



**RETURN BIDS TO:  
RETOURNER LES SOUMISSIONS À:**

**Bid Receiving - PWGSC / Réception des  
soumissions - TPSGC**

**11 Laurier St. / 11, rue Laurier**

**Place du Portage , Phase III**

**Core 0B2 / Noyau 0B2**

**Gatineau**

**Québec**

**K1A 0S5**

**Bid Fax: (819) 997-9776**

**REQUEST FOR PROPOSAL  
DEMANDE DE PROPOSITION**

**Proposal To: Public Works and Government  
Services Canada**

We hereby offer to sell to Her Majesty the Queen in right of Canada, in accordance with the terms and conditions set out herein, referred to herein or attached hereto, the goods, services, and construction listed herein and on any attached sheets at the price(s) set out therefor.

**Proposition aux: Travaux Publics et Services  
Gouvernementaux Canada**

Nous offrons par la présente de vendre à Sa Majesté la Reine du chef du Canada, aux conditions énoncées ou incluses par référence dans la présente et aux annexes ci-jointes, les biens, services et construction énumérés ici sur toute feuille ci-annexée, au(x) prix indiqué(s).

**Comments - Commentaires**

**Vendor/Firm Name and Address**

**Raison sociale et adresse du**

**fournisseur/de l'entrepreneur**

**Issuing Office - Bureau de distribution**

Electronics, Simulators and Defence Systems Div. /Division  
des systèmes électroniques et des systèmes de simulation et  
de défense

11 Laurier St. / 11, rue Laurier

8C2, Place du Portage

Gatineau

Québec

K1A 0S5

<b>Title - Sujet</b> R Mode transmitter / amplifier		
<b>Solicitation No. - N° de l'invitation</b> F7048-180007/B	<b>Date</b> 2018-12-06	
<b>Client Reference No. - N° de référence du client</b> F7048-180007		
<b>GETS Reference No. - N° de référence de SEAG</b> PW-\$\$QF-117-27094		
<b>File No. - N° de dossier</b> 117qf.F7048-180007	<b>CCC No./N° CCC - FMS No./N° VME</b>	
<b>Solicitation Closes - L'invitation prend fin</b> <b>at - à 02:00 PM</b> <b>on - le 2018-12-24</b>		<b>Time Zone</b> <b>Fuseau horaire</b> Eastern Standard Time EST
<b>F.O.B. - F.A.B.</b> <b>Plant-Usine:</b> <input type="checkbox"/> <b>Destination:</b> <input checked="" type="checkbox"/> <b>Other-Autre:</b> <input type="checkbox"/>		
<b>Address Enquiries to: - Adresser toutes questions à:</b> Deck, Cindy		<b>Buyer Id - Id de l'acheteur</b> 117qf
<b>Telephone No. - N° de téléphone</b> (819) 420-4557 ( )	<b>FAX No. - N° de FAX</b> ( ) -	
<b>Destination - of Goods, Services, and Construction:</b> <b>Destination - des biens, services et construction:</b> Canadian Coast Guard Base 101 Blvd Champlain Quebec Quebec G1K 7Y7 Canada		

**Instructions: See Herein**

**Instructions: Voir aux présentes**

<b>Delivery Required - Livraison exigée</b> See Herein	<b>Delivery Offered - Livraison proposée</b>
<b>Vendor/Firm Name and Address</b> <b>Raison sociale et adresse du fournisseur/de l'entrepreneur</b>	
<b>Telephone No. - N° de téléphone</b> <b>Facsimile No. - N° de télécopieur</b>	
<b>Name and title of person authorized to sign on behalf of Vendor/Firm</b> <b>(type or print)</b> <b>Nom et titre de la personne autorisée à signer au nom du fournisseur/</b> <b>de l'entrepreneur (taper ou écrire en caractères d'imprimerie)</b>	
<b>Signature</b>	<b>Date</b>



Item Article	Description	Dest. Code Dest.	Inv. Code Fact.	Qty Qté	U. of I. U. de D.	Unit Price/Prix unitaire FOB/FAM Destination	Plant/Usine	Delivery Req. Livraison Req.	Del. Offered Liv. offerte
1	Canadian Coast Guard R-Mode System	F7048	F7048	1	Each	\$	XXXXXXXXXXXX	See Herein	
2	HST	F7048	F7048	1	Each	\$	XXXXXXXXXXXX	See Herein	

## TABLE OF CONTENTS

<b>PART 1 - GENERAL INFORMATION .....</b>	<b>2</b>
1.1 STATEMENT OF WORK.....	2
1.2 DEBRIEFINGS .....	2
1.3 TRADE AGREEMENTS .....	2
1.4 EPOST CONNECT SERVICE .....	2
<b>PART 2 - BIDDER INSTRUCTIONS .....</b>	<b>2</b>
2.1 STANDARD INSTRUCTIONS, CLAUSES AND CONDITIONS.....	2
2.2 SUBMISSION OF BIDS.....	2
2.3 ENQUIRIES - BID SOLICITATION .....	2
2.4 APPLICABLE LAWS.....	3
<b>PART 3 - BID PREPARATION INSTRUCTIONS.....</b>	<b>3</b>
3.1 BID PREPARATION INSTRUCTIONS .....	3
<b>PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION .....</b>	<b>4</b>
4.1 EVALUATION PROCEDURES.....	4
4.2 BASIS OF SELECTION - MANDATORY TECHNICAL CRITERIA.....	5
<b>PART 5 – CERTIFICATIONS AND ADDITIONAL INFORMATION .....</b>	<b>5</b>
5.1 CERTIFICATIONS REQUIRED WITH THE BID .....	5
5.2 CERTIFICATIONS PRECEDENT TO CONTRACT AWARD AND ADDITIONAL INFORMATION .....	5
<b>PART 6 - RESULTING CONTRACT CLAUSES .....</b>	<b>6</b>
6.1 SECURITY REQUIREMENTS .....	6
6.2 STATEMENT OF WORK.....	6
6.3 STANDARD CLAUSES AND CONDITIONS.....	7
6.4 TERM OF CONTRACT .....	7
6.5 AUTHORITIES .....	7
6.6 PAYMENT .....	8
6.7 INVOICING INSTRUCTIONS .....	9
6.8 CERTIFICATIONS AND ADDITIONAL INFORMATION.....	9
6.9 APPLICABLE LAWS.....	10
6.10 PRIORITY OF DOCUMENTS .....	10
6.11 SACC <i>MANUAL</i> CLAUSES.....	10
6.12 SHIPPING INSTRUCTIONS - DELIVERY DUTY PAID .....	10
<b>ANNEX A .....</b>	<b>11</b>
STATEMENT OF WORK .....	11
<b>ANNEX B .....</b>	<b>11</b>
PRICING SCHEDULE .....	11
<b>ANNEX C .....</b>	<b>11</b>
EVALUATION CRITERIA .....	11

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## **PART 1 - GENERAL INFORMATION**

### **1.1 Statement of Work**

The Work to be performed is detailed under Article 6.2 of the resulting contract clauses.

### **1.2 Debriefings**

Bidders may request a debriefing on the results of the bid solicitation process. Bidders should make the request to the Contracting Authority within 15 working days from receipt of the results of the bid solicitation process. The debriefing may be in writing, by telephone or in person.

### **1.3 Trade Agreements**

The requirement is subject to the provisions of the Canadian Free Trade Agreement (CFTA).

### **1.4 epost Connect service**

This bid solicitation allows bidders to use the epost Connect service provided by Canada Post Corporation to transmit their bid electronically. Bidders must refer to Part 2 entitled Bidder Instructions, and Part 3 entitled Bid Preparation Instructions, of the bid solicitation, for further information.

## **PART 2 - BIDDER INSTRUCTIONS**

### **2.1 Standard Instructions, Clauses and Conditions**

All instructions, clauses and conditions identified in the bid solicitation by number, date and title are set out in the [Standard Acquisition Clauses and Conditions Manual](https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual) (<https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>) issued by Public Works and Government Services Canada.

Bidders who submit a bid agree to be bound by the instructions, clauses and conditions of the bid solicitation and accept the clauses and conditions of the resulting contract.

The [2003](#) (2018-05-22) Standard Instructions - Goods or Services - Competitive Requirements, are incorporated by reference into and form part of the bid solicitation.

### **2.2 Submission of Bids**

Bids must be submitted only to Public Works and Government Services Canada (PWGSC) Bid Receiving Unit by the date, time and place indicated in the bid solicitation.

### **2.3 Enquiries - Bid Solicitation**

All enquiries must be submitted in writing to the Contracting Authority no later than 5 calendar days before the bid closing date. Enquiries received after that time may not be answered.

Bidders should reference as accurately as possible the numbered item of the bid solicitation to which the enquiry relates. Care should be taken by Bidders to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a proprietary nature must be clearly marked "proprietary" at each relevant item. Items identified as "proprietary" will be treated as

such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the question(s) or may request that the Bidder do so, so that the proprietary nature of the question(s) is eliminated, and the enquiry can be answered to all Bidders. Enquiries not submitted in a form that can be distributed to all Bidders may not be answered by Canada.

## **2.4 Applicable Laws**

Any resulting contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in the province of Quebec.

Bidders may, at their discretion, substitute the applicable laws of a Canadian province or territory of their choice without affecting the validity of their bid, by deleting the name of the Canadian province or territory specified and inserting the name of the Canadian province or territory of their choice. If no change is made, it acknowledges that the applicable laws specified are acceptable to the Bidders.

## **PART 3 - BID PREPARATION INSTRUCTIONS**

### **3.1 Bid Preparation Instructions**

- If the Bidder chooses to submit its bid electronically, Canada requests that the Bidder submits its bid in accordance with section 08 of the 2003 standard instructions. Bidders must provide their bid in a single transmission. The epost Connect service has the capacity to receive multiple documents, up to 1GB per individual attachment.

The bid must be gathered per section and separated as follows:

Section I: Technical Bid  
Section II: Financial Bid  
Section III: Certifications

- If the Bidder chooses to submit its bid in hard copies, Canada requests that the Bidder submits its bid in separately bound sections as follows:

Section I: Technical Bid (1 hard copy and 1 soft copy on CD)  
Section II: Financial Bid (1 hard copy)  
Section III: Certifications (1 hard copy)

If there is a discrepancy between the wording of the soft copy on electronic media and the hard copy, the wording of the hard copy will have priority over the wording of the soft copy.

- If the Bidder is simultaneously providing copies of its bid using multiple acceptable delivery methods, and if there is a discrepancy between the wording of any of these copies and the electronic copy provided through epost Connect service, the wording of the electronic copy provided through epost Connect service will have priority over the wording of the other copies.

Prices must appear in the financial bid only. No prices must be indicated in any other section of the bid.

Canada requests that bidders follow the format instructions described below in the preparation of hard copy of their bid:

- (a) use 8.5 x 11 inch (216 mm x 279 mm) paper;
- (b) use a numbering system that corresponds to the bid solicitation.

In April 2006, Canada issued a policy directing federal departments and agencies to take the necessary steps to incorporate environmental considerations into the procurement process [Policy on Green Procurement](https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32573) (<https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=32573>). To assist Canada in reaching its objectives, bidders should:

- 1) use 8.5 x 11 inch (216 mm x 279 mm) paper containing fibre certified as originating from a sustainably-managed forest and containing minimum 30% recycled content; and
- 2) use an environmentally-preferable format including black and white printing instead of colour printing, printing double sided/duplex, using staples or clips instead of cerlox, duotangs or binders.

### **Section I: Technical Bid**

In their technical bid, Bidders should explain and demonstrate how they propose to meet the requirements and how they will carry out the Work.

### **Section II: Financial Bid**

Bidders must submit their financial bid in accordance with the Basis of Payment.

#### **3.1.2 Exchange Rate Fluctuation**

[C3011T](#) (2013-11-06), Exchange Rate Fluctuation

### **Section III: Certifications**

Bidders must submit the certifications and additional information required under Part 5.

## **PART 4 - EVALUATION PROCEDURES AND BASIS OF SELECTION**

### **4.1 Evaluation Procedures**

- (a) Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical and financial evaluation criteria.
- (b) An evaluation team composed of representatives of Canada will evaluate the bids.

#### **4.1.1 Technical Evaluation**

##### **4.1.1.1 Mandatory Technical Criteria**

The mandatory evaluation criteria is detailed in Annex C.

#### **4.1.2 Financial Evaluation**

##### **4.1.2.1 Evaluation of Price - Canadian / Foreign Bidders**

The price of the bid will be evaluated as follows:

- a. Canadian-based bidders must submit firm prices, Canadian customs duties and excise taxes included, and Applicable Taxes excluded.

- b. foreign-based bidders must submit firm prices, Canadian customs duties and excise taxes included, and Applicable Taxes excluded.

Unless the bid solicitation specifically requires bids to be submitted in Canadian currency, bids submitted in foreign currency will be converted to Canadian currency for evaluation purposes. The rate given by the Bank of Canada in effect on the bid solicitation closing date, or on another date specified in the bid solicitation, will be applied as a conversion factor to the bids submitted in foreign currency.

Bids will be assessed on a DDP destination basis.

For the purpose of the bid solicitation, bidders with an address in Canada are considered Canadian-based bidders and bidders with an address outside of Canada are considered foreign-based bidders.

#### **4.2 Basis of Selection - Mandatory Technical Criteria**

A bid must comply with the requirements of the bid solicitation and meet all mandatory technical evaluation criteria to be declared responsive. The responsive bid with the lowest evaluated price will be recommended for award of a contract.

### **PART 5 – CERTIFICATIONS AND ADDITIONAL INFORMATION**

Bidders must provide the required certifications and additional information to be awarded a contract.

The certifications provided by Bidders to Canada are subject to verification by Canada at all times. Unless specified otherwise, Canada will declare a bid non-responsive, or will declare a contractor in default if any certification made by the Bidder is found to be untrue whether made knowingly or unknowingly, during the bid evaluation period or during the contract period.

The Contracting Authority will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply and to cooperate with any request or requirement imposed by the Contracting Authority will render the bid non-responsive or constitute a default under the Contract.

#### **5.1 Certifications Required with the Bid**

Bidders must submit the following duly completed certifications as part of their bid.

##### **5.1.1 Integrity Provisions - Declaration of Convicted Offences**

In accordance with the Integrity Provisions of the Standard Instructions, all bidders must provide with their bid, **if applicable**, the declaration form available on the [Forms for the Integrity Regime](http://www.tpsgc-pwgsc.gc.ca/ci-if/declaration-eng.html) website (<http://www.tpsgc-pwgsc.gc.ca/ci-if/declaration-eng.html>), to be given further consideration in the procurement process.

#### **5.2 Certifications Precedent to Contract Award and Additional Information**

The certifications and additional information listed below should be submitted with the bid, but may be submitted afterwards. If any of these required certifications or additional information is not completed and submitted as requested, the Contracting Authority will inform the Bidder of a time frame within which to

provide the information. Failure to provide the certifications or the additional information listed below within the time frame provided will render the bid non-responsive.

### **5.2.1 Integrity Provisions – Required Documentation**

In accordance with the section titled Information to be provided when bidding, contracting or entering into a real procurement agreement of the [Ineligibility and Suspension Policy](http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html) (<http://www.tpsgc-pwgsc.gc.ca/ci-if/politique-policy-eng.html>), the Bidder must provide the required documentation, as applicable, to be given further consideration in the procurement process.

### **5.2.2 Federal Contractors Program for Employment Equity - Bid Certification**

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "FCP Limited Eligibility to Bid" list available at the bottom of the page of the [Employment and Social Development Canada \(ESDC\) - Labour's](https://www.canada.ca/en/employment-social-development/programs/employment-equity/federal-contractor-program.html#) website (<https://www.canada.ca/en/employment-social-development/programs/employment-equity/federal-contractor-program.html#>).

Canada will have the right to declare a bid non-responsive if the Bidder, or any member of the Bidder if the Bidder is a Joint Venture, appears on the "FCP Limited Eligibility to Bid" list at the time of contract award.

## **PART 6 - RESULTING CONTRACT CLAUSES**

The following clauses and conditions apply to and form part of any contract resulting from the bid solicitation.

### **6.1 Security Requirements**

#### **6.1.1 No Security Requirement, escort required at DFO site(s)**

The supplier and all individuals assigned to work on the contract MUST NOT have access to PROTECTED or CLASSIFIED information/assets.

The supplier and all individuals assigned to work on the contract MUST NOT have unescorted access to restricted access areas of Fisheries and Oceans Canada facilities, or Canadian Coast Guard vessels.

The supplier and all individuals assigned to work on the contract MUST NOT remove any PROTECTED or CLASSIFIED information/assets from DFO site(s)

Subcontracts or arrangement with a third party which contain security requirements are not to be awarded without the prior written permission of the Contracting Authority.

### **6.2 Statement of Work**

The Contractor must perform the Work in accordance with Annex A Statement of Work.

#### **6.2.1 Optional Goods and Services**



The Contractor grants to Canada the irrevocable option to acquire the goods, services or both described at Annex B Table 2 of the Contract under the same conditions and at the prices and/or rates stated in the Contract. The option may only be exercised by the Contracting Authority and will be evidenced, for administrative purposes only, through a contract amendment.

The Contracting Authority may exercise the option within 12 months after contract award by sending a written notice to the Contractor.

### **6.3 Standard Clauses and Conditions**

All clauses and conditions identified in the Contract by number, date and title are set out in the [Standard Acquisition Clauses and Conditions Manual](https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual) (https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual) issued by Public Works and Government Services Canada.

#### **6.3.1 General Conditions**

[2010A](#) (2018-06-21), General Conditions - Goods (Medium Complexity), apply to and form part of the Contract.

### **6.4 Term of Contract**

#### **6.4.1 Period of the Contract**

The period of the Contract is from date of Contract to \_\_\_\_\_ inclusive. (*to be completed at contract award*).

#### **6.4.2 Delivery Date**

All the deliverables must be received on or before 29 March 2019.

#### **6.4.3 Delivery Points**

Delivery of the requirement will be made to delivery points specified at Annex A of the Contract.

### **6.5 Authorities**

#### **6.5.1 Contracting Authority**

The Contracting Authority for the Contract is:

Name: Cindy Deck  
Title: Supply Team Leader  
Public Works and Government Services Canada  
Acquisitions Branch  
Directorate: Electronics, Munitions and Tactical Systems Procurement Directorate  
Address: 11 Laurier Street  
Gatineau, Quebec K1A 0S5  
Canada  
Telephone: 819-420-4557  
Facsimile: 819-956-5650  
E-mail address: cindy.deck@tpsgc-pwgsc.gc.ca

Solicitation No. - N° de l'invitation  
F7048-180007/B  
Client Ref. No. - N° de réf. du client  
F7048-180007

Amd. No. - N° de la modif.  
File No. - N° du dossier  
117qf. F7048-180007

Buyer ID - Id de l'acheteur  
117qf  
CCC No./N° CCC - FMS No./N° VME

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The Contracting Authority is responsible for the management of the Contract and any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor must not perform work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from anybody other than the Contracting Authority.

### 6.5.2 Project Authority

The Project Authority for the Contract is:

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_-\_\_\_\_-\_\_\_\_

Facsimile: \_\_\_\_-\_\_\_\_-\_\_\_\_

E-mail: \_\_\_\_\_.

The Project Authority is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the technical content of the Work under the Contract. Technical matters may be discussed with the Project Authority, however the Project Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority.

### 6.5.3 Contractor's Representative

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Organization: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone: \_\_\_\_-\_\_\_\_-\_\_\_\_

Facsimile: \_\_\_\_-\_\_\_\_-\_\_\_\_

E-mail address: \_\_\_\_\_

## 6.6 Payment

### 6.6.1 Basis of Payment – Firm Prices

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid firm unit prices, as specified in Annex B for a cost of \$\_\_\_\_(to be completed at contract award). Customs duties are included and Applicable Taxes are extra.

Canada will not pay the Contractor for any design changes, modifications or interpretations of the Work, unless they have been approved, in writing, by the Contracting Authority before their incorporation into the Work.

### 6.6.2 Multiple Payments

Canada will pay the Contractor upon completion and delivery of units in accordance with the payment provisions of the Contract if:

- a. an accurate and complete invoice and any other documents required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;
- b. all such documents have been verified by Canada;
- c. the Work delivered has been accepted by Canada.

### 6.6.3 Taxes – Foreign-based Contractor

Unless specified otherwise in the Contract, the price includes no amount for any federal excise tax, state or local sales or use tax, or any other tax of a similar nature, or any Canadian tax whatsoever. The price, however, includes all other taxes. If the Work is normally subject to federal excise tax, Canada will, upon request, provide the Contractor a certificate of exemption from such federal excise tax in the form prescribed by the federal regulations.

Canada will provide the Contractor evidence of export that may be requested by the tax authorities. If, as a result of Canada's failure to do so, the Contractor has to pay federal excise tax, Canada will reimburse the Contractor if the Contractor takes such steps as Canada may require to recover any payment made by the Contractor. The Contractor must refund to Canada any amount so recovered.

### 6.7 Invoicing Instructions

The Contractor must submit invoices in accordance with the section entitled "Invoice Submission" of the general conditions. Invoices cannot be submitted until all work identified in the invoice is completed.

Each claim must be supported by:

- a. all information required on form PWGSC-TPSGC 1111;
- b. all applicable information detailed under the section entitled "Invoice Submission" of the general conditions;
- c. the following text on each invoice:

<b>AP Coder:</b>	Suzanne Bériault	<a href="mailto:Suzanne.Berault@dfo-mpo.gc.ca">Suzanne.Berault@dfo-mpo.gc.ca</a>
<b>Financial Code:</b>	H9632-A35-120-0924-9HW31-6	
<b>WBS Number:</b>	1.2.1.2.1	

Invoices must be distributed as follows:

- a. One (1) copy must be forwarded electronically to the Project Authority identified under the section entitled "Authorities" of the Contract.
- b. One (1) copy must be forwarded electronically to the Contracting Authority identified under the section entitled "Authorities" of the Contract.
- c. One (1) copy must be forwarded electronically to [DFOinvoicing-MPOfacturation@DFO-MPO.GC.CA](mailto:DFOinvoicing-MPOfacturation@DFO-MPO.GC.CA).

The Contractor must not submit claims until all work identified in the claim is completed

### 6.8 Certifications and Additional Information

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### 6.8.1 Compliance

Unless specified otherwise, the continuous compliance with the certifications provided by the Contractor in its bid or precedent to contract award, and the ongoing cooperation in providing additional information are conditions of the Contract and failure to comply will constitute the Contractor in default. Certifications are subject to verification by Canada during the entire period of the Contract.

### 6.9 Applicable Laws

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in the province of Quebec.

### 6.10 Priority of Documents

If there is a discrepancy between the wording of any documents that appear on the list, the wording of the document that first appears on the list has priority over the wording of any document that subsequently appears on the list.

- (a) the Articles of Agreement;
- (b) the general conditions [2010A](#) (2018-06-21), General Conditions - Goods (Medium Complexity);
- (c) Annex A, Statement of Work;
- (d) Annex B, Pricing Schedule;
- (e) the Contractor's bid dated \_\_\_\_\_ (*date of bid*)

### 6.11 SACC Manual Clauses

B1501C (2006-06-16), Electrical Equipment;  
G1005C (2016-01-28), Insurance - No Specific Requirement

### 6.12 Shipping Instructions - Delivery Duty Paid

Goods must be consigned and delivered to the destination specified in the contract:

Incoterms 2000 Delivered Duty Paid (DDP) (Québec, QC).

## 1 Scope

### 1.1 Background and Introduction

Since 1994, the Canadian Coast Guard (CCG) has been providing a Differential Global Positioning System (DGPS) service to mariners in the form of differential corrections to improve the accuracy of the Global Positioning System (GPS) and provide integrity monitoring. The differential corrections are broadcast in the 285 to 325 kHz band.

The CCG is presently evaluating a GNSS backup system, called the "R-Mode", whose signals are added to the broadcast of MSK modulated corrections. R-Mode signals are 2 sine waves (CW1 and CW2) 450 Hz on each side of the carrier.

## 2 Work Description

### 2.1 Task

**2.1.1** The **Contractor** must provide one (1) transmitter/amplifier that has the capability to amplify "combined RF signals" made of the following 2 signals combined together:

- Minimum-Shift Keying (MSK) modulated DGPS corrections signal onto a carrier (central frequency between 285 and 325 kHz).
- R-Mode signals made of 2 continuous waves (CW1 and CW2) 450 Hz on each side of the carrier.

**Note:** The rest of this document refers to a transmitter to make the test shorter. However the proposed unit may be either a transmitter or an amplifier.

**2.1.2** The **Contractor** must ship the transmitter and the technical documents to the following location:

Canadian Coast Guard (CCG) base  
Attn: Sébastien Vincent  
101 Boulevard Champlain  
Québec, QC, Canada, G1K 7Y7  
Lat Long Coordinates: 46° 48' 36.46" N 71° 12' 9.11" W

The technical documents (specifications, drawings, user manual, maintenance manual, etc) can be provided either in English or in French, as chosen by the **Contractor**. However these documents must be provided in a Word 2010 format.

## 2.2 MSK DGPS Signal Structure

The differential corrections (RTCM messages) are modulated with Minimum-Shift Keying (MSK) at a typical DGPS frequency (between 285 kHz and 325 kHz) and the resulting RF signal is broadcast to mariners who are using a DGPS receiver.

A typical MSK DGPS signal has a constant amplitude that may be as high as 4 Vpp (Volts peak to peak) when provided by the MSK output of the CCG Reference Station, but is limited to a maximum of 2 Vpp when provided by the CCG R-Mode modulator. **Figure 1** shows an example of DGPS MSK at 1.22 Vpp and a carrier frequency at 309 kHz on a 1  $\mu$ s per division timescale. The frequency variations for the 0 and 1 bit values are however not visible in **Figure 1**.

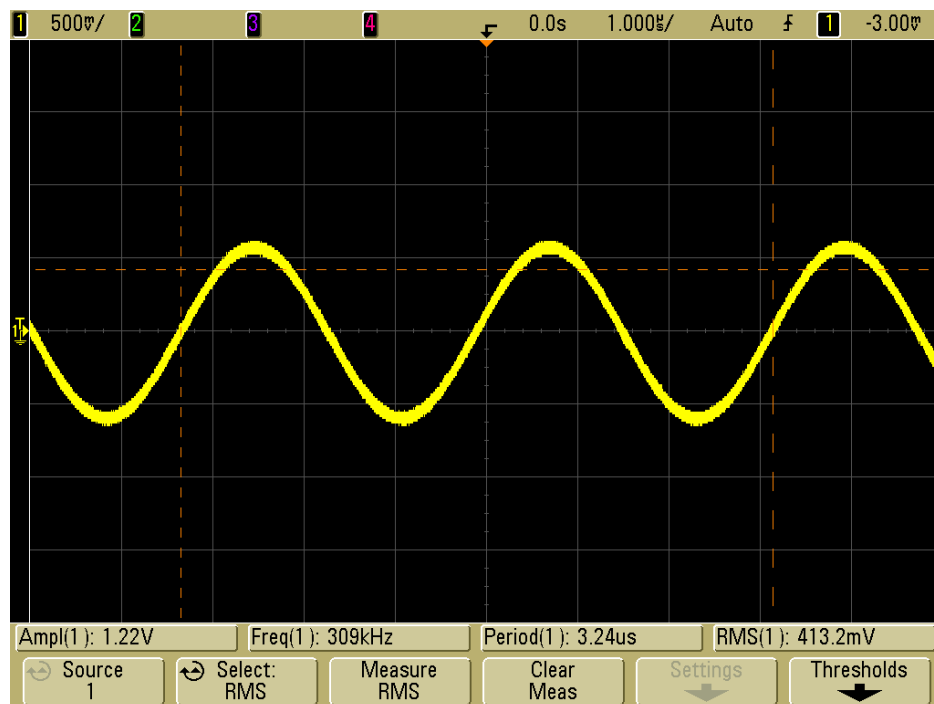


Figure 1 - MSK DGPS Signal Alone

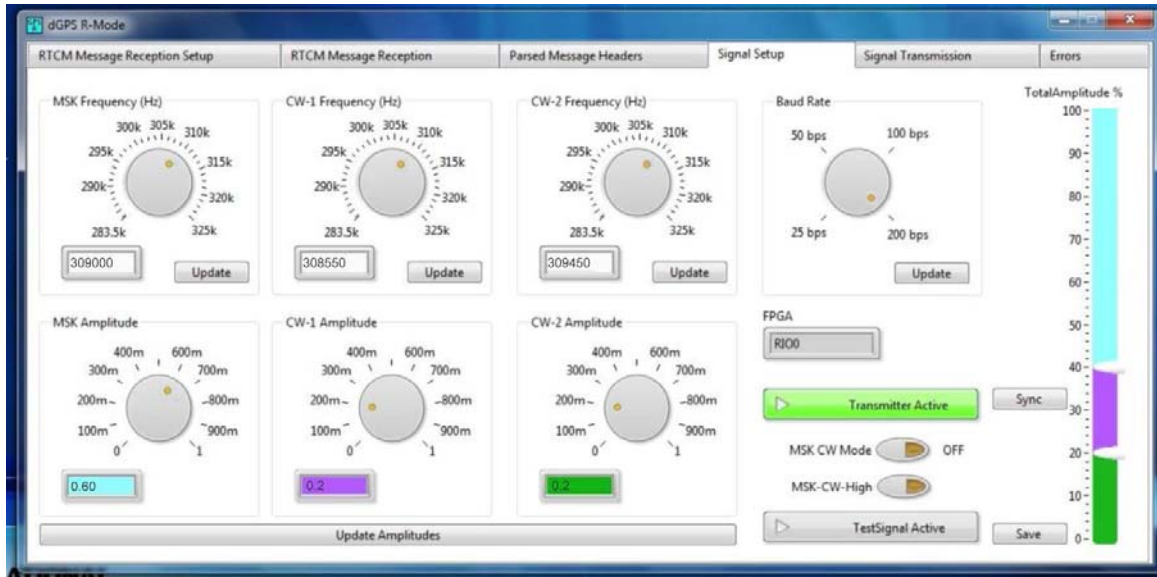
## 2.3 R-Mode Signal Structure

The R-Mode signal must be combined with the MSK DGPS signal described above while making sure that mariners will still be able to decode DGPS corrections using the regular DGPS receiver that they already own.

The R-Mode signal consists of 1 or 2 continuous wave (CW) signals (called CW1 and CW2) which can be added at any offset from the carrier (MSK centre frequency) up to  $\pm 1000$  Hz (but limited to  $\pm 500$  Hz in Canada due to regulation). Nominally, these are set to  $\pm 450$  Hz from the carrier. The 2 CW signals are simple sine waves that contain no data, and they are on all the time.

Adding the R-Mode signal to the MSK DGPS signal changes the constant amplitude input to one that varies, and it produces what we will refer to as the "combined RF signals" whose bandwidth is approximately 1 kHz.

The "combined RF signals", that must be amplified by the **Contractor's** transmitter, have a maximum total amplitude of 2 Vpp, therefore the sum of the amplitudes (MSK amplitude + CW1 amplitude + CW2 amplitude) must not be greater than 2 Vpp. These 3 amplitudes are adjustable independently from the custom CCG R-Mode modulator (**Figure 2**).



**Figure 2 - CCG R-Mode Modulator's Graphical User Interface (GUI)**

Typically, the MSK is set at an amplitude of 1.2 Vpp and the two CWs are each at 0.4 Vpp as shown in **Figure 2**. This would produce the following "combined RF signals" shown at two different timescales (**Figure 3 and Figure 4**).

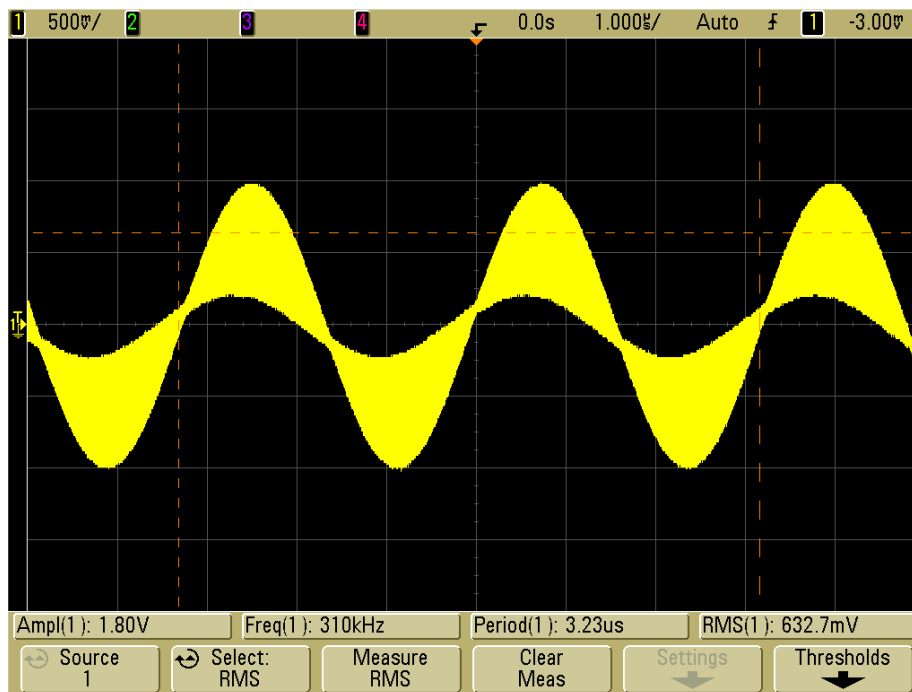


Figure 3 - MSK DGPS Signal + R-Mode Signal (CW1 and CW2) at 1  $\mu$ s timescale



Figure 4 - MSK DGPS Signal + R-Mode Signal (CW1 and CW2) at 10 ms timescale

The frequency spectrum of the "combined RF signals" looks like **Figure 5**, with the spikes for the 2 CW signals appearing at  $\pm 450$  Hz.



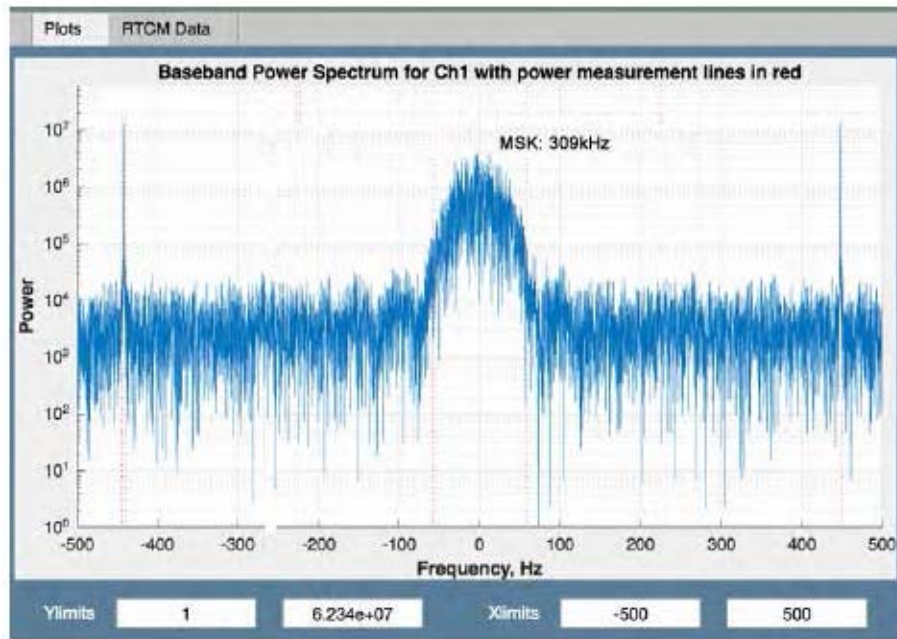


Figure 5 - Frequency Spectrum of MSK DGPS Signal + R-Mode Signal (CW1 and CW2)

## 2.4 CCG System Requirements

The transmitter proposed by the **Contractor** must be compatible with the following CCG system requirements:

### Transmitter Requirements:

- 1) Must be delivered by 29 March 2019 (due to budget availability and testing schedule).
- 2) Must have a "**class A**" power amplifier (linear) design.
- 3) Must be compatible with Canada's approved bandwidth for DGPS, which is limited to 1 kHz and therefore +/- 500 Hz from the carrier.
- 4) Must be able to amplify the "combined RF signals" (**Figures 3, 4 and 5**) provided by the CCG R-Mode modulator (on a single connector), without causing distortion, intermodulation or out-of-band noise. The transmitter's input connector must be able to accept a signal in the 0.5 to 4.0 Vpp range (a typical signal is 2.0 Vpp).
- 5) Must be able to continue amplifying the MSK DGPS signal alone when it cannot amplify the "combined RF signals" anymore (due to a possible fault in the generation of the 2 CW signals).
- 6) Must be compatible with the CCG Antenna Tuning Unit (ATU) which is a Nautel NX2000TUB (500 watts) and is connected to a 150' or 110' radiating tower.

- 7) Must have a power output of at least 500 watts.
- 8) Must work on either 120 V AC (60 Hz) or 240 V AC (60 Hz).
- 9) Must be able to operate between +5°C and +40°C.
- 10) The amplification must not disturb the signal synchronization explained here: The carrier must be synchronous with UTC (have 0 degree phase measured against a UTC 1 PPS). CW1 and CW2 also must be phase-synchronous with the carrier (at every integer UTC second the carrier and the two CW signals will all have zero phase).

## 2.5 Deliverables and Milestones

The transmitter must be delivered on (or before) the dates specified in the table below:

Deliverable	Date
Delivery of the transmitter and technical documents at the CCG base	29 March 2019

Solicitation No. - N° de l'invitation  
F7048-180007/B  
Client Ref. No. - N° de réf. du client  
F7048-180007

Amd. No. - N° de la modif.  
File No. - N° du dossier  
117qf. F7048-180007

Buyer ID - Id de l'acheteur  
117qf  
CCC No./N° CCC - FMS No./N° VME

**ANNEX B**  
**PRICING SCHEDULE**

**Requirement: (Bidder to Complete)**

The Contractor must provide the items detailed below.

Table 1

Item No.	Description	Firm Amount (DDP, excluding taxes)
001	One (1) Ranging Mode (R-Mode) transmitter / amplifier in accordance with Annex A SOW	

Table 2 Optional Requirements

Item No.	Description	Firm Amount (DDP, excluding taxes)
002	One (1) Ranging Mode (R-Mode) transmitter / amplifier in accordance with Annex A SOW	
003	One (1) Ranging Mode (R-Mode) transmitter / amplifier in accordance with Annex A SOW	

Evaluated Price (Total of Items 001-003) \_\_\_\_\_

All prices in the table above are provided in the following currency: \_\_\_\_\_

## **ANNEX C**

### **EVALUATION CRITERIA**

- 1)** Must be delivered by March 29, 2019 (due to budget availability and testing schedule).
- 2)** Must have a "class A" power amplifier (linear design).
- 3)** Must be compatible with Canada's approved bandwidth for DGPS, which is limited to 1 kHz and therefore +/- 500 Hz from the carrier.
- 4)** Must be able to amplify the RF signal (DGPS corrections modulated on a carrier around 300 kHz combined with two (2) continuous waves at +/- 450 Hz from the carrier) provided by the CCG R-Mode modulator (on a single connector), without causing distortion, intermodulation or out-of-band noise. The transmitter's input connector must be able to accept a signal in the 0.5 to 4.0 Vpp range (a typical signal is 2.0 Vpp).
- 5)** Must be able to continue broadcasting the MSK DGPS signal alone when it cannot broadcast the "combined RF signals" anymore (due to a possible fault in the generation of the 2 CW signals).
- 6)** Must be compatible with the CCG Antenna Tuning Unit (ATU) which is a Nautel NX2000TUB (500 watts) and is connected to a 150' or 110' radiating tower.
- 7)** Must have a power output of at least 500 watts.
- 8)** Must work on either 120 V AC (60 Hz) or 240 V AC (60 Hz).
- 9)** Must be able to operate between +5°C and +40°C.
- 10)** The amplification must not disturb the signal synchronization explained here: The carrier must be synchronous with UTC (have 0 degree phase measured against a UTC 1 PPS). CW1 and CW2 also must be phase-synchronous with the carrier (at every integer UTC second the carrier and the two CW signals will all have zero phase).