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LETTER OF INTEREST
LETTRE D'INTÉRÊT

Title - Sujet
Spectrum Monitoring Evolution initi

Solicitation No. - N° de l'invitation UT255-153306/A	**Date** 2015-06-01
Client Reference No. - N° de référence du client UT255-153306	**GETS Ref. No. - N° de réf. de SEAG** PW-$$EE-017-28972
File No. - N° de dossier 017ee.UT255-153306	**CCC No./N° CCC - FMS No./N° VME**

Solicitation Closes - L'invitation prend fin
at - à 02:00 PM
on - le 2015-07-13

Time Zone
Fuseau horaire
Eastern Daylight Saving Time EDT

F.O.B. - F.A.B.
Plant-Usine: ☐ **Destination:** ☐ **Other-Autre:** ☐

Address Enquiries to: - Adresser toutes questions à: Lessard, Peter	**Buyer Id - Id de l'acheteur** 017ee
Telephone No. - N° de téléphone (819) 956-5846 ( )	**FAX No. - N° de FAX** (819) 953-3703

Destination - of Goods, Services, and Construction:
Destination - des biens, services et construction:

DEPARTMENT OF INDUSTRY CANADA
8948 ERIN/HALTON HILL RD
P.O.BOX 30
ACTON
Ontario
L7J2M2
Canada

Comments - Commentaires

Instructions: See Herein

Instructions: Voir aux présentes

Vendor/Firm Name and Address
Raison sociale et adresse du fournisseur/de l'entrepreneur

Delivery Required - Livraison exigée See Herein	**Delivery Offered - Livraison proposée**

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Name and title of person authorized to sign on behalf of Vendor/Firm (type or print)
Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)

Signature **Date**

Issuing Office - Bureau de distribution
Systems Software Procurement Division / Division des achats des logiciels d'exploitation
11 Laurier St. / 11 rue, Laurier
4C1, Place du Portage, Phase III
Gatineau
Quebec
K1A 0S5

Canada

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	Spectrum Monitoring Evolution initiative	UT255	UT255	1	LOT	$	$	See Herein	

Please see following Attachement.

Industry Canada Industrie Canada

Request for Information
For
Spectrum Monitoring Systems in Support of Government Spectrum Management Functions

May 20, 2015

Table of Contents

Respondents are requested to complete the following:

Full corporate name	
Full address of head office	
Full address of the sale and service office closest to Ottawa, Canada and number of employees at that office. As well please provide the location of other sale and service offices in Canada.	
Full address of any implementation partners with offices in Canada, if applicable	
Total number of worldwide employees	
Total number of worldwide employees dedicated to Spectrum Monitoring solutions	
Name of Spectrum Monitoring products. For each component product you are proposing, please provide the year that the product was first made commercially available and the year of the latest physical or software change.	

1.0 Purpose of the Request for Information

This Request for Information (RFI) has been issued by the Spectrum, Information Technologies and Telecommunications (SITT) Sector of Industry Canada. The RFI has been issued to gather information about potential hardware and software solutions that are currently commercially available to support the integrated Spectrum Monitoring requirements of government regulatory organizations. In addition, information on the implementation capabilities of Suppliers who provide such Spectrum Monitoring solutions for fixed stations and vehicles is of interest.

The purpose of this RFI is:

1) to help Industry Canada better understand the marketplace for integrated Spectrum Monitoring systems to support fixed station and vehicle solutions ;
2) to help Industry Canada develop a procurement and implementation strategy for evolving their existing Spectrum Monitoring infrastructure involving fixed stations and vehicles;
3) to refine planning and cost estimates; and,
4) to increase Industry Canada's knowledge and awareness of monitoring systems currently available.

Industry Canada may release a Request for Proposal (RFP) for Spectrum Monitoring systems (including hardware and software) depending on a number of factors, including availability and viability of solutions and funding approvals.

Industry Canada is interested in receiving information on Spectrum Monitoring solutions targeted explicitly at remote fixed station and vehicle solutions used by national regulators that cover as many of its identified requirements as possible. It should be noted that Industry Canada would ideally have the required functionality delivered through a single or small number of suppliers' base offering(s) rather than through a best-of-breed integration of several distinct products coming from multiple sources with several points of potential failure.

Industry Canada is interested in receiving responses directly from software and hardware suppliers, though information from other sources such as Integrators who have direct agreements with software and hardware vendors is also of interest. Suppliers should indicate that the software and hardware offerings are available now with one or more current versions/releases in production throughout the supplier's customer base.

The RFI document outlines a number of areas where information is being requested. To provide a focus for the type of information required by Industry Canada, specific questions are being asked to help focus the attention on core areas of interest for Industry Canada. Any and all related information, particularly related to the RFI questions, is appreciated.

Primary Questions of Interest

Primary Question 1.1	Given the information provided in Section 2, please provide any options and/or recommendations on how Industry Canada might procure the required hardware, software, and professional services given that funds may become available to the project sporadically over several years. For example, would you recommend procuring and implementing new control software to control Industry Canada's existing monitoring hardware or replacing existing monitoring hardware and having the new hardware controlled by new control software in a phased in approach? How might a 7-12 year replacement effort be planned and managed?
Primary Question 1.2	The frequency coverage requirements of the Spectrum Monitoring systems are at least for the range of 20 MHz to 3 GHZ, with options for extended frequency coverage above and below this range on certain systems as needed (Example: Options for spectrum analysis and radio direction finding up to 6 GHz for transportable and vehicle systems; Options for spectrum analysis and radio direction finding down to 100KHz). Please provide information on your ability to meet the frequency range requirements for the products being proposed.
Primary Question 1.3	Industry Canada is in the late stages of implementing a commercial software solution for the majority of their integrated Spectrum Management requirements outside of spectrum monitoring. That software solution is centered around the LS telcom SPECTRA suite of products and the Industry Canada licence includes entity licencing for their MONITORplus product. How does your product suite and/or proposed solution work and interoperate (or not) with LS telecom's MONITORplus product?
Primary Question 1.4	Which national regulators have deployed one or more of your Spectrum Monitoring hardware and software products? Please specify products or modules in use by each and the approximate number of users licensed for each product or module. Kindly supply contacts with national regulators using your products.
Primary Question 1.5	Given the Requirements outlined in Section 3 and the Metrics outlined in Section 2.3, please provide an indicative cost estimate for the up-front and ongoing costs associated with purchase and licensing of each of the products/modules that might make up a hardware and software solution that meets as many of Industry Canada's requirements as possible.*
Primary Question 1.6	What guidelines or metrics pertaining to the costs and levels of effort could be applied by Industry Canada to estimate the professional services costs and timelines associated with: (a) Monitoring project strategy development and planning; (b) System configuration, integration and implementation; and, (c) Project management *

**** Note that cost estimates should be provided in Canadian dollars, FOB Ottawa, exclusive of taxes. Cost estimates are for the purposes of this Request for Information only and will not affect any potential future Request for Proposal pricing proposals.***

2.0 Background

2.1 The Organization

The **Spectrum, Information Technologies and Telecommunications** (SITT) Sector of Industry Canada facilitates access to the radio frequency spectrum by issuing authorities for its use, securing Canada's access to it through international negotiations and by ensuring its continued health, in Canada, through well planned allocation of the spectrum, enforcement of standards and the ability to detect and find radio interference or inappropriate spectrum use.

Within this Sector, the **Spectrum Management Operations Branch (DGSO)** provides national leadership and program direction for the delivery of the Spectrum/Telecom Program across Canada. Under the authority of the *Radiocommunication Act* and the *Broadcasting Act*, the Branch:

- Develops spectrum management regulatory and operational policies and procedures;
- Plans, authorizes and manages radio spectrum use by Canadian operators and license holders, and certifies broadcasting facilities;
- Ensures appropriate access to the radio frequency spectrum by as many users and for as many uses as possible and have the ability to determine and find interference issues or inappropriate use of the radio spectrum ;
- Facilitates the restoration of telecommunications during times of emergency to maintain reliable communications for Canadians; and
- Provides fair return to the government for the use of the radio frequency spectrum.

2.2 The Project

The **Spectrum Monitoring Evolution (SME) Project** was created to investigate commercially available spectrum monitoring equipment and systems that will meet current and future needs associated with Industry Canada's Spectrum Monitoring requirements, including the monitoring and measurement of the use of radio frequencies to ensure compliance to license conditions and ensuring efficient usage of spectrum.

Spectrum Monitoring provides support for several key Industry Canada functions including inspections, interference investigations, enforcement, licensing activities and frequency assignment, and spectrum utilization planning and engineering.

Industry Canada's Spectrum Monitoring capability leverages a significant infrastructure of hardware (including standardized field vehicles, specialized monitoring vehicles, and fixed monitoring installations across the country) and software (to control the hardware remotely and to collect and analyze the associated data). It is estimated that about $50M has been invested in this infrastructure and it has an annual ongoing maintenance and upgrade budget that averages approximately $1M.

Elements of the present monitoring infrastructure and development capability of the current systems are no longer being supported. Industry Canada is in the process of undertaking a large

review project that would see a strategy developed for replacing this current infrastructure over the course of the next 10+ years as funds become available.

One of the key elements to this initiative will be to work with industry via RFI and RFP processes to select a strategy and product set (including both hardware and software) that could best meet Industry Canada's needs and establish a procurement mechanism whereby it could be implemented over a period of several years.

2.3 Scope of Procurement

Renewal of Industry Canada's Spectrum Monitoring infrastructure may include procurement of the following elements:

- Monitoring hardware including:
  - Spectrum and signal analyzers
  - Communication analyzers
  - Receivers
  - Radio direction finding equipment including fixed, mobile and transportable DF antenna arrays
  - Variety of monitoring antennas (I.E. Broadband, directional, omni…etc.)
  - Antenna rotator systems
  - RF antenna switch matrix

- Monitoring software including:
  - Remote hardware control, system networking and multi-user interface software for remote fixed station control and vehicle system operation
  - Data gathering, reporting and analysis tools
  - Monitoring software and equipment drivers compatible with a MS Windows, Win7, 64 bit operating system environment (Present standard for Industry Canada.)
  - Interface and data support capabilities with Industry Canada's spectrum management system (I.E. LS telcom, Spectra Spectrum Management Software Suite)

- Professional services including:
  - Monitoring project strategy development and planning
  - System configuration, integration and implementation
  - System installation and Maintenance
  - Project management
  - Enhanced system developments for future monitoring requirements, including the potential to collaborate with the Department's Communication Research Centre (CRC) in the development of future required monitoring capabilities

- Monitoring hardware and software control proposed by vendor should provide Industry Canada with solutions for both fixed monitoring stations and mobile (vehicle) monitoring platforms.

- Monitoring solutions proposed by vendor should provide for flexibility in hardware configurations and software control to support more capable and complex monitoring requirements, as well as, accommodating less capable and low cost monitoring solutions.

2.4 Metrics

While future requirements may vary, key metrics of today's Spectrum Monitoring infrastructure used by Industry Canada includes the following:

- 78 fixed monitoring sites
- 50 monitoring vehicles (Minivan or SUV type)
- 2 specialty monitoring vehicles (Cube and Sprinter type)
- 8 monitoring trailers
- 12 light weight portable monitoring systems

The Spectrum Monitoring infrastructure is primarily used by approximately 200 regional Spectrum Management Officers distributed among 25 offices across the country. Typical concurrent usage is between 1-10 users with some peak periods of 20-30 concurrent users.

2.5 Budget and Timeline

The budget and timeline for this project has not yet been set and definition of such along with a project strategy will be developed from the results of this Request for Information (RFI), results of ongoing Environmental Scan efforts with other national spectrum regulators, and internal discussions.

The full renewal of the Spectrum Monitoring capability will likely be funded over a 7-12 year period varying with the availability of Program resources. The project may be funded solely by the annual capital budget of the program or by one or more future injection of funds. There are no current plans for such a one-time injection of funds and thus the project and procurement strategy will be premised on a long-term spend of annual capital funds but will leave open other funding possibilities.

2.6 Current Monitoring Infrastructure

Industry Canada's current spectrum monitoring systems are comprised of the following hardware with varied distribution and installation:

<u>Fixed sites</u>

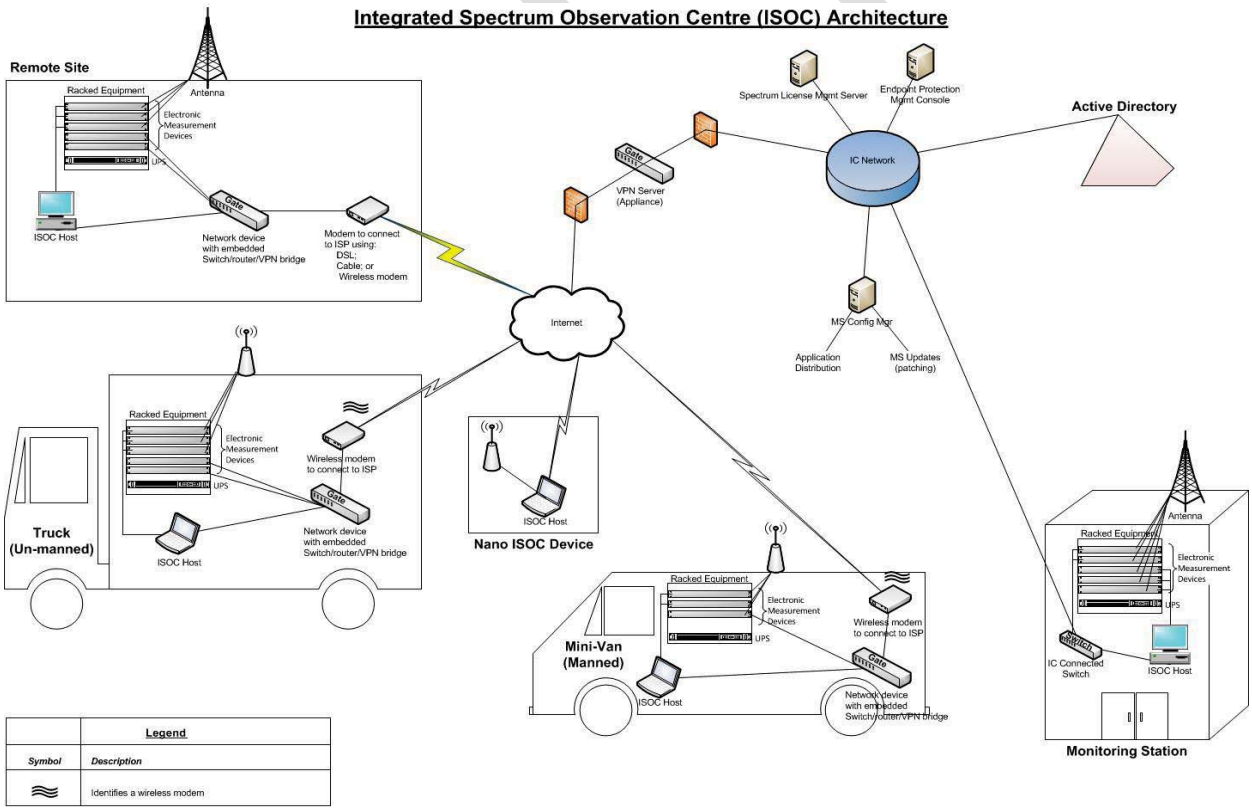
Spectrum Analyzer	– Rohde & Schwarz, Model FSx series (L/P/V); Agilent, Model 8594E series
Direction Finding	– Doppler Systems, Model DDF6000/6001/7000; Cubic, Model 4006R; CRC, Spectrum Explorer system utilizing DRS WJ8621/SI9136c tuners.
Receivers	– Icom, Model R-9000/8500/9500
Antenna Rotator	– Model EV 800 DX
RF switch matrix	– Aerosystems, Model ASI-100 RF Matrix

Vehicles

Spectrum Analyzer	– Rohde & Schwarz, Model FSx series (L/P/V); Tektronix, Model SA2500
Direction Finding	– Cubic, Model 4400 DF; CRC, Spectrum Explorer system utilizing DRS WJ8621/SI9144/SI9136c tuners.
Receivers	– Icom, Model 8500; Rohde & Schwarz, Model EB200

The majority of existing systems are controlled through custom control and multi user interface software (Integrated Spectrum Observation Centre - ISOC) to remotely control equipment through customized drivers, to manage measurement tasks for spectrum utilization data, audio recording sessions, networked direction finding control (multi-site triangulation) including mapping overlay, and to manage site audio, power, RF switching and other system controls.

The following diagram illustrates an example of the present spectrum monitoring system architecture used by Industry Canada (For reference only).



Industry Canada is in the late stages of implementing a commercial software solution for the majority of their integrated Spectrum Management requirements outside of spectrum monitoring. That software solution is centered on the LS telcom SPECTRA suite of products and the Industry Canada licence includes entity licencing for their MONITORplus product.

3.0 Functional Fit with Business Requirements

Suppliers should identify what product components or modules they offer to address the business requirement areas outlined in this section as well as indicate at least one national regulator client who has implemented said components or modules. Where components/modules and/or national regulator client implementations do not address 100% of the business requirements outlined in an area, please indicate such exceptions. Also provide any additional notes that would aid in Industry Canada's understanding of the product offering.

Suppliers are asked to provide a complete hard or soft copy of any available user documentation or manuals that currently ship with their software, including:

1) Functional /User documentation manual(s)
2) System Administration documentation manual(s)
3) Interface / Application Program Interface (API) documentation manual(s)

The Supplier may then refer to the volume / chapter / area(s) in the documentation manual(s) as part of their response to the listed RFI requirements.

A recommended response grid with representative sample data is provided as follows:

ID	Radio Spectrum Usage (Occupancy) Analysis a) Collection of frequency, channel and band specific usage data by system/software. b) Programmable scanning sessions and automated tasking by system/software. c) Data integrity review, analysis and reporting tools for the usage data. d) Options for data integration with LS telcom, Spectra Software Suite analysis and reporting tools. e) Capability of determining usage by frequency or band and/or usage by individual station on a defined frequency or within a defined frequency band.
Licensed Hardware and/or Software Offering and National Regulator Installed Base	XYZ Inc. offers our XYZSpectrum Usage product to address the requirements of radio spectrum usage analysis. Please refer to page xx of the XYZSpectrum Usage product brochure, Specification Guide or User Manual for a full description of the product's functional offerings. XYZSpectrum Usage product is currently in production used by 5 national regulator clients, including the National Regulator of ZZZ.
Exceptions	None of our existing national regulator clients have integrated our products utilization data with the LS telcom Spectra Software Suite analysis and reporting tools.
Notes	In addition to the XYZSpectrum Usage product, our product does provide the data and format required by LS telcom Spectra software modules and we also have several national regulator clients who have custom developed reporting tools to display and interact with data from our product.

Suppliers are asked to similarly complete the blank response grids as follows:

Business Requirement	<u>1. Radio Spectrum Usage (Occupancy) Analysis</u> a) Collection of frequency, channel and band specific usage data by system/software. b) Programmable scanning sessions and automated tasking by system/software. c) Quality review, analysis and reporting tools for occupancy data. d) Options for data storage and retrieval via LS telcom SPECTRA Software storage retrieval and reporting tools. e) Capability to determined usage by user/station on a defined frequency or within a defined frequency band.
Licensed Hardware and/or Software Offering and National Regulator Installed Base	
Exceptions	
Notes	

Business Requirement	<u>2. Monitoring for Compliance with Technical Standards and License Conditions</u> a) Evaluation of technical and operational characteristics of radio transmitters such as frequency offset, deviation, bandwidth, field strength, power density, modulation depth. b) License condition verification and unlicensed operation. c) Capability of signal demodulation and decoding, audio recording and playback for analogue and digital signals. (Specify) d) Identify and locate radio transmitters through Radio Direction Finding, including the use of multiple direction finding systems (i.e. fixed, mobile and transportable stations) to support triangulation DF methods and time difference of arrival DF methods.
Licensed Hardware and/or Software Offering and National Regulator Installed Base	
Exceptions	
Notes	

Business Requirement	<u>3. Solving Interference Problems</u> a) Real time spectrum and signal analysis. b) Audio demodulation capability, audio recording and playback for analogue and digital signals. (Specify). c) Intercept and locate analogue and digital signals with high probability of intercept for short duration signals (please indicate minimum required signal duration). d) Identifying and locating unintentional and intentional radiators through Radio Direction Finding (DF) including all narrow and wide band signals. (Specify) e) Automated recording and playback of spectral display, direction finding and audio data with time/date stamping capabilities to easily find information during playback. f) Identification of the signal modulation characteristics.
Licensed Hardware and/or Software Offering and National Regulator Installed Base	
Exceptions	
Notes	

Business Requirement	<u>4. System status monitoring and management</u> a) Monitoring system and equipment operational status. Reporting system failures. b) Monitoring and reporting system usage statistics. c) Monitoring site peripherals such as temperature, security sensors, power. d) Ability to report use of monitoring equipment.
Licensed Hardware and/or Software Offering and National Regulator Installed Base	
Exceptions	
Notes	

Business Requirement	<u>5. Graphical / Geographical / Visual Display</u> a) Ability to interface/utilize a variety of Graphical Information Systems for the purpose of visual display of external /internal data or the use of commercial data overlays. b) Provide geographical location display for fixed, transportable and mobile DF systems with Line of Bearing (LOB) and DF target location display. c) Examples of applications would be in propagation analysis, coverage mapping, antenna plotting, DF mapping etc.
Licensed Hardware and/or Software Offering and National Regulator Installed Base	
Exceptions	
Notes	

4.0 Information Management/ Information Technology (IM/IT) Considerations

Suppliers are asked to respond to each question in the following table to provide Industry Canada with relevant information on the IM/IT attributes of their product(s):

Question 4.1	Describe the application architecture (i.e. what components, interconnectivity, etc.) of a typical implementation of your product(s).
Question 4.2	Describe the infrastructure architecture for making your products operational in a typical implementation. Describe the typical operating environment. Include capacity/bandwidth requirements for each specified component; use the volumetric information in Section 6 to help with the understanding of capacity requirements. Describe key factors in determining bandwidth. Describe minimal desktop configuration requirements – CPU, memory, graphics capability (in the case of 3D graphical rendering and geographic information system (GIS) display), peripheral components, etc.
Question 4.3	Describe the integration architecture underpinning your solution. How do core hardware/software products integrate with 3rd Party systems – what currently supported interfaces exist? What data exchange and/or process choreographing mechanisms are supported (e.g. Service Oriented Architecture, XML, etc.)?
Question 4.4	Please provide schematic drawing(s) of a typical implementation of your product(s). Identify all hardware, client/server computers, and the software required (e.g. including operating system(s), database(s), application services, middleware, virtualization, etc.), and the interconnectivity of the components. In these depiction(s), include at least one remote fixed site, one mobile and one regional control site configuration framework. Identify all components of the architecture, including network components. Identify what components are web-based versus thick-client. Identify if any servers must be dedicated, or if they can share server space on corporate servers and under what conditions.
Question 4.5	Describe multilingual capability, specifically the support of English and French across all user interface components, and degree of localization (i.e. textual content, labels, titles, system messages, help system, pick-lists, et cetera).
Question 4.6	Describe the enabling technologies that have been used in the development of the software components of your solution (e.g. .NET, Java, Oracle Forms, PL/SQL, C/C++, et cetera). Suppliers should describe how future-ready capable their solution is i.e. Java EE, XHTML compliance, Windows 7.0, 64-bit client workstations, other (specify).

Question 4.7	Describe the product development strategy for the hardware and software product(s). How do you decide on new technology adoption, improvements, and modernization? How often do you publish new releases and what is your upgrade/support policy? Describe security update and operating system support for spectrum monitoring product(s) connecting to a corporate network (i.e. security patch support).
Question 4.8	Describe the approach and capabilities related to reporting. Describe the range of canned reports, parameterized reports, and reports for regular users vs. executive and management reporting. Describe the capability to develop custom reports. Suppliers should also identify the output(s) available for the reports - i.e. HTML, Text, Rich Text, PDF, other (specify).

5.0 Product Implementation Activities

Suppliers are asked to respond to each question in the following table to provide Industry Canada with relevant information on how their product(s) might be implemented:

Question 5.1	Please describe a typical implementation approach for your product(s) and a realistic/conservative timeline for implementation activities including any insight into typical phasing-in of functionality and/or services.
Question 5.2	Describe how you recommend that customers organize themselves to implement your product(s). Specifically, please provide a traditional organization chart illustrating what would be ideal for the successful implementation of your product(s). The organization chart and attached comments should outline key roles / responsibilities and the reporting relationships of these collectively up to the client project sponsor. Please identify specific roles that you suggest be filled by vendor staff and what expertise would be required from various client stakeholder groups.
Question 5.3	Outline any key success factors that you might suggest to ensure the successful implementation of your product(s). This might include human resource, change management, or other factors.
Question 5.4	Describe your approach, capability, and any recommended options for training users in our organization on the features of your solution. In doing so, factor in the significance of a diverse user base in terms of geographic location and varying degree of skill set and knowledge.
Question 5.5	Outline what future spectrum monitoring capabilities your firm is reviewing or will be addressing, that are not currently covered by your current spectrum monitoring systems?

6.0 Licensing and Costs Considerations

Suppliers are asked to respond to each question in the following table to provide Industry Canada with relevant information on how their product(s) are licenced:

Question 6.1	Please describe your hardware own/lease models and software standard licencing model(s) (e.g. per named user, per concurrent user, enterprise licence, etc.) and describe how they might be applied or modified to best fit Industry Canada's requirements.
Question 6.2	Please specify any peripheral licensing requirements (i.e. any third-party products used to deliver relevant functionality such as reporting/business intelligence, mapping data, geographically information systems, etc.).
Question 6.3	For all products referenced in your response, please describe the typical annual maintenance and support requirements and how costs for these services are calculated. If there are varying levels of maintenance and support services, please describe the differences and provide costs for each.
Question 6.4	Please provide your current standard per diem rates, by resource type, for any analysis, installation, and customization efforts.
Question 6.5	Please provide a brief overview of any standardized training offerings including pricing and location details for any regularly scheduled classes (on a per student basis including any multi-student discounts) and pricing details for on-site training at Industry Canada (on a per session basis including guidelines on maximum students per session).
Question 6.6	In order to ensure an "apples-to-apples" comparison of costs between potential Suppliers, please detail any and all direct and indirect cost elements that you typically foresee for purchase/lease, licensing and implementation in similar projects.
Question 6.7	What type of users based on access roles would you recommend for the solution?

*** Responses in this section should reflect pricing in Canadian dollars, FOB Ottawa, and exclusive of taxes.** ***Cost estimates are for the purposes of this Request for Information only and will not affect any potential future Request for Proposal pricing proposal.***

Annex A: Glossary of Acronyms

This glossary provides an explanation of various acronyms used in this document.

Acronym	Meaning
API	Application Program Interface
CPU	Central Processing Unit
CRC	Communication Research Centre
DF	Direction Finding
DGSO	Spectrum Management Operations Branch
DSL	Digital Subscriber Line
FOB	Free on Board
GIS	Geographical Information System
HTML	Hyper Text Markup Language
IC	Industry Canada
IM/IT	Information Management/Information Technology
ISOC	Integrated Spectrum Observation Centre
ISP	Internet Service Provider
LOB	Line of Bearing
MS	Microsoft
PDF	Portable Document Format
RF	Radio Frequency
RFI	Request for Information
RFP	Request for Proposal
SITT	Spectrum, Information Technologies and Telecommunications Sector of Industry Canada
SMEP	Spectrum Monitoring Evolution Project
SUV	Sport Utility Vehicle
UPS	Uninterrupted Power Source
VPN	Virtual Private Network
XML	Extensible Markup Language