

RADIO LICENCE

Issued under the authority of the Minister of Industry in accordance with the Radiocommunication Act and Regulations made thereunder

ACCOUNT NUMBER	LICENCE NUMBER
7-150006171	5124222

TRANSMITTING FREQUENCIES	RECEIVING FREQUENCIES	CHANNEL TX RX	BANDWIDTH AND EMISSION	POWER	POWER TYPE	AUTHORIZED COMMUNICATIONS AND CONDITIONS
2286.25000 MHz		A	1M00 F1DAN	2.0 W	PEP	ADS04

SERVICES

F FIXED

LICENCE ADDENDA

This licence authorizes the licensee to establish and operate a radio station as described in the approved application, in accordance with specific items or conditions and applicable provisions of the Radiocommunication Act and its regulations. This authority should not be construed as approving the use of any antenna supporting structure which has not been approved by the Department of Transport from an aeronautical safety point of view. Except as provided in the regulations, no change in the apparatus or operations shall be made without the authority of the Minister, Industry Canada, and the licensee shall notify the Department in writing upon a change of address.

The Department may, at a future date, require the licensee to install filters, tone coding devices, reduce the effective radiated power and/or antenna height as appropriate.

Service Category indicates the categories of service the station is authorized to perform.

In many cases licence fees are related to the number of transmit and receive channels. A code, used in the "channel" column, indicates the number of equivalent voice channels as given in the following table:

Channel Code	1 to 9	A	B	C	D	E	F	G	Other Letters H, I, J, etc.
Equivalent No. of Voice Channels	1 to 9	10 to 24	25 to 60	61 to 120	121 to 300	301 to 600	601 to 960	961 to 1200	Measured in units of 300 channels

For further information regarding your radio licence please contact your nearest Industry Canada District Office. The Radiocommunication Act and the Radiocommunication Regulations are available on Internet at:

<http://www.ic.gc.ca/spectrum>

ENQUIRIES CONCERNING THIS RADIO LICENCE SHOULD BE DIRECTED TO INDUSTRY CANADA DISTRICT OFFICE,
SPECTRUM MANAGEMENT OPERATIONS BRANCH, 300 SLATER STREET, OTTAWA, ON, K1A 0C8.
E-mail :spectrum.operations@ic.gc.ca

Government
of CanadaGouvernement
du Canada[Industry Canada \(/eic/site/icgc.nsf/eng/home\)](http://www.ic.gc.ca/eic/site/icgc.nsf/eng/home)[Home](#) → [Internet, Radio, and Wireless](#) → [Spectrum Management and Telecommunications](#)→ [Radiocom](#) → [Satellite Services](#) → [Satellite Service Authorizations](#)

Spectrum Management and Telecommunications [\(/eic/site/smt-gst.nsf/eng/home\)](http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/home)

ExactEarth Conditions for Approval in Principle of the ADS Satellite Network — Amended

Posted on Industry Canada website: May 2, 2014

Amended: October 22, 2015

Attachment A

Eligibility

1. The licensee must comply with the eligibility criteria as set out in the *Radiocommunication Regulations* (<http://laws-lois.justice.gc.ca/eng/regulations/sor-96-484/index.html>).

Licence Transferability

2. Licences may not be transferred or assigned without a full review of the request by Industry Canada, and are subject to the authorization of the Minister. For clarification and without limiting the generality of the foregoing, "transfer" includes any leasing, sub-leasing or other disposition of the rights and obligations of the licence, and also includes any change that would have a material effect on the ownership or control in fact of the licensee.

Laws and Regulations

3. The licensee and its use of the spectrum assigned in this authorization are subject to and must comply with the ITU *Radio Regulations* (<http://www.itu.int/pub/R-REG-RR>), the Canadian *Radiocommunication Act* (<http://laws.justice.gc.ca/eng/acts/R-2/FullText.html>), the Canadian *Radiocommunication Regulations* (<http://laws-lois.justice.gc.ca/eng/regulations/sor-96-484/index.html>), and Canada's spectrum utilization policies pertaining to the authorized radio frequency bands and satellite orbit.

Canadian Direction and Control

4. The licensee must maintain direction and control of the satellites at all times. If primary control is located outside of Canada, the licensee must maintain a secondary facility located in Canada that is



capable of the functions listed in Client Procedures Circular, CPC-2-6-02, [Licensing of Space Stations \(sf01385.html\)](#).

Relocation of Satellites

5. The satellites may not be relocated without a full review of the request by Industry Canada and the authorization of the Minister.

Implementation Milestone

6. exactEarth shall have placed the six satellites in the authorized orbit by December 31, 2018.

International Coordination

7. It is the responsibility of the licensee to participate, on an ongoing basis, in coordination activities with a view to protecting its network and fulfilling ITU obligations. To this end, the licensee must undertake the following: participate, at its own expense, in the coordination of the satellite network with the satellite and terrestrial networks of other countries; provide Industry Canada, in a manner acceptable to the ITU, with the satellite coordination, notification and administrative due diligence information required by the ITU; pay the applicable ITU cost recovery charges for satellite network filings; and ensure that the operation of the satellite complies with any arrangements and agreements undertaken by Canada with respect to the coordination of the satellite.

8. The licensee must maintain a valid ITU filing associated with the satellite system or network at all times.

Domestic Coordination

9. In order to avoid harmful interference, the licensee will be required to coordinate its satellite network/system with other potentially affected Canadian satellite and terrestrial services, and the satellite or satellite system must be operated in a manner consistent with any arrangements made to facilitate domestic satellite coordination.

10. In the event that coordination cannot be completed between licensees, the Department may impose the implementation of mitigation techniques, taking into account all relevant factors including, without limitation, the order of domestic authorization. The licensee must ensure that the operation of its satellite system complies with all measures imposed by the Department.

Information Requirements

11. At the Department's request, the licensee must provide all necessary information to a licence applicant to facilitate the coexistence analysis for the Department's consideration, as part of that applicant's licence application. Such information must be provided within a reasonable timeframe.

Operating Requirements

12. In the frequency band 399.9-400.05 MHz (earth to space), the mobile-satellite service shall not constrain the development and use of the radionavigation-satellite service.

13. exactEarth must coordinate its use of the frequency bands 399.9-400.05 MHz (Earth to space) and 400.15-401 MHz (space to Earth) with other potentially affected satellite operators prior to commencing use. Until such time as the spectrum is successfully coordinated internationally, exactEarth may use these bands on a no interference, no protection basis.

14. In the band 2025-2110 MHz (Earth to space), operation of experimental transmitters is permitted on a no interference, no protection basis.

15. In the frequency band 2200-2290 MHz (space to earth) satellite emissions from the ADS satellites shall comply with the limits specified in Article 21 of the ITU *Radio Regulations* (<http://www.itu.int/pub/R-REG-RR>).

16. The use of the band 2200-2290 MHz, for the transmission of AIS data from the space station to earth stations, will be on a no interference, no protection basis. exactEarth shall coordinate with other operators using the same band prior to commencement of such use.

17. In the band 2200-2290 MHz (space to Earth) operation of experimental transmitters is permitted on a no interference, no protection basis.

18. In the band 5150-5216 MHz the power flux-density at the Earth's surface produced by space stations of the fixed-satellite service operating in the space-to-Earth direction shall not exceed -164 dB(W/m²) in any 4 kHz band for all angles of arrival.

19. In the band 5150-5250 MHz, should the operation of the satellite network cause unacceptable or harmful interference to the reception of any station entitled to protection, exactEarth shall immediately take measures to eliminate the interference, including, if necessary, ceasing operations.

Provision of Service

20. The satellite system must be in-service within 6 months of reaching its authorized orbit, and must maintain operations in accordance with the international *Radio Regulations* (<http://www.itu.int/pub/R-REG-RR>), its associated ITU filings and domestic authorization.

Space Debris Mitigation

21. The licensee, at the end-of-life of the satellite, must implement space debris mitigation measures in accordance with best industry practices so as to minimize adverse effects on the orbital environment.

Earth Station Licensing

22. All earth stations in Canada communicating with the satellite, except those exempted from the licensing requirement pursuant to the *Radiocommunication Act* (<http://laws.justice.gc.ca/eng/acts/R-2/FullText.html>) and *Radiocommunication Regulations* (<http://laws-lois.justice.gc.ca/eng/regulations/sor-96-484/index.html>), shall be licensed prior to operation pursuant to Client Procedure Circular, CPC-2-6-01, *Procedure for the Submission of Applications to License Fixed Earth Stations and to Approve the Use of Foreign Satellites in Canada* ([sf01940.html](http://www.ic.gc.ca/sf01940.html)).

Satellite Licensing Information

23. Prior to commencement of operations, exactEarth shall obtain spectrum licences for the use of spectrum aboard the ADS space stations related to the reception of AIS signals.

24. exactEarth shall obtain space station radio licences for the transmission of AIS data, for the feederlinks related to the low data rate service, and for the reception and transmission of TT&C signals prior to commencement of operations. To this end, exactEarth shall submit the administrative licensing information, set out in Annex C of Client Procedure Circular, CPC-2-6-02, [Licensing of Space Stations \(sf01385.html\)](#), at least 30 days in advance of the anticipated launch date of the satellites.

Reporting Requirements

25. The licensee is required to immediately report changes to its contact information or to information concerning its satellite operations and/or control facilities to Industry Canada.

26. The licensee shall submit an annual report for each year of operation, indicating continued compliance with these conditions. This report is due March 31st of each year.

27. The licensee shall notify the Department when satellites are decommissioned or de-orbited.

28. At the end of life of the satellites, the licensee shall submit a final report to the Department detailing the space debris mitigation measures undertaken. This report shall be submitted within 60 business days of the end of life of the satellites.

29. The licensee shall provide any information requested by the Department, within the timeframe established in the request.

30. All reports are to be submitted to the Manager, Satellite Authorization Policy at [ic.satelliteauthorization-autorisationsatellite.IC@ic.gc.ca](mailto:%20IC.satelliteauthorization-autorisationsatellite.IC@ic.gc.ca) (<mailto:%20IC.satelliteauthorization-autorisationsatellite.IC@ic.gc.ca>).

Payment of Fees

31. Licence fees are paid on an annual basis in advance, and are due by March 31 of each year.

Licence Term

32. This is an annual licence, renewable on March 31st of every year.

Attachment B

List of Authorized ADS Frequencies and Frequency Bands

ADS01:

Frequencies	Use
156.7625-156.7875 MHz (Earth to space)	Receive AIS signals

156.8125-156.8375 MHz (Earth to space)	Receive AIS signals
161.9375-162.0375 MHz (Earth to space)	Receive AIS signals
2025-2110 MHz (Earth to space)	<ul style="list-style-type: none"> • TT&C • Experimental TT&C receiver
2200-2290 MHz (space to Earth)	<ul style="list-style-type: none"> • Telemetry and back-up AIS data • Telemetry (back-up and during launch and early operations phase) • Experimental TT&C transmitter
5150-5250 MHz (space to Earth)	Download AIS data

ADS02 and ADS03:

Frequencies	Use
156.7625-156.7875 MHz (Earth to space)	Receive AIS signals
156.8125-156.8375 MHz (Earth to space)	Receive AIS signals
161.9375-162.0375 MHz (Earth to space)	Receive AIS signals
399.9-400.05 MHz (Earth to space)	TT&C
400.15-401 MHz (space to Earth)	TT&C
2025-2110 MHz (Earth to space)	TT&C
2200-2290 MHz (space to Earth)	TT&C and download AIS data

ADS04, ADS05, ADS06:

Frequencies	Use
156.7625-156.7875 MHz (Earth to space)	Receive AIS signals
156.8125-156.8375 MHz (Earth to space)	Receive AIS signals
161.9375-162.0375 MHz (Earth to space)	Receive AIS signals
399.9-400.05 MHz (Earth to space)	Receive LDR signals and TT&C
400.15-401 MHz (space to Earth)	Transmit LDR signals and TT&C
2025-2110 MHz (Earth to space)	TT&C
2200-2290 MHz (space to Earth)	TT&C

Date modified:

2015-10-22