National Defence | Défense nationale

National Defence Headquarters
Ottawa, Ontario
K1A 0K2

Quartier général de la Défense nationale
Ottawa (Ontario)
K1A 0K2

REQUEST FOR PROPOSAL
DEMANDE DE PROPOSITION

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
FAX : 819-997-9776

Title/Titre **SMART Antenna, ANTI-JAM PROTECTION/** **Antenne INTELLIGENT, PROTECTION ANTI-BOURRAGE**	**Solicitation No – Nº de l'invitation :** **W8472-195743/A**
Date of Solicitation – Date de l'invitation	
Address Enquiries to – Adresser toutes questions à **Okafo EKE, Ifeoma** **D MAR P 2-2-4** **Ifeoma.okafoeke@forces.gc.ca**	
Telephone No. – Nº de téléphone : **Ifeoma.okafoeke@forces.gc.ca**	**FAX No – Nº de fax**
Destination: **Department of National Defence** **CFB Halifax Main Warehouse** **Bldg D-206 Door 1 thru 13** **HMC Dockyard Halifax, NS, B3K 5X5** **Canada**	

Proposal To: National Defence 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 and services listed herein and on any attached sheets at the price(s) set out therefore.

Proposition à : Défense nationale 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 et services énumérés ici et sur toute feuille ci-annexée, au(x) prix indique(s).

Instructions:
Municipal taxes are not applicable. Unless otherwise specified herein all prices quoted must include all applicable Canadian customs duties, GST/HST, excise taxes and are to be delivered Delivery Duty Paid including all delivery charges to destination(s) as indicated. The amount of the Goods and Services Tax/Harmonized Sales Tax is to be shown as a separate item.

Instructions: Les taxes municipales ne s'appliquent pas. Sauf indication contraire, les prix indiqués doivent comprendre les droits de douane canadiens, la TPS/TVH et la taxe d'accise. Les biens doivent être livrés « rendu droits acquittés », tous frais de livraison compris, à la ou aux destinations indiquées. Le montant de la taxe sur les produits et services/taxe de vente harmonisée doit être indiqué séparément.

Solicitation Closes –
L'invitation prend fin

At – à : 14:00 EST

On - le :

2018/12/05

Delivery required - Livraison exigée	Delivery offered - Livraison proposée
Vendor Name and Address - Raison sociale et adresse du fournisseur	
Name and title of person authorized to sign on behalf of vendor (type or print) - Nom et titre de la personne autorisée à signer au nom du fournisseur (caractère d'imprimerie) Name/Nom _____ Title/Titre _____ Signature _____ Date _____	

Canada

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PART 1 - GENERAL INFORMATION

1.1 Security Requirements

There is no security requirement applicable to this contract.

1.2 Requirement

The requirement is detailed in Annex “C”, Technical Statement of Requirements (TSOR).

1.3 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.

1.4 Trade Agreements

The requirement is subject to the provisions of the North American Free Trade Agreement (NAFTA).

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) 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.

DELETE Section 8 2. epost Connect of 2003 (2018-05-22) Standard Instructions - Goods or Services - Competitive Requirements in its entirety.

2.2 SACC Manual Clauses

SACC Manual Clause B4060C (2011-05-16), Controlled Goods

2.3 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.

2.4 Enquiries - Bid Solicitation

All enquiries must be submitted in writing to the Contracting Authority no later than 7 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.

2.5 Applicable Laws

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

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 in hard copies, Canada requests that the Bidder submits its bid in separately bound sections as follows:

Section I: Technical Bid 3 hard copies
Section II: Financial Bid 1 hard copy
Section III: Certifications 1 hard copy

Due to the nature of the bid solicitation, bids transmitted by epost Connect service will not be accepted.

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). 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 in Annex “C” and Annex “D”.

Section II: Financial Bid
Bidders must submit their financial bid in accordance with the Basis of Payment.

3.2 Electronic Payment of Invoices – Bid

If you are willing to accept payment of invoices by Electronic Payment Instruments, complete Annex “E” Electronic Payment Instruments, to identify which ones are accepted.

If Annex “E” Electronic Payment Instruments is not completed, it will be considered as if Electronic Payment Instruments are not being accepted for payment of invoices.

Acceptance of Electronic Payment Instruments will not be considered as an evaluation criterion.

3.3 Exchange Rate Fluctuation

SACC Manual Clause C3010T 2014-11-27 Exchange Rate Fluctuation Risk Mitigation

3.4 SACC Manual Clauses

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.

4.2 Technical Evaluation

The Anti-Jamming GPS device must be verified for mandatory technical compliance listed in Annex “D” the Evaluation Checklist

4.3 Financial Evaluation

SACC Manual Clause A0222T (2014-06-26), Evaluation of Price / Foreign Bidders
SACC Manual Clause C2000C (2007-11-30), Taxes –Foreign-based Contractor

4.4 Basis of Selection

SACC Manual Clause A0031T (2010-08-16), Basis of Selection - Mandatory Technical Criteria

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.

5.2 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 website (http://www.tpsgc-pwgsc.gc.ca/ci-if/declaration-eng.html), to be given further consideration in the procurement process.

5.3 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.

5.4 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), the Bidder must provide the required documentation, as applicable, to be given further consideration in the procurement process.

5.5 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 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

There is no security requirement applicable to the Contract.

6.2 Requirement

The contractor must provide the items detailed in Annex “A”.

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) issued by Public Works and Government Services Canada.

6.4 General Conditions

SACC Manual Clause 2010A (2018-06-21), General Conditions - Goods (Medium Complexity), apply to and form part of the Contract.

6.5 Period of the Contract

The period of the Contract is from date of Contract to _____ inclusive

6.6 Delivery Date

All the deliverables must be received on or before _____ .

6.7 Delivery Points

Delivery of the requirement will be made to delivery point(s) specified at Annex “A” of the Contract.

6.8 Authorities

6.8.1 Contracting Authority

The Contracting Authority for the Contract is:

TO BE PROVIDED AT CONTRACT AWARD

Name: _____
Title: _____
Directorate: _____
Address: _____
Telephone: ___ ___ _____
Facsimile: ___ ___ _____
E-mail address: _____

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.

6.8.2 Contractor's Representative

Name: _____
Title: _____
Address: _____
Telephone: ___ ___ _____
Facsimile: ___ ___ _____
E-mail address: _____

6.9 Shipping

SACC Manual Clause D6009C (2017-11-28) Shipping Instructions: Delivery and destination schedules unknown

The Contractor must ship the goods prepaid DDP - Delivered Duty Paid (... named place of destination). Unless otherwise directed, delivery must be made by the most economical means. Shipping charges must be shown as a separate item on the Contractor's invoice. The Contractor is responsible for all delivery charges, administration, costs and risks of transport and customs clearance, including the payment of customs duties and Applicable Taxes.

The Contractor must deliver the goods to Canadian Forces (CF) Supply Depots by appointment only. The Contractor or its carrier must arrange delivery appointments by contacting the Depot Traffic Section at the appropriate location shown below. The consignee may refuse shipments when prior arrangements have not been made.

(a) 7H1 CF Halifax
Halifax, N.S.
Email: P-HFX.BLog.CargoOps@intern.mil.ca

6.10 Payment

6.10.1 Basis of Payment

SACC Manual Clause C0207C (2013-04-25) Basis of Payment - Firm Price, Firm Unit Price(s) or Firm Lot Price(s)

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid a firm price, as specified in Annex "B" for a cost of $ _____. 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.

6.10.2 Limitation of Price

SACC Manual clause C6000C (2017-08-17), Limitation of Price

6.11 SACC Manual Clauses -

SACC Manual clause C2000C (2007-11-30), Taxes – Foreign-based Contractor

SACC Manual clause D2000C (2017-11-30), Marking

SACC Manual clause D2001C (2007-11-30), Labelling

SACC Manual clause B7500C (2006-06-16), Excess Goods

SACC Manual Clause B4060C (2011-05-16), Controlled Goods

6.12 Packaging

SACC Manual clause D3018C (2014-09-25), Packaging Requirement using Specification D-LM-008-036/SF-000

The Contractor must prepare all items for delivery in accordance with the latest issue of the Canadian Forces Packaging Specification *D-LM-008-036/SF-000*, DND Minimum Requirements for Manufacturer's Standard Pack.

SAAC Manual clause D2025C 2017-08-17, Wood packaging materials

SAAC Manual clause D6010C 2007-11-30, Palletization

6.13 Electronic Payment of Invoices – Contract

The Contractor accepts to be paid using any of the following Electronic Payment Instrument(s):

a. Direct Deposit (Domestic and International);
b. Electronic Data Interchange (EDI);
c. Wire Transfer (International Only)

6.14 Invoicing Instructions

SAAC Manual clause H5001C 2008-12-12, 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.

Invoices must be distributed as follows:

The original and one (1) copy must be forwarded to the Contracting Authority identified under the section entitled "Authorities" of the Contract address shown on page 1 of the Contract for certification and payment:

Department of National Defence
101 Colonel By Drive
Ottawa, ON K1A 0K2
Attention: D MARP 2-2-4

6.15 Certifications and Additional Information

6.15.1 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.

6.16 Applicable Laws

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

6.17 Priority of Documents

If there is a discrepancy between the wordings 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 DND Contract
(b) SACC Clause 2010A (2018-06-21), General conditions: Goods (medium complexity)
(c) Annex “A”, Line item details
(d) The Contractor’s bid dated _____.

6.18 Defence Contract

SACC Manual clause A9006C (2012-07-16) Defence Contract

ANNEX A - LINE ITEM DETAILS

Item	Part Number	Description	Unit of Issue	Quantity	Destination Address	Invoice Address	Security Requirement	Quality Assurance Code (QAC)	Controlled Goods (CTAT or ITAR)	Trade Agreement
001	P/N NCAGE Name of Manufacturer 	Anti-Jamming GPS device subject to TSOR requirements	EA	1	Department of National Defence CFB Halifax Main Warehouse Bldg D-206 Door 1 thru 13 HMC Dockyard Halifax, NS, B3K 5X5 Canada	Department of National Defence 101 Colonel By Drive Ottawa, ON K1A 0K2 Canada Attention: D MAR P 2-2-4	NO	NO	NO	YES

ANNEX B BASIS OF PAYMENT

Item	Part Number	Description	Quantity	Destination Address	Invoice Address	FIRM UNIT PRICE: Delivered Duty Paid (DDP), Transportation costs included	EXTENDED PRICE: Applicable taxes extra	Applicable taxes	TOTAL PRICE: Applicable taxes Included
001	P/N NCAGE Name of Manufacturer	Anti-Jamming GPS device subject to TSOR requirements	1	Department of National Defence CFB Halifax Main Warehouse Bldg D-206 Door 1 thru 13 HMC Dockyard Halifax, NS, B3K 5X5 Canada	101 Colonel By Drive Ottawa, K1A 0K2 Attention: D Mar P 2-2-4	$ -	$ -	$ -	$ -
							Subtotal		
							Total Taxes		
							Total		

ANNEX D EVALUATION CHECKLIST

TSOR REF.	MANDATORY TECHNICAL REQUIREMENTS CRITERIA	PASS/ FAIL	Evaluator Comments
5	**SOFTWARE REQUIREMENTS**		
5.1	If the GPS CRPA firmware is upgradeable, the GPS CRPA must include a Firmware Update Utility.		
5.2	If a Firmware Update Utility is provided, its user interface must be in the English language.		
6	**HARDWARE REQUIREMENTS**		
6.1	The GPS CRPA must be capable of receiving L1 (i.e., 1575.42 megahertz [MHz]) and L2 (i.e., 1227.6 MHz) Band GPS signals.		
6.3	The GPS CRPA must be Military Code (M-Code) compatible.		
6.4	The GPS CRPA must provide an omnidirectional radiation pattern in azimuth when not in the presence of jamming signals.		
6.5	For elevations of 5 to 90 degrees over the horizon, the GPS CRPA gain roll-off must be a maximum of 10 decibels from the antenna boresight when not in the presence of jamming signals.		
6.6	NavDDS-Halifax currently provides a plus five (5) Volts Direct Current (VDC), thirty-five (35) milliamp power source to power the L1/L2 GPS antennas in use on the Halifax Class frigates. The GPS CRPA may use this power source or may use its own power source, if the power from NavDDS-Halifax is insufficient. If a separate power source is required, it must be provided with the GPS CRPA and the power source from NavDDS-Halifax must be blocked.		
6.7	The output of the GPS CRPA must be a standard Radio Frequency (RF) output suitable for input into the fitted Trimble Force 524D GRAMs, as specified in the Trimble Force 524D Data Sheet.		
6.8	The GPS CRPA must have a maximum Voltage Standing Wave Ratio (VSWR) of two (2) to one (1), within 24 MHz centred on both the L1 and L2 Band frequencies, and within 20 MHz centred on the L5 Band frequency, if the CRPA provides a L5 Band GPS signal reception capability.		
6.9	The current L1/L2 GPS antennas use N-type connectors, the GPS CRPA is to use this connector or an appropriate coaxial adapter that will allow the connection of the existing ship's cabling to the GPS CRPA must be provided.		
6.10	Any time delay caused by the GPS CRPA must not exceed 65.535 microseconds.		
6.11	The GPS CRPA must provide jamming protection of the L1, L2, and L5 GPS Bands simultaneously.		
6.12	The GPS CRPA must be capable of providing jamming protection from three or more simultaneous jamming and interference sources.		
6.13	The GPS CRPA must automatically start its anti-jamming functions by default once power is supplied to the GPS CRPA.		
6.14	The GPS CRPA must provide for a remote indication of the presence of signal jamming.		
6.16	The GPS CRPA must provide the relative bearing of the detected jamming signal or the antenna sector that is being jammed.		
6.17	Normal operation of the GPS CRPA must require no user interaction.		
7	**DATA REQUIREMENTS**		
7.3	**Power**		
7.3.1	The primary power for the GPS CRPA, if required, and all ancillary support equipment must be derived from the ship's one hundred and fifteen (115) Volts Alternating Current (VAC) sixty (60) hertz (Hz) single phase main power.		
7.3.2	All equipment must be in accordance with the operational constraints including, but not limited to, harmonic current content, ramp loading, and so forth for Type I power in accordance with MIL-STD-1399, Section 300.		
7.3.3	The GPS CRPA and all ancillary support equipment must remain fully operational for worst case voltage and frequency conditions in accordance with MIL-STD-1399, Section 300.		
7.3.4	Power circuit protection must meet the requirements of D-03-003-005/SF-000.		
8	**PHYSICAL REQUIREMENTS**		
8.1	**Construction**		
8.1.2	The GPS CRPA must be constructed of material suitable for installation and use on the exterior of an ocean-going vessel.		
8.1.4	All ancillary support equipment supplied with the GPS CRPA must be constructed of material suitable for installation and use on the exterior of an ocean-going vessel or in a compartment that may be open to the exterior of an ocean-going vessel.		
8.2	**Cooling**		
	Cooling will be provided by the ambient environmental conditions prevalent during the evaluation.		
8.3	**Cabling**		
	The GPS CRPA must connect to the GRAM using the existing ship's RF cabling.		

9	**ENVIRONMENTAL REQUIREMENTS**		
	The GPS CRPA and all ancillary support equipment are to be capable of operating within the environment as specified in this section.		
9.1	**Temperature** The GPS CRPA and all ancillary support equipment must be capable of functioning within the temperature ranges specified in MIL-HDBK-2036 for non-mission critical systems, as follows:		
	a. Operating: minus forty (-40) to plus fifty (+50) degrees Celsius; and b. Non-operating/Storage: minus fifty (-50) to plus seventy (+70) degrees Celsius.		
9.2	**Humidity**		
	The GPS CRPA and all ancillary support equipment must be capable of operating in humidity as specified in MIL-HDBK-2036 for non-mission critical systems.		
9.3	**Vibration**		
	The GPS CRPA and all ancillary support equipment must meet the requirements for Type 1 tests, as specified in MIL-STD-167-1.		
9.4	**Shipboard Equipment Noise**		
	The GPS CRPA and all ancillary support equipment must meet the requirements for Grade A3 equipment; see MIL-HDBK-1908, as specified in MIL-STD-1474.		
9.5	**Fungus**		
	All materials used in the GPS CRPA and all ancillary support equipment supplied must be fungus inert, as specified in Guideline 4 of MIL-HDBK-454.		
9.6	**Shock**		
9.6.1	The GPS CRPA and all ancillary support equipment must be qualified to the Grade 2A shock loading requirements for Grade 1 equipment mounted on upper decks and superstructure, as specified in D-03-003-007/SG-000.		
9.6.2	Shock isolators may be included as part of the GPS CRPA or ancillary support equipment to meet the above requirements and, if used, the shock isolators must be supplied with the GPS CRPA or ancillary support equipment, as appropriate.		
9.7	**Magnetic Fields**		
	The GPS CRPA and all ancillary support equipment must be able to function or not be harmed when within magnetic fields, as follows:		
	a. Operating: five (5) Gauss; and b. Non-operating/Storage: thirty (30) Gauss.		
9.8	**Hazardous Materials**		
	In accordance with MIL-HDBK-2036, the following materials must not be used in the GPS CRPA or any of the ancillary support equipment:		
	• Carcinogens; • Exposed glass fibers; • Lithium and lithium compounds, except batteries approved for the intended service conditions; • Magnesium and magnesium alloys; • Polyvinyl Chloride (PVC); • Cadmium; • Radioactive materials; and • Zinc or zinc alloys.		
9.9	**Electrical Hazards**		
9.9.1	In accordance with MIL-HDBK-2036, the GPS CRPA and all ancillary support equipment must be designed such that personnel cannot be exposed to voltages in excess of thirty (30) VAC or sixty (60) VDC.		
9.9.2	All high voltage circuits must discharge to less than thirty (30) volts within two (2) seconds of power being removed.		
9.10	**Motion and Attitude**		
	The GPS CRPA and all ancillary support equipment must remain fully operational for all vessel motion and attitude conditions in accordance with DOD-STD-1399, Section 301.		
10	**RELIABILITY**		
10.1	Mean Time Between Failures (MTBF) predictions must be calculated in accordance with industry standard BELLCORE prediction models, or equivalent method, for marine sheltered equipment operating at an ambient temperature of twenty-five (25) degrees Celsius.		
10.2	MTBF prediction for any signal path must be no less than ten thousand (10,000) hours of use, refer to MIL-HDBK-217.		
11	**MAINTAINABILITY**		
11.1	**Accessibility and Fabrication**		
11.1.1	All subassemblies and replaceable units must be easily accessible and readily removable for repair.		
11.1.2	Keying or its equivalent must be used to prevent incorrect positioning of modules, connectors, and other components.		
11.1.3	Positive stops must be provided on all hinged doors or panels to lock them in the open position, when necessary.		
11.1.4	A system ground strap must be provided, conforming to MIL-STD-1310, for connecting to the vessel's common ground bus.		
11.2	**Indicators**		
11.2.1	All external incandescent status lights, if used, must be replaceable from the front.		
11.2.2	Normally-off lamps must have push-to-test or other test provisions to verify their operation, if applicable.		

DEPARTMENT OF NATIONAL DEFENCE

ANNEX C

TECHNICAL STATEMENT OF REQUIREMENTS

FOR

Global Positioning System
Controlled Reception Pattern Antenna Evaluation
on the
Halifax Class Frigate

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1.0 GENERAL

1.1 Scope

This Technical Statement of Requirements (TSOR) specifies the technical requirements for the provision of anti-jamming protection for the Military Global Positioning Systems (GPS) fitted on the Halifax Class frigates.

1.2 Background

1.2.1 The Halifax Class frigates are equipped with two E-57-862-000 Force 524D Global Positioning System (GPS) Receiver Application Modules (GRAM) that are integral components of the E-57-858-000 Navigation Data Distribution System (NavDDS-Halifax), which provides the primary position and timing information for the frigate's systems. Testing has determined that the fitted GRAMs are vulnerable to signal jamming and interference, and require a mitigation solution.

1.2.2 Jamming, whether intentional or unintentional, can seriously degrade GPS position, navigation, and time availability by creating excessive noise in the GPS receiver front end that overpowers the low power GPS signals, which can lead to total GPS information denial.

1.2.3 Interference from shipboard systems can be mitigated by the beamforming techniques available in the GPS Controlled Reception Pattern Antenna (CRPA), which create dynamic nulls in the receive antenna coverage that provides protection against both narrowband and broadband interference sources.

1.2.4 The installation of GPS CRPAs should provide adequate protection for the frigate's Military GPS (i.e. the fitted GRAMs) against both intentional and unintentional jamming, as well as interference from shipboard systems.

1.2.5 The intention is to temporarily install the GPS CRPA on a Halifax Class frigate to evaluate the interoperability of the GPS CRPA with the frigate's Military GPS (i.e., the fitted GRAMs) and the associated shipboard systems that rely on GPS information for precise Position, Navigation, and Timing (PNT).

2.0 DEFINITIONS AND TERMINOLOGY

CRPA	-	Controlled Reception Pattern Antenna
dB	-	decibel
GNSS	-	Global Navigation Satellite System
GPS	-	Global Positioning System
GRAM	-	Global Positioning System Receiver Application Module
M-Code	-	Military Code
MHz	-	Megahertz
MTBF	-	Mean Time Between Failures
NATO	-	North Atlantic Treaty Organization
NavDDS	-	Navigation Data Distribution System
NavDDS-Halifax	-	Navigation Data Distribution System – Halifax Class
PNT	-	Position, Navigation, and Timing
PVC	-	Polyvinyl Chloride
RFP	-	Request for Proposal
TSOR	-	Technical Statement of Requirements
VAC	-	Volts Alternating Current

VDC - Volts Direct Current

VSWR - Voltage Standing Wave Ratio

3.0 APPLICABLE DOCUMENTS

3.1 These documents form part of this TSOR to the extent specified and are supportive of this TSOR when referenced. All other document references are to be considered supplemental information only. Unless otherwise specified, the issue or amendment of documents effective for this contract will be those in effect on the Request for Proposal (RFP) closing date.

3.2 The Contractor must bring to the attention of Canada any perceived inconsistencies between the requirements stated in this TSOR and the referenced documents.

3.3 In the event of conflict between the content of this TSOR and the referenced documents, the following order of precedence applies:

a. content of this TSOR;

b. North Atlantic Treaty Organization (NATO) Standards;

c. Canadian Forces Specifications and Standards;

d. United States Federal Specifications;

e. United States Military Specifications; and then

f. Commercial and Industrial Standards.

3.4 The following reference documents are applicable:

a. Trimble Force 524D Data Sheet;

b. D-03-003-005/SF-000 General Electrical Specification for Canadian Forces Ships;

c. D-03-003-007/SG-000 Specifications for Design and Test Criteria for Shock Resistant Equipment in Naval Ships;

d. DOD-STD-1399, Section 301 Interface Standard for Shipboard Systems, Ship Motion and Attitude (Metric);

e. MIL-STD-1399, Section 300 Interface Standard for Shipboard Systems, Electric Power, Alternating Current;

f. MIL-STD-1474 Design Criteria Standard, Noise Limits;

g. MIL-STD-1310 Shipboard Bonding, Grounding, and Other Techniques for Electromagnetic Compatibility and Safety;

h. MIL-STD-167-1 Mechanical Vibrations of Shipboard Equipment (Type I – Environmental and Type II – Internally Excited);

i. MIL-STD-461G Requirements for the Control of Electromagnetic Interference Characteristics of Subsystems and Equipment

j. MIL-HDBK-2036 Preparation of Electronic Equipment Specifications;

k. MIL-HDBK-1908 Definitions of Human Factors Terms (Metric);

l. MIL-HDBK-454 General Guidelines for Electronic Equipment; and

m. MIL-HDBK-217 Reliability Prediction of Electronic Equipment.

4.0 SYSTEMS OVERVIEW

4.1 The fitted GRAMs are the primary PNT aid for the Halifax Class frigates.

4.2 The fitted GRAMs provide GPS information to NavDDS-Halifax, which distributes that information to shipboard ancillary systems, as appropriate.

5.0 SOFTWARE REQUIREMENTS

5.1 If the GPS CRPA firmware is upgradeable, the GPS CRPA must include a Firmware Update Utility.

5.2 If a Firmware Update Utility is provided, its user interface must be in the English language.

6.0 HARDWARE REQUIREMENTS

6.1 The GPS CRPA must be capable of receiving L1 (i.e., 1575.42 megahertz [MHz]) and L2 (i.e., 1227.6 MHz) Band GPS signals.

6.2 The GPS CRPA may provide a L5 (i.e. 1176.45 MHz) Band GPS signal reception capability.

6.3 The GPS CRPA must be Military Code (M-Code) compatible.

6.4 The GPS CRPA must provide an omnidirectional radiation pattern in azimuth when not in the presence of jamming signals.

6.5 For elevations of 5 to 90 degrees over the horizon, the GPS CRPA gain roll-off must be a maximum of 10 decibels from the antenna boresight when not in the presence of jamming signals.

6.6 NavDDS-Halifax currently provides a plus five (5) Volts Direct Current (VDC), thirty-five (35) milliamp power source to power the L1/L2 GPS antennas in use on the Halifax Class frigates. The GPS CRPA may use this power source or may use its own power source, if the power from NavDDS-Halifax is insufficient. If a separate power source is required, it must be provided with the GPS CRPA and the power source from NavDDS-Halifax must be blocked.

6.7 The output of the GPS CRPA must be a standard Radio Frequency (RF) output suitable for input into the fitted Trimble Force 524D GRAMs, as specified in the Trimble Force 524D Data Sheet.

6.8 The GPS CRPA must have a maximum Voltage Standing Wave Ratio (VSWR) of two (2) to one (1), within 24 MHz centred on both the L1 and L2 Band frequencies, and within 20 MHz centred on the L5 Band frequency, if the CRPA provides a L5 Band GPS signal reception capability.

6.9 The current L1/L2 GPS antennas use N-type connectors, the GPS CRPA is to use this connector or an appropriate coaxial adapter that will allow the connection of the existing ship's cabling to the GPS CRPA must be provided.

6.10 Any time delay caused by the GPS CRPA must not exceed 65.535 microseconds.

6.11 The GPS CRPA must provide jamming protection of the L1, L2, and L5 GPS Bands simultaneously.

6.12 The GPS CRPA must be capable of providing jamming protection from three or more simultaneous jamming and interference sources.

6.13 The GPS CRPA must automatically start its anti-jamming functions by default once power is supplied to the GPS CRPA.

6.14 The GPS CRPA must provide for a remote indication of the presence of signal jamming.

6.15 The GPS CRPA may provide the relative strength of the detected jamming signal.

6.16 The GPS CRPA must provide the relative bearing of the detected jamming signal or the antenna sector that is being jammed.

6.17 Normal operation of the GPS CRPA must require no user interaction.

7.0 DATA REQUIREMENTS

7.1 Input Data

No data will be supplied to the GPS CRPA.

7.2 Output Data

The RF output of the GPS CRPA will be connected directly to the RF input of one (1) of the two (2) fitted GRAMs, using the existing ship's cabling.

7.3 Power

7.3.1 The primary power for the GPS CRPA, if required, and all ancillary support equipment must be derived from the ship's one hundred and fifteen (115) Volts Alternating Current (VAC) sixty (60) hertz (Hz) single phase main power.

7.3.2 All equipment must be in accordance with the operational constraints including, but not limited to, harmonic current content, ramp loading, and so forth for Type I power in accordance with MIL-STD-1399, Section 300.

7.3.3 The GPS CRPA and all ancillary support equipment must remain fully operational for worst case voltage and frequency conditions in accordance with MIL-STD-1399, Section 300.

7.3.4 Power circuit protection must meet the requirements of D-03-003-005/SF-000.

8.0 PHYSICAL REQUIREMENTS

8.1 Construction

8.1.1 The GPS CRPA will be temporarily installed on a Halifax Class frigate's Bridge Top in the vicinity of the port-side L1/L2 GPS antenna for the evaluation.

8.1.2 The GPS CRPA must be constructed of material suitable for installation and use on the exterior of an ocean-going vessel.

8.1.3 All ancillary support equipment supplied with the GPS CRPA will be temporarily installed on the Halifax Class frigate's Bridge or Bridge Top, as appropriate.

8.1.4 All ancillary support equipment supplied with the GPS CRPA must be constructed of material suitable for installation and use on the exterior of an ocean-going vessel or in a compartment that may be open to the exterior of an ocean-going vessel.

8.1.5 The GPS CRPA and all ancillary support equipment will be removed upon completion of the evaluation.

8.2 Cooling

Cooling will be provided by the ambient environmental conditions prevalent during the evaluation.

8.3 Cabling

The GPS CRPA must connect to the GRAM using the existing ship's RF cabling.

9.0 ENVIRONMENTAL REQUIREMENTS

The GPS CRPA and all ancillary support equipment are to be capable of operating within the environment as specified in this section.

9.1 Temperature

The GPS CRPA and all ancillary support equipment must be capable of functioning within the temperature ranges specified in MIL-HDBK-2036 for non-mission critical systems, as follows:

a. Operating: minus forty (-40) to plus fifty (+50) degrees Celsius; and

b. Non-operating/Storage: minus fifty (-50) to plus seventy (+70) degrees Celsius.

9.2 Humidity

The GPS CRPA and all ancillary support equipment must be capable of operating in humidity as specified in MIL-HDBK-2036 for non-mission critical systems.

9.3 Vibration

The GPS CRPA and all ancillary support equipment must meet the requirements for Type 1 tests, as specified in MIL-STD-167-1.

9.4 Shipboard Equipment Noise

The GPS CRPA and all ancillary support equipment must meet the requirements for Grade A3 equipment; see MIL-HDBK-1908, as specified in MIL-STD-1474.

9.5 Fungus

All materials used in the GPS CRPA and all ancillary support equipment supplied must be fungus inert, as specified in Guideline 4 of MIL-HDBK-454.

9.6 Shock

9.6.1 The GPS CRPA and all ancillary support equipment must be qualified to the Grade 2A shock loading requirements for Grade 1 equipment mounted on upper decks and superstructure, as specified in D-03-003-007/SG-000.

9.6.2 Shock isolators may be included as part of the GPS CRPA or ancillary support equipment to meet the above requirements and, if used, the shock isolators must be supplied with the GPS CRPA or ancillary support equipment, as appropriate.

9.7 Magnetic Fields

The GPS CRPA and all ancillary support equipment must be able to function or not be harmed when within magnetic fields, as follows:

a. Operating: five (5) Gauss; and

b. Non-operating/Storage: thirty (30) Gauss.

9.8 Hazardous Materials

In accordance with MIL-HDBK-2036, the following materials must not be used in the GPS CRPA or any of the ancillary support equipment:

a. Carcinogens;

b. Exposed glass fibers;

c. Lithium and lithium compounds, except batteries approved for the intended service conditions;

d. Magnesium and magnesium alloys;

e. Polyvinyl Chloride (PVC);

f. Cadmium;

g. Radioactive materials; and

h. Zinc or zinc alloys.

9.9 Electrical Hazards

9.9.1 In accordance with MIL-HDBK-2036, the GPS CRPA and all ancillary support equipment must be designed such that personnel cannot be exposed to voltages in excess of thirty (30) VAC or sixty (60) VDC.

9.9.2 All high voltage circuits must discharge to less than thirty (30) volts within two (2) seconds of power being removed.

9.10 Motion and Attitude

The GPS CRPA and all ancillary support equipment must remain fully operational for all vessel motion and attitude conditions in accordance with DOD-STD-1399, Section 301.

10.0 RELIABILITY

10.1 Mean Time Between Failures (MTBF) predictions must be calculated in accordance with industry standard BELLCORE prediction models, or equivalent method, for marine sheltered equipment operating at an ambient temperature of twenty-five (25) degrees Celsius.

10.2 MTBF prediction for any signal path must be no less than ten thousand (10,000) hours of use, refer to MIL-HDBK-217.

10.3 The average GPS CRPA and ancillary support equipment usage is estimated at six thousand (6000) hours per calendar year.

11.0 MAINTAINABILITY

11.1 Accessibility and Fabrication

11.1.1 All subassemblies and replaceable units must be easily accessible and readily removable for repair.

11.1.2 Keying or its equivalent must be used to prevent incorrect positioning of modules, connectors, and other components.

11.1.3 Positive stops must be provided on all hinged doors or panels to lock them in the open position, when necessary.

11.1.4 A system ground strap must be provided, conforming to MIL-STD-1310, for connecting to the vessel's common ground bus.

11.2 Indicators

11.2.1 All external incandescent status lights, if used, must be replaceable from the front.

11.2.2 Normally-off lamps must have push-to-test or other test provisions to verify their operation, if applicable.

ANNEX "E"

ELECTRONIC PAYMENT INSTRUMENTS

The Bidder accepts any of the following Electronic Payment Instrument(s):

( ) Direct Deposit (Domestic and International);

( ) Electronic Data Interchange (EDI);

( ) Wire Transfer (International Only);