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11 Laurier St. / 11, rue Laurier
Place du Portage, Phase III
Core 0A1 / Noyau 0A1
Gatineau, Québec K1A 0S5
Bid Fax: (819) 997-9776

Revision to a Request for a Standing Offer
Révision à une demande d'offre à commandes
National Master Standing Offer (NMSO)
Offre à commandes principale et nationale (OCPN)

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

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

Comments - Commentaires

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

Issuing Office - Bureau de distribution
Acquisition Branch, STAMS, ITSPD / Direction générale des acquisitions, SGAST, DASIT
Computer Hardware Division
Div. de l'équipement informatique
Place du Portage, Phase III, 4C2
11 Laurier Street/11, rue Laurier
Gatineau
Québec
K1A 0S5

Title - Sujet NMSO - COMPUTERS	
Solicitation No. - N° de l'invitation E60EJ-11000C/H	Date 2012-09-28
Client Reference No. - N° de référence du client E60EJ-11000C	Amendment No. - N° modif. 001
File No. - N° de dossier 436ej.E60EJ-11000C	CCC No./N° CCC - FMS No./N° VME
GETS Reference No. - N° de référence de SEAG PW-\$\$EJ-436-24924	
Date of Original Request for Standing Offer Date de la demande de l'offre à commandes originale 2012-09-20	
Solicitation Closes - L'invitation prend fin at - à 02:00 PM on - le 2012-11-30	
Address Enquiries to: - Adresser toutes questions à: Lipski, Sarah	Buyer Id - Id de l'acheteur 436ej
Telephone No. - N° de téléphone (819) 956-4013 ()	FAX No. - N° de FAX (819) 956-1156
Delivery Required - Livraison exigée	
Destination - of Goods, Services, and Construction: Destination - des biens, services et construction: See herein	
Security - Sécurité This revision does not change the security requirements of the Offer. Cette révision ne change pas les besoins en matière de sécurité de la présente offre.	

Instructions: See Herein

Instructions: Voir aux présentes

Acknowledgement copy required	Yes - Oui	No - Non
Accusé de réception requis	<input type="checkbox"/>	<input type="checkbox"/>
The Offeror hereby acknowledges this revision to its Offer. Le proposant constate, par la présente, cette révision à son offre.		
Signature	Date	
Name and title of person authorized to sign on behalf of offeror. (type or print) Nom et titre de la personne autorisée à signer au nom du proposant. (taper ou écrire en caractères d'imprimerie)		
For the Minister - Pour le Ministre		

Solicitation No. - N° de l'invitation

E60EJ-11000C/H

Client Ref. No. - N° de réf. du client

E60EJ-11000C

Amd. No. - N° de la modif.

001

File No. - N° du dossier

436ejE60EJ-11000C

Buyer ID - Id de l'acheteur

436ej

CCC No./N° CCC - FMS No/ N° VME

The purpose of this Amendment is to extend the first Question Period until 2PM, Thursday, October 4, 2012.

Also included is a revised Annex A, Technical Specifications.

ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED

ANNEX A: TECHNICAL SPECIFICATIONS - SERVERS

1.0 INTRODUCTION

- (a) This document addresses the requirement for eight (8) categories of Rack / Pedestal based systems and eight (8) Blade based systems. The categories are as follows:

Note: Categories shown in italics are not being competed at this time.
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- (i) *Category 1.0V Low-cost Computing (LCC) 1-Socket Pedestal or Rack-optimized 2U;*
 - (ii) Category 1.0S Rack-Optimized 2-Socket 1U;
 - (iii) Category 2.0S Rack-Optimized 2-Socket 2U;
 - (iv) Category 2.1S Rack-Optimized Enterprise 2-Socket 2U;
 - (v) Category 3.0S Pedestal-To-Rack Convertible Departmental 2-Socket 5U;
 - (vi) Category 4.0S Rack-Mount Departmental 4-Socket 4U;
 - (vii) *Category 4.1S Rack-Mount Enterprise 4-Socket 4U;*
 - (viii) *Category 4.2S Rack-Mount Enterprise 8-Socket 10U;*
 - (ix) Category 1.0B Blade Chassis / Enclosure;
 - (x) Category 2.0B 2-Socket Blade;
 - (xi) Category 2.1B 2-Socket Blade Enterprise;
 - (xii) Category 3.0B 4-Socket Blade;
 - (xiii) Category 3.1B 4-Socket Blade Enterprise;
 - (xiv) *Category 4.0B Entry-Level UNIX 1 RISC or EPIC Processor Based;*
 - (xv) *Category 4.1B Mid-Level UNIX 2-to-4 RISC or EPIC Processor Based; and*
 - (xvi) *Category 5.0B 1-to-2 Socket HPC - Graphics Intensive Blade.*
- (b) The Systems must:
- (i) Be commercially available;
 - (ii) Use a single chassis / enclosure with the exception of Categories 4.2S, 3.1B and 4.1B where a maximum of 2 is allowed provided the configuration runs and recognizes the Operating System under 3.2 Operating System and Hypervisor as one system image;
 - (iii) Be based on industry standard x86 64-Bit architecture from either Intel or AMD with the exception of Categories 4.0B and 4.1B where systems must be based on either 64-Bit RISC or EPIC architecture;
 - (iv) Be compatible with the installed base of Intel Xeon, and AMD Opteron systems within the Federal Government and conform to industry standard architecture with the exception of Categories 4.0B and 4.1B;
 - (v) Be certified to operate under one of the currently released UNIX Operating System variants if offered under categories 4.0B and 4.1B: IBM's AIX, Hewlett-Packard's HP-UX, or Oracle's Solaris;
 - (vi) Provide 100% binary compatibility to any of the existing UNIX OS variants identified in (v) if offered under categories 4.0B and 4.1B;
 - (vii) Not be embellished from its original purpose (e.g.: portable / mobile turned server or desktop / workstation turned server);

- (viii) Be fully operational and in ready-to-use state, containing all major components and all requisite ancillary items. These include but are not limited to: Chassis / enclosure, motherboard / system board, processor / processor modules / memory / memory cards, UNIX Operating System (for Categories 4.0B & 4.1B), power supplies, cooling fans, internal / external cables to the System, I/O cables, etc. to allow the system to satisfy the requirements in the environments identified in 3.2, Operating System and Hypervisor.

2.0 CONFIGURATIONS

Systems must meet or exceed the technical specifications outlined in this annex.

2.1 CATEGORY 1.0V LOW-COST COMPUTING (LCC) 1-SOCKET PEDESTAL OR RACK-OPTIMIZED 2U:

- (a) Competed under E60EJ-11000C/E – currently not being tendered.

2.2 CATEGORY 1.0S RACK-OPTIMIZED 2-SOCKET 1U:

- (a) Be available in a rack form-factor with a maximum size of 1U (1.75").
- (b) Have two (2) Intel Xeon E5-2660 or two (2) AMD Opteron 6284SE processors.
- (c) Have no less than two (2) QuickPath Interconnect (QPI) links for Intel Xeon or HyperTransport Technology 3.0 (HT3) for AMD Opteron.
- (d) Provide hardware virtualization (e.g.: Intel VT or AMD-V 2.0) capability.
- (e) Support a minimum of 512 Gigabyte (GB) of Quad-Channel PC3-12800 (DDR3-1600) Registered DIMMs.
- (f) Include a SAS controller with sufficient ports supporting the maximum installable disk drives. Controller must have minimum support for RAID 0, 1, 5 and 6 (double-parity) with 256MB of ECC (BBWC) Battery-Backed-Write-Cache.
- (g) Have six (6) vacant hot-swap drive bays to accommodate the installation of SAS Hard Disk Drives.
- (h) Have an integrated dual-port 100/1000Base-T or integrated 10GSFP+ network interface adapter capable of fault tolerance (FT) and load balancing.
- (i) Have one (1) internal ISO9660 compliant 8X speed DVD-ROM drive or via virtual media (eg: ILO or ILOM) that facilitates access to a remote optical media.
- (j) Have two (2) vacant 64bit PCI-Express Gen 2 (minimum 4x lane) slots or better after configuration.
- (k) Provide Keyboard, Mouse, and Serial ports or three (3) USB ports.
- (l) Have one (1) management port. A serial port or NIC port may be used for this function. If a NIC port is used, it must not be from item (h) above.
- (m) Have an integrated video graphics controller supporting a minimum of 1024 x 768 resolution.
- (n) Have a minimum of two (2) hot-swap / hot plug power supplies one of which must be redundant.
- (o) Support 110 to 125 VAC or 200 to 240 VAC @ 50Hz & 60Hz.
- (p) Provide hot-swap / hot-plug redundant cooling fans. These fans are in addition to the power supply fans and any CPU fans (if offered). These fans must either be constantly operational or thermostatically controlled.
- (q) Provide sufficient cooling to permit full density rack mounting (without spacing).

2.3 CATEGORY 2.0S RACK-OPTIMIZED 2-SOCKET 2U:

- (a) Be available in a rack form-factor with a maximum size of 2U (3.5").
- (b) Have two (2) Intel Xeon E5-2660 or two (2) AMD Opteron 6284SE processors.
- (c) Have no less than two (2) QuickPath Interconnect (QPI) links for Intel Xeon or HyperTransport Technology 3.0 (HT3) for AMD Opteron.

- (d) Provide hardware virtualization (e.g.: Intel VT or AMD-V 2.0) capability.
- (e) Support a minimum of 512 Gigabyte (GB) of Quad-Channel PC3-12800 (DDR3-1600) Registered DIMMs.
- (f) Include a SAS controller with sufficient ports supporting the maximum installable disk drives. Controller must have minimum support for RAID 0, 1, 5 and 6 (double-parity) with 512MB of ECC (BBWC) Battery-Backed-Write-Cache.
- (g) Have sixteen (16) vacant hot-swap drive bays to accommodate the installation of SAS Hard Disk Drives.
- (h) Have an integrated dual-port 100/1000Base-T or integrated 10GSFP+ network interface adapter capable of fault tolerance (FT) and load balancing.
- (i) Have one (1) internal ISO9660 compliant 8X speed DVD-ROM drive or via virtual media (eg: ILO or ILOM) that facilitates access to a remote optical media.
- (j) Have five (5) vacant 64bit PCI-Express Gen 2 (minimum 4x lane) slots or better after configuration.
- (k) Provide Keyboard, Mouse, and Serial ports or three (3) USB ports.
- (l) Have one (1) management port. A serial port or NIC port may be used for this function. If a NIC port is used, it must not be from item (h) above.
- (m) Have an integrated video graphics controller supporting a minimum of 1024 x 768 resolution.
- (n) Have a minimum of two (2) hot-swap / hot plug power supplies one of which must be redundant.
- (o) Support 110 to 125 VAC or 200 to 240 VAC @ 50Hz & 60Hz.
- (p) Provide hot-swap / hot-plug redundant cooling fans. These fans are in addition to the power supply fans and any CPU fans (if offered). These fans must either be constantly operational or thermostatically controlled.
- (q) Provide sufficient cooling to permit full density rack mounting (without spacing).

2.4 CATEGORY 2.1S RACK-OPTIMIZED ENTERPRISE 2-SOCKET 2U:

- (a) Be available in a rack form-factor with a maximum size of 2U (3.5").
- (b) Have two (2) Intel Xeon E7-2870.
- (c) Have no less than four (4) QuickPath Interconnect (QPI) links for Intel Xeon
- (d) Provide hardware virtualization (e.g.: Intel VT) capability.
- (e) Support a minimum of 1 Terabyte (TB) of Quad-Channel PC3-8500R (DDR3-1066) Registered DIMMs.
- (f) Include a SAS controller with sufficient ports supporting the maximum installable disk drives. Controller must have minimum support for RAID 0, 1, 5 and 6 (double-parity) with 512MB of ECC (BBWC) Battery-Backed-Write-Cache.
- (g) Have six (6) vacant hot-swap drive bays to accommodate the installation of SAS Hard Disk Drives.
- (h) Have an dual-port 100/1000Base-T or integrated 10GSFP+ network interface adapter capable of fault tolerance (FT) and load balancing.
- (i) Have one (1) internal ISO9660 compliant 8X speed DVD-ROM drive or via virtual media (eg: ILO or ILOM) that facilitates access to a remote optical media.
- (j) Have four (4) vacant 64bit PCI-Express Gen 2 (minimum 4x lane) slots or better after configuration.
- (k) Provide Keyboard, Mouse, and Serial ports or three (3) USB ports.
- (l) Have one (1) management port. A serial port or NIC port may be used for this function. If a NIC port is used, it must not be from item (h) above.

- (m) Have an integrated video graphics controller supporting a minimum of 1024 x 768 resolution.
- (n) Have a minimum of two (2) hot-swap / hot plug power supplies one of which must be redundant.
- (o) Support 110 to 125 VAC or 200 to 240 VAC @ 50Hz & 60Hz.
- (p) Provide hot-swap / hot-plug redundant cooling fans. These fans are in addition to the power supply fans and any CPU fans (if offered). These fans must either be constantly operational or thermostatically controlled.
- (q) Provide sufficient cooling to permit full density rack mounting (without spacing).
- (r) Have DDDC (Double Device Data Correction) capability in support of 3.2 (a) and (b).
- (s) Have MCA (Machine Check Architecture) Recovery in support of 3.2 (a), (b) and (c).

2.5 CATEGORY 3.0S PEDESTAL-TO-RACK CONVERTIBLE DEPARTMENTAL 2-SOCKET 5U:

- (a) Be available in a rack form-factor with a maximum size of 5U (8.75")
- (b) Be available in a tower or pedestal configuration
- (c) Have two (2) Intel Xeon E5-2660 or two (2) AMD Opteron 6284SE processors.
- (d) Have no less than two (2) QuickPath Interconnect (QPI) links for Intel Xeon or HyperTransport Technology 3.0 (HT3) for AMD Opteron.
- (e) Provide hardware virtualization (e.g.: Intel VT or AMD-V 2.0) capability.
- (f) Support a minimum of 512 Gigabyte (GB) of Quad-Channel PC3-12800 (DDR3-1600) Registered DIMMs.
- (g) Include a SAS controller with sufficient ports supporting the maximum installable disk drives. Controller must have minimum support for RAID 0, 1, 5 and 6 (double-parity) with 512MB of ECC (BBWC) Battery-Backed-Write-Cache.
- (h) Have twenty-four (24) vacant hot-swap drive bays to accommodate the installation of SAS Hard Disk Drives.
- (i) Have an integrated dual-port 100/1000Base-T or integrated 10GSFP+ network interface adapter capable of fault tolerance (FT) and load balancing.
- (j) Have one (1) internal ISO9660 compliant 8X speed DVD-ROM drive or via virtual media (eg: ILO or ILOM) that facilitates access to a remote optical media.
- (k) Have seven (7) vacant 64bit PCI-Express Gen 2 (minimum 4x lane) slots or better after configuration.
- (l) Provide Keyboard, Mouse, and Serial ports or three (3) USB ports.
- (m) Have one (1) management port. A serial port or NIC port may be used for this function. If a NIC port is used, it must not be from item (i) above.
- (n) Have an integrated video graphics controller supporting a minimum of 1024 x 768 resolution.
- (o) Have a minimum of two (2) hot-swap / hot plug power supplies one of which must be redundant.
- (p) Support 110 to 125 VAC or 200 to 240 VAC @ 50Hz & 60Hz.
- (q) Provide hot-swap / hot-plug redundant cooling fans. These fans are in addition to the power supply fans and any CPU fans (if offered). These fans must either be constantly operational or thermostatically controlled.
- (r) Provide sufficient cooling to permit full density rack mounting (without spacing).

2.6 CATEGORY 4.0S RACK-MOUNT DEPARTMENTAL 4-SOCKET 4U:

- (a) Be available in a rack form-factor with a maximum size of 4U (7").
- (b) Have four (4) Intel Xeon E5-4620 or four (4) AMD Opteron 6284SE processors.
- (c) Have no less than four (4) QuickPath Interconnect (QPI) links for Intel Xeon or HyperTransport Technology 3.0 (HT3) for AMD Opteron.
- (d) Provide hardware virtualization (e.g.: Intel VT or AMD-V 2.0) capability.
- (e) Support a minimum of 1 Terabyte (TB) of Quad-Channel PC3-8500R (DDR3-1066) Registered DIMMs.
- (f) Include a SAS controller with sufficient ports supporting the maximum installable disk drives. Controller must have minimum support for RAID 0, 1, 5 and 6 (double-parity) with 512MB of ECC (BBWC) Battery-Backed-Write-Cache.
- (g) Have four (4) vacant hot-swap drive bays to accommodate the installation of SAS Hard Disk Drives.
- (h) Have an integrated dual-port 100/1000Base-T or integrated 10GSFP+ network interface adapter capable of fault tolerance (FT) and load balancing.
- (i) Have one (1) internal ISO9660 compliant 8X speed DVD-ROM drive or via virtual media (eg: ILO or ILOM) that facilitates access to a remote optical media.
- (j) Have six (6) vacant 64bit PCI-Express Gen 2 (minimum 4x lane) and/or PCI-X (minimum 100mhz) slots or better after configuration.
- (k) Provide Keyboard, Mouse, and Serial ports or three (3) USB ports.
- (l) Have one (1) management port. A serial port or NIC port may be used for this function. If a NIC port is used, it must not be from item (h) above.
- (m) Have an integrated video graphics controller supporting a minimum of 1024 x 768 resolution.
- (n) Have a minimum of two (2) hot-swap / hot plug power supplies one of which must be redundant.
- (o) Support 110 to 125 VAC or 200 to 240 VAC @ 50Hz & 60Hz.
- (p) Provide hot-swap / hot-plug redundant cooling fans. These fans are in addition to the power supply fans and any CPU fans (if offered). These fans must either be constantly operational or thermostatically controlled.
- (q) Provide sufficient cooling to permit full density rack mounting (without spacing).

2.7 CATEGORY 4.1S RACK-MOUNT ENTERPRISE 4-SOCKET 4U:

- (a) Competed under E60EJ-11000C/E – currently not being tendered.

2.8 CATEGORY 4.2S RACK-MOUNT ENTERPRISE 8-SOCKET 10U:

- (a) Competed under E60EJ-11000C/E – currently not being tendered.

BLADE SYSTEM PLATFORM

A valid blade system platform must include the following sub-systems and must meet or exceed the technical specifications in 2.9 (Chassis/Enclosure) and whichever Categories 2.10 – 2.16 (Blade Systems) are offered:

- (a) Blade Chassis / Enclosure (Frame)
- (b) Power Sub-system (Pooled)
- (c) Networking / Interconnect
- (d) Port Connectivity
- (e) Chassis / Enclosure Management

(f) Blade Systems

2.9 CATEGORY 1.0B BLADE CHASSIS / ENCLOSURE:

(a) BLADE CHASSIS / ENCLOSURE (FRAME):

- (i) Must be no greater than 10U (17.5") including all cooling, power, management device, and network interconnect while adhering to all other stated minimum specifications listed in this document.
- (ii) Provide redundant interconnect devices designed for and hosted inside the chassis / enclosure. However, if external devices are provided, they must be purpose built by the blade system platform manufacturer only for switching and management operations of the blade system product line and must be explicitly required for standard operation of the blade system platform. Furthermore, these external devices may not be purchased separately from the chassis / enclosure.
- (iii) Standard PC or "white box" server motherboards in trays will be deemed non-compliant.
- (iv) A valid blade system platform must include one other category from 2.10 to 2.16.

(b) POWER SUB-SYSTEM (POOLED)

(i) Power

- (A) Include a power sub-system that is internal to the chassis / enclosure.
- (B) Be sufficient to support any configuration (e.g.: from a single blade system up to the maximum number of of fully configured blade systems and redundant network interconnects allowed in the chassis / enclosure.)
- (C) Be fully redundant allowing the blade system platform to continue uninterrupted operation in the event of a power supply failure until such time as a replacement can be installed.
- (D) Redundancy may be achieved either through a second power supply or through an N+1 approach to power protection.
- (E) Provide a fully redundant AC power input from multiple discrete AC power sources.
- (F) The power sub-system must have the ability to connect to 3-Phase North America 2 x NEMA L15-30p or to Single Phase 6 x IEC-320 C20.

(ii) Cooling

- (A) Include a cooling sub-system that is internal to the chassis / enclosure.
- (B) Be sufficient to support any configuration (e.g.: from a single blade system up to the maximum number of fully configured blade systems and redundant network interconnects allowed in the chassis / enclosure.)
- (C) Be fully redundant allowing the blade system platform to continue uninterrupted operation in the event of a cooling unit failure until such time as a replacement can be installed.
- (D) Redundancy may be achieved either through a second cooling unit or through an N+1 approach to cooling protection.

(c) NETWORKING/INTERCONNECT: Network, SAN & Fabric

Vendors must provide either Option (1) 10GbE switch & 8Gb FC switch (discrete redundant 10Gb Ethernet and Fibre Channel switching devices for blade systems that use separate network cards and fibre channel host bus adapters), Option (2) FCoE switch (converged 10Gb Ethernet switches that support Fibre Channel over Ethernet if the proposed blade system and chassis / enclosure support
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Converged Network Adapters) or Option (3) 10GbE switch (discrete redundant 10Gb Ethernet switching device for blade systems that use separate network cards).

Option 1:

- (i) 10GbE Switch
 - (A) The blade system platform must include a pair of redundant 10Gb Ethernet OSI Layer-2 switches that are integral to the blade system chassis / enclosure for aggregating connections to each blade system network card in the proposed chassis / enclosure.
 - (B) The redundant 10Gb Ethernet switches must provide downlinks to each blade system in the chassis / enclosure such that each blade system has a discrete 10Gb network connection to each of the switches.
 - (C) The 10Gb Ethernet switches must each support a minimum of 4 X 10Gb uplinks to outside network environments exclusive of any Fibre Channel uplink requirements.
 - (D) The uplink ports from the 10Gb Ethernet switches must be in an industry standard SFP+ form factor accommodating both optical SWL transceivers and CX4, CX1, or Twinax copper cables.
 - (E) The KR based Ethernet switches must meet the following standards:
 - (I) IEEE 802.3ae 10 Gigabit Ethernet
 - (II) IEEE 802.3 Ethernet
 - (III) IEEE 802.1Q VLAN tagging
 - (IV) IEEE 802.1p Quality of Service (QoS)
 - (V) IEEE 802.3x Flow Control
 - (VI) IEEE 802.1w Rapid Spanning Tree Protocol
 - (VII) Jumbo Frames of sizes up to 9000 bytes
 - (VIII) Internet Group Management Protocol (IGMP) Snooping Versions 2
- (ii) 8Gb FC Switch
 - (A) The blade system platform must include a pair of redundant Fibre Channel 8Gb switches that are integral to the blade system chassis / enclosure for aggregating Fibre Channel connections to each blade system in the chassis / enclosure.
 - (B) The 8Gb Fibre Channel switches must support a minimum of 4 X 8Gb uplinks to outside storage area network environments exclusive of any 10Gb Ethernet uplink requirements.
 - (C) The uplink ports from the 8Gb Fibre Channel switches must be in an industry standard SFP+ form factor accommodating optical 8Gb fibre channel transceivers with the ability to auto-negotiate to 4Gb.
 - (D) The 8Gb Fibre Channel switches must have the ability to seamlessly connect and pass through all blade system Fibre Channel connections to existing external Fibre Channel Storage network fabrics without the need for enabling interoperability mode in the existing fabrics by interfacing with NPIV enabled Fibre Channel ports in those existing storage fabrics.

Option 2:

- (iii) FCoE Switch
 - (A) The blade system platform must include a pair of redundant 10Gb OSI Layer 2 Ethernet switches that support Fibre Channel over Ethernet and are able to provide both Ethernet and ANSI T11 FC-BB-5 (when ratified as a standard) Fibre Channel over Ethernet protocol to each blade system in the chassis / enclosure.

- (B) The redundant 10Gb FCoE switches must provide downlinks to each blade system in the chassis / enclosure such that each blade system has a discrete 10Gb network connection to each of the switches.
- (C) The uplink ports from the 10Gb Ethernet FCoE switches must be in an industry standard SFP+ form factor accommodating both optical SWL transceivers and CX4, CX1, or Twinax copper cables and the 8Gb uplink ports from the FCoE switches must be in an industry standard SFP+ form factor accommodating optical 8Gb fibre channel transceivers respectively.
- (D) The 10Gb Ethernet FCoE capable switches must support a minimum of 4 X 10Gb uplinks to outside network environments and a minimum of 4 X 8Gb uplinks to outside storage area network environments simultaneously.
- (E) The 10Gb FCoE based switch it must meet the following standards:
 - (I) IEEE 802.3ae 10 Gigabit Ethernet
 - (II) IEEE 802.3 Ethernet
 - (III) IEEE 802.1Q VLAN tagging
 - (IV) IEEE 802.1p Quality of Service (QoS)
 - (V) IEEE 802.3x Flow Control
 - (VI) IEEE 802.1w Rapid Spanning Tree Protocol
 - (VII) Jumbo Frames of sizes up to 9000 bytes
 - (VIII) Internet Group Management Protocol (IGMP) Snooping Versions 2
 - (IX) IEEE 802.1Qbb Priority-based Flow Control (PFC)
 - (X) IEEE 802.1Qaz Enhanced Transmission Selection (ETS) and Data Centre Bridging eXchange (DCBX)
 - (XI) ANSI T11 FC-BB-5 Fibre Channel over Ethernet
- (F) The 8Gb uplink ports from 10Gb FCoE switches must be in an industry standard SFP+ form factor accommodating optical 8Gb fibre channel transceivers respectively.
- (G) The 10Gb FCoE switches must support a facility to seamlessly connect and pass through all blade server Fibre Channel over Ethernet connections to existing external Fibre Channel Storage network fabrics without the need for enabling interoperability mode in the existing fabrics by interfacing with NPIV enabled Fibre Channel ports in those existing storage fabrics.
- (H) The 10Gb Ethernet FCoE switches must be either:
 - (I) Integrated 10Gb FCoE switching modules that functionally fit internally to and are physically part of the blade system chassis / enclosure
 - (II) External switching devices that are logically managed and are port extensions of 10Gb Ethernet and 4Gb Fibre Channel over Ethernet ports in each of the blade systems in one or more chassis / enclosure.

Option 3:

(iv) 10GbE Switch

- (A) The blade system platform must include a pair of redundant 10Gb Ethernet OSI Layer-2 switches that are integral to the blade system chassis / enclosure for aggregating connections to each blade system network card in the proposed chassis / enclosure.
- (B) The redundant 10Gb Ethernet switches must provide downlinks to each blade system in the chassis / enclosure such that each blade system has a discrete 10Gb network connection to each of the switches.
- (C) The 10Gb Ethernet switches must each support a minimum of 4 X 10Gb uplinks to outside network environments exclusive of any Fibre Channel uplink requirements.

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- (D) The uplink ports from the 10Gb Ethernet switches must be in an industry standard SFP+ form factor accommodating both optical SWL transceivers and CX4, CX1, or Twinax copper cables.
 - (E) The KR based Ethernet switches must meet the following standards:
 - (I) IEEE 802.3ae 10 Gigabit Ethernet
 - (II) IEEE 802.3 Ethernet
 - (III) IEEE 802.1Q VLAN tagging
 - (IV) IEEE 802.1p Quality of Service (QoS)
 - (V) IEEE 802.3x Flow Control
 - (VI) IEEE 802.1w Rapid Spanning Tree Protocol
 - (VII) Jumbo Frames of sizes up to 9000 bytes
 - (VIII) Internet Group Management Protocol (IGMP) Snooping Versions 2
- (d) **I/O Ports Connectivity**
- Provide connectivity to a keyboard, mouse and video monitor. Must provide an internal (either to the chassis/enclosure or blade system) or external (via ILO or ILOM connectivity) compliant 8X speed DVD-ROM drive.
- (e) **CHASSIS / ENCLOSURE MANAGEMENT**
- (i) Include chassis / enclosure management device designed for and hosted inside the blade chassis / enclosure.
 - (ii) Include management software that is fully licensed for the blade systems, hardware components, and software. All management software must be specific to the model and family of blade system platform.
 - (iii) At a minimum, the management device and software must:
 - (A) Facilitate the rapid deployment (eg: provisioning of an operating system) of blade systems.
 - (B) Facilitate single sign-on to blade servers resident in the chassis / enclosure.
 - (C) Facilitate power capping capabilities inside the blade chassis / enclosure.
 - (D) Provide capabilities for monitoring thermal, fan and power status.
 - (E) Provide capabilities for powering on and off individual systems, setting SNMP traps, and recycling "hung" systems.
 - (F) Provide capabilities for pre-failure alerts on CPU, RAM, and DISK
 - (G) Provide capabilities for asset reporting and inventory information for all devices in the chassis / enclosure.
 - (H) Provide a secure web-based console redirection for monitoring and management of the chassis and each blade-based server.
- (f) **BLADE SYSTEMS**
- (i) Be fully "hot pluggable" with respect to the blade chassis / enclosure and feature on-board diagnostics.
 - (ii) Have an LED or LCD display that indicates the system status.
 - (iii) Have a latching mechanism which secures the blade system into the chassis / enclosure.
 - (iv) Have an electrical and mechanical design of the blade system such that insertion or removal is accomplished without the need for the manual connection of cables such as power, I/O or network interfaces.

- (v) Have an embedded Ethernet connector in the backplane of the chassis / enclosure that is hardwired to either a pass-through or switch device.
- (vi) Include management module or management integrated into each blade system (Applies to 2.10 up to 2.16).

2.10 CATEGORY 2.0B 2-SOCKET BLADE SYSTEM:

- (a) Have two (2) Intel Xeon E5-2660 or two (2) AMD Opteron 6284SE processors.
- (b) Have no less than two (2) QuickPath Interconnect (QPI) links for Intel Xeon, or HyperTransport Technology 3.0 (HT3) for AMD Opteron.
- (c) Provide hardware virtualization (e.g.: Intel VT or AMD-V 2.0) capability.
- (d) Support a minimum of 384 Gigabyte (GB) of Quad-Channel PC3-12800 (DDR3-1600) Registered DIMMs.
- (e) Include an integrated SAS controller with sufficient ports supporting the maximum installable disk drives. Controller must have minimum support for RAID 0, and 1.
- (f) Have two (2) vacant drive connections to accommodate the installation of SAS Hard Disk Drives or SATA Solid State Disks.
- (g) Have an integrated dual-port 100/1000Base-T or integrated 10GSFP+ network interface adapter capable of fault tolerance (FT) and load balancing.
- (h) Have one (1) vacant 64bit PCI-Express Gen 2 (minimum 4X lane) mezzanine slots or better after configuration.
- (i) Provide connection port for keyboard, mouse and video on each blade-based server, or a single chassis-based KVM switch capability.
- (j) Support PXE boot

2.11 CATEGORY 2.1B 2-SOCKET BLADE ENTERPRISE SYSTEM:

- (a) Have two (2) Intel Xeon E7-2870.
- (b) Have no less than two (2) QuickPath Interconnect (QPI) links for Intel Xeon.
- (c) Provide hardware virtualization (e.g.: Intel VT) capability.
- (d) Support a minimum of 512 Gigabyte (GB) of Quad-Channel PC3-8500R (DDR3-1066) Registered DIMMs per blade-based server.
- (e) Include an integrated SAS controller with sufficient ports supporting the maximum installable disk drives. Controller must have minimum support for RAID 0, and 1.
- (f) Have two (2) vacant drive connections to accommodate the installation of SAS Hard Disk Drives or SATA Solid State Disks.
- (g) Have an integrated dual-port 100/1000Base-T or integrated 10GSFP+ network interface adapter capable of fault tolerance (FT) and load balancing.
- (h) Have one (1) vacant 64bit PCI-Express Gen 2 (minimum 4X lane) mezzanine slots or better after configuration.
- (i) Provide connection port for keyboard, mouse and video on each blade-based server, or a single chassis-based KVM switch capability.
- (j) Support PXE boot.
- (k) Have DDDC (Double Device Data Correction) capability in support of 3.2 (a) & (b).
- (l) Have MCA (Machine Check Architecture) Recovery in support of 3.2 (a), (b) and (c).

2.12 CATEGORY 3.0B 4-SOCKET BLADE SYSTEM:

- (a) Have four (4) Intel Xeon E5-4620 or four (4) AMD Opteron 6284SE processors.
- (b) Have no less than two (2) QuickPath Interconnect (QPI) links for Intel Xeon.
- (c) Provide hardware virtualization (e.g.: Intel VT) capability.
- (d) Support a minimum of 512 Gigabyte (GB) of Quad-Channel PC3-8500R (DDR3-1066) Registered DIMMs per blade-based server.
- (e) Include an integrated SAS controller with sufficient ports supporting the maximum installable disk drives. Controller must have minimum support for RAID 0, and 1.
- (f) Have two (2) vacant drive connections to accommodate the installation of SAS Hard Disk Drives or SATA Solid State Disks.
- (g) Have an integrated dual-port 100/1000Base-T or integrated 10GSFP+ network interface adapter capable of fault tolerance (FT) and load balancing.
- (h) Have two (2) vacant 64bit PCI-Express Gen 2 (minimum 4X lane) mezzanine slots or better after configuration.
- (i) Provide connection port for keyboard, mouse and video on each blade-based server, or a single chassis-based KVM switch capability.
- (j) Support PXE boot

2.13 CATEGORY 3.1B 4-SOCKET BLADE ENTERPRISE SYSTEM:

- (a) Have four (4) Intel Xeon E7-4870.
- (b) Have no less than two (2) QuickPath Interconnect (QPI) links for Intel Xeon.
- (c) Provide hardware virtualization (e.g.: Intel VT) capability.
- (d) Support a minimum of 1 Terabyte (TB) of Quad-Channel PC3-8500R (DDR3-1066) Registered DIMMs per blade-based server.
- (e) Include an integrated SAS controller with sufficient ports supporting the maximum installable disk drives. Controller must have minimum support for RAID 0, and 1.
- (f) Have two (2) vacant drive connections to accommodate the installation of SAS Hard Disk Drives or SATA Solid State Disks.
- (g) Have an integrated dual-port 100/1000Base-T or integrated 10GSFP+ network interface adapter capable of fault tolerance (FT) and load balancing.
- (h) Have two (2) vacant 64bit PCI-Express Gen 2 (minimum 4X lane) mezzanine slots or better after configuration.
- (i) Provide connection port for keyboard, mouse and video on each blade-based server, or a single chassis-based KVM switch capability.
- (j) Support PXE boot
- (k) Have DDDC (Double Device Data Correction) capability in support of 3.2 (a) & (b).
- (l) Have MCA (Machine Check Architecture) Recovery in support of 3.2 (a), (b) and (c).

2.14 CATEGORY 4.0B ENTRY-LEVEL UNIX 1 RISC OR EPIC PROCESSOR BASED SYSTEM:

- (a) Competed under E60EJ-11000C/E – currently not being tendered.

2.15 CATEGORY 4.1B MID-LEVEL UNIX 2-TO-4 RISC OR EPIC PROCESSOR BASED SYSTEM:

- (a) Competed under E60EJ-11000C/E – currently not being tendered.

2.16 CATEGORY 5.0B 1-TO-2 SOCKET HPC – GRAPHICS INTENSIVE BLADE SYSTEM:

- (a) To be competed under a future solicitation – currently not being tendered.

3.0 CERTIFICATIONS

3.1 HARDWARE CERTIFICATION:

- (a) All high voltage electrical equipment supplied under the Standing Offer must be certified or approved for use in accordance with the Canadian Electrical Code, Part 1, before delivery, by an agency accredited by the Standards Council of Canada. All Systems must bear the certification logo that applies to the accredited agency. Any System not bearing a logo from the accredited agency described below will be considered non-compliant. Current accredited agencies include, but are not exclusively comprised of:
 - (i) Canadian Standards Association (CSA);
 - (ii) Underwriters' Laboratory Inc. (cUL) (cULus);
 - (iii) Underwriters' Laboratories of Canada (ULC);
 - (iv) Entela Canada (cEntela);
 - (v) Intertek Testing Services (cETL);
 - (vi) Met Laboratories (cMET); and
 - (vii) OMNI Environmental Services Inc (cOTL).
 - (viii) TUV Rhineland of North America (cTUV).
- (b) Systems must comply with the emission limits and labeling requirements set out in the Interference Causing Standard ICES-003, "Digital Apparatus", published by Industry Canada. Systems that have obtained Industry Canada ICES-003 approval that have been assembled from tested components and have not undergone entire system testing will be considered noncompliant. All devices tested must bear the appropriate labels indicating trade name, model number, and the words indicating Industry Canada ICES-003 compliance.

3.2 OPERATING SYSTEM AND HYPERVISOR - ALL X86 CATEGORIES ONLY

- (a) Systems must have the following Microsoft Windows Server logo: Certified for Windows Server 2008 R2 and Certified for Windows Server 2008. Certifications must be performed at the specified operating frequencies identified in Annex A, 2.0 Configurations and populated with the maximum number of processor sockets.
- (b) Systems must have the following Linux certification: Red Hat Enterprise Linux 6 or SUSE Linux Enterprise Server 11 and SLES 11 with XEN certifications (logo level). This certification must be performed on the entire system and must fall under what a certified system is as defined by Red Hat and SUSE. Certifications must be performed at the specified operating frequencies identified in Annex A, 2.0 Configurations and populated with the maximum number of processor sockets.
- (c) Except for Category 1.0V, systems must must have the following VMWare certification: Certified for vSphere 4.X and 5.X server level. Certifications must be performed at the specified operating frequencies identified in Annex A, 2.0 Configurations and populated with the maximum number of processor sockets.
- (d) Except for Category 1.0V, systems must have vSphere 4.X and 5.X I/O level certified devices.
- (e) With the exception of VMWare I/O device certification on (d) above, all operating system and hypervisor certifications must be performed on the entire system and not performed autonomously on separate components (e.g.: motherboard / systemboard certification tested separately, hard disk drive controller tested separately). Component level certification or a collection of certified components forming a system is not acceptable. An entire certified system is defined as CPU type and speed, motherboard / system board brand and model, BIOS/firmware brand and major revision (this includes the first number in front of the decimal and the first two numbers after the decimal (e.g. 4.XX)). The certification agreement must be between the OEM and the respective Operating System and Hypervisor certification laboratory. Category 1.0V is excluded from this requirement.

- (f) Certifications performed on identical Xeon or Opteron processor based servers in a faster model class are acceptable (e.g. E7-8870 certifications will apply to an identically equipped E7-8830 system).
- (g) Systems must provide full support for Microsoft's Windows Server Failover Clustering.
- (h) Systems must natively support or be logo'd for IPv6 Silver Ready (Phase-1) and commit to achieving Phase-2 or Gold Ready status when available.

4.0 GREEN PROCUREMENT INITIATIVES

- (a) In support of the Canadian Federal Government's Sustainable Development Strategy which includes policies on Green Procurement, system manufacturers must commit to a comprehensive, nationally recognized environmental standards for:
 - (i) The reduction or elimination of environmentally hazardous materials
 - (ii) Design for reuse and recycling
 - (iii) Energy efficiency
 - (iv) End of Life Management for reuse and recycling
 - (v) Environmental stewardship in the manufacturing process
 - (vi) Packaging
- (b) All systems must be RoHS Certified.
- (c) The OEM must be a member in good standing of EPSC – Electronic Product Stewardship of Canada.
- (d) The OEM must be ISO 14001 certified.
- (e) The OEM must have a "Contributor Membership" level to www.thegreengrid.org in good standing.
- (f) The OEM must have a plan or strategy in place for achieving EPA's evolving Energy Star compliancy requirements for all systems.
- (g) The OEM must have a plan or strategy in place for achieving 80 PLUS compliancy requirements for all systems.
- (h) As Category technical requirements are modified and new Categories are added through the processes outlined in this NMSO, additional emerging requirements in support of Green Procurement and Sustainable Development will be introduced.

5.0 VALUE-ADDED VENDOR SUPPORT

5.1 PERSONNEL SUPPORT – ALL CATEGORIES EXCEPT 4.0B & 4.1B

- (a) The Offeror must have on-staff, or through an authorized national dealer network, an existing and experienced technical support infrastructure, staffed with personnel that is trained on the Offeror's products. This technical support infrastructure must consist of no less than twenty-five (25) support personnel available across North America. Of those twenty five technical support personnel, a minimum of seven (7) must be (MCSE) Microsoft Certified Systems Engineer with MCITP for Windows Server 2008, a minimum of seven (7) must be (RHCSA) Red Hat Certified System Administrator for RHEL 6, a minimum of seven (7) must be (VCP4 or VCP5) VMware Certified Professional on vSphere 4 or 5, and must be direct employees of the system manufacturer.
- (b) All technical support personnel as specified above, and telephone support personnel, as specified below, must possess knowledge specific to the Offeror's exact configuration as offered. This must include accreditation for completing the system manufacturer's hardware training course described in paragraph (c) below.
- (c) The Offeror must have an established hardware and OS training program for on-staff technical support personnel and third-party technical support organizations that is specific to the system brand

and model (as indicated by the label on the system and all supporting manuals and documentation). The course curriculum must include hardware (which includes the model or model family bid), operating environment identified in 3.2, Operating System and Hypervisor, management software, diagnostics and other service utilities as offered by the system manufacturer. This course must be available to federal government employees upon request.

5.2 PERSONNEL SUPPORT – CATEGORIES 4.0B & 4.1B

- (a) The Offeror must have on-staff, or through an authorized national dealer network, an existing and experienced technical support infrastructure, staffed with personnel that is trained on the Offeror's products. This technical support infrastructure must consist of no less than fifteen (15) support personnel available across Canada. Of those fifteen technical support personnel, a minimum of seven (7) must be UNIX Operating System support specialists; must be fully trained or certified and must be direct employees of the system manufacturer.
- (b) All technical support personnel as specified above, and telephone support personnel, as specified below, must possess knowledge specific to the Offeror's exact configuration as offered. This must include accreditation for completing the system manufacturer's hardware training course and the UNIX Operating System described in paragraph (c) below.
- (c) The Offeror must have an established hardware and OS training program for on-staff technical support personnel and third-party technical support organizations that is specific to the system brand and model (as indicated by the label on the system). The course curriculum must include hardware (which includes the model or model family bid), Operating System, management software, diagnostics and other service utilities as offered by the system manufacturer. This course must be available to federal government employees upon request.

5.3 TELEPHONE SUPPORT

- (a) The Offeror must provide end-user accessible, telephone-based, bilingual (French and English) technical support involving: Operating System issues, hardware trouble shooting, configuration support, any systemic software/hardware inter-operability issues and/or connectivity issues. The telephone support service must be performed by the manufacturer of the system (as defined by the brand name appearing on the system unit and in all supporting manuals and documentation). The telephone support staffs are obligated to support:
 - (i) All internal hardware components of the system;
 - (ii) Operating System and/or Hypervisor issues if supplied by the Offeror, as it relates to the Offeror's hardware;
 - (iii) LAN infrastructure, regardless of supplier, as it relates to the Offeror's system; and
 - (iv) All additional components if purchased from the Offeror.
- (b) The bilingual telephone support line service must be active and must include the following:
 - (i) Be a toll-free service;
 - (ii) Employ a minimum staff of ten support personnel, 24 hours a day, seven days a week dedicated to the Offeror's system platform;
 - (iii) Offer this support service in both official languages (French and English) based on the caller's preference;
 - (iv) Be accessible from all parts of Canada, United States and from international locations here telephone service is available.
 - (v) Use a serial number tracking system that identifies all components, respective versions and driver versions of the installed system undergoing the troubleshooting. These components must include but are not limited to: motherboard / system board model and revision; firmware model and revision; memory / memory modules model and revision, controller model and revision; hard drive brand, model and revision; Operating System and/or Hypervisor revision (if included in the system);

- (vi) Use an electronically shared, nationwide knowledge database to be used by support staff for all acquired troubleshooting expertise, product idiosyncrasies and configuration parameters for each specific component supplied;
- (vii) Provision to escalate issues to plant of manufacture;
- (viii) Provide a minimum 90% first call connection rate to a trained and qualified support personnel on calls defined as highest priority by the caller on systems where that level of service is specified in the warranty, during the warranty period, or where it has been purchased according to a service contract;
- (ix) Not exceed an initial on-hold time of more than five minutes on initial call; and
- (x) Be available for the duration of the warranty or service contract period.

5.4 WEB SITE SUPPORT

The Offeror must have an Internet WEB site referencing the exact make and model(s) of System(s) offered and must contain the following:

- (a) Pages specific to the NMSO. These pages must contain details on the default system configuration, options, default system illustrations and pricing.
- (b) Support file areas offering download/upload access for drivers, setup and configuration files and other pertinent software specific to the exact model(s). These files, drivers and documents must be clearly identified as pertaining to the specific make and model of system;
- (c) Message areas for technical assistance and problem diagnosis with support personnel if covered under the warranty or service contact on the system;
- (d) Technical information library for downloading product information files, pertinent white papers, hardware service manuals or detailed technical manuals (that cover the exact model with all internal components described in the same document);
- (e) FAQ (frequently asked questions) areas;
- (f) Bulletins pertaining to product announcements, recalls, bug fixes, etc;
- (g) "Plain language" technical support question search engine with immediate response;
- (h) Areas detailing system accessories and upgrades;
- (i) Offer e-mail notification subscription services to alert clients of device driver revisions, BIOS / firmware updates that pertain to the exact model family purchased;
- (j) The features in articles (a) through (i) must be contained on the OEM's (as defined by the brand name appearing on the system unit and in all supporting manuals and documentation) web site. Links to other manufacturer's web sites cannot be used to achieve the mandatory requirements.
- (k) The features in articles (a) through (i) must offer navigation links in French and English up to the final destination page. That destination page may be either French or English. Exceptions for uni-lingual content are allowed for technical descriptions, part number references and technical documentation.
- (l) When the Offeror refers specifically to this NMSO on its web site, the information presented must be accurate in that only equipment and related prices listed on the CAG web site may be represented on the Offeror's web site as being available on its NMSO.

6.0 DETAILED SPECIFICATIONS

6.1 PROCESSORS & CHIPSET:

- (a) PROCESSOR – X86
All processors must:
 - (i) Be an Intel Xeon or an AMD Opteron.

- (ii) Function in a symmetrical multi-processing SMP or Parallel mode (with the exception of Category 1.0V).
 - (iii) Provide the latest release in hardware virtualization (i.e.: Intel VT or AMD V 2.0) capability
 - (iv) Be able to support 32-bit and 64-bit applications natively and simultaneously.
 - (v) Be of identical stepping within each processor socket.
- (b) PROCESSOR – RISC & EPIC
- All Processors must:
- (i) Be any one of the following 64-bit RISC and EPIC architecture.
 - (ii) Be the current released models from the OEM. The acceptable models are: Power 7, SPARC T3/T4, and Itanium 9300. The number of processor is based on: #1 For RISC based systems running Solaris, a processor is counted by processor socket; #2 For RISC based systems running AIX, a processor is counted by processor core; or #3 For EPIC based systems running -UX, a processor is counted by processor socket.
 - (iii) Function in a symmetrical multiprocessing SMP or Parallel processing mode.
 - (iv) Systems must support ECC on the CPU cache.

6.2 BIOS / FIRMWARE:

All BIOS / firmware must:

- (a) Be upgradeable through flash ROM technology.
- (b) Have the ability to accept a previous version of the BIOS or firmware in the event of an incompatible or corrupted version.

6.3 RAM:

All RAM must:

- (a) Be a minimum of 2GB per DIMM (e.g.: 1 x 2GB DIMM) for Category 1.0V and a minimum of 4GB per Registered DIMM (e.g.: 1 x 4GB RDIMM) for all other categories.
- (b) Be manufactured by an ISO (International Standards Organization) 9001:2008 specs certified manufacturer. The ISO certification applies to the RAM manufacturer's manufacturing process and applies to both the RAM chip manufacturer and the DIMM assembly manufacturer.
- (c) Have standard ECC for Category 1.0V and have advanced ECC, chip-kill functionality or equivalent feature for all other categories.
- (d) All RAM modules must either be an OEM or OEM approved component.

6.4 HARD DISK AND CONTROLLER:

- (a) Serial Attached SCSI (SAS)
 - (i) If the storage platform uses Serial Attached SCSI hard disk drives, the hard disks must:
 - (A) Have a maximum average seek time of 5 ms. or less and a minimum spin rate of 10,000 revolutions per minute;
 - (B) Have physical bytes of storage as specified without the use of hardware or software disk compression utilities, as actual data space available to user;
 - (C) Support all of the capabilities and throughput of the SAS controller below;
 - (D) Except for Category 1.0V, all drives must be hot-pluggable (without downing the system and without disruption of service when configured).
 - (ii) The SAS disk controller must:

- (A) Be a minimum of PCI-Express x4 wide;
- (B) Support a burst transfer rate of 600MB per second.
- (b) Enhanced Multi-Level Cell – Solid State Drive (eMLC-SSD)
 - (i) If the storage platform uses Solid-State-Drive hard disk device, the hard disks must:
 - (A) Have a read / write speeds (IOPS) (4K blocks) of 20,000 / 3,000;
 - (B) Have physical bytes of storage as specified without the use of hardware or software disk compression utilities, as actual data space available to user;
 - (C) Support all of the capabilities and throughput of the SAS controller below;
 - (D) Except for blade-based systems, all drives must be hot-pluggable (without downing the system and without disruption of service when configured).
 - (ii) The SAS Disk controller must be a 64-Bit PCI-Express supporting a burst transfer rate of 3Gb/sec per SAS/SATA port.

6.5 SERIAL & MANAGEMENT PORTS

This port must be:

- (a) A USB port;
- (b) An RS-232-C serial interface port or;
- (c) Similar in function that will provide a method for out of band management capability.

7.0 EXPANDABILITY:

7.1 CATEGORY 1.0V LOW-COST-COMPUTING (LCC) 1-SOCKET PEDESTAL OR RACK-OPTIMIZED 2U:

The system must have:

- (a) N/A

7.2 CATEGORY 1.0S RACK-OPTIMIZED 2-SOCKET 1U:

The system must have:

Ability to be configured with half the number of CPUs with no less than half the maximum RAM available

7.3 CATEGORY 2.0S RACK-OPTIMIZED 2-SOCKET 2U:

The system must have:

Ability to be configured with half the number of CPUs with no less than half the maximum RAM available

7.4 CATEGORY 2.1S RACK-OPTIMIZED ENTERPRISE 2-SOCKET 2U:

The system must have:

- (a) Ability to be configured with half the number of CPUs with no less than half the maximum RAM available.

7.5 CATEGORY 3.0S PEDESTAL-TO-RACK CONVERTIBLE DEPARTMENTAL 2-SOCKET 5U:

The system must have:

Ability to be configured with half the number of CPUs with no less than half the maximum RAM available

7.6 CATEGORY 4.0S RACK-MOUNT DEPARTMENTAL 4-SOCKET 4U:

The system must have:

Ability to be configured with half the number of CPUs with no less than half the maximum RAM available

7.7 CATEGORY 4.1S RACK-MOUNT ENTERPRISE 4-SOCKET 4U:

The system must have:

- (a) Ability to be configured with two (2) CPUs with no less than half the maximum RAM available

7.8 CATEGORY 4.2S RACK-MOUNT ENTERPRISE 8-SOCKET 10U:

The system must have:

- (a) Ability to be configured with four (4) CPUs with no less than half the maximum RAM available

7.9 CATEGORY 1.0B BLADE CHASSIS / ENCLOSURE:

The system must have:

- (a) N/A

7.10 CATEGORY 2.0B 2-SOCKET BLADE:

The system must have:

Ability to be configured with half the number of CPUs with no less than half the maximum RAM available

7.11 CATEGORY 2.1B 2-SOCKET ENTERPRISE BLADE:

The system must have:

- (a) Ability to be configured with half the number of CPUs with no less than half the maximum RAM available.

7.12 CATEGORY 3.0B 4-SOCKET BLADE:

The system must have:

Ability to be configured with half the number of CPUs with no less than half the maximum RAM available

7.13 CATEGORY 3.1B 4-SOCKET ENTERPRISE BLADE:

The system must have:

Ability to be configured with half the number of CPUs with no less than half the maximum RAM available

7.14 CATEGORY 4.0B ENTRY-LEVEL UNIX 1 RISC OR EPIC PROCESSOR BASED:

The system must have:

- (a) N/A

7.15 CATEGORY 4.1B MID-LEVEL UNIX 2-TO-4 RISC OR EPIC PROCESSOR BASED:

The system must have:

- (a) N/A

7.16 CATEGORY 5.0B 1-TO-2 SOCKET HPC - GRAPHICS INTENSIVE BLADE:

RESERVED

8.0 POWER SUPPLY

8.1 POWER SUPPLY - CATEGORY 1.0V:

- (a) The power supply must run on 100 - 240 volts AC 60Hz.
- (b) The power supply must be available as a Single IEC-320 C13.
- (c) If the power supply fails (if the power supply is redundant) there must be a provision to communicate the condition through the system management utility to alert the network administrator.
- (d) The power supply must be able to support a fully populated system on its own. A fully populated system is defined as having the maximum installed processors, all internal drive bays, all I/O slots or modules and memory slots populated.

- (e) It must operate in temperature and humidity conditions of the normal business office environment, with no special air conditioning required.
- (f) All external cabling must be positively secured and resistant to damage.

8.2 REDUNDANT POWER SUPPLIES - CATEGORIES 1.0S, 2.0S, 2.1S, 3.0S, 4.0S, 4.1S, AND 4.2S:

- (a) The power supplies must be installed and removed without requiring any tool or requiring the removal of the chassis / enclosure cover.
- (b) The power supplies must have the ability to connect to 3-Phase North America N x NEMA L15-30p or Single Phase N x IEC-320 13 or C19 where N matches the number of power supplies in the system.
- (c) The power supply must run on 100 - 240 volts AC @ 60Hz or 200 - 240 volts AC @ 60 Hz.
- (d) If dual power supplies are included in the system, then at least one power supply must operate in a redundant fashion to the other(s) in that in the case of one power supply failing the other will continue to power the system without any interruption of services or performance. If three or more power supplies are included in the system, then they must be configured in an N+1 configuration so that in the case of one power supply failing, the others will continue to power the system without any interruption of services or performance.
- (e) If the power supply fails there must be a provision to communicate the condition through the system management utility to alert the network administrator.
- (f) If one power supply fails, the remaining functional power supply or supplies must be able to support a fully populated system on its own. A fully populated system is defined as having the maximum installed processors, all internal drive bays, all I/O slots or modules and memory slots populated.
- (g) System must use a secondary system of additional cooling fans or provide sufficient cooling to support a fully configured system. If a secondary system of additional cooling fans is provided, these fans must be in addition to the power supply fan and any CPU fans (if included in Default System). These fans must either be constantly operational or thermostatically controlled.
- (h) All external cabling must be positively secured and resistant to damage.

8.3 REDUNDANT POWER SUPPLIES - CATEGORIES 1.0B:

- (a) The power supplies must be installed and removed without requiring any tool or requiring the removal of the chassis / enclosure cover.
- (b) The power supplies must have the ability to connect to 3-Phase North America N x NEMA L15-30p and Single Phase N x IEC-320 13 or C19 where N matches the number of power supplies in the system.
- (c) The power supply must run on 100 - 240 volts AC @ 60Hz or 200 - 240 volts AC @ 60 Hz.
- (d) If dual power supplies are included in the system, then at least one power supply must operate in a redundant fashion to the other(s) in that in the case of one power supply failing the other will continue to power the system without any interruption of services or performance. If three or more power supplies are included in the system, then they must be configured in an N+1 configuration so that in the case of one power supply failing, the others will continue to power the system without any interruption of services or performance.
- (e) If the power supply fails there must be a provision to communicate the condition through the system management utility to alert the network administrator.
- (f) If one power supply fails, the remaining functional power supply or supplies must be able to support a fully populated system on its own. A fully populated system is defined as having the maximum installed processors, all internal drive bays, all I/O slots or modules and memory slots populated.
- (g) System must use a secondary system of additional cooling fans or provide sufficient cooling to support a fully configured system. If a secondary system of additional cooling fans is provided, these

fans must be in addition to the power supply fan and any CPU fans (if included in Default System). These fans must either be constantly operational or thermostatically controlled.

- (h) All external cabling must be positively secured and resistant to damage.

9.0 ETHERNET CONTROLLER:

- (a) Rackmount and Pedestal Systems - Network interface cards must:
- (i) Have 100/1000 MB per second unshielded twisted pair or 10Gb (SFP+) network interface controllers (NIC);
 - (ii) Be 100Base-T and 1000Base-T or 10GSFP+ compliant and capable of auto-negotiating;
 - (iii) Be capable of supporting Fault-Tolerance and Load-Balancing;
 - (iv) Meet IEEE 802.3u and 802.3ab or 802.3ae compliance;
 - (v) Support category 5 wiring;
 - (vi) Capable of being disabled;
 - (vii) Allow for PXE 2.0 booting.
- (b) Blade Systems - Network interface cards must:
- (i) Be 100Base-T and 1000Base-T or 10GBase-KR compliant;
 - (ii) Be capable of supporting Fault-Tolerance and Load-Balancing;
 - (iii) Capable of being disabled;
 - (iv) Allow for PXE 2.0 booting

10.0 REMOTE SYSTEM MANAGEMENT CONTROLLER:

Except for Category 1.0V, each system must have available a remote management controller with requisite software. This controller must be manufactured or optimized by the system manufacturer and must bear the same brand label as the system manufacturer. Third party controllers will not be accepted. The controller must:

- (a) Provide continuous in-band and out-of-band communication, status/threshold and alert monitoring;
- (b) Provide connectivity through an Ethernet LAN, serial port or USB port;
- (c) Provide capability for virtual media (e.g.: CD-ROM, DVD-ROM);
- (d) Provide capability allowing for event logging, on-demand remote system power-up, reboot, and power-down;
- (e) Provide support for remote BIOS / Firmware updates and system re-configuration;
- (f) Provide SSH (Secure Shell) connectivity using military grade ciphers (3DES or AES) and SSL (Secure Socket Layer) through 128-bit encryption while communicating via HTTP; and
- (g) Use system management utilities and diagnostics (as detailed item 11.0) to trap out-of-band alerts and generate SNMP traps or WBEM alerts that will execute corrective measures remotely.

11.0 LIGHTS OUT SYSTEM MANAGEMENT / DIAGNOSTICS AND INSTALLATION / CONFIGURATION UTILITY:

11.1 LIGHTS OUT SYSTEM MANAGEMENT & DIAGNOSTICS

The System must have:

- (a) A ROM based "SELF-TEST" procedure that is automatically executed on system power-up. This built-in test routine must test all installed memory and motherboard / system board based components (including ports), all I/O controller(s), all network interface controllers, and report all malfunctions during boot up.

- (b) A system based diagnostics and system management utility that provides configuration information, status/threshold monitoring and failure/pre-failure alerting for:
 - (i) Environment conditions which include processor temperature, thermal warning, or failure conditions;
 - (ii) Power supply detection, information and status;
 - (iii) Cooling fan detection, speed and status;
 - (iv) Enclosure/Chassis temperature, thermal warning or failure conditions;
 - (v) System load and current sensors status; and
 - (vi) Voltages.
- (c) All of the above information must be accessible to an SNMP (Simple Network Management Protocol) compatible management service or other management tools/services providing same capabilities. This must comply to the DMTF standards like WBEM and CIM, providing compatibility with other enterprise management platforms.
- (d) If a CD/DVD-ROM is provided, it must be a pressed production media and must be written by or optimized by the system OEM (Original Equipment Manufacturer) with a suitable label that identifies it as such, including the system manufacturer's name, applicable model(s) and the revision number. The system OEM specific brand and model must be referenced through the software utility as well. Gold, write-once CD/DVDs (CD-R/+R, CD-RW/+RW, DVD-R/+R or DVD-RW/+RW) will not be accepted. All other system diagnostics and system management utility will not be accepted.

11.2 INSTALLATION AND CONFIGURATION UTILITY:

The OEM (Original Equipment Manufacturer) must provide either an embedded or a bootable CD/DVD-ROM(s) based configuration application or set of applications to aid in the initial hardware setup of the system and installation of the Operating System and Hypervisor. These applications must be menu driven and allow reconfiguration and device driver optimization of the system under the environments identified in 3.2. The installation procedure must be intuitive and be provided in both French and English. If a CD/DVD-ROM is provided, it must be a pressed production CD/DVD and must be written by the system OEM with a suitable label that identifies it as such, including the system manufacturer's name and applicable model(s) and the revision number. The OEM specific brand and model must be referenced through the software utility as well. Gold, write-once CD/DVDs (CD-R/+R, CD-RW/+RW, DVD-R/+R or DVD-RW/+RW) will not be accepted.

12.0 SECURITY & ENCRYPTION FEATURES – CATEGORY 4.0B & 4.1B:

Categories 4.0B and 4.1B must have a minimum number of Security and Encryption features. Category 4.0B must have a minimum of four (4) and Category 4.1B must have a minimum of six (6) feature items. The acceptable features are:

- (a) 3DES;
- (b) HMAC or CMAC;
- (c) AES;
- (d) RC4;
- (e) SHA-1;
- (f) SHA-2;
- (g) MD5;
- (h) RSA to 2048 key;
- (i) ECC; and

(j) FHMQV

13.0 (RAS) RELIABILITY-AVAILABILITY-SERVICEABILITY FEATURES – CATEGORY 4.0B & 4.1B:

Systems must have a minimum number of eight (8) RAS feature items. Acceptable RAS features are:

- (a) RAM: ECC & Extended ECC support;
- (b) RAM: Data path integrity;
- (c) RAM: SRAM and register protection;
- (d) RAM: Configurable memory mirroring; Partial / fine grained
- (e) RAM: Proactive memory scrubbing;
- (f) RAM: Double-chip sparing;
- (g) RAM: Offlining or Deconfiguration;
- (h) Memory page retirement;
- (i) CPU: Automatic Offlining or Deconfiguration;
- (j) CPU: Error Protection;
- (k) CPU: Automatic System Recovery w/ Instruction Retry;
- (l) Hot-plug processor boards;
- (m) Auto diagnosis and recovery;
- (n) Service Processor to monitor system status;
- (o) Redundant Management Processor;
- (p) Live OS upgrade;
- (q) Hardware partition; Fujitsu
- (r) Fault-isolated dynamic domains / re-configurable partitions;
- (s) System Bus: Redundant data, address, and response crossbar;
- (t) Online Addition / replacement of I/O devices;
- (u) I/O Bus / Bus Controller: Error checking / correcting of I/O Paths;
- (v) I/O Boards / Slots: Dynamic de-allocation;
- (w) Redundant network connections; and
- (x) Hardened I/O Drivers or System Configuration / Hardening Tool.

14.0 PARTITIONING / VIRTUALIZATION FEATURES – CATEGORY 4.0B AND 4.1B:

Categories 4.0B and 4.1B must support a minimum number of Partitioning / Virtualization Feature level. Category 4.0B must support no less than two (2) levels and Category 4.1B must support no less than two (2) levels where Level-3 is one of the two features supported.

- (a) Level-1 Partitioning / Virtualization Feature:
System must:
 - (i) Run a minimum of two 'isolated partitions' each running its own instance of the OS, and each having dedicated CPU and memory; and
 - (ii) Dynamically add/install, remove, replace, and re-configure core system components into the system while the OS and applications are running.
- (b) Level-2 Partitioning / Virtualization Feature:

System must:

- (i) Run a minimum of two 'isolated environments' or 'workloads' within a single OS;
- (ii) Share/provide sharing resources between multiple partitions. This feature must allow for resources to flow between running partitions on the same physical system; and
- (iii) Perform a Virtual OS abstraction that provides a protected environment in which applications run. This feature must ensure applications are protected from each other to provide software fault isolation.

(c) Level-3 Partitioning / Virtualization Feature:

System must:

- (i) Run a minimum of eight 'isolated partitions' each running its own instance of the OS; each having the capability to expand / contract CPU, memory, Ethernet, and HBA resources in each running partition without requiring a partition or system to reboot;
- (ii) Provide the ability to move or migrate active/running workload or virtual machine from one physical system to another physical system while it continues to run;
- (iii) Perform resource allocation (e.g.: CPU, memory, I/O) into logical groupings or domains, where it provides the ability to create multiple discrete systems, each having their own OS, resources, and identity within a single physical system; and
- (iv) Dynamically add/install, remove, replace, and re-configure core system components into the system while the OS and applications are running. These partitions must be flexible, fault isolated that allows the administrator to run multiple applications/workloads and multiple copies/instances of the OS on a single system.

15.0 TECHNICAL DOCUMENTATION:

15.1 USER MANUALS:

Each system must include an operator/user manual(s). These manuals must be comprehensive guides that offer the user instructions for setting up, installing, and configuring of all components of the default system. These manual(s) must consist of at least the following:

- (a) Bilingual: The manual(s) for each system must be available in both official languages.
- (b) User manual: The user manual for each System must include an accurate description of all hardware components and all their respective features. This must include descriptions of, and installation and configuration instructions for all components
- (c) Diagrams: For the purposes of orientation, and as a compliment to the setup and configuration instructions, the manual must have internal and external diagrams of the system as delivered. These diagrams must accurately illustrate external chassis (front and rear), cover removal, rear chassis port configuration, hard drive cage assembly (for the purposes of hard disk configuration), exact motherboard / system board showing expansion slot types and location, processor socket or modules / cards and Memory boards and modules
- (d) The manual(s) must include documentation for power, power management, environmental or site preparation requirements.
- (e) A chapter on the system management utilities detailed in this Annex.
- (f) The manual(s) must include diagnostics/troubleshooting section referencing errors generated through power-on self-test (POST), system Firmware/BIOS and any other hardware error. This section must also include appropriate explanations and troubleshooting advice for each error described.
- (g) The features in articles (a) through (f) must be included in the same document, in the same format and their respective chapters must be referenced properly in a table of contents and indexes.

- (h) The manuals must be finished products and must not describe components that are obsolete and are not included in the system.
- (i) If the system undergoes a major configuration change (e.g.: changes in motherboard / system board, Firmware/BIOS make, setup/configuration routines, external cabinet and chassis) during the life of the Standing Offer, the manuals must reflect that change in the form of a manual reissue or an addendum shipped with the original manual. The addendum must be the same quality, typeface and page size as the original manual.
- (j) The manual(s) must be published by the system OEM with a suitable label that identifies it as such, including the system manufacturer's name and applicable model(s).
- (k) The manuals described in this annex must be available electronically (contained on an accompanying CD/DVD-ROM or available on the manufacturer's web site specified in this annex). The manual must be bundled with an applicable reader. The reader must have a table of contents, index, hypertext links and word search capabilities. "Read me" files to be viewed by a text editor are unacceptable. The on-line versions must have the mandatory illustrations with the same level of detail as a paper equivalent. If a CD/DVD-ROM is submitted it must be a pressed production CD/DVD and must be written by the original equipment manufacturer with a suitable label that identifies it as such, including the manufacturer's name, applicable model(s) and revision number.

15.2 TECHNICAL MANUALS:

- (a) The technical manuals must be made available at no cost to Canada. The technical manuals must describe the hardware in sufficient level of detail for a qualified technician to repair the equipment to its original level of operation.
- (b) Technical manuals must be published by the system OEM with a suitable label that identifies it as such, including the system manufacturer's name and applicable model(s).
- (c) Any third party components not originally equipped by the OEM (eg: hard disks, I/O controllers & adapters) must also be documented to the same level of detail and included as appendices in the OEM technical manual.
- (d) The manuals described in this annex must be available electronically (contained on an accompanying CD/DVD-ROM or available on the manufacturer's web site specified in this annex). The manual must be bundled with an applicable reader. The reader must have a table of contents, index, hypertext links and word search capabilities. "Read me" files to be viewed by a text editor are unacceptable. The on-line versions must have the mandatory illustrations with the same level of detail as a paper equivalent. If a CD/DVD-ROM is submitted it must be a pressed production CD/DVD and must be written by the original equipment manufacturer with a suitable label that identifies it as such, including the manufacturer's name, applicable model(s) and revision number.