Approved by OMB
3060–0678

Date & Time Filed: Jul 19 2007 2:11:09:793PM
File Number: SAT–STA–20070719–00103
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:
Request for STA to Operate Low Power SDARS Repeaters at Two 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<br>36th Floor | **E–Mail:** | |
| **City:** | New York | **State:** | NY |
| **Country:** | USA | **Zipcode:** | 10020 – |
| **Attention:** | Mr Patrick L Donnelly | | |

GRANTED*
International Bureau
* subject to attached conditions

File # SAT-STA-20070719-00103

Call Sign _____ Grant Date 08/13/07
(or other identifier)

Term Dates
From See application To: See application

Approved: _____
Kathryn Medley, Chief
Satellite Engineering Branch

**Application of Sirius Satellite Radio Inc. for Special Temporary Authority**
**IBFS File No. SAT-STA-20070719-00103**

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 Great American Trucking Show in Dallas, TX, from August 21-25, 2007, and at CEDIA EXPO 2007 in Denver, CO, from September 3-9, 2007, according to the technical parameters specified in its application and letter of August 7, 2007, 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 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.

GRANTED*
International Bureau

File # SAT-STA-20070719-00103

Call Sign _____ Grant Date 08/13/07
(or other identifier)

Term Dates
From see application To: see application

Approved: _____
Kathryn Medley, Chief
Satellite Engineering Branch

*Subject to conditions above

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:** | |
| | 36th Floor | | |
| **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 SATSTA2005030100053 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 Inc. herein requests Special Temporary Authority to operate low-power satellite digital audio radio service terrestrial repeaters at two trade shows from Aug. 21-25, 2007 and September 3-9, 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 | 11. Title of Person Signing |
|---|---|
| Patrick L. Donnelly | Exec. VP, GC, and Sec'y |

12. Please supply any need attachments.

| Attachment 1: Attachment | 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, hereby requests Special Temporary Authority ("STA") to operate in its licensed frequency band (2320-2332.5 MHz) low-power satellite DARS repeaters with an Effective Isotropically Radiated Power ("EIRP") of 200 watts at two trade shows in August and September 2007. The first will be operated at the Great American Trucking Show from August 23-25, 2007 and the second will be operated at CEDIA EXPO 2007 from September 5-9, 2007. Sirius requests authorization to install and test these repeaters two days before the start of the events.[1] Thus, Sirius requests authority to operate repeaters August 21-25, 2007 and September 3-9, 2007.

The repeaters will be used by Sirius to carry out equipment and service demonstrations at these trade shows. 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 would require radios to be displayed with hard wire connections, which limits the locations within the venue that Sirius can set up its displays, creating difficulties for trade show organizers and Sirius. Accordingly, grant of the requested STA to use repeaters for these limited periods will serve the public interest.

*Technical Information.* In Exhibit A, Sirius provides a list of technical parameters, the location, and dates for the trade show repeaters it seeks to operate pursuant to this STA. Sirius has included the following information: (1) event; (2) antenna type; (3) antenna beamwidth; (4) EIRP; and (5) approximate maximum height Above Ground Level (AGL). Exhibit B provides an RF exposure analysis for the GATS trade show, showing that any human radiofrequency exposure that might occur is well below acceptable limits. Exhibit C provides a similar RF exposure analysis for CEDIA EXPO 2007.

*Interference Considerations.* The repeaters will not cause harmful interference to other radio services. Because Sirius has exclusive use of its licensed frequency band,[2] there is no potential for in-band interference. Moreover, these repeaters will operate at a maximum of 200 watts. Sirius' initial STA to operate a satellite DARS terrestrial repeater network[3] allowed Sirius to

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[1] Because Sirius is requesting STA for less than 30 days, the Commission can grant this application without placing it on Public Notice. 47 C.F.R. § 25.120(b)(4).

[2] 47 C.F.R. § 25.202(a)(6) (stating the 2320-2345 MHz band is allocated exclusively for SDARS).

[3] *Sirius Satellite Radio Inc. Application for Special Temporary Authority to Operate Satellite Digital Audio Radio Service Complementary Terrestrial Repeaters*, Order and Authorization, 16 FCC Rcd 16773 (Int'l Bur. 2001) ("*2001 STA Grant Order*"). Since that time, the Commission has extended the STA several times, pending the issuance of final rules governing the use of satellite DARS terrestrial repeaters. In September of 2004, the Commission granted Sirius a new STA to operate for 180 days or until the Commission issued final rules governing the use of satellite DARS terrestrial repeaters. *Sirius Satellite Radio Inc. Request to Modify Special Temporary Authority To Operate Satellite DARS Terrestrial Repeaters*, Order

"operate complementary terrestrial repeaters...at or below 2kW nationwide."[4] Thus, the Commission recognized that repeaters operating at or below the 2000 Watt threshold were presumptively unlikely to cause harmful interference to other radiocommunications operations. Indeed, WCS licensees have deemed the 2000 Watt threshold acceptable.[5] Nevertheless, out of an abundance of caution, Sirius requests Commission authorization to operate these repeaters.

In addition, these repeaters will only be used for a very limited time, further eliminating any opportunity for interference. Therefore, Sirius does not anticipate that the repeaters will cause blanketing interference to any WCS receivers. As a result, and because there are no WCS facilities operating in the area, Sirius has not notified the WCS licensees in the affected MSA prior to filing this request.

*Ownership and Control of Repeaters.* Sirius will own the repeaters installed at the venues and will retain full operational control of them. Sirius will also be responsible for installation of the repeaters.

*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, like GATS and CEDIA EXPO, where it provides demonstrations of its equipment to consumers. Without repeaters 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 will provide clear signal reception at the shows for these demonstrations, and will eliminate any need for a hard wire connection.

Sirius understands that its operation of these repeaters 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 until such interference can be eliminated.

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(Continued . . .)
and Authorization, 19 FCC Rcd 18140 (2004) ("*2004 STA Grant Order*"). Sirius timely filed an application for renewal of this STA on March 1, 2005. *See* File No. SAT-STA-20050301-00053. To date, the Commission has not acted on this application. Under Section 1.62(f) of the Commission's rules, the timely filed renewal tolls the expiration of the previously granted STA. 47 C.F.R. §1.62(f). The FCC has also previously granted several modifications of the STA.

4 *Id.* at 16779 (¶ 17).

5 *See, e.g.,* Petition to Dismiss or Deny of BellSouth Mobile Data, Inc. and BellSouth Wireless Cable, Inc., File No. SAT-STA-20060623-00067 (filed September 18, 2006) at 6 ("BellSouth believes that terrestrial repeaters operating below 2 kW peak EIRP will not cause undue interference to its WCS operations").

*Certifications.* Sirius acknowledges that the conditions imposed in the 2001 Order granting Sirius' request for STA to operate terrestrial repeaters[6] will continue to apply to the repeaters authorized as a result of this application. Specifically, Sirius certifies the following:

(1) Sirius will operate the repeaters 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 on a non-interference basis with respect to all permanently authorized radiocommunication facilities;

(3) The repeaters 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 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 will comply with Part 17 of the Commission's rules – Construction, Marking, and Lighting of Antenna Structures;

(6) The repeaters 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 will be limited to 75+log (EIRP) dB less than the transmitter EIRP;

(8) Sirius will operate the repeaters according to the technical parameters provided in this application;

(9) Sirius will maintain full ownership and operational control of the repeaters; and

(10) Sirius will immediately shut down the repeaters upon a complaint of interference, upon direction from the Commission, or upon finding that the repeaters have not been properly installed.

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

SIRIUS SATELLITE RADIO INC.

EXHIBIT A

**Sirius Trade Shows / Events**

| Event | Event Dates | Market | Location | No Of Sectors | Antenna Type | Sector 1 | | | | Coordinates | | Antenna Height (feet) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Antenna Beamwidth | Orientation | Downtilt | EIRP (Watts) | Longitude (W) | Latitude (N) | |
| GATS | August 23 - 25, 2007 | Dallas, TX | Dallas Convention Center | 1 | Mobile Mark OD12-2400 | Omni | 0 | 0 | 200 | 96-47-58.84 | 32-46-28.09 | 50 |
| CEDIA | September 5 - 9th, 2007 | Denver, CO | Colorado Convention Center | 1 | Mobile Mark OD12-2400 | Omni | 0 | 0 | 200 | 104-59-45.62 | 39-44-33.61 | 90 |

# EXHIBIT B

## RF Exposure Analysis

## The Great American Trucking Show (GATS) 2007
## August 23-25, 2007
## Dallas Convention Center, Dallas, TX

This technical addendum is to support the STA request for GATS 2007. This event is being held at the Dallas Convention Center in Dallas, TX. 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:

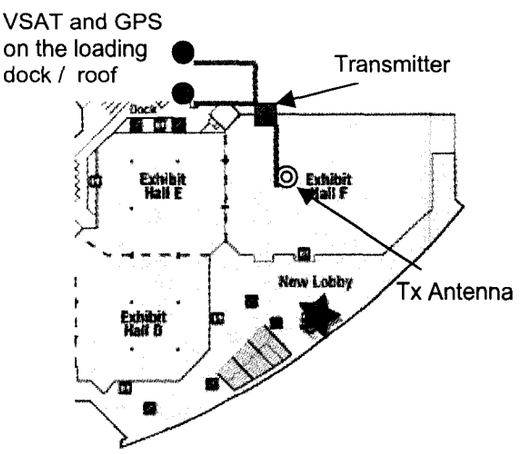


**Figure 1. Diagram of Main hall**

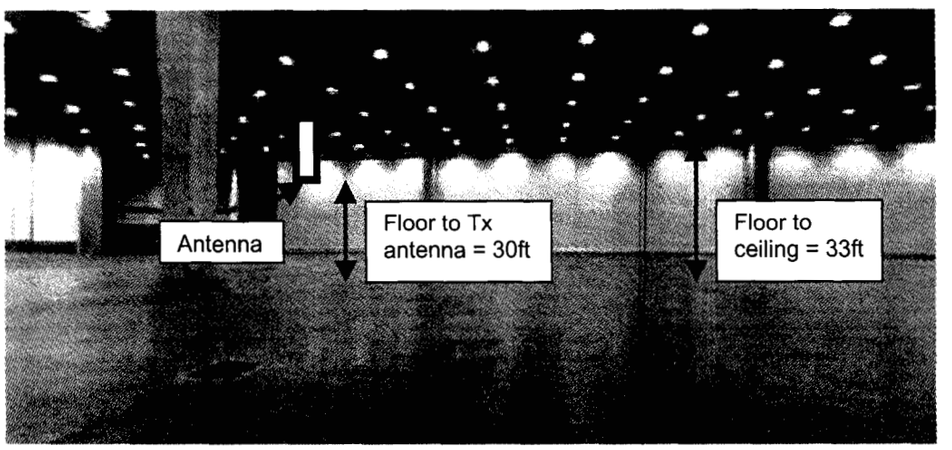


**Figure 2. Main Exhibit hall**

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 2.326.25 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 Power Density=EIRP/(4*Π*R^2) from OET 65) and also a more conservative formula which takes into account reflection (the formula PD= 2.56*EIRP/(4*Π*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 $1/1000^{th}$ of the time for the Sirius waveform for this transmitter type.

**Table 2. Calculations for power density**

- Power Density = EIRP/(4piR^2) (Equation 4 page 19 of OET 65)
- Power Density adjusted for reflection = 2.56*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 | 3.84845 |
| 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 | 26.15867 |
| 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 | 42.45568 |
| 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 |

## 2. RF Exposure Analysis for Signal Booster

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

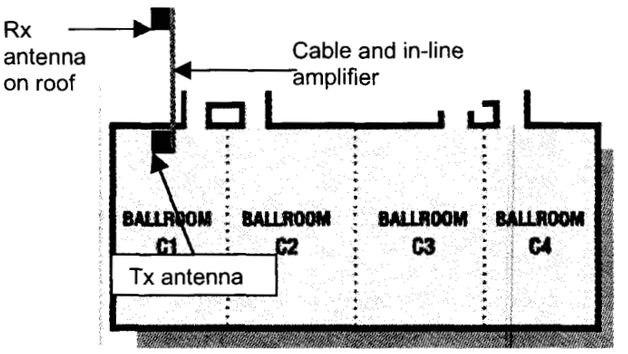


**Figure 3. Diagram of ballrooms**

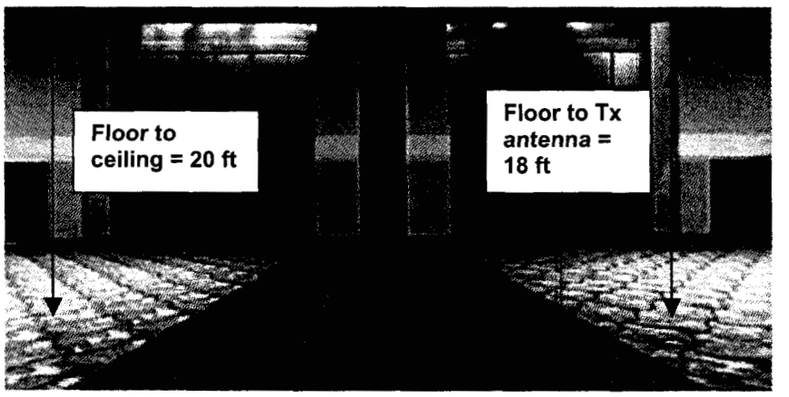


**Figure 4. Ballroom**

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 Power Density=EIRP/(4*Π*R^2) from OET 65) and also a more conservative formula which takes into account reflection (the formula PD= 2.56*EIRP/(4*Π*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 = EIRP/(4piR^2) (Equation 4 page 19 of OET 65)
- Power Density adjusted for reflection = 2.56*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 | 42455679 |
| 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 C

## RF Exposure Analysis

## CEDIA EXPO 2007
## September 5-9, 2007
## Colorado Convention Center, Denver, CO

This technical addendum is to support the STA request for the CEDIA Expo. This event is being held at the Colorado Convention Center in Denver, CO. 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:

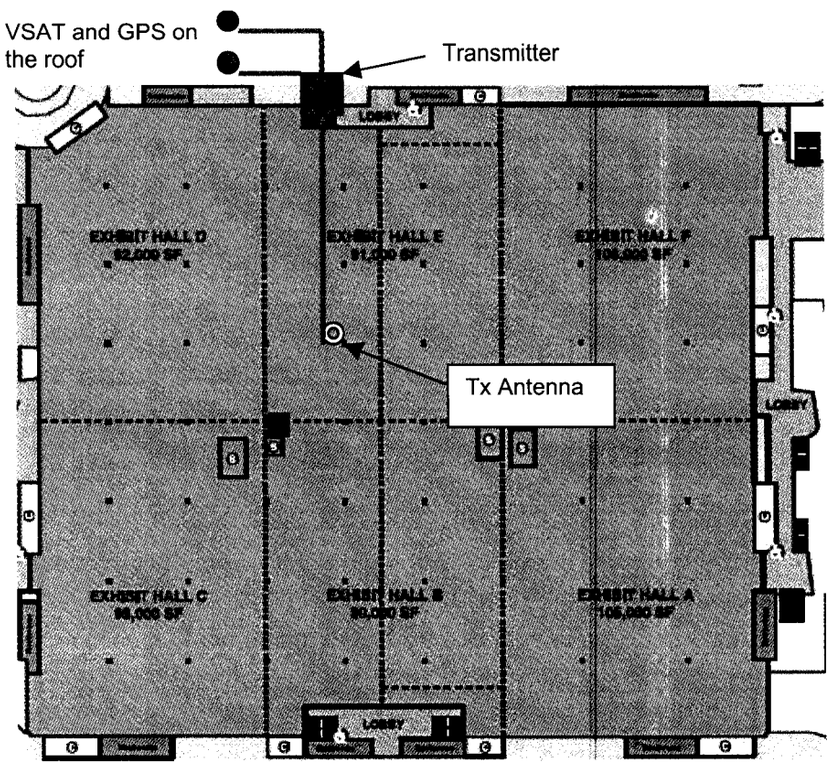


**Figure 1. Diagram of Main hall**

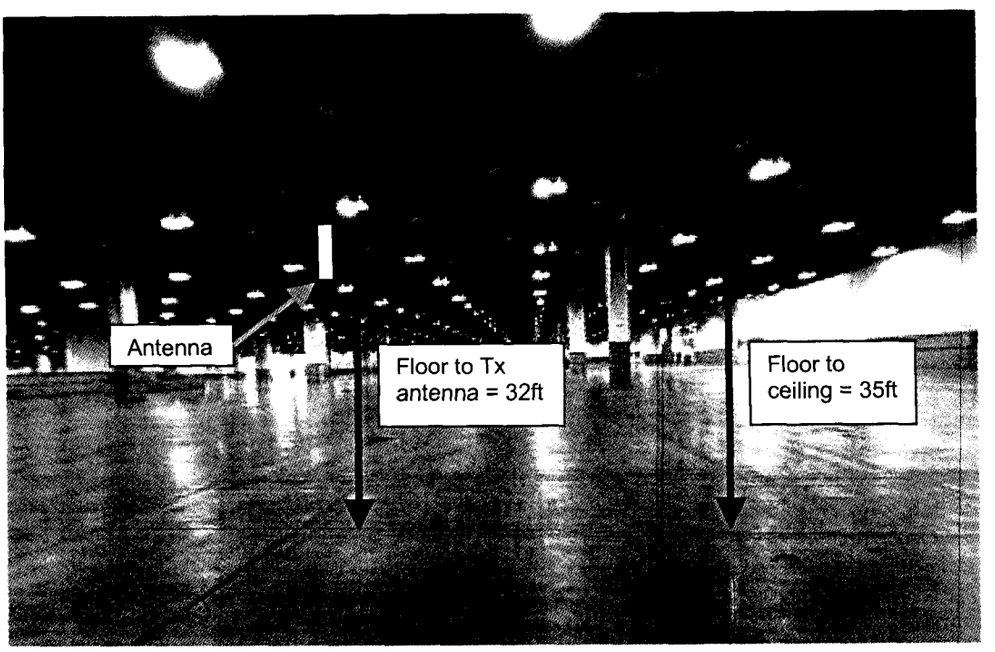


**Figure 2. Main Exhibit hall**

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 32 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 2.326.25 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 25 feet was chosen as the minimum distance criteria for exposure by taking the

height of the antenna (32 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 Power Density=EIRP/(4*Π*R^2) from OET 65) and also a more conservative formula which takes into account reflection (the formula PD= 2.56*EIRP/(4*Π*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 25 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 $1/1000^{th}$ of the time for the Sirius waveform for this transmitter type.

**Table 2. Calculations for power density**

- Power Density = EIRP/(4piR^2) (Equation 4 page 19 of OET 65)
- Power Density adjusted for reflection = 2.56*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) |
|---|---|---|---|---|
| 25 | 0.02829 | 0.12732 | 0.32595 | 3.06796 |
| 30 | 0.01965 | 0.08842 | 0.22635 | 4.41786 |
| 35 | 0.01444 | 0.06496 | 0.16630 | 6.01320 |
| 40 | 0.01105 | 0.04974 | 0.12732 | 7.85398 |
| 45 | 0.00873 | 0.03930 | 0.10060 | 9.94020 |
| 50 | 0.00707 | 0.03183 | 0.08149 | 12.27185 |
| 55 | 0.00585 | 0.02631 | 0.06734 | 14.84893 |
| 60 | 0.00491 | 0.02210 | 0.05659 | 17.67146 |
| 65 | 0.00419 | 0.01883 | 0.04822 | 20.73942 |
| 70 | 0.00361 | 0.01624 | 0.04158 | 24.05282 |
| 75 | 0.00314 | 0.01415 | 0.03622 | 27.61165 |
| 80 | 0.00276 | 0.01243 | 0.03183 | 31.41593 |
| 85 | 0.00245 | 0.01101 | 0.02820 | 35.46564 |
| 90 | 0.00218 | 0.00982 | 0.02515 | 39.76078 |
| 95 | 0.00196 | 0.00882 | 0.02257 | 44.30137 |
| 100 | 0.00177 | 0.00796 | 0.02037 | 49.08739 |
| 105 | 0.00160 | 0.00722 | 0.01848 | 54.11884 |
| 110 | 0.00146 | 0.00658 | 0.01684 | 59.39574 |
| 115 | 0.00134 | 0.00602 | 0.01540 | 64.91807 |
| 120 | 0.00123 | 0.00553 | 0.01415 | 70.68583 |
| 125 | 0.00113 | 0.00509 | 0.01304 | 76.69904 |
| 130 | 0.00105 | 0.00471 | 0.01205 | 82.95768 |
| 135 | 0.00097 | 0.00437 | 0.01118 | 89.46176 |
| 140 | 0.00090 | 0.00406 | 0.01039 | 96.21128 |
| 145 | 0.00084 | 0.00378 | 0.00969 | 103.20623 |
| 150 | 0.00079 | 0.00354 | 0.00905 | 110.44662 |

## 2. RF Exposure Analysis for Signal Booster

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

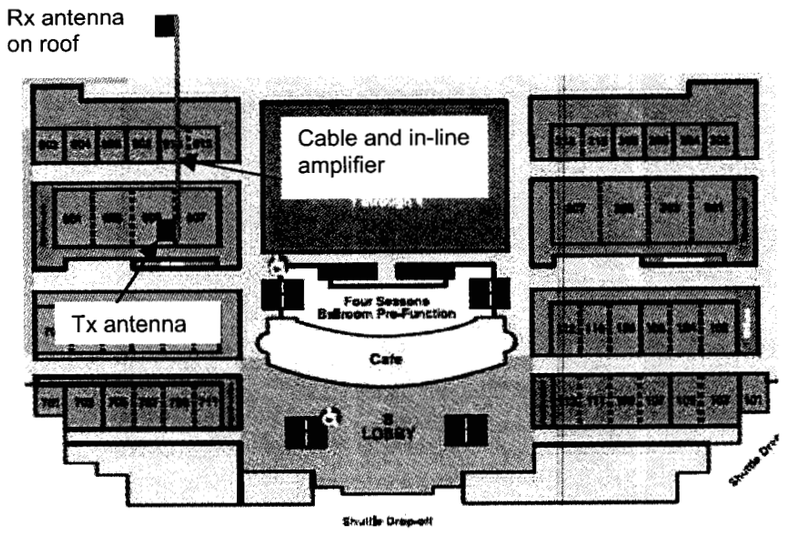


**Figure 3. Diagram of meeting rooms**

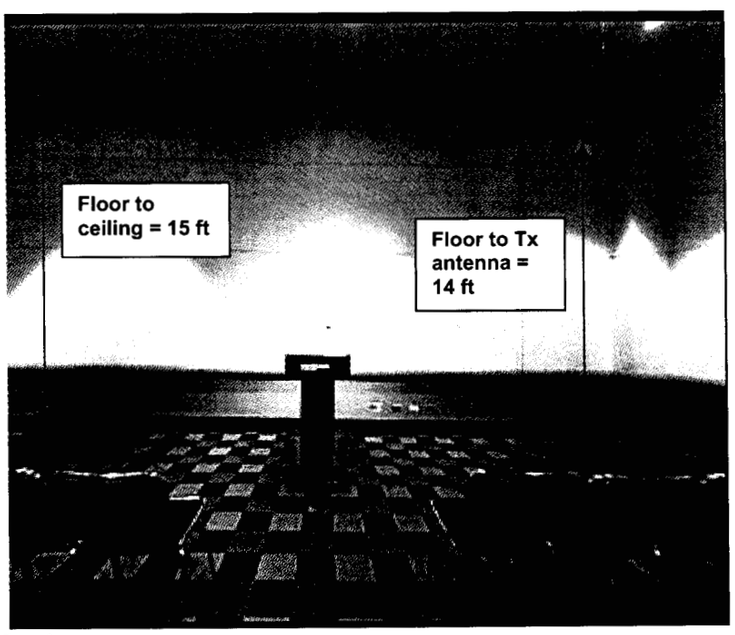


**Figure 4. Meeting room**

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 14 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 7 feet was chosen as the minimum distance criteria for exposure by taking the height of the antenna (14 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 Power Density=EIRP/(4*Π*R^2) from OET 65) and also a more conservative formula which takes into account reflection (the formula PD= 2.56*EIRP/(4*Π*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**

A very conservative approach shows all RF exposure from the proposed installation is well below the 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 = EIRP/(4piR^2) (Equation 4 page 19 of OET 65)

- Power Density adjusted for reflection = 2.56*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) |
|---|---|---|---|
| 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 | 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 |

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August 7, 2007

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**VIA HAND DELIVERY**

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

**Re: IBFS File No. SAT-STA-20070719-00103**

Dear Ms. Dortch:

By this letter, Sirius hereby clarifies its application for Special Temporary Authority filed July 19, 2007, IBFS File No. SAT-STA-20070719-00103, to operate a low-power satellite digital audio radio service repeater at two trade shows between August 21-25, 2007 and September 3-9, 2007. By way of clarification, Sirius plans to operate signal boosters at these short-duration indoor trade shows. Such boosters previously have been approved for use in retail stores; they operate at an EIRP of only 0.0001 watts and so will not generate harmful interference. The International Bureau previously has granted STA to deploy identical boosters at past trade shows.[1]

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 may be necessary to ensure full coverage of each trade show. As Sirius explained in its STA request, repeaters and boosters are necessary at these events because walls and ceilings block Sirius' signal and make real-time demonstrations difficult. Thus, use of these boosters is in the public interest.

Exhibit A to this letter 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 included the following information: (1) antenna

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[1] *See* File No. SAT-STA-20061107-00135 (grant stamp with conditions Dec. 19, 2006).

[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 Satellite Radio Inc. Request for STA to Operate In-

type; (2) antenna beamwidth; (3) total EIRP; and (4) approximate maximum height Above Ground Level ("AGL"). In addition, Sirius 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 and again in the January 18, 2007 STA to operate an additional 5,000 in-store signal boosters.

Sincerely,

Carl R. Frank

Cc: Robert Nelson (by email)
Stephen Duall (by email)

Store SDARS Signal Boosters, File No. SAT-STA-20030411-00075 (filed June 5, 2003). The link budget is also incorporated by reference herein. *See also* File No. SAT-STA-20050601-00114 (grant stamp with conditions January 18, 2007) (authorizing Sirius to operate an additional 5,000 in-store boosters).

**EXHIBIT A**

Attached is the following information for the 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 Locations | 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.