



Industry  
Canada

Industrie  
Canada

CPC-2-5-01  
Issue 1  
December 2010

Spectrum Management and Telecommunications

Client Procedures Circular

# Licensing Procedure for Global Positioning System (GPS) Active Repeater Stations

## Preface

Client Procedures Circulars describe the various procedures or processes to be followed by the public when dealing with Industry Canada. The information contained in these circulars is subject to change without notice. It is therefore suggested that interested persons consult the nearest district office of Industry Canada for additional details. While every reasonable effort has been made to ensure accuracy, no warranty is expressed or implied. As well, these circulars have no status in law.

Comments and suggestions may be directed to the following address:

Industry Canada  
Spectrum Management Operations Branch  
300 Slater Street  
Ottawa, Ontario K1A 0C8

Attention: Spectrum Management Operations

E-mail: [spectrum\\_pubs@ic.gc.ca](mailto:spectrum_pubs@ic.gc.ca)

All Spectrum Management and Telecommunications publications are available on the following website: <http://www.ic.gc.ca/spectrum>.

## Contents

<b>1.</b>	<b>Principle</b> .....	<b>1</b>
<b>2.</b>	<b>Intent</b> .....	<b>1</b>
<b>3.</b>	<b>Mandate</b> .....	<b>1</b>
<b>4.</b>	<b>Background</b> .....	<b>1</b>
<b>5.</b>	<b>Licensing Procedure</b> .....	<b>2</b>
	5.1 Licence Fees .....	3
	5.2 Licence Term .....	3
<b>6.</b>	<b>Licence Conditions</b> .....	<b>3</b>
<b>7.</b>	<b>Licence Applications and Data Entry</b> .....	<b>3</b>
<b>8.</b>	<b>Equipment Certification</b> .....	<b>3</b>
<b>9.</b>	<b>Coordination</b> .....	<b>4</b>
<b>10.</b>	<b>Related Documents</b> .....	<b>4</b>
	<b>Appendix A - Spectrum Direct Data Entry Guidelines</b> .....	<b>5</b>

## 1. Principle

The Minister of Industry, pursuant to the *Department of Industry Act*, the *Radiocommunication Act* and the *Radiocommunication Regulations*, with due regard to the objectives of the *Telecommunications Act*, is responsible for spectrum management in Canada. As such, the Minister is responsible for developing national policies and goals for the effective use and management of the radio frequency spectrum.

## 2. Intent

The intent of this circular is to describe the manner in which GPS active repeater stations are licensed by Industry Canada. Unlike passive repeaters that do not amplify received radio signals and therefore do not require licensing, GPS active repeater stations meet the definition of “radio apparatus<sup>1</sup>” and therefore must be licensed.

## 3. Mandate

Paragraph 5(1)(a) of the *Radiocommunication Act* states that the Minister of Industry may issue radio licences with respect to radio apparatus. The Minister may also fix terms and conditions of any such licence.

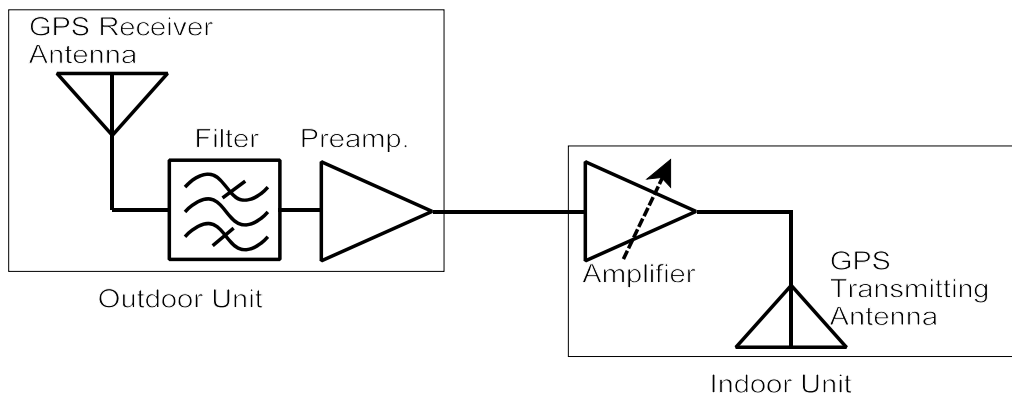
## 4. Background

A GPS active repeater station is a zone enhancer<sup>2</sup> specifically designed for retransmitting GPS signals in areas of poor reception. Such repeaters usually consist of a receiver antenna, bandpass filter, preamplifier, unidirectional amplifier and a transmitting antenna. The receiver antenna and preamplifier are installed outdoors where the GPS signal is available, whereas the unidirectional amplifier and transmitting antenna are installed within a building where the GPS signal cannot naturally penetrate. A typical configuration is shown in Figure 1.

---

<sup>1</sup> The *Radiocommunication Act* defines radio apparatus as a “device or combination of devices intended for, or capable of being used for, radiocommunication.”

<sup>2</sup> Also known as “booster amplifiers,” zone enhancers are used to improve signal quality in areas of poor reception.



**Figure 1: Typical Configuration of a GPS Active Repeater**

## 5. Licensing Procedure

As the GPS serves a variety of purposes (e.g. aeronautical radionavigation, ground-based positioning information, timing system synchronization), it is crucial that harmful interference not be caused to it. As such, Industry Canada is not in favour of widespread deployment of GPS active repeaters due to their potential (however limited) to interfere with the GPS service.

Consequently, GPS active repeaters will be authorized as fixed radiodetermination service stations, as defined in the *Radiocommunication Act*, on a non-standard, no-protection, non-interference basis to other radio users. As well, licences for GPS active repeater stations will normally be issued to Category 1 public safety agencies<sup>3</sup> only, and at the sole discretion of the District Director of the local Industry Canada Spectrum Management office.

Regardless, all applicants must clearly demonstrate their rationale for establishing GPS active repeater stations. Examples of rationales that may be acceptable to Industry Canada are:

- To eliminate satellite signal acquisition delays for GPS equipment installed in vehicles located indoors (and out of direct GPS satellite coverage areas), when such delays may have a critical impact on service operations. Public safety vehicles that are required to provide real-time vehicle location information upon leaving indoor parking locations would meet this criteria. Conversely, this rationale cannot be invoked by private businesses solely because their vehicles are parked indoors.
- To provide an indoor signal for GPS equipment trials and demonstrations.

In all cases, the amplified signal must only be transmitted within a building where the GPS signal would not otherwise normally be received. Furthermore, all requirements noted in Client Procedures Circular CPC-2-0-03, *Radiocommunication and Broadcasting Antenna Systems*, must be respected by GPS active repeater licensees.

<sup>3</sup> Category 1 public safety agencies are defined as police, fire and emergency medical services.

## 5.1 Licence Fees

Licensing fees for GPS active repeaters will be the same as that for fixed radiodetermination service stations, as outlined in subparagraph 62(1)(a)(iv) of the *Radiocommunication Regulations*.

## 5.2 Licence Term

Radio licences for GPS active repeater stations will be issued for a term expiring on March 31 of each year. Licensees may renew their licence for the next annual term upon payment of the required annual licence fees in advance of March 31.

## 6. Licence Conditions

GPS active repeater station licences shall be issued with the following licence conditions:

- GPS active repeater stations are non-standard radio systems, authorized on a no-protection, non-interference basis to other radio systems.
- These stations are used for GPS signal distribution within the specified building only.
- Radiated power must be kept to the minimum level required to ensure proper reception of the GPS signal within the building.
- Station installation must ensure minimal external re-radiation of the GPS signal.
- The licensee must comply with Client Procedures Circular CPC-2-0-03, *Radiocommunication and Broadcasting Antenna Systems*, as amended from time to time.
- With respect to reported cases of harmful interference, the operator must immediately cease operation of the GPS active repeater station upon request from Industry Canada.

## 7. Licence Applications and Data Entry

Licence applications for GPS active repeater stations can be submitted to Industry Canada online via Spectrum Direct, by using the Microwave application option. Spectrum Direct is accessible via the Internet at <http://www.ic.gc.ca/spectrumdirect>. Data entry guidelines via Spectrum Direct are provided in Appendix A of this document.

All enquiries related to licence applications and Spectrum Direct data entry for GPS active repeater stations should be directed to the local Industry Canada Spectrum Management office. A complete listing of all departmental regional and district offices is available at <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01742.html>.

## 8. Equipment Certification

At this time, there are no Radio Standards Specifications (RSS) for the certification of GPS active repeater equipment. GPS active repeater stations are non-standard radio systems, which will be authorized on a non-standard, no-protection, and non-interference basis to other radio systems.

## **9. Coordination**

GPS active repeaters are not currently subject to domestic or international coordination.

## **10. Related Documents**

*Radiocommunication Act*

*Radiocommunication Regulations*

Client Procedures Circular CPC-2-0-03, *Radiocommunication and Broadcasting Antenna Systems*

Standard Radio System Plan SRSP-301.4, *Technical Requirements for Fixed Radio Systems Operating in the Bands 1427-1452 MHz and 1492-1518 MHz*

## Appendix A - Spectrum Direct Data Entry Guidelines

Applicants should use the following data entry guidelines when submitting licence information for GPS active repeater stations via Spectrum Direct:

- The station's location must be the same as that of the GPS receiver antenna.
- The above ground height value of the antenna structure shall correspond to the height of the structure upon which the highest antenna (usually the receiving antenna) is installed.
- Transmit and receive frequency is 1575.42 MHz. Enter as a single TX/RX type record.
- Total TX attenuation loss corresponds to that of the cable connecting the indoor unit with the transmitting antenna.
- Total RX attenuation loss corresponds to that of the cable connecting the outdoor and indoor units.
- Radio frequency output power is that of the amplifier feeding the transmitting antenna (indoor unit).
- Select the GPS active repeater model number from the list of radios available in Spectrum Direct. The model number of these devices will have the prefix "(AR)." If the model number is not available (i.e. it is a new model), create a new radio data entry by using the "(AR) GPSRKL1 1.5G" model as an example. Note that code "(AR)" is required to be entered prior to the model number to indicate that the station is an "active repeater."
- Bandwidth: Corresponds to the frequency response of the repeater between the -3 dB points, which is typically that of the bandpass filter of the outdoor unit.
- Select the "omni generic" antenna model from the list of antennas available in Spectrum Direct; enter the antenna gain in dBi.
- TX antenna gain: The gain (in dBi) of the indoor transmitting antenna.
- RX antenna gain: The gain (in dBi) of the outdoor GPS receiving antenna (without considering the preamplifier).
- TX/RX antenna polarization: Circular (right).
- TX/RX antenna azimuth: default to 0 degrees.
- The height of the TX antenna (above ground level) is that of the indoor transmitting antenna.
- The height of the RX antenna (above ground level) is that of the outdoor GPS signal receiving antenna.
- TX elevation angle: default to -90 degrees.
- RX elevation angle: default to +90 degrees.
- Unfaded received signal level: -130 dBm.
- Propagation availability: 99%.
- No international coordination is required.
- Link station name can be defaulted to "GPS" and circuit length to 1 km. In the Link Station Call Sign Management field, always select "Other."