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Spectrum Management and Telecommunications

Broadcasting Procedures and Rules

Part 9: Application Procedures and Rules for Terrestrial S-DARS (Satellite Digital Audio Radio Service) Undertakings

Preface

Issue 3 of BPR-9 is hereby released.

Listed below are the changes:

- (a) WGS84 (World Geodetic System 1984) is defined as the new standard for geographical coordinates.
- (b) A new file format has been established for antenna patterns.
- (c) The decommissioning of the Spectrum GEO website will require applicants to consult the Statistics Canada website directly for obtaining information on urban and rural areas in Canada.
- (d) Other updates have been made, including editorial changes.

It is noted that applications for terrestrial S-DARS will continue to be accepted electronically only by email and in paper format.

Issued under the authority of the Minister of Industry.

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1. General

1.1 Spectrum Accommodation

Since the 1992 ITU World Administrative Radio Conference, through the adoption of an in-country footnote, a few countries including the United States, allocated the band 2310-2360 MHz to the broadcasting-satellite service and complementary terrestrial broadcasting service on a primary basis. Furthermore, the United States saw to designate the band 2320-2345 MHz for the establishment of two satellite digital audio radio services (S-DARS), including the installation of terrestrial S-DARS transmitters in urban areas to increase the satellite radio coverage.

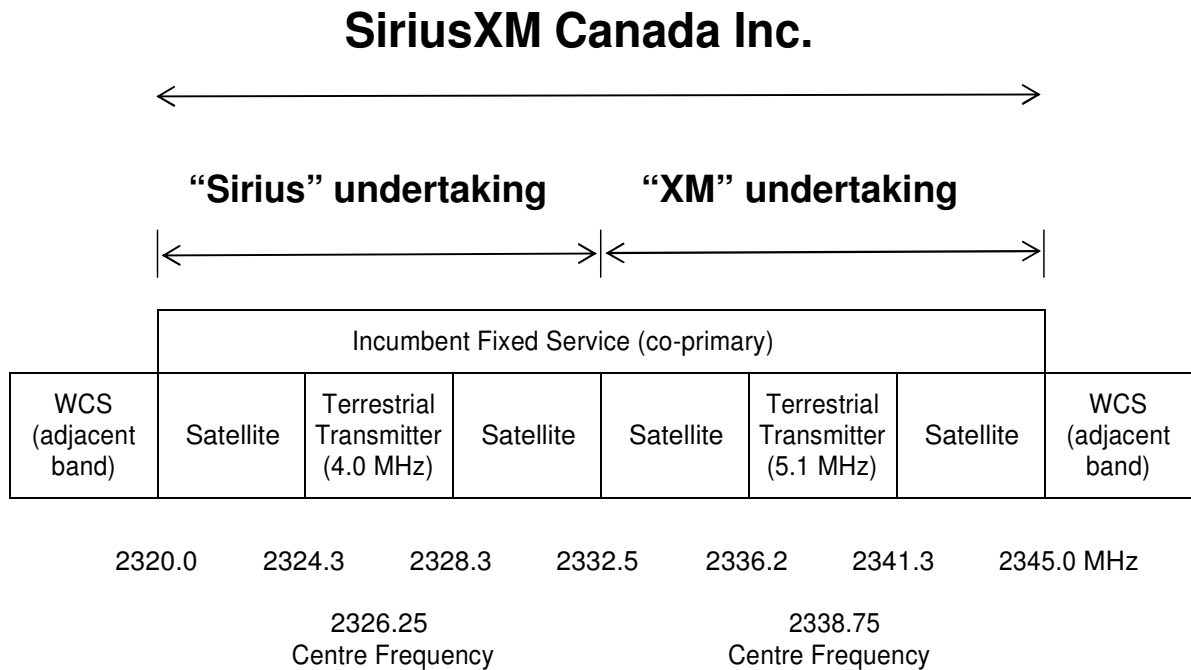
Industry Canada, through its spectrum utilization policies, made the band 2320-2345 MHz available to accommodate similar satellite radio services in Canada based on using the US satellites. Subsequently, the Canadian Radio-television and Telecommunications Commission (CRTC) granted broadcasting licences to Canadian Satellite Radio Inc. (CSR) and SIRIUS Canada, and the government modified its satellite-use policy to permit these licensees to use the US S-DARS satellite facilities of XM Radio and SIRIUS Radio respectively, for the transmission of Canadian digital satellite subscription radio services in Canada. In 2011, following the merger of XM Radio and SIRIUS Radio in the United States, CSR and SIRIUS Canada received approval from the CRTC to also merge and create SiriusXM Canada Inc.

It should be noted that the bands 2305-2320 MHz and 2345-2360 MHz, which are adjacent to the S-DARS operations, are designated for Wireless Communication Service (WCS) applications under the fixed and mobile service allocations, and the spectrum has been auctioned to various licensees. Use of these bands for WCS is governed by Industry Canada's Standard Radio System Plan SRSP-516, [*Technical Requirements for Wireless Communication Service \(WCS\) Operating in the Bands 2305-2320 MHz and 2345-2360 MHz*](#), which includes provisions to manage the potential interference of out-of-band emissions between terrestrial S-DARS and WCS.

1.2 Bilateral Coordination With the United States (S-DARS to S-DARS)

Noting that Canadian digital satellite subscription radio service undertakings are associated with US partners through commercial agreements and that close spectrum coordination for the terrestrial S-DARS transmitters is expected to be carried out between the Canadian and US licensees, bilateral coordination between Canada and the United States is not required. Figure 1 below describes the frequency sub-bands to be used for the satellite and terrestrial S-DARS transmitters by SiriusXM Canada Inc.

Figure 1: Satellite and Terrestrial Spectrum Utilization



1.3 Coordination Within Canada

As the band 2320-2345 MHz is co-allocated with the fixed service, the Canadian satellite radio licensees are expected to reach a mutually acceptable arrangement with the existing fixed service licensees¹ for fixed stations that are within 150 km of any terrestrial S-DARS transmitter. Furthermore, due to the WCS operations in bands adjacent to the satellite radio services, satellite radio licensees will be required to cooperate, or at times reach an arrangement, with the WCS operators depending on the location of the terrestrial S-DARS transmitters². Sections 3.5 and 3.6 below describe these requirements.

1.4 Radiated Out-of-Band Emissions

Radiated out-of-band emissions of the terrestrial S-DARS transmitter shall be -75 dBW or less, relative to an isotropic radiator, when measured with a resolution bandwidth of 1 MHz. The limit applies to all bands outside the band occupied by the terrestrial and satellite components of the S-DARS service.

¹ Since 2001, Industry Canada has maintained a moratorium on the licensing of any new fixed systems in the band 2320-2345 MHz. See *Canada Gazette* Notice DGTP-003-01, [Revisions to the Spectrum Utilization Policy for Services in the Frequency Range 2285-2483.5 MHz](#).

² See Industry Canada’s SRSP-516.

2. Terrestrial S-DARS – General

2.1 Definitions

Effective Isotropic Radiated Power (e.i.r.p.): The effective isotropic radiated power (e.i.r.p.) is the product of the transmitter output power, the transmission line (and combiner) efficiency and the maximum power gain of the antenna relative to an isotropic radiator.

Effective Radiated Power (ERP): The effective radiated power (ERP) is the product of the transmitter output power, the transmission line (and combiner) efficiency and the maximum power gain of the antenna relative to a dipole radiator.

e.i.r.p. = ERP + 2.15 dB when expressed in dBW
e.i.r.p. = ERP x 1.64 when expressed in W

Urban and Rural Areas: As of 2011, Statistics Canada defines a population centre as an area with a population of at least 1 000 and a density of 400 or more people per square kilometre. Small, medium and large urban population centres are defined as having a population of between 1 000 and 29 999, 30 000 and 99 999, and 100 000 and over, respectively. Population centres are considered urban areas. All areas outside population centres are defined as rural areas.

The [MapInfo boundary files](http://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-2011-eng.cfm) for population centres are available at the Statistics Canada website: <http://www12.statcan.gc.ca/census-recensement/2011/geo/bound-limit/bound-limit-2011-eng.cfm>.

2.2 Maximum Permissible Operating Power

The maximum permissible operating power is 12.5 kW e.i.r.p. This is calculated using the maximum value of radiation from the antenna in the plane of maximum radiation and, for directional antennas, in the direction of maximum radiation.

3. Applications for Terrestrial S-DARS Transmitters

3.1 Application Requirements

An application is required for:

- (a) the construction of a new terrestrial S-DARS transmitter or facility; and
- (b) a modification to an existing terrestrial S-DARS transmitter which impacts on its coverage, such as the addition of transmitters, and changes to the e.i.r.p., antenna height, antenna pattern or location.

Table 1 in Section 3.8 summarizes these application requirements.

All necessary forms can be obtained from the [Spectrum Management and Telecommunications](http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf01700.html) website at http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf01700.html.

3.1.1 Email Application Requirements

When submitting an application to the Department by **email**, the applicant shall use the following email address: DBCE-APPS@ic.gc.ca.

The application must include the following documentation:

- form IC-3050, *Application for a Broadcasting Certificate for a Regular Power Undertaking* (in PDF format);
- an engineering brief (in PDF format) that includes any required maps prepared in accordance with Section 3 of BPR-1, [Part I: General Rules](#);
- electronic contours (in MapInfo format: *.dat/*.id/*.map/*.tab, or in GIS format: *.mif/*.mid) (see Section 3.2.7);
- a text file containing horizontal and vertical antenna pattern data, in accordance with Annex B;
- form IC-3052, *Commitment Form* (in PDF format) (refer to BPR-1, Section 1.1); and
- form IC-2430, *Radiocommunication and Broadcasting Antenna Systems Attestation* (in PDF format).

It is the responsibility of the applicant submitting the application to ensure that all electronic documents submitted have the necessary signatures.

The Department reserves the right to request a signed attestation to verify the authenticity of an application and may delay the processing of the application until it has received a satisfactory attestation.

3.1.2 Written Application Requirements

When submitting an application **on paper**, the applicant shall provide printed and signed versions of the application form and other documentation previously described.

3.1.3 Site Selection Requirements

All proposed antenna structures, whether new or modified, low or full power, must comply with the current requirements of Client Procedures Circular CPC-2-0-03, *Radiocommunication and Broadcasting Antenna Systems*, and Section 2 of BPR-1. In addition to meeting the requirements regarding site sharing, land-use consultation and public consultation, applicants must also fulfill other important obligations, including compliance with Health Canada's *Safety Code 6* guideline for the protection of the general public, compliance with radio frequency immunity criteria, notification of nearby broadcasting stations, environmental considerations, and Transport Canada / NAV CANADA aeronautical safety responsibilities.

3.2 Engineering Brief

The order of material presented in the engineering brief shall be presented as listed below from sections 3.2.1 to 3.2.7 to simplify processing. The metric system (International System of Units) shall be used throughout the engineering brief.

3.2.1 Title Page

The title page shall include the submission title, project or reference number, date, name and address of the applicant, as well as the name of the consultant.

3.2.2 Table of Contents

The table of contents shall present the sections of the brief with their respective page numbers.

3.2.3 Summary Sheet

A summary sheet shall be prepared as per Annex A for each proposed transmitter site and each antenna on that site. The antenna location coordinates are to be given to the nearest hundredth of a second, as per the WGS84 system.

3.2.4 Main Section

The main section of the brief shall include the following components:

- an introduction in which a general statement addresses the purpose of the brief;
- a list of the sources of information used in compiling the brief;
- the transmitters' specific make, type and output power; and
- a description of the antenna system.

The description of the antenna system must include the manufacturer, type, number of sections (if applicable), power gain, vertical and horizontal radiation patterns, and polarization.

Note: Only vertical polarization shall be employed.

3.2.5 Diagrams

The engineering brief shall include a diagram showing the elevation of each structure and transmitting antenna as per Figure A1 of Annex A, as well as a block diagram showing the transmitting system's major components.

3.2.6 Radiation Patterns

For each antenna, the applicant shall provide vertical and horizontal pattern data as per Annex B.

For installations comprised of more than one antenna, the composite pattern shall be provided.

The beam tilt shall be indicated in degrees below (positive) or above (negative) the horizontal plane.

3.2.7 Maps

When the e.i.r.p. is greater than 50 W, the applicant shall provide a site map showing each proposed antenna site with geographical coordinates (latitude and longitude) and a proposed service contour.

3.3 Radio Frequency (RF) Exposure, Land-Use and Public Consultations, Immunity-Related Interference, Environmental Assessments and Transport Canada / NAV CANADA Safety-Related Issues

Refer to sections 3.1.3 and 3.7 for the requirements regarding these issues.

3.4 On-Air Testing Procedures

Note: This section applies only to terrestrial S-DARS facilities that exceed 50 W e.i.r.p.

The procedures, as outlined in Section 1.4 of BPR-1, shall be followed.

3.5 Wireless Communication Services (WCS)

Note: This section applies only to terrestrial S-DARS facilities that exceed 50 W e.i.r.p.

WCS licensees in the bands 2305-2320 MHz and 2345-2360 MHz may experience or cause interference from or to S-DARS licensees. SRSP-516 sets out the requirements that apply to these WCS licensees for sharing information regarding the location and operation of base and fixed stations (with the exception of fixed subscriber stations) with S-DARS licensees.

This section sets out the requirements that apply to S-DARS licensees for sharing information regarding the location and operation of terrestrial S-DARS repeaters with WCS licensees.

Terrestrial S-DARS transmitters that are to be implemented for the purpose of augmenting the satellite coverage within urban areas, and that meet the requirements for technical certification, will need to be located in consultation with those WCS operators, licensed and operating, within the urban area to maximize co-existence of both services. If licensed WCS are not in operation, information on the current and future terrestrial S-DARS locations needs to be provided to the WCS licensees in a timely manner, in order to facilitate the current and long-term plans of both the WCS and S-DARS licensees.

For terrestrial S-DARS transmitters whose e.i.r.p. is greater than 50 W (17 dBW) and that are located outside urban centres or intended to improve coverage outside urban centres, the S-DARS licensee will need to seek an arrangement with any WCS licensee within the coverage area of the terrestrial S-DARS transmitter. Written confirmation of an arrangement shall be provided to the Department. Upon request, the Department will provide a list of the existing WCS licensees within the coverage area.

The respective licensees must work in collaboration to develop a suitable arrangement before the

deployment of facilities. It is expected that the time frame to develop such an arrangement will not exceed 30 calendar days. In the event that a mutually acceptable arrangement cannot be concluded between licensees, either licensee may ask the Department to facilitate resolution of the issue.

3.6 Fixed Service Coordination

For each terrestrial S-DARS transmitter, the licensee is expected to reach a mutually acceptable arrangement with the licensee of any existing fixed service within a 150-km radius, if the bandwidth of the fixed service overlaps the bandwidth of the terrestrial S-DARS. The respective licensees must work in collaboration to develop a suitable arrangement before the deployment of the facilities. Written confirmation of an arrangement shall be provided to the Department. In the event that a mutually acceptable arrangement cannot be concluded within 30 calendar days of the initial contact between licensees, either licensee may ask the Department to facilitate resolution of the issue.

3.7 RF Interference and Immunity of Receivers and Equipment

3.7.1 Requirements

Broadcast receivers and their associated equipment, as well as non-radio equipment (e.g. radio-sensitive devices), are expected to operate properly within field strengths lower than those indicated in the Electromagnetic Compatibility Advisory Bulletin EMCAB-2, [Criteria for Resolution of Immunity Complaints Involving Fundamental Emissions of Radiocommunications Transmitters](#). The Department uses EMCAB-2 to make determinations on interference or immunity cases.

3.7.2 Resolving Issues

The broadcasters will be responsible for solving immunity-type interference in the case of valid complaints (see Section 3.7.4).

The guidelines on resolving immunity issues related to radio-sensitive equipment are outlined in Industry Canada's Client Procedures Circular CPC-3-14-01, [Determinations of Harmful Interference with Respect to Radio-Sensitive Equipment](#). This CPC can also be used as a guide for resolving immunity-related interference to broadcast receivers and associated equipment.

3.7.3 Method for Calculating High Field Strength Contours

In predicting high field strength contours, the ERP should be based on the appropriate vertical plane radiation pattern of the antenna for the azimuthal direction in question.

For distances less than 1.5 km from the transmitting site, the field strength should be calculated using the following free space formula:

$$F = 137 + 10 \log (\text{ERP}) - 20 \log (d)$$

where:

- F is the field strength in dB μ V/m (dB above one microvolt per metre);

- *ERP* is the effective radiated power in watts at the pertinent depression angle; and
- *d* is the slant distance (in metres) between the centre of radiation of the antenna and the receiving location.

3.7.4 Complaints Judged Not Valid by the Department

The following types of complaints are judged not valid by the Department and, therefore, terrestrial S-DARS operators are not responsible for resolving them:

- complaints attributed to immunity-type interference to broadcast receivers and associated equipment that are located in an area where the measured field strength does not exceed 125 dB μ V/m;
- complaints attributed to immunity-type interference to radio-sensitive equipment that is located in an area where the measured field strength does not exceed 130 dB μ V/m; and
- any other complaint deemed not valid by the Department.

3.8 Summary of Application Requirements

Table 1 presents the items that need to be addressed by the applicant. These items may be related to information and analysis that needs to be provided, coordination with other users of the spectrum and consultation with municipalities.

Table 1 - Characteristics of the Terrestrial S-DARS Transmitters

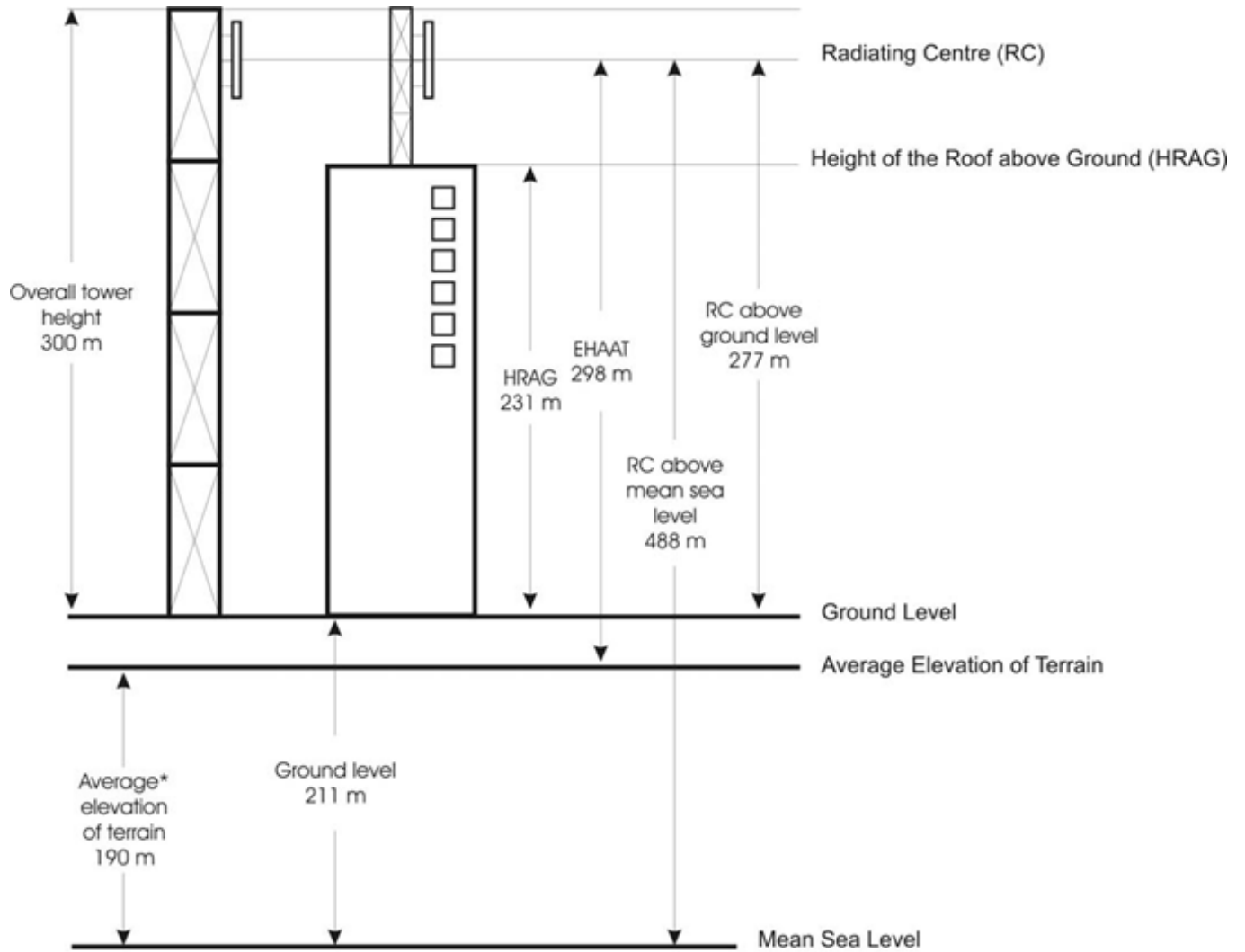
The word *yes* indicates items that must be addressed by the applicant.

The word *no* indicates items that do not need to be addressed by the applicant.

	e.i.r.p. of 50 W or less		e.i.r.p. greater than 50 W	
	Existing tower without changes	New or modified tower	Existing tower without changes	New or modified tower
Transmitter and antenna parameters	yes	yes	yes	yes
Geo coordinates	yes	yes	yes	yes
WCS coordination	no	no	yes*	yes*
Fixed services coordination	yes	yes	yes	yes
RF exposure analysis	yes	yes	yes	yes
EMCAB-2 analysis	Refer to Section 3.7			
Public/municipal/land-use authority consultation, RF exposure, etc.	Refer to sections 3.1.3 and 3.3			

* Refer to Section 3.5.

Figure A1 - Elevation Diagram of Typical Tower and Transmitting Antenna



* AET optional

Annex B — Antenna Radiation Pattern Data

Format of the Antenna Radiation Pattern

For the vertical and horizontal patterns, data shall be taken relative to maximum gain (boresight = 0°). For the vertical and horizontal pattern, a sufficient number of points shall be selected to provide an accuracy of ± 0.5 dB in the main beam of the antenna (a range of 0 to -10 dB from the maximum) and an accuracy of 1 dB in all other directions.

A text file, as per the specifications in Annex E of BPR-1, must be prepared for the composite antenna pattern.