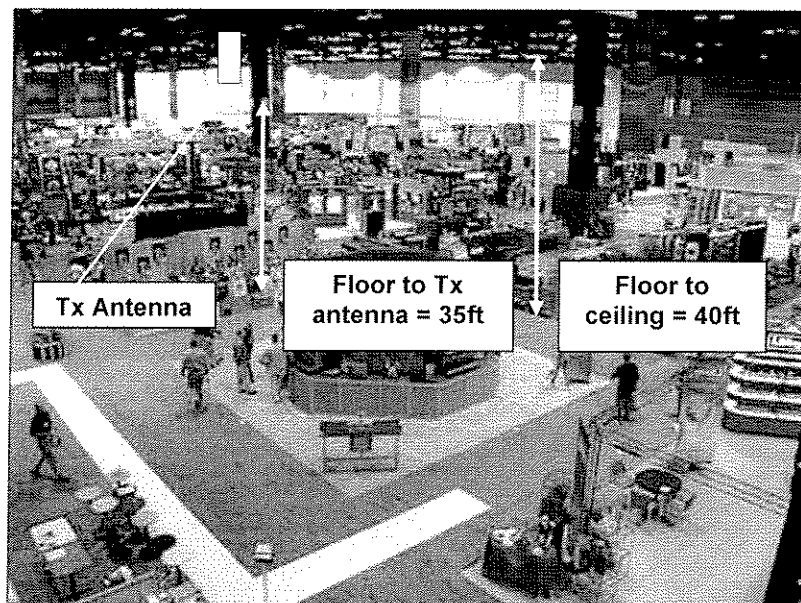


Figure 4. Central Main Exhibit hall

To establish the RF exposure environment for this request the following process has been used to establish that there is no general population exposure over the allowed limit:

1. The locations of the antenna and the transmission parameters have been established. The antennas in both locations are placed 35 feet above the show floor as seen in Figure 2 and Figure 4. A 20 watt (average), 90 watt (peak) power transmitter is used. Together with the assumed length and type of cable feeding the antenna (which is omni directional) and the type and gain of the antenna used, this leads to an effective isotropically radiated power (EIRP) of 200 watts (average) and 900 watts (peak). This calculation is summarized in Table 1. The transmitter operates at 2.32625 GHz which is the carrier frequency allocated to the Sirius repeater network. At this frequency the FCC has established a limit of 1 mW/square centimeter for general population exposure (OET 65).
2. Using the calculation methods described in OET 65 and the EIRP's derived as described in "1" a calculation is made of the power density at various distances from the antenna for both the average and peak powers involved. The distance of 28 feet was chosen as the minimum distance criteria for exposure by taking the height of the antenna (35 feet) and subtracting a 7 foot allowance for the height of any individuals who may be present on the show floor. This distance represents the closest point that a member of the general population could approach this repeater antenna. Table 2 summarizes the results of the normal calculation (using the formula $\text{Power Density} = \text{EIRP} / (4 * \pi * R^2)$ from OET 65) and also a more conservative formula which takes into account reflection (the formula $\text{PD} = 2.56 * \text{EIRP} / (4 * \pi * R^2)$) also from OET 65. In order to provide a comprehensive view, values are included separately for the regular case (average and peak power based) and for the reflective case (peak power based).

Summary

Using a very conservative approach the calculated RF exposure levels from the proposed installation are well within the stated limits defined in OET 65. Several worst case assumptions were made as follows:

1. No allowance was made for the significant reduction in power density that will occur due to the attenuation of the antenna pattern at the location immediately under the antenna, the location to which the minimum distance of 28 feet applies.
2. No allowance was made in the case of peak level calculations for the fact that these levels occurs a very small fraction of the overall time of transmission.
3. The maximum transmitter power of 20 watts was used although in practice Sirius has determined that the transmitter will be operated at a level at or below 10 watts which will provide adequate margin for the demonstrations involved.
4. Access to the ceiling area where the antenna is mounted is restricted only to convention electricians and installation crews.
5. The highest level of exposure, involving the potential for additive reflection and peak level EIRP was used as the exposure criteria.

Table 1. Transmit chain loss budget

	Average (watts)	Average (dBW)	Peak (watts)	Peak (dBW)
Transmitter output power	20	13.0	90	19.5
Cable Loss (db)		2		2
Antenna gain dBi (max)		12		12
EIRP (max)	200.0	23.0	900.0	29.5

The effective isotropic radiated power (EIRP) is calculated by taking the transmitter output power, subtracting the cable loss and adding the antenna gain.

The peak power is determined by applying the peak to average factor of the OFDM waveform to the average power of the transmitter. This peak level occur less than 1/1000th of the time for the Sirius waveform for this transmitter type.

Table 2. Calculations for power density

- Power Density = $EIRP/(4\pi R^2)$ (Equation 4 page 19 of OET 65)
- Power Density adjusted for reflection = $2.56 \times \text{Power Density}$ (Equation 7, page 21 of OET 65)

As can be seen from this table, even under very conservative transmission assumptions, the general population exposure limits are not exceeded at the worst case location.

Radial Distance from Antenna (Feet)	Power Density (Average) mW/square cm	Power density (Peak) mW/square cm	Peak power density with 2.56 multiplier (Max reflection)	Worst Case Safety Margin over exposure standard (times)
28	0.02256	0.10150	0.25984	3.84845
33	0.01624	0.07307	0.18707	5.34562
38	0.01225	0.05511	0.14108	7.08822
43	0.00956	0.04304	0.11018	9.07626
48	0.00768	0.03454	0.08842	11.30973
53	0.00630	0.02833	0.07252	13.78865
58	0.00526	0.02366	0.06056	16.51300
63	0.00446	0.02005	0.05133	19.48278
68	0.00382	0.01721	0.04406	22.69801
73	0.00332	0.01493	0.03823	26.15887
78	0.00291	0.01308	0.03348	29.86477
83	0.00257	0.01155	0.02957	33.81630
88	0.00228	0.01028	0.02631	38.01327
93	0.00204	0.00920	0.02355	42.45568
98	0.00184	0.00829	0.02121	47.14352
103	0.00167	0.00750	0.01920	52.07681
108	0.00152	0.00682	0.01747	57.25553
113	0.00138	0.00623	0.01595	62.67968
118	0.00127	0.00572	0.01463	68.34928
123	0.00117	0.00526	0.01347	74.26431
128	0.00108	0.00486	0.01243	80.42477
133	0.00100	0.00450	0.01152	86.83068
138	0.00093	0.00418	0.01070	93.48202
143	0.00086	0.00389	0.00996	100.37879
148	0.00081	0.00363	0.00930	107.52101
153	0.00076	0.00340	0.00870	114.90866
158	0.00071	0.00319	0.00816	122.54175

2. RF Exposure Analysis for Signal Booster

The set up of the signal booster in the meeting room is illustrated in the figures below:

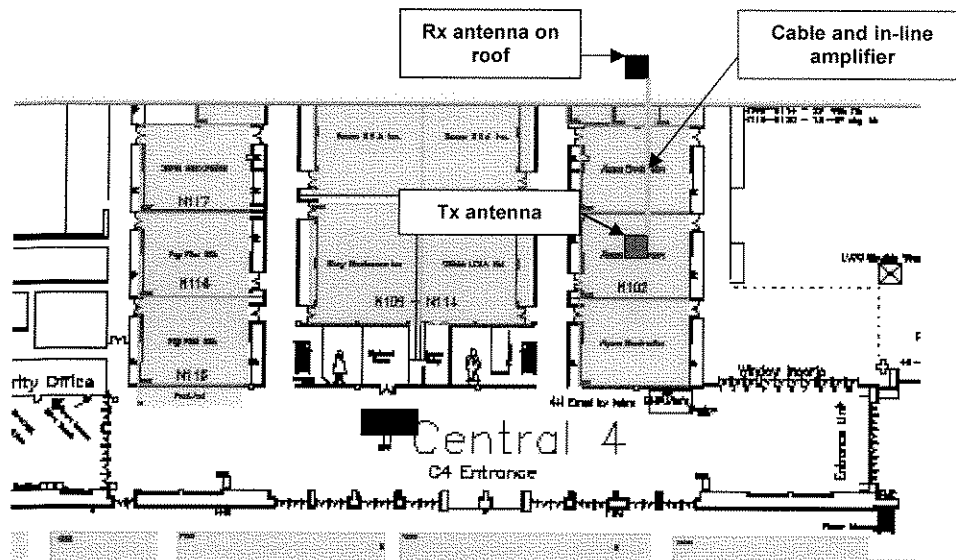


Figure 7. Diagram of meeting rooms

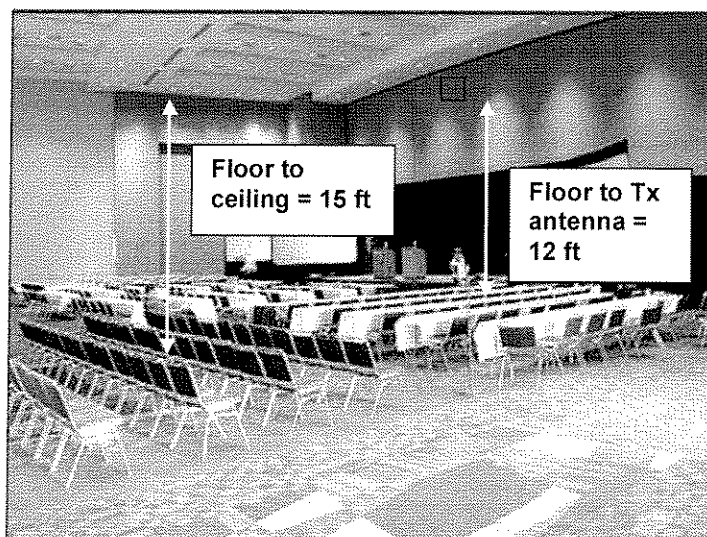


Figure 8. Meeting room

To establish the RF exposure environment for the signal boosters the following process has been used to confirm that there is no general population exposure over the allowed limit:

1. The transmit antenna is placed 12 feet above the meeting floor as seen in Figure 6. A 0.0001 Watt EIRP signal booster identical to boosters that have previously been approved for retail stores is used. The booster operates at 2320-2332.5MHz which is the carrier frequency allocated to the Sirius repeater network. At this frequency the FCC has established a limit of 1 mW/square centimeter for general population exposure (OET 65).
2. Using the calculation methods described in OET 65 and the EIRP's described in "1" a calculation is made of the power density at various distances from the transmit antenna. The distance of 5 feet was chosen as the minimum distance criteria for exposure by taking the height of the antenna (12 feet) and subtracting a 7 foot allowance for the height of any individuals who may be present on the show floor. This distance represents the closest point that a member of the general population could approach this transmit antenna. Table 5 summarizes the results of the normal calculation (using the formula $\text{Power Density} = \text{EIRP} / (4 * \pi * R^2)$ from OET 65) and also a more conservative formula which takes into account reflection (the formula $\text{PD} = 2.56 * \text{EIRP} / (4 * \pi * R^2)$) also from OET 65. In order to provide a comprehensive view, values are included separately for the regular case and for the reflective case.

Summary

Using a very conservative approach the calculated RF exposure levels from the proposed installation are well within the stated limits defined in OET 65. Several worst case assumptions were made as follows:

1. No allowance was made for the significant reduction in power density that will occur due to the attenuation beyond the 3 dB antenna beamwidth.
2. The highest level of exposure, involving the potential for additive reflection was used as the exposure criteria.

Table 5. Signal Booster specifications

Antenna Type	Antenna Beamwidth	Total EIRP in Watts
Antenna Specialists XMSSR923WR	75 degrees	0.0001

Table 6. Calculations for power density

- Power Density = $\text{EIRP} / (4\pi R^2)$ (Equation 4 page 19 of OET 65)
- Power Density adjusted for reflection = $2.56 * \text{Power Density}$ (Equation 7, page 21 of OET 65)

As can be seen from this table, even under very conservative transmission assumptions, the general population exposure limits are not exceeded at the worst case location.

Radial Distance from Antenna (Feet)	Power Density mW/square cm	Power Density with 2.56 multiplier (Max reflection)	Worst Case Safety Margin over exposure standard (times)
5	0.000000354	0.00000091	1104466
6	0.000000246	0.00000063	1590431
7	0.000000180	0.00000046	2164754
8	0.000000138	0.00000035	2827433
9	0.000000109	0.00000028	3578470
10	0.000000088	0.00000023	4417865
11	0.000000073	0.00000019	5345616
12	0.000000061	0.00000016	6361725
13	0.000000052	0.00000013	7466191
14	0.000000045	0.00000012	8659015
15	0.000000039	0.00000010	9940196
16	0.000000035	0.00000009	11309734
17	0.000000031	0.00000008	12767529
18	0.000000027	0.00000007	14313882
19	0.000000024	0.00000006	15948491
20	0.000000022	0.00000006	17671459
21	0.000000020	0.00000005	19482783
22	0.000000018	0.00000005	21382465
23	0.000000017	0.00000004	23370504
24	0.000000015	0.00000004	25446900
25	0.000000014	0.00000004	27611654
26	0.000000013	0.00000003	29864785
27	0.000000012	0.00000003	32206233
28	0.000000011	0.00000003	34636059
29	0.000000011	0.00000003	37154242
30	0.000000010	0.00000003	39760762
31	0.000000009	0.00000002	42455679
32	0.000000009	0.00000002	45236934
33	0.000000008	0.00000002	48110546
34	0.000000008	0.00000002	51070516