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

## SOLICITATION AMENDMENT MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

**Comments - Commentaires**  
THIS DOCUMENT CONTAINS A SECURITY  
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<b>Title - Sujet</b> Mercury Global Anchor Stations	
<b>Solicitation No. - N° de l'invitation</b> W8474-14MG25/A	<b>Amendment No. - N° modif.</b> 004
<b>Client Reference No. - N° de référence du client</b> W8474-14MG25	<b>Date</b> 2013-09-18
<b>GETS Reference No. - N° de référence de SEAG</b> PW-\$\$\$T-006-26331	
<b>File No. - N° de dossier</b> 006st.W8474-14MG25	<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 2013-10-31</b>	<b>Time Zone</b> <b>Fuseau horaire</b> Eastern Daylight Saving Time EDT
<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> Thorsley, Mark	<b>Buyer Id - Id de l'acheteur</b> 006st
<b>Telephone No. - N° de téléphone</b> (819) 956-1772 ( )	<b>FAX No. - N° de FAX</b> (819) 997-2229
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<b>Signature</b>	<b>Date</b>

This amendment is raised to address the following:

- To respond to questions received during the solicitation period; and
- To revise the solicitation accordingly, as applicable.

## **Questions and Answers**

### **Q20 DAB SOW, Section 5.2.10**

Section 5.2.10.2 of the DAB SOW states a requirement to analyze the propagation link availability A) to and from the satellite according to the scenarios in Table 1-4, and B) end to end according to Appendix 2 and provide the results in the TLDR. Appendix 2, Section 2.2.3 is clear: it requires that any fade mitigation techniques be described. Section 2.5.2 of Appendix 2 provides propagation availability targets but to verify that this can be achieved requires a complete and accurate end to end link budget (including terminal performance and MODCOD) to determine if the available link margin accommodates the propagation link statistics or not.

In contrast, Appendix 7 of the Bid Evaluation Plan describing the BRA states that the contractor only provide the basic performance parameters of our design that would then be used as an input with Table A7.2 and A7.3 for evaluation by USASMDC/ARSTRAT. It is this software that would presumably be able to determine an accurate link budget from which the propagation availability requested in Section 2.5.2 of Appendix 2 could be determined.

(Note also that this section fixes the modulation and coding scheme, margins, etc for the BRA. Given that this fixes the bandwidth for each carrier type and mission set, that Canada has defined the modems to use, and that all of the rest of the satellite and link parameters would be common between all of the bidders, the BRA analysis correlates directly with the anchor station EIRP and G/T performance that are already part of the evaluation criteria making them somewhat double-counted).

Putting these points together, the DAB SOW appears to ask for the contractor to provide a detailed link analysis while Appendix 7 of the Evaluation Plan suggests that the contractor provide only high level information for inputs to a detailed analysis by USASMDC/ARSTRAT. The latter approach seems to be the only practical analysis at this time, since:

- there has been no provision of satellite gain information needed in any Eb/No calculation, nor is there any satellite antenna pattern information. "Satellite Transmit peak EIRP performance can be assumed to be at least 3 dB better than edge-of-coverage" (DAB SOW Section 1.3.1 e) is too vague to be useful for this analysis and refers only to satellite transmit.
- "Standard regulatory adjacent satellite interference assumptions can be assumed." (DAB SOW Section 1.3.1 f). We are not aware of appropriate standards to use for military band communications. Standards such as FCC 25.138 apply to commercial band applications only.
- Other users of the satellite would drive the satellite closer to its operating point than our traffic alone, affecting the C/I contribution from the satellite.

Note that Appendix 3 of the Bid Evaluation Plan also states that the propagation availability be "regardless of Anchor Site and terminal class", suggesting that the analysis be done for the worst possible link. Was this intended? This makes an accurate analysis that much more critical.

To summarize: The propagation availability analysis is intertwined with the link analysis. Could Canada clarify the requirements for these analyses to be provided at the proposal stage, especially in light of the limited information available to the bidders at this time and the sensitivity of the results to any assumptions made? Perhaps our confusion is the level of analysis that is to be provided as part of the initial proposal vs. the analysis that would be performed as the project develops?

A20 With respect to the MG SATCOM transmission link design and analysis, the bidder is encouraged to distinguish among the following:

1. What is required for specification , e.g., DAB SOW, Section 5.2.10.2A?
2. What is required for evaluation, e.g., Appendix 7 of the Bid Evaluation Plan?
3. What is required for an indication of the bidder's link analysis capability, i.e., DAB SOW, Section 5.2.10.2B?
4. What is required initially at bid and subsequently to be updated as a CDRL after Contract Award and more WGS specific information can be transferred, i.e., TLDR DAB SOW, Section 5.2.10.3?
5. What is required to be monitored after acceptance of the Anchor Segment, e.g., outage, G/T, Transmit EIRP?

With respect to no. 1, the specification is to be determined on an individual communication link basis. It is important to note that Canada requires that any MG SATCOM link be available IAW required, and for as long as required, for any IER. Therefore, using the information presented in Table 1-4, Anchor Station RF propagation availability specifications are essential on the Anchor Station side (uplink forward and downlink return), per climate regions at the Anchor Sites, and which would accommodate the most stringent communication link determined (and guaranteed) by the bidder (i.e., using the designated notional remote terminal). This also necessitates accommodating the propagation availability to reflect predictable events such as sun transit outages. As stated, Site Diversity, while not a mandatory requirement, might be proposed to improve or maintain a particular guaranteed RF propagation availability.

With respect to no. 2, the BRA analysis is a cumulative clear sky bandwidth allocation, keyed on the proposed Anchor Stations; i.e., the overall number and optimised capacity of the SATCOM links that comprise the missions. The intent is not for it to be used by Canada to determine an availability target that would be mandated for the winning bidder.

With respect to 3, the end-to-end link performance (including end-to-end propagation availability) is not a mandated requirement since the Terminal Segment is not part of this SOW. However, it is expected that the bidder will use this type of analysis to establish its guaranteed specifications (e.g., item no.1). Any assumptions being made in support of this specification will be evaluated as per its appropriateness and Canada thinks it is a reasonable start to assume (if appropriate) acceptable SATCOM link design allocations.

With respect to 4, the TLDR is a living document that is initially submitted at bid but will be required to be updated after contract award prior to CDR (and other WGS-specific information can be provided to the Contractor), and as necessary thereafter during the In-Service Support phases.

With respect to 5, as stated, Canada will consider the implementation of reference communication links to provide the means to continuously monitor the outage/RF propagation availability; for each WGS satellite being anchored. This will be decided prior to CDR. In this scenario, the reference terminals will be provided by Canada.

Q21 Anchor Station Availability -Section: Reference DAB SOW Appendix 2 section 2.4 Anchor Station Availability paragraph 2.4.2

The RFP states that Anchor Station Availability must include allocation for the NMS availability, with respect to any NMS functionality required to establish and maintain the IER.

Is it correct for the bidders to assume that an NMS failure that does not impact established circuits will not count as an unavailability to the Anchor Station and IER?

A21 Minor NMS failures that do not impact the establishment, maintenance, and management of the IERs do not count towards unavailability of the Anchor Station . Basically, Canada envisions that minor failures related to esthetics and other types agreed between the Contractor and Canada do not count towards unavailability.

Q22 Modem Deliverables Section: DAB SOW Section 5.2.6.2

With respect to DAB SOW, section 5.2.6.2 Modem Deliverables seems to be in conflict with requirements in Appendix 2 section 2.3.2 IF Transmit and Receive regarding total number of modems to be supported at each Anchor Site. Section 5.2.6.2 appears to indicate the entire MGAS solution is to support 60 modems with expansion to 125 after initial delivery. This is interpreted to be 20 modems at each Anchor Site location totaling 60 across the three sites. However, Appendix 2 indicates EACH Anchor Site is to support 60 modems with expansion to 125 after initial delivery. This requirement appears to indicate a total delivery of 180 modems (60 at each Anchor Site x 3 Anchor Sites).

Will Canada confirm the total number of modems the contractor is asked to initially support from EACH Anchor Site as well as the expansion requirement for EACH Anchor Site?

A22 Canada confirms the total number of modems the contractor is asked to initially support from EACH Anchor Site is sixty (60) for a total MGAS initial capability of 180 modems. As well, each site must be capable of accommodating a further 65 modems for a total of 125 modems at each site.

Q23 Mission planning tool(s) Section: DAB SOW 5.2.9.1.d (including Figure 5-3: and 5.2.9.2.e)

Please clarify the mission planning requirement for the NMS, what does the SCOC's or other mission planning tool(s) consist of?

A23 The mission planning tools are those related to link analysis and link planning scenarios; e.g., link budget tool, sun transit prediction, transmission scenarios, etc. No Mission Planning tools exist currently at SCOC or elsewhere.

Q24 When calculating RF propagation availability for the "Anchor Station RF Propagation Availability Evaluation", are bidders permitted to assume satellite parameters appropriate for the center of beam coverage and/or beginning of life?

A24 The appropriate satellite parameters provided are for Edge-of-Coverage and End-of-Life.

Q25 DAB SOW 3.2.1, 3.2.3, and Appendix 4 (CDRL) - Telecom Facility Provision CDRL

We note that the CDRL table requires that bidders provide the Telecom Shelter Facility Provision CDRL (DAB?SE?015) with the bid proposal, but that it is not mentioned in Section 3.2.1 or 3.2.3. We recommend that you provide an update to one of Sections 3.2.1 or 3.2.3 to include the Telecom Facility Provision document.

A25 Agree. As responded previously, the Telecom Shelter (and site preparation) is presented as an option that will be exercised by Canada. The reason it was done this way was to communicate to industry that the site and Telecom Shelter are new requirements that are not included in the ceiling price; and as such represent additional cost above the ceiling price. For the purposes of bid preparation, the telecom shelter and site option are to be included. The DAB SOW has been amended accordingly as per item 1 below.

Q26 Bid Evaluation Plan, Appendix 7- Table A7.3

Table A7.3 of the Bid Evaluation Plan is inconsistent with Table 1-5 of the DAB SOW. Please update Table A7.3.

A26 Table 7.3 in the Evaluation Plan has an additional column of details to provide general information. This does not represent a mandatory level of details that is necessary in the DAB SOW.

Q27 The WGS Fact Sheet gives the total X-band EIRP to be 60.2 dBW. Is the total EIRP available for a single beam, or is each beam restricted to 1/8 of the power?

A27 The X-band Phased Array EIRP is adjustable such that 100% of the EIRP (60.2 dBW) can be made available in one beam, or the EIRP can be distributed in any desired percentage across any number of the 8 beams such that the total of percentages across all beams in use is equal to 100% EIRP (60.2 dBW).

Q28 When calculating RF propagation availability for the "Anchor Station RF Propagation Availability Evaluation", what specific value of interference (in dB) should bidders assume for the following?

A28 For transmission link design and analysis the following can be used:

- i. Uplink X-pol (Target/Assume a minimum 25 dB)
- ii. Downlink X-pol (Target/Assume a minimum 25 dB)
- iii. Adjacent satellite interference (Adjacent satellite)
- iv. Interference on uplink of -20.9 dBW/Hz and on downlink of the sum of -20 dBW/Hz and -32 dBW/Hz affects all links; where interference is based on Geocentric angles
- v. Uplink intermod (Assume satellite amplifiers are linearised)
- vi. Transponder intermod (Assume satellite amplifiers are linearised)

Q29 DAB SOW Section 5.2.10 Transmission Link Design - Satellite performance parameters

Table 1-4 provides the information about the links between the HUB terminal and the remote terminals for the purpose of carrying out the required link budget analysis. The Table includes data rate, Hub terminal, and quantity, type, and location of the remote terminals.

Tables 1-5 provides the information on the remote terminals to be used in the link budget analysis, including terminal EIRP, G/T, antenna size, and modem designation.

Section 5.2.10.1 requires that the analysis consider, among other things "iv. WGS Spacecraft uplink and downlink performance parameters". The information provided regarding the WGS performance parameters is incomplete and is NOT adequate for completing this analysis.

The additional information need about the satellite segment is as follows:

- For each link identified in Table 1-4, please specify the satellite to be used in the link analysis in each case
- For each link identified in Table 1-4, please specify the satellite uplink and downlink BEAMs to be used in the link analysis in each case for the HUB terminal and the remote terminal
- For each link identified in Table 1-4, please specify the satellite transponder parameters to be used in the link analysis in each case:
  - o transponder # or transponder frequencies
  - o transponder SFD or gain setting
  - o input/output back-off
  - o transponder bandwidth
  - o transponder C/IM specification

A29 As per the DAB SOW sub-section 1.3.1 (and follow-on clarification) "The four (4) WGS satellites currently visible from Canada are located at: 12oW, 52.5oW, 135oW, and 175oE." Also, Figure 1-3 presents the Canadian WGS Regional Views. Bidders should use this information as they reason appropriate.

Beam information is as identified in the WGS Factsheet. Concentric uplink and downlink beams can be assumed.

1. Transponder # or transponder frequencies (The frequency band is military X- and Ka-band; use worst case frequencies as appropriate)
2. Transponder SFD or gain setting (Not available; use as deemed appropriate)
3. Input/output back-off (Not Available; use as deemed appropriate, transponders are linearised)
4. Transponder bandwidth (See WGS Fact Sheet DAB SOW, Appendix 1)
5. Transponder C/IM specification (Assume linearised transponder)

Q30 DAB SOW Section 5.2.10 Transmission Link Design - Modem parameters

The specified modems support a very broad range of modulation and coding options, in many cases running to several dozens of combinations. In order for all bidders to produce consistent link analysis, please specify the modulation and code rate set for each of the links. If it is the intent to leave the selection of modulation and code rates to each bidder, please provide guidance on which criteria bidders should use in making these selections. Options include selecting modulation and code rate to satisfy one of the following criteria:

- minimize the transponder resources (EIRP and bandwidth) required to support each link in each case defined in Table 1-4.
- minimize the EIRP (and so HPA power) at either the HUB, remote, or both needed to close the links in each case defined in Table 1-4.

- maximize the link margins and corresponding availability of each link in each case defined in Table 1-4.

A30 With respect to the MG SATCOM transmission link design and analysis, the bidder is encouraged to distinguish among the following:

1. What is required for specification , i.e., DAB SOW, Section 5.2.10.2A?
2. What is required for evaluation i.e., Appendix 7 of the Bid Evaluation Plan?
3. What is required for an indication of the bidder's link analysis capability, i.e., DAB SOW, Section 5.2.10.2B?
4. What is required initially at Bid and subsequently to be updated as a CDRL after Contract Award and more WGS specific information can be transferred, i.e., TLDR DAB SOW, Section 5.2.10.3?
5. What is required to be monitored after acceptance of the Anchor Segment, e.g., outage, G/T, Transmit EIRP?

With respect to no. 1, the specification is to be determined on an individual communication link basis. Canada requires that any MG SATCOM link be available IAW required, and for as long as required, for any IER. Therefore, using the information presented in Table 1-4, Anchor Station RF propagation availability specifications are essential on the Anchor Station side (uplink forward and downlink return), per climate regions at the Anchor Sites, and which would accommodate the most stringent communication link determined (and guaranteed) by the bidder (i.e., using the designated notional remote terminal). This also necessitates accommodating the propagation availability to reflect predictable events such as sun transit outages. As stated, Site Diversity, while not a mandatory requirement, might be proposed to improve or maintain a particular guaranteed RF propagation availability.

With respect to no. 2, the BRA analysis is a cumulative clear sky bandwidth allocation, keyed on the proposed Anchor Stations; i.e., the overall number and optimised capacity of the SATCOM links that comprise the missions. The intent is not for it to be used by Canada to determine an availability target that would be mandated for the winning bidder.

With respect to 3, the end-to-end link performance (including end-to-end propagation availability) is not a mandated requirement since the Terminal Segment is not part of this SOW. However, it is expected that the bidder will use this type of analysis to establish its guaranteed specifications (e.g., item no.1). Any assumptions being made in support of this specification will be evaluated as per its appropriateness and Canada thinks it is a reasonable start to assume (if appropriate) acceptable SATCOM link design allocations.

With respect to 4, the TLDR is a living document that is initially submitted at Bid but will be required to be updated after contract award prior to CDR (and other WGS-specific information can be provided to the Contractor), and as necessary thereafter during the In-Service Support phases.

With respect to 5, as stated, Canada will consider the implementation of reference communication links to provide the means to continuously monitor the outage/RF propagation availability; for each WGS satellite being anchored. This will be decided prior to CDR. In this scenario, the reference terminals will be provided by Canada.

Q31 DAB SOW Section 5.2.10.2 RF Propagation Link Availability - Sun Outage

Sun-transit outages are a known and easily predicted phenomenon. The duration of such outages varies year to year and depends on the location of the terminal and the satellite. As such it is NOT a statistical or random parameter, such as rainfall. Nor is it a propagation issue. It is more akin to such things as scheduled maintenance or hardware upgrades that also cause "outages" of the equipment or subsystems involved.

There are no mitigation techniques that can be used to eliminate or lessen these events. Therefore, these fixed downtimes (due to sun transit, scheduled maintenance, etc.) are in nearly all cases NOT included in an analysis of RF propagation availability.

We recommend that these outages be computed and included in the proposal as additional performance information, but that they be excluded from the analysis of propagation availability.

- A31 Canada acknowledges that the standard approach to RF propagation availability is to exclude the effect of fading due to spring and autumn Sun transits. However, unlike scheduled maintenance, MG operational activities may not have the flexibility to re-schedule SATCOM requirements to account for this phenomenon.

Given the known location of the Anchor Sites, the WGS satellites of interest, proposed antenna specifications, established sun transit analyser programs available, and the reference link being used to develop the guaranteed availability specification, bidders are encouraged to predict whether there is a complete loss of signal or only a tolerable degradation in signal quality (and the resulting time of outage) for each Anchor Station; and its impact on the RF Propagation Availability. Bidders can also propose Site Diversity across the Anchor Segment as a means of mitigating this effect during these periods.

- Q32 On page 51 of 63 in RFP, Annex H - the tables "Availability Delivered for Applicable Month": the second row has an '=' sign in it indicating "Less than or equal to 99.9X%". This indicates that the contractor gets penalized for meeting their availability. Suggest that the '=' sign be moved to the top row so it is "equal to or greater than 99.9X%". This table reappears incorrectly throughout this Annex.
- A32 The table is incorrect. A revised table including an additional row for meeting the availability has been amended as per item 2 below.
- Q33 Outstanding questions relating to RF transmission link design are limiting our ability to finalize the terminal size, e.g. antenna aperture and amplifier power. Will the DND consider an extension of 4 weeks to allow contractors to optimize proposed design with DND's clarifications/answers to these questions?
- A33 Canada is able to provide an extension of 4 weeks. The solicitation has been amended accordingly.

### **Solicitation Revisions**

1. At Annex A Statement of Work - Design and Build, section 3.2.3:

INSERT: (g) Telecom Shelter Facility Provision (CDRL-DAB-SE-015)



## 2. At Annex H, Basis of Payment - In-Service Support,

DELETE: All occurrences of the following table:

Availability Delivered for Applicable Month	Adjustment Per Month
> 99.9X% ( <i>X as per bid</i> )	+ 5%
<= 99.9X% ( <i>X as per bid</i> )	- 5%
< 99.90%	- 10%

INSERT: Replace all occurrences with the following table:

Availability Delivered for Applicable Month	Adjustment Per Month
> 99.9X% ( <i>X as per bid</i> )	+ 5%
= 99.9X% ( <i>X as per bid</i> )	-
< 99.9X% ( <i>X as per bid</i> )	- 5%
< 99.90%	- 10%

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ALL OTHER TERMS AND CONDITIONS REMAIN THE SAME